

**Electrical & Mechanical Services
Industry**

Fire Engineering Branch

**Specification of Competency
Standards**

1st Edition

March 2009

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Chapter 1

Preface

Background of the Industry

With a view to providing users with a convenient, comfortable, healthy and safe living or working environment, buildings nowadays are normally installed with various kinds of electrical and mechanical engineering installations, such as electrical installations, lighting system, air-conditioning system, lifts, water supply and drainage systems, fire alarm and fire extinguishing facilities, security and communication systems, etc. The discipline of fire engineering has been providing buildings with engineering services related to fire safety installations. Engineering services generally include design, installation, repair and maintenance work, which enable users of buildings such as offices, hospitals, schools, factories or living quarters to enjoy a safe environment.

2. Since early 70's, fire engineering in Hong Kong had to be carried out by registered fire service installation contractors and the existing three-class system has been implemented effectively for over 30 years. The existing classification system has broadly divided all contractors into three major categories, namely the first class that is responsible for automatic detection and fire alarm system; the second class that is responsible for fire-fighting systems which carry water or some other fire extinguishing medium such as sprinkler, fire hydrant, hose reel, etc.; and the third class that is responsible for portable fire extinguishing equipment. The Association of Registered Fire Service Installation Contractors of Hong Kong Limited (FSICA) was set up in early 70's, with an aspiration to enhance the professional status of the Industry and various fire safety standards, and to progressively develop modern fire-fighting systems by exchanging and sharing technology with the Fire Service Department through continuous contact. The FSICA also frequently organizes various kinds of special topic lectures and seminars to enrich the knowledge of practitioners. In the early days, the practitioners in fire engineering normally studied mechanical engineering, electrical engineering, or building services engineering. Only until 90's fire engineering have its own professional courses.

3. The fire engineering industry has laid extremely great emphasis on on-the-job training for long, and many organizations have their own comprehensive, versatile and systematic training mechanism. Nevertheless, if there is integrated and systematic staff competency training for all related organizations, it will certainly give greater benefits to the enhancement of the staff competency and the standard of the Industry.

Current Situation of the Industry

4. Hong Kong has become a financial centre in Asia, with an undeniable international status. However, Hong Kong's success today is definitely built on the long-term silent endeavours of a group of enthusiastic and enterprising professionals in various sectors. As a discipline of the electrical and mechanical industry, the fire engineering team has actively participated in various infrastructure plans. In respect of the improvement of the fire safety of buildings, the practitioners in different positions in the Industry including engineers, technicians, and skilled workers have paid

different levels of efforts in building Hong Kong. Following the development of the society, there will be more new and high-rise buildings in Hong Kong and the demand for fire service installations and equipment will continue to change. The Industry also needs to make continuous improvement accordingly, implying that fire engineering industry will bear a greater responsibility.

5. In face of the economic slump in the past few years and the cessation of land selling by the Government, the fire engineering industry in Hong Kong has suffered a blow to a certain extent. However, since the Hong Kong Government needs to progressively upgrade the fire safety facilities of old buildings, it has passed the Fire Safety (Commercial Premises) Ordinance and its amendments successively, regulating commercial buildings before 1987 to improve their fire safety measures according to current standards. This created many positions for the fire engineering industry in the downturn period of the construction industry. In order to raise the fire safety standards for old multi-purpose buildings and residential buildings, the Government has formulated the Fire Safety (Buildings) Ordinance and will provide the Industry with many job opportunities for fire safety improvement works. No change has been made to the three-class system for registered fire service installation contractors in Hong Kong for over 30 years in the past. The old system gives one a reliable impression. Nevertheless, the existing system must respond to service targets' continuous demand for improvement. The Fire Services Department began to review registered fire installation contractor system a few years ago. The information from the Fire Services Department shows that the classification of registered fire installation contractors will be changed from the three classes at present to four classes in future, making the classification system more perfect and more capable to satisfy the requirements of the Industry.

6. As local economy improves, the demand for fire engineering experts increases. Along with the active development of Macau in recent years, the many construction projects have also directly and indirectly increased the demand for fire engineering practitioners. Besides, the surge of Mainland's economy and in the number of individual visitors, China's entry to World Trade and Closer Economic Partnership Arrangement (CEPA), etc. have opened up new opportunities for local fire engineering personnel. As people's living standard rises, business opportunities in Mainland are found everywhere. Heavy industry, light industry, manufacturing industry and various kinds of building constructions, etc have attracted many factories to invest in the Mainland, thus consolidating China's economic status invisibly. It can be seen that the demand for related technical manpower will become stronger in order to cope with the development of the industries. Backed by China and facing the world, the elite of the fire engineering industry in Hong Kong will be an ideal choice for many Mainland factories that intend to enter the international market.

7. Nowadays, although individual universities, training institutes or some large enterprises have provided pre-employment technical or on-the-job training courses related to fire engineering industry, these courses cannot fully cater for the development of the fire engineering industry in different domains. As a result, for the frontline practitioners in some domains like technical staff, designers and maintenance technicians, etc., they in general can only learn from their experienced colleagues or masters to deal with common routine work upon employment. Along with the downfall of traditional "apprenticeship", quite many practitioners become unable to fully master formal professional knowledge and the application of new technology related to the Industry.

Specification of Competency Standards

8. In view of the industry's current situation and future development trend, it is imminent that the Specification of Competency Standards (SCS) be formulated to provide a solid framework for training to enhance the industry's technical capability, competitiveness and quality of service.

9. The SCS consists of competency standards of different levels. Competency standards are benchmarks for the industry-specific knowledge, professional skills and soft skills required for performing different job functions of the industry. The functional areas and competency standards under SCS will be practical and competence-based. The SCS not only sets out the professional knowledge and skills required for today, but also takes into account factors such as the development trend of both the industry and the society.

10. In the long run, the industry-recognised SCS will become the blueprint for training. It will not only ensure that training providers can meet the industry's present and future needs by offering training courses covering all the knowledge and skills required by the industry, but also provide employees with a clear set of learning pathways, so that they can draw up their own learning and career roadmaps. As such, the SCS will complement the full-scale implementation of the Qualifications Framework by the Government.

11. The E&M Industry Training Advisory Committee (ITAC), comprising representatives of employers, employees, the Government and professional bodies of the industry, has prepared a preliminary version of "SCS for the E&M Industry – Fire Engineering Branch" with reference to its current status and development trend, as well as the standard and format adopted in the Mainland and overseas, with a view to providing practitioners with clear guidelines for devising their own learning and career roadmaps.

Chapter 2

Qualifications Framework

Qualifications Framework

12. The E&M Industry Training Advisory Committee (ITAC) was set up by the Education Bureau in January 2005 to facilitate the implementation of the Hong Kong Qualifications Framework (QF) in the industry. The proposed QF is a voluntary system. It is a seven-level hierarchy that provides benchmarks for determining the level of complexity and difficulty of individual competencies. It is also used to order and support qualifications of different natures and titles. The QF has in place an independent quality assurance (QA) system that would enhance recognition and acceptance of the qualifications in the industry, irrespective of the mode and source of learning.

13. The E&M ITAC is responsible for the development of its industry-specific, task-based SCS for the identified core functional areas. The SCS, in the form of Units of Competencies (UoCs), provides not only quantitative and qualitative specifications on the competencies required for specific tasks, but also the integrated outcome standards required as well as information on the QF level and credits.

14. The SCS may be used to aid vocational curriculum design by vocational education and training providers, or in-service employee development by HR personnel, or best practice recognition and qualifications by awarding bodies within the industry. SCS is the cornerstone to enhance workforce competitiveness and industry sustainability in the long run.

15. The QF aims to provide clear learning pathways for individuals to draw up their own roadmaps to obtain quality assured qualifications. Learners can either pursue a specific learning pathway to upgrade their skills in a particular area of specialization in a gradual and orderly manner (vertical development), or progress through traversing learning pathways to become multi-skilled (horizontal development). Through the full-scale implementation of the QF, we will foster a vocational environment and culture conducive to lifelong learning and continuing education in the industry. With the active participation of employers and employees as well as the wide acceptance of the industry, the QF will also encourage the development of quality training programmes by providers to meet the needs of the community and the industry.

Qualifications Framework levels

16. The QF has seven levels, from level 1 to level 7, where level 1 is the lowest and level 7 the highest. The outcome characteristic of each level is depicted by a set of generic level descriptors (GLD) (Appendix 1). The GLD specifies for each QF level its generic complexity, demand and challenges in the four dimensions below:

- a. Knowledge and intellectual skills;
- b. Process;
- c. Application, autonomy and accountability; and
- d. Communications, IT skills and numeracy.

The UoCs (See Chapter 4) are benchmarked to the QF levels in accordance with the GLD. It is worth to note that competency elements in a UoC may fall in some or all of the GLD dimensions as what it naturally should be. The QF level assignment is essentially a holistic judgement on the unit's integrated outcome requirement.

17. QF levels are discrete. That is, there cannot be assignment of UoC in-between QF levels. Also, UoCs that may not fully match the characteristic requirement of one or more dimensions of a level would be "rounded" to the level below.

Chapter 3

Competency Standards

Major Functional Areas of the Fire Services Sector

18. As proposed by the Electrical and Mechanical ITAC, functional areas of the Fire Services Sector should focus on fire services. The Specification of Competency Standards (SCS) may consist of the following major functional areas:

(i) Design

This functional area covers the application of electrical and mechanical related knowledge, technology and skills, legislations and regulations related to fire services, and design technique, to design highly effective, safe and reliable electrical and mechanical systems and equipment for fire services, and formulate documents and drawings for the engineering design.

(ii) Installation

This functional area requires practitioners to apply electrical and mechanical related knowledge and skills to install various kinds of electrical and mechanical systems and equipment for fire services according to design intent, installation specifications, codes and regulations related to fire services.

(iii) Inspection, Testing and Commissioning

This functional area requires practitioners to formulate and carry out testing procedures according to system requirements and equipment specification, to examine system's functions and safety devices, and to calibrate and set the systems and equipment so as to achieve the best performance and comply with the safety standard.

(iv) Operation, Repair and Maintenance

This functional area requires practitioners to apply electrical and mechanical related knowledge in safe operation of electrical and mechanical systems and equipment for fire services. They should be able to formulate and carry out regular inspection, testing and upgrading procedures and plans so as to ensure the safety and reliability of equipment in most effective ways. They should also master the troubleshooting technique and use testing instruments and equipment to locate the problem when there are faults in the equipment or any irregularities. They should be able to analyze fault records and formulate proposals on the enhancement of systems and equipment.

(v) Project Management

This functional area requires practitioners to apply knowledge of electrical and mechanical project management in preparing cost estimates and tender documents, handling project contracts, formulating and coordinating engineering processes and plans for fire services, controlling the costs and resources, and enabling the project to complete successfully on time.

(vi) Operation Management

This functional area requires practitioners to apply enterprise management knowledge and skills in formulating and implementing fire services enterprise operation plan and code of operation so as to achieve effective enterprise management. Practitioners should master general knowledge of business operation, including that of engineering management, finance, logistics and human resources, etc.

(vii) Safety, Health and Environmental Protection

This functional area requires practitioners to apply safety and health management knowledge and skills in formulating and implementing policies and codes of safety, health and environment protection according to relevant legislations. They should be able to establish safety and health system to protect the staff and provide safe and reliable fire equipment and related engineering services.

(viii) Quality Management

This functional area requires practitioners to apply quality management knowledge and skills to formulate and implement quality management systems and procedures for fire services, so as to ensure the quality of fire products and engineering services.

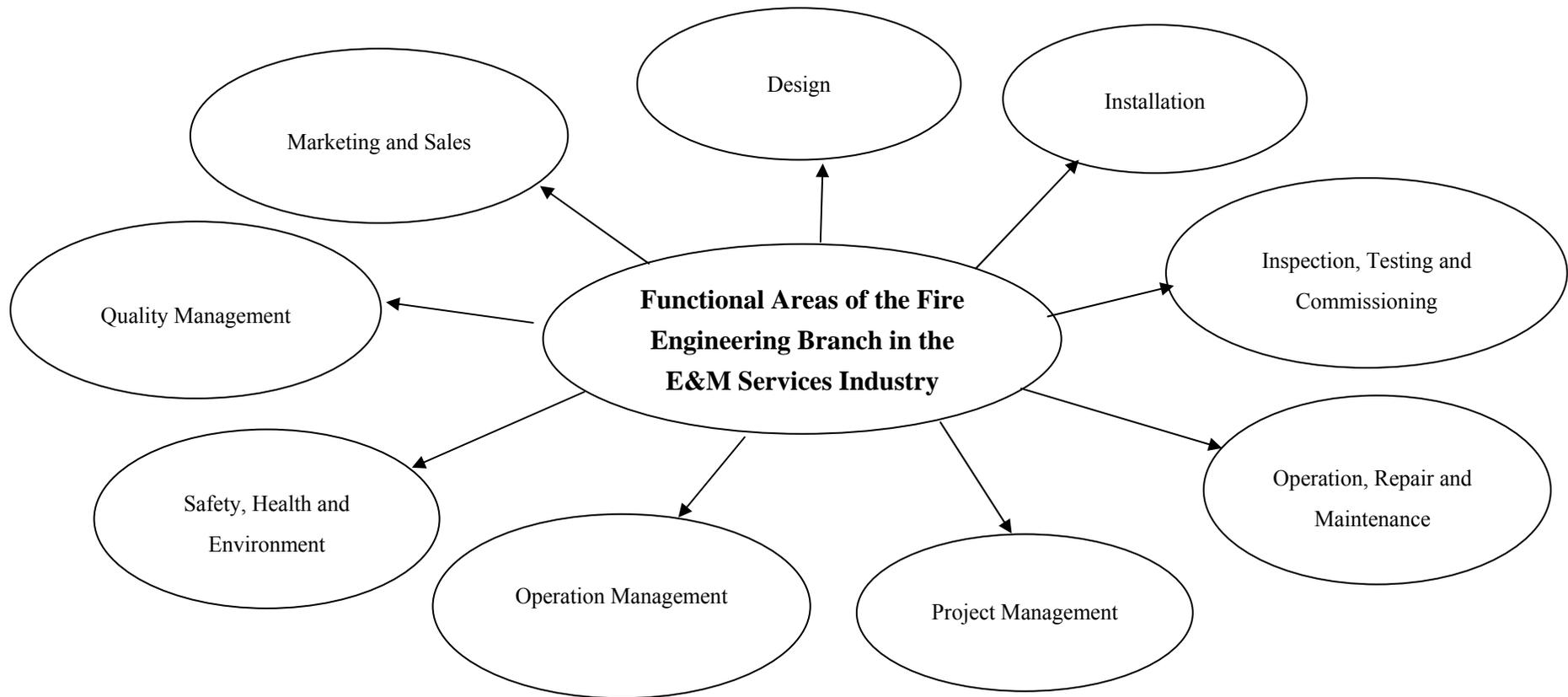
(ix) Marketing and sales

This functional area requires practitioners to understand the market demand and master marketing technique in order to formulate and implement marketing and promotion plans effectively. They should be able to apply customer service technique in fire product sales and engineering services, and provide operation demonstration and after-sales service.

Please refer to Diagram 1 for further information.

19. Based on the generic level descriptors and the major functional areas, the E&M ITAC has formulated a “List of Competencies” (Chapter 4) for the industry. The list provides details of the training requirements of the industry in regard to the different competency levels and functional areas. It is designed to provide clear and unified guidelines for drawing up individual learning roadmaps. Learners may either pursue a specific learning pathway to upgrade their skills in a particular area of specialisation in a gradual and orderly manner (vertical development), or progress along a number of learning pathways to become multi-skilled (horizontal development).

Functional Map showing the Major Functional Areas of the Fire Engineering Branch in the Electrical & Mechanical Services Industry



Competency Standards

20. Competency standards refer to the skills and knowledge required for a particular job function. They represent the industry benchmarks for the skills, knowledge and attributes required to perform competently in a particular job. Thus they are the most important part of the SCS.

Units of Competencies

21. The E&M ITAC has set out the competency standards for various job functions in the form of units of competencies, which describe the performance and standard required for each competency. Please refer to Chapter 4 for details.

Every “unit of competency” comprises eight basic items:

1. Title
2. Code
3. Range
4. Level
5. Credits
6. Competency
7. Assessment Criteria
8. Remarks

Recognition of Prior Learning

22. A major concept of QF is that individuals may acquire knowledge and skills from their work experience, apart from attending formal training courses. People may, through the Recognition of Prior Learning (RPL) mechanism, obtain relevant qualifications if their experience, skills and knowledge gained in the workplace meet the competency standards set by the ITAC.

23. Since in-house training has long been the major training opportunity for employees of the E&M industry, it is extremely difficult to determine whether such training has met the competency standards. Therefore, the ITAC will consult members of the industry to develop an appropriate RPL mechanism.

Chapter 4

**Units of Competencies of
the Fire Engineering Branch in the Electrical
& Mechanical Services Industry**

List of Competencies of the Fire Engineering Branch in the Electrical & Mechanical Services Industry

<u>Functional Areas</u>	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair and Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environment</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	<u>(DE)</u>	<u>(IN)</u>	<u>(IT)</u>	<u>(OR)</u>	<u>(PM)</u>	<u>(OM)</u>	<u>(SH)</u>	<u>(QM)</u>	<u>(MS)</u>
<u>QF Levels</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>
1	Use typical electrical meters (3 Credits) <u>EMCUDE101A</u> (P. 32)		Basic knowledge of electrical and mechanical services management (6 Credits) <u>EMCUOM102A</u> (P. 42)		Perform quality assurance (3 Credits) <u>EMCUQM101A</u> (P. 49)				
	Identify general properties of different types of typical electrical and mechanical engineering materials (3 Credits) <u>EMCUDE109A</u> (P. 33)	Identify general properties of different types of typical electrical and mechanical engineering materials (3 Credits) <u>EMCUDE109A</u> (P. 33)	Identify general properties of different types of typical electrical and mechanical engineering materials (3 Credits) <u>EMCUDE109A</u> (P. 33)	Identify general properties of different types of typical electrical and mechanical engineering materials (3 Credits) <u>EMCUDE109A</u> (P. 33)					
		Use general loading and lifting equipment (9 Credits) <u>EMCUIN102A</u> (P. 35)		Use general loading and lifting equipment (9 Credits) <u>EMCUIN102A</u> (P. 35)					
		Apply basic bench fitting techniques and use small typical hand tools (9 Credits) <u>EMCUIN106A</u> (P. 37)	Apply basic bench fitting techniques and use small typical hand tools (9 Credits) <u>EMCUIN106A</u> (P. 37)	Apply basic bench fitting techniques and use small typical hand tools (9 Credits) <u>EMCUIN106A</u> (P. 37)					

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair and Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environment</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	<u>(DE)</u>	<u>(IN)</u>	<u>(IT)</u>	<u>(OR)</u>	<u>(PM)</u>	<u>(OM)</u>	<u>(SH)</u>	<u>(QM)</u>	<u>(MS)</u>
<u>QF Levels</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>
1	Identify different types of pipe materials and their range of application (3 Credits) <u>EMCUIN109A</u> (P. 39)	Identify different types of pipe materials and their range of application (3 Credits) <u>EMCUIN109A</u> (P. 39)	Identify different types of pipe materials and their range of application (3 Credits) <u>EMCUIN109A</u> (P. 39)	Identify different types of pipe materials and their range of application (3 Credits) <u>EMCUIN109A</u> (P. 39)					
		Use general personal protective equipment (3 Credits) <u>EMCUSH108A</u> (P. 43)	Use general personal protective equipment (3 Credits) <u>EMCUSH108A</u> (P. 43)	Use general personal protective equipment (3 Credits) <u>EMCUSH108A</u> (P. 43)			Use general personal protective equipment (3 Credits) <u>EMCUSH108A</u> (P. 43)		
		Perform manual handling operation (3 Credits) <u>EMCUSH109A</u> (P. 44)	Perform manual handling operation (3 Credits) <u>EMCUSH109A</u> (P. 44)	Perform manual handling operation (3 Credits) <u>EMCUSH109A</u> (P. 44)			Perform manual handling operation (3 Credits) <u>EMCUSH109A</u> (P. 44)		
		Safety operation in confined spaces (3 Credits) <u>EMCUSH110A</u> (P. 45)		Safety operation in confined spaces (3 Credits) <u>EMCUSH110A</u> (P. 45)			Safety operation in confined spaces (3 Credits) <u>EMCUSH110A</u> (P. 45)		

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency								
1	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P. 46)
	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P. 47)
		Handle general chemicals safely (3 Credits) <u>EMCUSH113A</u> (P. 48)		Handle general chemicals safely (3 Credits) <u>EMCUSH113A</u> (P. 48)			Handle general chemicals safely (3 Credits) <u>EMCUSH113A</u> (P. 48)		
	Know about types of basic fire service installations (3 Credits) <u>EMFSDE101A</u> (P. 34)	Know about types of basic fire service installations (3 Credits) <u>EMFSDE101A</u> (P. 34)	Know about types of basic fire service installations (3 Credits) <u>EMFSDE101A</u> (P. 34)	Know about types of basic fire service installations (3 Credits) <u>EMFSDE101A</u> (P. 34)					

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
1		Apply basic electrical skills (3 Credits) <i>EMFSIN101A</i> (P. 40)	Apply basic electrical skills (3 Credits) <i>EMFSIN101A</i> (P. 40)	Apply basic electrical skills (3 Credits) <i>EMFSIN101A</i> (P. 40)					
				Perform simple maintenance and repair for fire service components (3 Credits) <i>EMFSOR102A</i> (P. 41)					
2	Select general electrical materials and electrical equipment (6 Credits) <i>EMCUDE204A</i> (P. 51)	Select general electrical materials and electrical equipment (6 Credits) <i>EMCUDE204A</i> (P. 51)	Select general electrical materials and electrical equipment (6 Credits) <i>EMCUDE204A</i> (P. 51)	Select general electrical materials and electrical equipment (6 Credits) <i>EMCUDE204A</i> (P. 51)	Apply basic quantity measurement techniques (4 Credits) <i>EMFSPM201A</i> (P. 81)		Apply basic risk assessment methods (3 Credits) <i>EMCUSH205A</i> (P. 83)		Provide basic customer services (2 Credits) <i>EMFSMS201A</i> (P. 88)
	Use computer to draw mechanical drawings (8 Credits) <i>EMCUDE212A</i> (P. 53)	Use computer to draw mechanical drawings (8 Credits) <i>EMCUDE212A</i> (P. 53)		Use computer to draw mechanical drawings (8 Credits) <i>EMCUDE212A</i> (P. 53)			Implement work site occupational health and safety management (3 Credits) <i>EMCUSH206A</i> (P. 84)		
	Use computer to draw electrical drawings (8 Credits) <i>EMCUDE213A</i> (P. 54)	Use computer to draw electrical drawings (8 Credits) <i>EMCUDE213A</i> (P. 54)		Use computer to draw electrical drawings (8 Credits) <i>EMCUDE213A</i> (P. 54)			Handle general industrial accidents (3 Credits) <i>EMCUSH208A</i> (P. 85)		

<u>Functional Areas</u>	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair and Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environment</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	<u>(DE)</u>	<u>(IN)</u>	<u>(IT)</u>	<u>(OR)</u>	<u>(PM)</u>	<u>(OM)</u>	<u>(SH)</u>	<u>(QM)</u>	<u>(MS)</u>
<u>QF Levels</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>
2		Perform routine wiring tasks (9 Credits) <u>EMCUIN208A</u> (P. 57)		Perform routine wiring tasks (9 Credits) <u>EMCUIN208A</u> (P. 57)			Obtain data and information of occupational safety and health and environmental protection to compile relevant statistics (3 Credits) <u>EMCUSH211A</u> (P. 86)		
		Install general plastic pipes and fittings (3 Credits) <u>EMCUIN216A</u> (P. 59)		Install general plastic pipes and fittings (3 Credits) <u>EMCUIN216A</u> (P. 59)			Implement preventive measures on general occupational safety and health (3 Credits) <u>EMCUSH212A</u> (P. 87)		
		Install metallic (steel/stainless steel/galvanized iron) pipes and fittings (3 Credits) <u>EMCUIN217A</u> (P. 60)		Install metallic (steel/stainless steel/galvanized iron) pipes and fittings (3 Credits) <u>EMCUIN217A</u> (P. 60)					

<u>Functional Areas</u>	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair and Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environment</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	<u>(DE)</u>	<u>(IN)</u>	<u>(IT)</u>	<u>(OR)</u>	<u>(PM)</u>	<u>(OM)</u>	<u>(SH)</u>	<u>(QM)</u>	<u>(MS)</u>
<u>QF Levels</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>
2		Install non-metallic (copper/aluminium) pipes and fittings (3 Credits) <u>EMCUIN218A</u> (P. 61)		Install non-metallic (copper/aluminium) pipes and fittings (3 Credits) <u>EMCUIN218A</u> (P. 61)					
		Install cast iron pipes and fittings (3 Credits) <u>EMCUIN219A</u> (P. 62)		Install cast iron pipes and fittings (3 Credits) <u>EMCUIN219A</u> (P. 62)					
		Replace mechanical parts and devices of electric motors (3 Credits) <u>EMCUIN221A</u> (P. 63)		Replace mechanical parts and devices of electric motors (3 Credits) <u>EMCUIN221A</u> (P. 63)					
		Basic manual metal arc welding (MMAW)/shielded metal arc welding (SMAW) (6 Credits) <u>EMCUIN225A</u> (P. 64)		Basic manual metal arc welding (MMAW)/shielded metal arc welding (SMAW) (6 Credits) <u>EMCUIN225A</u> (P. 64)					

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales	
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)	
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	
2		Basic oxy-acetylene welding(OAW) / oxyfuel and arc cutting(OAC) (5 Credits) <u>EMCUIN226A</u> (P. 66)		Basic oxy-acetylene welding(OAW) / oxyfuel and arc cutting(OAC) (5 Credits) <u>EMCUIN226A</u> (P. 66)						
	Apply commonly used regulations and international standards relevant to electrical installations (6 Credits) <u>EMCUIT203A</u> (P. 72)	Apply commonly used regulations and international standards relevant to electrical installations (6 Credits) <u>EMCUIT203A</u> (P. 72)	Apply commonly used regulations and international standards relevant to electrical installations (6 Credits) <u>EMCUIT203A</u> (P. 72)	Apply commonly used regulations and international standards relevant to electrical installations (6 Credits) <u>EMCUIT203A</u> (P. 72)						
	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)	Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P. 82)
	Apply basic fire service installations (6 Credits) <u>EMFSDE201A</u> (P. 55)	Apply basic fire service installations (6 Credits) <u>EMFSDE201A</u> (P. 55)	Apply basic fire service installations (6 Credits) <u>EMFSDE201A</u> (P. 55)	Apply basic fire service installations (6 Credits) <u>EMFSDE201A</u> (P. 55)	Apply basic fire service installations (6 Credits) <u>EMFSDE201A</u> (P. 55)					

<u>Functional Areas</u>	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair and Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environment</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	<u>(DE)</u>	<u>(IN)</u>	<u>(IT)</u>	<u>(OR)</u>	<u>(PM)</u>	<u>(OM)</u>	<u>(SH)</u>	<u>(QM)</u>	<u>(MS)</u>
<u>QF Levels</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>
2	Draw simple engineering drawings of fire service installations (9 Credits) <i>EMFSDE204A</i> (P. 56)	Draw simple engineering drawings of fire service installations (9 Credits) <i>EMFSDE204A</i> (P. 56)	Draw simple engineering drawings of fire service installations (9 Credits) <i>EMFSDE204A</i> (P. 56)	Draw simple engineering drawings of fire service installations (9 Credits) <i>EMFSDE204A</i> (P. 56)					
		Perform basic installation tasks for water-based fire service mechanical installations (6 Credits) <i>EMFSIN201A</i> (P. 68)	Apply basic fire service installation testing instruments (4 Credits) <i>EMFSIT201A</i> (P. 73)	Basic repair and maintenance of water-based fire service mechanical installations (6 Credits) <i>EMFSOR201A</i> (P. 76)					
		Perform basic installation tasks for non-water-based fire service mechanical installations (6 Credits) <i>EMFSIN202A</i> (P. 69)	Perform basic tests for fire service installations (4 Credits) <i>EMFSIT202A</i> (P. 74)	Basic repair and maintenance of non-water-based fire service mechanical installations (6 Credits) <i>EMFSOR202A</i> (P. 77)					
		Perform basic installation tasks for fire detection and alarm systems and equipment (6 Credits) <i>EMFSIN203A</i> (P. 70)		Basic maintenance and repair of fire detection and alarm systems and equipment (6 Credits) <i>EMFSOR203A</i> (P. 78)					

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
2		Perform basic installation tasks for fire service power supply and control equipment (4 Credits) EMFSIN204A (P. 71)		Basic maintenance and repair of fire service power supply and control equipment (4 Credits) EMFSOR204A (P. 79)					
				Basic maintenance and repair of portable fire extinguishing equipment (4 Credits) EMFSOR205A (P. 80)					
3	Use computer to draw complicated mechanical engineering drawings (5 Credits) EMCUDE315A (P. 90)	Use computer to draw complicated mechanical engineering drawings (5 Credits) EMCUDE315A (P. 90)		Use computer to draw complicated mechanical engineering drawings (5 Credits) EMCUDE315A (P. 90)	Draw up rates of quantities and costing of project (4 Credits) EMFSPM301A (P. 134)	Procure simple electrical and mechanical engineering equipment and materials (3 Credits) EMCUOM301A (P. 136)	Investigate general industrial accidents (3 Credits) EMCUSH305A (P. 138)	Handle and review customers' complaints about electrical and mechanical product or service quality (3 Credits) EMCUQM302A (P. 140)	Apply sales and marketing techniques (3 Credits) EMCUMS301A (P. 144)
	Use computer to draw for complicated electrical engineering drawings (5 Credits) EMCUDE316A (P. 91)	Use computer to draw for complicated electrical engineering drawings (5 Credits) EMCUDE316A (P. 91)		Use computer to draw for complicated electrical engineering drawings (5 Credits) EMCUDE316A (P. 91)	Apply basic construction techniques (4 Credits) EMFSPM302A (P. 135)	Apply basic operation management techniques (4 Credits) EMFSOM301A (P. 137)	Perform occupational safety and health supervision (3 Credits) EMCUSH308A (P. 139)	Implement quality control and quality assurance (4 Credits) EMCUQM303A (P. 141)	Fire installation sales and after-sales services (2 Credits) EMFSMS301A (P. 145)

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
3	Use computer to draw combined services drawings of building services (5 Credits) <u>EMCUDE317A</u> (P. 92)	Use computer to draw combined services drawings of building services (5 Credits) <u>EMCUDE317A</u> (P. 92)		Use computer to draw combined services drawings of building services (5 Credits) <u>EMCUDE317A</u> (P. 92)				Formulate simple quality assurance plan and quality assurance reports (6 Credits) <u>EMCUQM304A</u> (P. 142)	
	Choose typical materials for electrical and mechanical work (3 Credits) <u>EMCUDE318A</u> (P. 93)	Choose typical materials for electrical and mechanical work (3 Credits) <u>EMCUDE318A</u> (P. 93)	Choose typical materials for electrical and mechanical work (3 Credits) <u>EMCUDE318A</u> (P. 93)	Choose typical materials for electrical and mechanical work (3 Credits) <u>EMCUDE318A</u> (P. 93)					
		Perform electrical and mechanical installation and testing according to the drawings and specifications of electrical devices and wiring (4 Credits) <u>EMCUIN306A</u> (P. 105)	Perform electrical and mechanical installation and testing according to the drawings and specifications of electrical devices and wiring (4 Credits) <u>EMCUIN306A</u> (P. 105)	Perform electrical and mechanical installation and testing according to the drawings and specifications of electrical devices and wiring (4 Credits) <u>EMCUIN306A</u> (P. 105)				Record quality issues on electrical and mechanical services (3 Credits) <u>EMCUQM306A</u> (P. 143)	
		Perform general lifting machinery and lifting equipment inspection (3 Credits) <u>EMCUIN313A</u> (P. 107)		Perform general lifting machinery and lifting equipment inspection (3 Credits) <u>EMCUIN313A</u> (P. 107)					

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
3		Operate and maintain abrasive wheels safely (3 Credits) <u>EMCUIN315A</u> (P. 108)		Operate and maintain abrasive wheels safely (3 Credits) <u>EMCUIN315A</u> (P. 108)					
		Perform manual metal arc welding (MMAW) / shielded metal arc welding (SMAW) on different kinds of steel according to drawings (4 Credits) <u>EMCUIN321A</u> (P. 109)		Perform manual metal arc welding (MMAW) / shielded metal arc welding (SMAW) on different kinds of steel according to drawings (4 Credits) <u>EMCUIN321A</u> (P. 109)					
		Perform oxy-acetylene welding(OAW) / oxyfuel and arc cutting(OAC) according to drawings (4 Credits) <u>EMCUIN323A</u> (P. 111)		Perform oxy-acetylene welding(OAW) / oxyfuel and arc cutting(OAC) according to drawings (4 Credits) <u>EMCUIN323A</u> (P. 111)					

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
3				Apply fault finding techniques to find the root causes of fault (3 Credits) <u>EMCUOR301A</u> (P. 123)					
	Apply the Code of Practice for Fire Service Installations and Equipment and relevant legislations (3 Credits) <i>EMFSDE301A</i> (P. 94)	Apply the Code of Practice for Fire Service Installations and Equipment and relevant legislations (3 Credits) <i>EMFSDE301A</i> (P. 94)	Apply the Code of Practice for Fire Service Installations and Equipment and relevant legislations (3 Credits) <i>EMFSDE301A</i> (P. 94)	Apply the Code of Practice for Fire Service Installations and Equipment and relevant legislations (3 Credits) <i>EMFSDE301A</i> (P. 94)					
	Apply the knowledge of centrifugal water pumps and piping systems (4 Credits) <i>EMFSDE302A</i> (P. 95)	Apply the knowledge of centrifugal water pumps and piping systems (4 Credits) <i>EMFSDE302A</i> (P. 95)	Apply the knowledge of centrifugal water pumps and piping systems (4 Credits) <i>EMFSDE302A</i> (P. 95)	Apply the knowledge of centrifugal water pumps and piping systems (4 Credits) <i>EMFSDE302A</i> (P. 95)					
	Apply the knowledge of fire pump motors and control circuits (3 Credits) <i>EMFSDE303A</i> (P. 97)	Apply the knowledge of fire pump motors and control circuits (3 Credits) <i>EMFSDE303A</i> (P. 97)	Apply the knowledge of fire pump motors and control circuits (3 Credits) <i>EMFSDE303A</i> (P. 97)	Apply the knowledge of fire pump motors and control circuits (3 Credits) <i>EMFSDE303A</i> (P. 97)					

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
3	Draw engineering drawings of fire service installations (9 Credits) <i>EMFSDE304A</i> (P. 98)	Draw engineering drawings of fire service installations (9 Credits) <i>EMFSDE304A</i> (P. 98)	Test fire service installations (4 Credits) <i>EMFSIT301A</i> (P. 122)	Draw engineering drawings of fire service installations (9 Credits) <i>EMFSDE304A</i> (P. 98)					
	Apply the knowledge of water-based fire systems and equipment (6 Credits) <i>EMFSDE305A</i> (P. 100)	Apply the knowledge of water-based fire systems and equipment (6 Credits) <i>EMFSDE305A</i> (P. 100)	Apply the knowledge of water-based fire systems and equipment (6 Credits) <i>EMFSDE305A</i> (P. 100)	Apply the knowledge of water-based fire systems and equipment (6 Credits) <i>EMFSDE305A</i> (P. 100)					
	Apply the knowledge of non-water-based fire systems and equipment (6 Credits) <i>EMFSDE306A</i> (P. 102)	Apply the knowledge of non-water-based fire systems and equipment (6 Credits) <i>EMFSDE306A</i> (P. 102)	Apply the knowledge of non-water-based fire systems and equipment (6 Credits) <i>EMFSDE306A</i> (P. 102)	Apply the knowledge of non-water-based fire systems and equipment (6 Credits) <i>EMFSDE306A</i> (P. 102)					
	Apply the knowledge of fire detection and alarm systems and equipment (6 Credits) <i>EMFSDE307A</i> (P. 104)	Apply the knowledge of fire detection and alarm systems and equipment (6 Credits) <i>EMFSDE307A</i> (P. 104)	Apply the knowledge of fire detection and alarm systems and equipment (6 Credits) <i>EMFSDE307A</i> (P. 104)	Apply the knowledge of fire detection and alarm systems and equipment (6 Credits) <i>EMFSDE307A</i> (P. 104)					

<u>Functional Areas</u>	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair and Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environment</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	<u>(DE)</u>	<u>(IN)</u>	<u>(IT)</u>	<u>(OR)</u>	<u>(PM)</u>	<u>(OM)</u>	<u>(SH)</u>	<u>(QM)</u>	<u>(MS)</u>
<u>QF Levels</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>
3		Install water-based fire service mechanical equipment (6 Credits) EMFSIN301A (P. 112)		Maintain and repair water-based fire service mechanical installations (6 Credits) EMFSOR301A (P. 124)					
		Install non-water-based fire service mechanical equipment (6 Credits) EMFSIN302A (P. 114)		Maintain and repair non-water-based fire service mechanical installations (6 Credits) EMFSOR302A (P. 126)					
		Install fire detection and alarm systems and equipment (6 Credits) EMFSIN303A (P. 116)		Maintain and repair fire detection and alarm systems and equipment (6 Credits) EMFSOR303A (P. 128)					
		Install fire service power supply and control equipment (4 Credits) EMFSIN304A (P. 118)		Maintain and repair fire service power supply and control equipment (4 Credits) EMFSOR304A (P. 130)					

<u>Functional Areas</u>	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair and Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environment</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	<u>(DE)</u>	<u>(IN)</u>	<u>(IT)</u>	<u>(OR)</u>	<u>(PM)</u>	<u>(OM)</u>	<u>(SH)</u>	<u>(QM)</u>	<u>(MS)</u>
<u>QF Levels</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>
3				Maintain and repair portable fire extinguishing equipment (3 Credits) <u>EMFSOR305A</u> (P. 132)					
		Install fire pumps (3 Credits) <u>EMFSIN305A</u> (P. 120)		Install fire pumps (3 Credits) <u>EMFSIN305A</u> (P. 120)					
4	Formulate effective storage and updating system for drawings (3 Credits) <u>EMCUDE405A</u> (P. 147)			Supervise equipment maintenance work to ensure its quality, standard and efficiency (9 Credits) <u>EMCUMA401A</u> (P. 166)	Plan the finance, accounts and insurance of engineering projects (6 Credits) <u>EMCUPM401A</u> (P. 171)			Implement quality management in electrical and mechanical engineering services (6 Credits) <u>EMCUQM402A</u> (P. 175)	Promote products and marketing services (3 Credits) <u>EMFSMS401A</u> (P. 178)
	Apply the knowledge of specialized fire systems and equipment (6 Credits) <u>EMFSDE401A</u> (P. 148)	Apply the knowledge of specialized fire systems and equipment (6 Credits) <u>EMFSDE401A</u> (P. 148)	Apply the knowledge of specialized fire systems and equipment (6 Credits) <u>EMFSDE401A</u> (P. 148)	Apply the knowledge of specialized fire systems and equipment (6 Credits) <u>EMFSDE401A</u> (P. 148)	Perform fire service project management (6 Credits) <u>EMFSPM401A</u> (P. 172)			Promote quality management culture at working level (3 Credits) <u>EMCUQM403A</u> (P. 176)	

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
4	Perform basic tasks of designing fire service mechanical equipment (6 Credits) EMFSDE402A (P. 150)	Supervise fire equipment installation (9 Credits) EMFSIN401A (P. 154)	Test and commission water-based fire system's electrical and mechanical installations (6 Credits) EMFSIT401A (P. 158)	Formulate fire equipment maintenance and repair plans (9 Credits) EMFSOR401A (P. 168)	Write tenders (4 Credits) EMFSPM402A (P. 173)			Conduct site survey and quality control (3 Credits) EMCUQM404A (P. 177)	
	Perform basic tasks of designing fire service electrical equipment (6 Credits) EMFSDE403A (P. 151)	Install specialized fire systems and equipment (4 Credits) EMFSIN402A (P. 156)	Test and commission non-water-based fire system's electrical and mechanical installations (6 Credits) EMFSIT402A (P. 160)	Maintain and repair specialized fire systems and equipment (4 Credits) EMFSOR402A (P. 169)	Formulate job sequence and project management plan (6 Credits) EMFSPM403A (P. 174)				
	Basic application of fire system computer-aided design (CAD) software (3 Credits) EMFSDE404A (P. 153)		Test and commission fire detection and alarm systems and installations (6 Credits) EMFSIT403A (P. 162)						

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency								
4			Test and commission specialized fire systems and equipment (4 Credits) <u>EMFSIT404A</u> (P. 164)						
5	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P. 180)
	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P. 181)
	Design water-based fire systems and equipment (6 Credits) <u>EMFSDE501A</u> (P. 182)	Formulate fire service installation plan and instructions (9 Credits) <u>EMFSIN501A</u> (P. 192)	Formulate fire system testing and commissioning plans (9 Credits) <u>EMFSIT501A</u> (P. 194)	Formulate fire system enhancement proposals (12 Credits) <u>EMFSOR501A</u> (P. 195)	Formulate project procedures and schedule (9 Credits) <u>EMCUPM501A</u> (P. 198)	Implement engineering operation and supervisory management (6 Credits) <u>EMCUOM502A</u> (P. 202)	Implement risk management for electrical and mechanical services (9 Credits) <u>EMCUSH502A</u> (P. 205)	Formulate and implement quality management courses and training programmes (4 Credits) <u>EMCUQM503A</u> (P. 213)	Formulate marketing plans (4 Credits) <u>EMFSMS501A</u> (P. 218)

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
5	Design non-water-based fire systems and equipment (6 Credits) EMFSDE502A (P. 184)			Perform fire service installation operation, repair and maintenance management (12 Credits) EMFSOR502A (P. 196)	Formulate contract documents for fire service projects (9 Credits) EMFSPM501A (P. 199)	Formulate operation and financial management plan (9 Credits) EMFSOM502A (P. 203)	Formulate occupational safety and health management system (3 Credits) <u>EMCUSH504A</u> (P. 207)	Formulate and analyze quality assurance reports (3 Credits) <u>EMCUQM504A</u> (P. 214)	
	Design fire detection and alarm systems and equipment (6 Credits) EMFSDE503A (P. 186)				Perform management for fire service tender bids (12 Credits) EMFSPM502A (P. 200)		Formulate occupational safety and health and environmental protection schemes (6 Credits) <u>EMCUSH505A</u> (P. 208)	Formulate schemes to enhance staff's awareness of quality management (5 Credits) <u>EMCUQM505A</u> (P. 215)	
	Design specialized fire systems and equipment (6 Credits) EMFSDE504A (P. 188)				Perform cost management for fire service projects (12 Credits) EMFSPM503A (P. 201)		Perform risk assessment for electrical and mechanical work (3 Credits) <u>EMCUSH506A</u> (P. 210)	Implement quality management training courses (9 Credits) <u>EMCUQM506A</u> (P. 216)	
	Formulate conventional fire system design reports (6 Credits) EMFSDE505A (P. 190)						Formulate environmental protection management system (3 Credits) <u>EMCUSH507A</u> (P. 211)	Implement quality management standards of International Organization for Standardization (ISO) (3 Credits) <u>EMCUQM507A</u> (P. 217)	

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair and Maintenance	Project Management	Operation Management	Safety, Health and Environment	Quality Management	Marketing and Sales
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency	Unit of Competency
5	Apply fire system computer-aided design (CAD) software (4 Credits) EMFSDE506A (P. 191)						Implement occupational safety and health and environmental protection courses and training programmes (3 Credits) <u>EMCUSH508A</u> (P. 212)		
6	Apply fire dynamics and fire simulation techniques (6 Credits) EMFSDE601A (P. 221)			Formulate maintenance and repair management system and policy (12 Credits) EMFSOR601A (P. 223)	Apply project management skills and professional knowledge to handle unfulfilled or unperformed contracts effectively (20 Credits) <u>EMCUPM601A</u> (P. 224)		Formulate overall safety, health and environmental protection policy (20 Credits) <u>EMCUSH601A</u> (P. 226)	Formulate quality management strategy (20 Credits) <u>EMCUQM601A</u> (P. 232)	Lead and oversee the overall sales and marketing (6 Credits) EMFSMS601A (P. 235)
	Design non-conventional fire services (12 Credits) EMFSDE602A (P. 222)				Formulate project management strategies (6 Credits) EMFSPM601A (P. 225)		Formulate improvement plans for occupational safety and health (20 Credits) <u>EMCUSH602A</u> (P. 228)	Implement total quality management plan (20 Credits) <u>EMCUQM602A</u> (P. 233)	

<u>Functional Areas</u>	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair and Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environment</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	<u>(DE)</u>	<u>(IN)</u>	<u>(IT)</u>	<u>(OR)</u>	<u>(PM)</u>	<u>(OM)</u>	<u>(SH)</u>	<u>(QM)</u>	<u>(MS)</u>
<u>QF Levels</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>	<u>Unit of Competency</u>
6							Formulate environmental protection improvement plans (20 Credits) <u>EMCUSH603A</u> (P. 230)		
7	Design complicated non-conventional fire services (15 Credits) EMFSDE701A (P. 237)						Formulate overall operation development direction and strategy (20 Credits) <u>EMCUOM701A</u> (P. 242)		
	Formulate the reports for non-conventional fire system design scheme (12 Credits) EMFSDE702A (P. 239)								
	Master the study of fluid dynamics and fire simulation tools (6 Credits) EMFSDE703A (P. 241)								

Competency Level 1

1. Title	Use typical electrical meters
2. Code	EMCUDE101A
3. Range	With regard to electrical and mechanical engineering services, have basic understanding in electrical terms, units and calculations, and electrical components; and use typical electrical meters for general measurement.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic electrical concepts</p> <ul style="list-style-type: none"> ◆ Understand basic electrical concepts, including: <ul style="list-style-type: none"> • Stating briefly the names and uses of common electrical components from distribution board to all final circuits • Distinguish and apply basic electrical terms such as electric current, electric voltage, electric resistance, electric energy and electric power, etc., and their basic units and calculations ◆ Understand the working principles of common meters, including: <ul style="list-style-type: none"> • Structure and working principles of moving coil, moving iron and electric meter • Uses and the pros and cons of the above three types of meters • Structure, working principles and uses of traditional multimeter ◆ Understand the code of safety and operation for using common meters <p>6.2 Use of meters</p> <ul style="list-style-type: none"> ◆ Use typical meters <ul style="list-style-type: none"> • Capable to use multimeters safely and correctly to measure electric current, electric voltage and electric resistance of simple circuits • Capable to use appropriate common meters safely and correctly to measure electric energy (kWH) and electric power (kW) • Know how to maintain typical meters
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to use multimeters to measure electric current, electric voltage and electric resistance of simple circuits according to the code of safety and operation, and make simple calculations of electricity; and</p> <p>(ii) Capable to use appropriate typical meters to measure electric energy and electric power of simple circuits according to the code of safety and operation.</p>
8. Remarks	This unit of competency is applicable to new entrants of electrical and mechanical engineering services.

1. Title	Identify general properties of different types of typical electrical and mechanical engineering materials
2. Code	EMCUDE109A
3. Range	Capable to identify the general properties and range of application of different types of typical electrical and mechanical engineering materials for electrical and mechanical design, installation, repair and maintenance.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 General properties of typical electrical and mechanical engineering materials</p> <ul style="list-style-type: none"> ◆ Understand the general properties of typical electrical and mechanical engineering materials including metals and non-metals: <ul style="list-style-type: none"> • Mechanical properties such as strength, hardness, resilience, etc. • Density • Electric conductivity • Thermal conductivity • Melt ability <p>6.2 Identify properties and range of application of typical electrical and mechanical engineering materials</p> <ul style="list-style-type: none"> ◆ Capable to identify different types of typical electrical and mechanical engineering materials, including metal type: steel, copper, aluminium, iron, etc., and non-metal type: wood, plastic, resin, etc. ◆ Capable to identify basic range of application of different types of typical electrical and mechanical engineering materials ◆ Capable to perform simple design, installation, repair and maintenance engineering works according to the general properties and range of application of different types of typical electrical and mechanical engineering materials
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to identify the general properties and range of application of different types of typical electrical and mechanical engineering materials.</p>
8. Remarks	This unit of competency is applicable to new entrants of electrical and mechanical engineering services.

1. Title	Know about types of basic fire service installations
2. Code	EMFSDE101A
3. Range	Describe fire causes, fire-extinguishing methods, and the types and applications of basic fire service installations.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Know about fire causes and fire-extinguishing methods</p> <ul style="list-style-type: none"> ◆ Understand fire causes and the combustion of different classes of fires ◆ Understand the gases released by combustion and the impact ◆ Understand fire-extinguishing methods ◆ Understand different types of extinguishing agents and their applications ◆ Understand the ways of fire spread and methods to prevent fire spread <p>6.2 Types and applications of basic fire service installations</p> <ul style="list-style-type: none"> ◆ Master the applications of active types of basic fire service installations under the instructions of superiors, including: <ul style="list-style-type: none"> • Sprinkler system • Fire hydrant/hose reel system • Fire detection and alarm system • Portable fire-fighting equipment ◆ Master the applications of passive types of basic fire service installations under the instructions of superiors, including: <ul style="list-style-type: none"> • Fire damper • Fire-resisting partition • Fire stop door etc.
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to understand the applications of active and passive types of basic fire service installations; and</p> <p>(ii) Capable to use proper extinguishing agents and fire service installations, under the instructions of superiors, according to different types of fires.</p>
8. Remarks	This unit of competency is applicable to new entrants of the fire engineering trade.

1. Title	Use general loading and lifting equipment	
2. Code	EMCUIN102A	
3. Range	Use general loading and light duty lifting equipment, not including heavy duty lifting equipment, in industrial plants or workplaces where lifting is involved.	
4. Level	1	
5. Credit	9	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Understand the principles of common lifting machines and devices operation</p> <ul style="list-style-type: none"> ◆ Understand the types, use, functions, operation and maintenance of general loading and lifting machines and devices; and noting points when using them <ul style="list-style-type: none"> • Lifting machines include: crane, gin block, winch, rolling wheel, lift purchase and gin wheel • Lifting devices include: hook, chain, rope and overhead conveyor <p>6.2 Understand the code of safety and legal requirements for goods handling</p> <ul style="list-style-type: none"> ◆ Understand the code of safety and legal requirements for goods handling <ul style="list-style-type: none"> • Understand the danger of moving and using lifting machines and devices • Understand the safety inspection requirements for handling goods • Understand the safety operation of lifting device and sling, and the requirements for pre-use inspection • Understand the code of safety for using lifting machines and the requirements for pre-use inspection ◆ Inspect the safety of the working environment, and clear all obstacles and potential dangers to goods handling work before starting the lifting and loading operations <p>6.3 Apply general loading methods and lifting equipment correctly</p> <ul style="list-style-type: none"> ◆ Use general loading and lifting machines and devices correctly <ul style="list-style-type: none"> • Use general loading and lifting machines and devices correctly under clear instruction, including: <ul style="list-style-type: none"> ▸ Using chains and ropes to tie the goods ▸ Using lifting devices such as ropes, chain, hook and overhead conveyor to lift up and convey the goods ▸ Using hydraulic lifting machines to handle heavy goods ▸ Using electric lifting machines to handle goods ▸ operating truck lifting platform ◆ Use general loading methods correctly <ul style="list-style-type: none"> • Carry out basic manual handling operation correctly • Simple ways of using ropes, such as tying knots and rings 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to use general loading and lifting machines and devices correctly and safely for handling general electrical and mechanical equipment.
8. Remarks	(i) This unit of competency is applicable to electrical and mechanical practitioners in general. (ii) The credit value of this unit of competencies is set on the presumption that the person already possesses the competency of the following unit of competency: The competencies of EMCUSH109A “Implement safety procedures for manual handling operation”.

1. Title	Apply basic bench fitting techniques and use small typical hand tools
2. Code	EMCUIN106A
3. Range	Apply basic bench fitting techniques, including marking, sawing, filing, grinding, drilling and chiseling, in tasks of production, installation and maintenance and repairs for electrical and mechanical works.
4. Level	1
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Know about basic bench fitting techniques and small typical hand tools</p> <ul style="list-style-type: none"> ◆ Understand basic bench fitting techniques, including marking, sawing, filing, grinding, drilling and chiselling ◆ Understand the operation of small typical hand tools, including cutting tools, measuring instruments, files, assembling and dismantling tools, marking-out tools, portable power drills, drilling machines, and relevant concerns <p>6.2 Apply basic bench fitting techniques and small typical hand tools in tasks of production, installation and maintenance and repairs</p> <ul style="list-style-type: none"> ◆ Understand the correct use of small typical hand tools <ul style="list-style-type: none"> • Capable to use various types of cutting tools correctly, such as bow saws and shears • Capable to use metric and imperial measuring instruments correctly, such as steel rules, venires, inside callipers and outside callipers • Capable to use steel rules and beam squares to measure the length and to check horizontal, vertical and curved surfaces correctly • Capable to select and use files correctly, such as single cut files, flat files, round files, half-round files, triangular files, double cut files, rough-cut and smooth files of different degree of fineness • Capable to select and use scrapers correctly • Capable to use assembling and dismantling tools correctly, such as open-ended spanners, adjustable spanners, box spanners, hexagon ring spanners, screw drivers, jaw vices, hand vices and hammers, to assemble or dismantle simple mechanical devices • Capable to use various types of marking-out tools correctly, such as line needle, hook needle, centre punches, pin punches and dividers

	<ul style="list-style-type: none"> • Capable to use portable power drills and drilling machines correctly ◆ Apply basic bench fitting techniques and use small typical hand tools • Identify and select common metals <ul style="list-style-type: none"> ▸ Capable to identify various types of common metals ▸ Capable to select suitable common metals according to uses • Capable to apply basic bench fitting techniques, including marking, sawing, filing, grinding, drilling and chiselling, to trim materials, to measure work pieces and to make metal work pieces to required dimensions, according to templates or simple drawings <p>6.3 Code of practice for bench fitting ◆ Capable to use small typical hand tools and bench fitting techniques in completing tasks of production, installation, maintenance and repairs according to the code of safety</p>
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to make metal pieces to required dimensions according to templates or simple drawings; apply the techniques of marking, sawing, filing, grinding, drilling and chiseling in tasks of production, installation, maintenance and repairs; capable to observe the code of safety.</p>
8. Remarks	This unit of competency is applicable to new entrants of the electrical and mechanical trade.

1. Title	Identify different types of pipe materials and their range of application
2. Code	EMCUIN109A
3. Range	Capable to identify different types of pipe materials and their range of application in general industrial plants, power plants, and workplaces where ship engineering, fire engineering, plumbing or gas engineering is involved.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Pipe materials and their range of application</p> <ul style="list-style-type: none"> ◆ Understand different types of pipe materials, such as: <ul style="list-style-type: none"> • Cast iron • Low-carbon steel • Stainless steel • Copper • Aluminium • Plastic ◆ Understand the properties of different types of pipe materials, such as: <ul style="list-style-type: none"> • Bend ability • Pressure resistance • Heat resistance • Resilience • Weldability • Corrosion resistance ◆ Understand the characteristics of pipeline manufacturing <ul style="list-style-type: none"> • Casting • Plastic moulding • Lining • Electric welding • Seamless • Continuous welding, etc. ◆ Understand the range of application of different types of pipes <p>6.2 Identify the application of different types of pipes</p> <ul style="list-style-type: none"> ◆ Identify the properties and range of application of different types of pipe materials for general pipe installation
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Identify the properties and range of application of different types of pipe materials for general pipe installation.</p>
8. Remarks	This unit of competency is applicable to new entrants of electrical and mechanical engineering services.

1. Title	Perform simple maintenance and repair for fire service components						
2. Code	EMFSOR102A						
3. Range	Perform simple maintenance and repair for fire service components under instruction in routine working environment at workshops or installation work sites.						
4. Level	1						
5. Credit	3						
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <table border="0"> <tr> <td style="vertical-align: top;">6.1</td> <td style="vertical-align: top;">Know about concepts of fire service component maintenance and repair</td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ◆ Know about the types and uses of major components of common fire systems ◆ Understand the aims and basic methods of regular checking and maintenance, such as cleaning, rust removal, painting, applying lubricant, fastening loose parts, replacing aged components </td> </tr> <tr> <td style="vertical-align: top;">6.2</td> <td style="vertical-align: top;">Methods and procedures of fire service component maintenance and repair</td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ◆ Use basic tools to assist in installing, dismantling and cleaning components, applying lubricant, fastening loose parts and replacing aged components under instruction in routine working environment ◆ Clean the water tanks, remove rust on fire service components and coat with paint according to instructions </td> </tr> </table>	6.1	Know about concepts of fire service component maintenance and repair	<ul style="list-style-type: none"> ◆ Know about the types and uses of major components of common fire systems ◆ Understand the aims and basic methods of regular checking and maintenance, such as cleaning, rust removal, painting, applying lubricant, fastening loose parts, replacing aged components 	6.2	Methods and procedures of fire service component maintenance and repair	<ul style="list-style-type: none"> ◆ Use basic tools to assist in installing, dismantling and cleaning components, applying lubricant, fastening loose parts and replacing aged components under instruction in routine working environment ◆ Clean the water tanks, remove rust on fire service components and coat with paint according to instructions
6.1	Know about concepts of fire service component maintenance and repair	<ul style="list-style-type: none"> ◆ Know about the types and uses of major components of common fire systems ◆ Understand the aims and basic methods of regular checking and maintenance, such as cleaning, rust removal, painting, applying lubricant, fastening loose parts, replacing aged components 					
6.2	Methods and procedures of fire service component maintenance and repair	<ul style="list-style-type: none"> ◆ Use basic tools to assist in installing, dismantling and cleaning components, applying lubricant, fastening loose parts and replacing aged components under instruction in routine working environment ◆ Clean the water tanks, remove rust on fire service components and coat with paint according to instructions 					
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to use basic tools to perform simple maintenance and repair for fire service components under instruction in routine working environment, such as cleaning water tanks, removing rust on fire service components and coating with paint.</p>						
8. Remarks							

1. Title	Basic knowledge of electrical and mechanical services management
2. Code	EMCUOM102A
3. Range	Capable to understand the basic concepts of electrical and mechanical services management, to build up team spirit and to assist the company to perform routine duties.
4. Level	1
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Know about basic management theory</p> <ul style="list-style-type: none"> ◆ Understand team building and maintain team spirit, including: <ul style="list-style-type: none"> • Building of working team • Definition of working team • Classification of working team • Formulating clear and tangible goals • Trusting each other • Taking the initiative to listen carefully • Formulating practical and challenging goals ◆ Understand organization's basic way of operation, including: <ul style="list-style-type: none"> • Engineering workforce organizational chart • Engineering project schedules • Working procedure flow chart • Basic concept of logistics management for materials, tools, instruments, etc <p>6.2 Apply basic management theory in daily electrical and mechanical engineering works</p> <ul style="list-style-type: none"> ◆ Know how to apply basic management theory in daily electrical and mechanical engineering works, including: <ul style="list-style-type: none"> • Enhancing the efficiency of company's daily work • Fostering the spirit of cooperation among staff members • Minimizing misunderstanding of work • Strengthening self-confidence
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to know about basic theory of electrical and mechanical services management, to build up team spirit and to enhance the efficiency of organizational routines.</p>
8. Remarks	This unit of competency is applicable to electrical and mechanical practitioners in general.

1. Title	Use general personal protective equipment
2. Code	EMCUSH108A
3. Range	Use general personal protection device correctly at electrical and mechanical work sites to protect personal safety and health.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Various types of personal protective equipment</p> <ul style="list-style-type: none"> ◆ Understand the types, utilization, maintenance and limitations of personal protection device such as safety belt, eye protector, safety shoes, insulating gloves, protective guard, helmet and ear plug, etc. ◆ Understand the basic maintenance of personal protective equipment <p>6.2 Use of personal protective equipment</p> <ul style="list-style-type: none"> ◆ Capable to use general personal protection device such as safety belt, eye protector, safety shoes, insulating gloves, protective guard, helmet and ear plug, etc. ◆ Capable to choose and use general personal protection device correctly by following systematic safety procedures for the best protection ◆ Capable to use and maintain personal protection device correctly according to safety guidelines and procedures so as to comply with the law
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to understand various types of personal protection device and their limitations;</p> <p>(ii) Capable to choose and use general personal protection device correctly; and</p> <p>(iii) Capable to use and maintain personal protection device correctly in daily working environment according to safety guidelines and procedures so as to comply with the law.</p>
8. Remarks	This unit of competency is applicable to electrical and mechanical practitioners in general.

1. Title	Perform manual handling operation
2. Code	EMCUSH109A
3. Range	Apply the correct way of manual lifting and handling at electrical and mechanical work sites to avoid bodily injuries.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Correct way of manual lifting and handling</p> <ul style="list-style-type: none"> ◆ Understand the effects of incorrect lifting and handling, including: <ul style="list-style-type: none"> • The impact on the waist and the back • Causes of manual lifting injuries • Basic knowledge of waist and back care <p>6.2 Application of the correct way of manual lifting and handling</p> <ul style="list-style-type: none"> ◆ Capable to apply the way of manual lifting and handling correctly and properly to avoid bodily injuries ◆ Capable to implement the recommendations of the risk assessment for the manual handling operation
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to illustrate the importance of applying the correct way of manual lifting and handling so as to avoid bodily injuries; and</p> <p>(ii) Capable to apply the correct way of manual lifting and handling for materials that need to be handled manually in routine operation.</p>
8. Remarks	This unit of competency is applicable to frontline electrical and mechanical practitioners in general.

1. Title	Safety operation in confined spaces
2. Code	EMCUSH110A
3. Range	Apply the basic knowledge of safety operation in confined spaces and understand the hazards when working in confined spaces so as to prevent accidents.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of safety operation in confined spaces</p> <ul style="list-style-type: none"> ◆ Understand potential hazards and causes for working in confined spaces, including explosion, fire, anoxia, poisonous gas, etc. ◆ Understand the types of confined spaces and relevant legal requirements ◆ Understand the safety procedures, including the use of general protective equipment, for working in confined spaces <p>6.2 Basic safety for working in confined spaces</p> <ul style="list-style-type: none"> ◆ Possess basic safety knowledge of carrying out electrical and mechanical engineering works in confined spaces ◆ Capable to work in confined spaces according to safety procedures, preventive measures of working in confined spaces and relevant legal requirements
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to work in confined spaces according to safety procedures, preventive measures of working in confined spaces and relevant legal requirements.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic safety knowledge.

1. Title	Comply with the legal requirements on electrical and mechanical occupational safety and health
2. Code	EMCUSH111A
3. Range	Comply with the codes of practice and legal requirements on occupational safety and health when working at electrical and mechanical work sites.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Codes of practice and ordinances for occupational safety and health</p> <ul style="list-style-type: none"> ◆ Understand the requirements for site workers imposed by the codes of practice and ordinances for occupational safety and health, and how to ensure personal occupational safety with correct working procedures. These codes and ordinances include: <ul style="list-style-type: none"> • Occupational Safety and Health ordinance and Regulations • Factories and Industrial Undertakings Ordinance and Regulations • Factories and Industrial Undertakings (Electricity) Regulations • Factories and Industrial Undertakings (Lifting Appliances and Lifting Gear) Regulations <p>6.2 Comply with codes of practice and ordinances for occupational safety and health</p> <ul style="list-style-type: none"> ◆ Capable to comply with the legal requirements on occupational safety and health to carry out routine, repetitive or clearly defined electrical and mechanical engineering work safely
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to understand the requirements for site workers imposed by the codes of practice and ordinances for occupational safety and health; and to carry out routine, repetitive or clearly defined electrical and mechanical engineering work with proper working procedures.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic safety knowledge.

1. Title	Comply with the legal requirements on environmental protection
2. Code	EMCUSH112A
3. Range	Comply with the legal requirements on environmental protection when working at electrical and mechanical work sites.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Environmental protection legislations</p> <ul style="list-style-type: none"> ◆ Understand the legal requirements for electrical and mechanical engineering work on environmental protection, such as: <ul style="list-style-type: none"> • Noise Control Ordinance • Waste Disposal Ordinance • Water Pollution Control Ordinance • Ozone Layer Protection Ordinance • Dumping at Sea Ordinance • Air Pollution Control Ordinance <p>6.2 Application of environmental protection legislations</p> <ul style="list-style-type: none"> ◆ Capable to comply with the legal requirements on environmental protection to carry out routine, repetitive or clearly defined electrical and mechanical engineering work
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to comply with the legal requirements on environmental protection to carry out routine, repetitive or clearly defined electrical and mechanical engineering work with correct working procedures.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general awareness of environmental protection.

1. Title	Handle general chemicals safely
2. Code	EMCUSH113A
3. Range	Capable to handle general chemicals safely in workshops or work sites, and understand the hazards and preventive measures for these chemicals so as to protect oneself and other people during daily operation or accident happened.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of handling general chemicals safely in workshops or work sites</p> <ul style="list-style-type: none"> ◆ Possess basic knowledge of handling chemicals safely, including: <ul style="list-style-type: none"> • Hazards of chemicals • Labelling of chemicals • Ways of chemicals entering human bodies • Safety measures for handling chemicals • Personal protective equipment • Compliance of contingency measures ◆ Understand the classification of general chemical substances, including: <ul style="list-style-type: none"> • Explosive substance • Flammable substance • Strong supporter of combustion • Gas • Harmful or poisonous substance • Organic solvent • Corrosive fluid <p>6.2 Way of handling general chemicals</p> <ul style="list-style-type: none"> ◆ Handle chemicals correctly and prevent chemical hazards, including making use of personal protection device ◆ Capable to prevent occupational health hazards caused by chemicals
7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to handle general chemicals safely and prevent chemical hazards.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of occupational safety and health.

1. Title	Perform quality assurance
2. Code	EMCUQM101A
3. Range	With regard to electrical and mechanical engineering quality assurance, assist to control and monitor the engineering quality under supervision.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Know about quality assurance standards and rules</p> <ul style="list-style-type: none"> ◆ Understand the organizational quality management scheme, including: <ul style="list-style-type: none"> • Mode of quality management such as the implementation of ISO 9000, quality circle, etc. • Duties of quality management committee • Quality management training ◆ Understand the organizational and international quality assurance standards and rules <p>6.2 Perform quality assurance and monitoring procedures</p> <ul style="list-style-type: none"> ◆ Assist to perform quality assurance and monitoring for the electrical and mechanical engineering works under supervision according to organizational instructions and international standards ◆ Capable to record quality test results
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to master and apply the organizational and international quality management standards and rules, and assist in quality assurance and monitoring of the electrical and mechanical engineering works under supervision.</p>
8. Remarks	This unit of competency is applicable to electrical and mechanical practitioners in general.

Competency Level 2

1. Title	Select general electrical materials and electrical equipment
2. Code	EMCUDE204A
3. Range	Select general electrical materials and electrical equipment to perform electrical installation work.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Functions, properties and application conditions of general electrical materials and electrical equipment and devices</p> <ul style="list-style-type: none"> ◆ Understand the functions, properties and application conditions of general electrical materials and electrical equipment and devices, including: <ul style="list-style-type: none"> • General electrical materials <ul style="list-style-type: none"> ▸ Basic configuration, colour code, types, nominal, current-carrying capacity and skin effect of different cables ▸ Electrical materials generally used in wiring systems, such as switch, switch box, distribution board, metallic and non-metallic conduits, conduit accessories, trunking and trunking accessories, etc. ▸ Electrical materials generally used for motor control, such as electromagnetic switch, relay, timer, push-button switch, travel switch, overload protector, limit switch and water level controller, etc. ▸ Limitations of materials in voltage, current and temperature • General electrical equipment and devices <ul style="list-style-type: none"> ▸ General power supply and distribution equipment such as transformer, distribution board, busbar system and rising main ▸ General electrical equipment for buildings, such as electric pump and lighting, etc. <p>6.2 Select general electrical materials and electrical equipment and devices</p> <ul style="list-style-type: none"> ◆ Capable to select general electrical materials and electrical equipment correctly for electrical installation work according to the application requirements as well as the functions, properties and limitations of the materials and equipment ◆ Capable to select and check the materials and equipment in order to ensure that they comply with the safety standards and specifications

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to select general electrical materials and electrical equipment and devices correctly for general power distribution systems for buildings and building services installations according to the application requirements and ensure that they comply with the safety specifications.
8. Remarks	This unit of competency is applicable to electrical and mechanical practitioners in general.

1. Title	Use computer to draw mechanical drawings
2. Code	EMCUDE212A
3. Range	Use typical computer software to draw mechanical drawings for electrical and mechanical work according to design.
4. Level	2
5. Credit	8
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Computer drawing techniques and methods</p> <ul style="list-style-type: none"> ◆ Understand the computer drawing techniques and methods, including the knowledge of drawing specifications, machinery to be drawn and pneumatic symbols <p>6.2 Application of computer drawing</p> <ul style="list-style-type: none"> ◆ Use the computer to set the drawing specifications <ul style="list-style-type: none"> • Set the drawing specifications • Use all types of lines, layers and typeface • Open and save file ◆ Use the computer to draw geometric figures, including mechanical and pneumatic symbols ◆ Use the computer to draw mechanical drawings according to design <ul style="list-style-type: none"> • Draw mechanical layouts • Draw projected mechanical parts • Draw sectional views for mechanical parts ◆ Use the computer to draw the pneumatic system according to design <ul style="list-style-type: none"> • Draw the pneumatic system's layout according to the pneumatic design • Draw the electric control circuit of the pneumatic system according to the circuit design
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to use computer to draw mechanical layouts, projection and sectional views of mechanical equipment and parts according to design; and</p> <p>(ii) Capable to use computer to draw the pneumatic control layouts for a whole pneumatic system unit of an industrial plant with general requirements and specifications according to design.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic computer knowledge.

1. Title	Use computer to draw electrical drawings
2. Code	EMCUDE213A
3. Range	Use typical computer software to draw electrical drawings for electrical and mechanical work according to design.
4. Level	2
5. Credit	8
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Computer drawing techniques and methods</p> <ul style="list-style-type: none"> ◆ Understand the computer drawing techniques and methods, including the knowledge of drawing specifications, electrical wiring symbols and layout <p>6.2 Application of computer drawing</p> <ul style="list-style-type: none"> ◆ Use the computer to lay down the drawing specifications <ul style="list-style-type: none"> • Set the drawing specifications • Use all types of lines, layers and typeface • Open and save file ◆ Use the computer to draw geometric figures and electrical symbols ◆ Use the computer to draw electrical drawings according to design <ul style="list-style-type: none"> • Draw the main circuit layout according to the circuit design • Draw the wiring layout according to design • Draw the control circuit layout according to design
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to use computer to draw the main circuit, wiring and control circuit layouts for a whole power system unit of a multi-storey building with general requirements and specifications according to design.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic computer knowledge.

1. Title	Apply basic fire service installations
2. Code	EMFSDE201A
3. Range	Master the construction and simple working principles of basic fire service installations, the Code of Practice for Fire Service Installations and Equipment and relevant ordinances in performing basic installation, inspection, testing, commissioning, operation, repair and maintenance of fire systems at general fire service work sites.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of basic fire service installations</p> <ul style="list-style-type: none"> ◆ Understand the construction of basic fire service installations and the simple working principles of main components, including: <ul style="list-style-type: none"> • Sprinkler system • Fire hydrant/hose reel system • Fire detection and alarm system • Portable fire-fighting equipment • Drencher/deluge/water spray system • Fire extinguishing system with carbon dioxide, FM200 or similar agents ◆ Understand the provisions on general residential, industrial and commercial buildings stated in the Code of Practice for Fire Service Installations and Equipment, including the required fire systems and their extents <p>6.2 Apply basic fire service installations</p> <ul style="list-style-type: none"> ◆ Identify different types of fire service installations and their uses ◆ State the fire service installations and equipment required in general residential, industrial and commercial buildings ◆ Assist in the selection and use of proper fire service installations
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to state the fire service installations and equipment required in general residential, industrial and commercial buildings according to the Code of Practice for Fire Service Installations and Equipment; and</p> <p>(ii) Capable to assist in the selection and use of proper fire service installations in basic installation, inspection, testing, commissioning, operation, repair and maintenance of fire systems.</p>
8. Remarks	This unit of competency is applicable to general fire engineering practitioners.

1. Title	Draw simple engineering drawings of fire service installations
2. Code	EMFSDE204A
3. Range	Draw simple engineering drawings of fire service installations, at design offices, drawing rooms or work sites, according to instructions.
4. Level	2
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Know about the production of engineering drawings of fire service installations</p> <ul style="list-style-type: none"> ◆ Understand the information included in schematic drawings of fire service installations, such as drawing list, building floor plan, abbreviations, symbol and explanatory note ◆ Understand the types and details of engineering drawings of fire service installations, and the basic production of drawings, including: <ul style="list-style-type: none"> • Layout plan • Vertical system schematic diagram • Electrical power and control wiring diagrams ◆ Understand the conventions and standards for production of engineering drawings of fire service installations <p>6.2 Draw simple engineering drawings of fire service installations</p> <ul style="list-style-type: none"> ◆ Master the basic procedures and methods of producing engineering drawings of fire service installations ◆ Use standard drawing symbols and, according to instructions, draw simple fire service layout plans, vertical system schematic diagram and electrical power and control wiring diagrams, with the inclusion of information like equipment position, size and type, and wiring and conduit path ◆ Draw simple assembly drawings under supervision ◆ Modify simple engineering drawings of fire service installations according to instructions <p>6.3 Professionalism in production of engineering drawings of fire service installations</p> <ul style="list-style-type: none"> ◆ Draw simple engineering drawings of fire service installations according to trade standards ◆ Undertake the production of engineering drawings of fire service installations according to legal requirements and relevant codes of practice
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to undertake the production of simple engineering drawings of fire service installations effectively, according to guidelines, including layout plans, electrical power and control wiring diagrams and simple assembly drawings.</p>
8. Remarks	This unit of competency is applicable to practitioners who are engaged in the design, installation, operation, repair, maintenance and project management of general fire service installations.

1. Title	Perform routine wiring tasks
2. Code	EMCUIN208A
3. Range	Apply the techniques of electrical wiring and the understanding of relevant code of practice in routine wiring tasks for electrical and mechanical works.
4. Level	2
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 General principles of electrical wiring ♦ Understand the basic requirements, code of practice and relevant standards for wiring, including:</p> <ul style="list-style-type: none"> • Uses and installation methods of conduits and trunkings • Techniques for installation of low voltage sheathed cables and armoured cables • Code of practice for wiring, such as identification of markings • Insulation and continuity testing • Methods of circuit terminal connection <p>6.2 Perform regular wiring tasks ♦ Make electrical wiring conduits according to instructions</p> <ul style="list-style-type: none"> • Use relevant techniques and conduit cutting, bending and assembling tools to make metallic conduits for electrical wiring according to requirements • Make PVC wiring conduits • Install wiring conduits correctly <p>♦ Make electrical wiring trunkings according to instructions</p> <ul style="list-style-type: none"> • Use relevant techniques and trunking cutting and assembling tools to make metallic trunkings for electrical wiring, according to requirements • Make earthing arrangement correctly • Install wiring trunkings correctly <p>♦ Make electrical wiring trunkings according to instructions</p> <ul style="list-style-type: none"> • Install low voltage sheathed cables and armoured cables correctly <p>♦ Undertake electrical wiring properly according to instructions</p> <ul style="list-style-type: none"> • Classify electrical circuits properly according to wiring requirements and the code of practices • Apply relevant techniques in electrical wiring • Attach correct identification markings to cables

	<ul style="list-style-type: none"> ◆ Perform insulation and continuity tests for circuits according to instructions <ul style="list-style-type: none"> • Use an insulation tester and continuity tester to perform insulation and continuity tests for circuits according to relevant code of practice and standards • Undertake terminal connection of circuits • Use proper assembling tools and termination accessories to connect cables to electrical devices
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to install wiring for general electrical equipment and systems correctly and safely according to instructions, wiring requirements and the code of practice; make conduits and trunkings, undertake wiring work, install low voltage metal-sheathed cables and armoured cables; and carry out terminal connection and validity tests.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses basic electrical knowledge.</p>

1. Title	Install general plastic pipes and fittings
2. Code	EMCUIN216A
3. Range	Perform simple installation of general plastic (e.g. PVC,ABS and UPVC) pipes and fittings, and common parts at general industrial plants, power plants or premises/work sites where boat, fire fighting, water, gas or pipe works is involved.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types of pipes and fitting materials</p> <ul style="list-style-type: none"> ◆ Know about the types of pipes, accessories and materials, including: <ul style="list-style-type: none"> • Types of pipes • Bends and tees • Extension joints • Joint accessories • Fill materials • Bedding and coating materials ◆ Understand hazards of solvent cement to individuals and the environment <p>6.2 Methods of installing and jointing pipes</p> <ul style="list-style-type: none"> ◆ Capable to apply general repairing and bench fitting techniques in pipe installation according to requirements ◆ Capable to joint pipes by solvent cement, etc. ◆ Capable to apply common methods of cold or thermal bending in simple installation of pipes ◆ Place rubber gaskets or pads at proper positions to prevent leakage <p>6.3 Professionalism in pipe overhaul and installation</p> <ul style="list-style-type: none"> ◆ Capable to use correct tools in simple installation of plastic pipes according to requirements ◆ Perform pipe installation according to legal requirements and the code of safety; pass the leakage test
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to install common plastic pipes and fittings correctly and safely according to pipe-laying and legal requirements and the code of safety; pass the leakage test.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of mechanics and installation skills.

1. Title	Install metallic (steel/stainless steel/galvanized iron) pipes and fittings
2. Code	EMCUIN217A
3. Range	Perform simple installation of metallic (steel/stainless steel/galvanized iron) pipes and fittings, and common parts at general industrial plants, power plants or premises/work sites where boat, fire fighting, water, gas or pipe works is involved.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types of pipes and fitting materials</p> <ul style="list-style-type: none"> ◆ Know about the types of pipes, accessories and materials, including: <ul style="list-style-type: none"> • Types of pipes • Types of flanges • Bends and tees • Expansion joints • Joint accessories • Fill materials • Bedding and coating materials • Heat preservation materials <p>6.2 Methods of installing and jointing pipes</p> <ul style="list-style-type: none"> ◆ Capable to apply general repairing and bench fitting techniques, including marking, sawing, chiselling, drilling, scraping, grinding, jointing and sealing, in pipe installation according to requirements ◆ Capable to joint pipes by argon arc welding, electric arc welding, compressing, threading, flanging, etc. ◆ Capable to apply typical methods of cold or thermal bending in simple installation of pipes ◆ Place rubber gaskets or pads at proper positions for prevent leakage <p>6.3 Professionalism in pipe overhaul and installation</p> <ul style="list-style-type: none"> ◆ Capable to use correct tools in simple installation of metallic (steel/stainless steel/galvanized iron) pipes according to requirements ◆ Perform pipe installation according to legal requirements and the code of safety; pass the leakage test
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to install common metallic (steel/stainless steel/galvanized iron) pipes and fittings correctly and safely according to pipe-laying and legal requirements and the code of safety; pass the leakage test.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of mechanics and installation skills.

1. Title	Install non-metallic (copper/aluminium) pipes and fittings
2. Code	EMCUIN218A
3. Range	Perform simple installation of typical copper or aluminum pipes and fittings, at general industrial plants, power plants, ship repair, fire & plumbing, gas engineering or work sites where installation work is involved.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types of pipes and fitting materials</p> <ul style="list-style-type: none"> ◆ Know about the types of pipes, accessories and materials, including: <ul style="list-style-type: none"> • Types of pipes • Bends and tees • Expansion joints • Joint accessories • Fill materials • Bedding and coating materials • Heat preservation materials <p>6.2 Methods of installing and jointing pipes</p> <ul style="list-style-type: none"> ◆ Capable to apply general repairing and bench fitting techniques, including marking, sawing, chiselling, drilling, scraping, grinding, jointing and sealing, in pipe installation according to requirements ◆ Capable to joint pipes by silver soldering, copper brazing, tin soldering, compressing, etc. ◆ Capable to apply common methods of cold or thermal bending in simple installation of pipes ◆ Place rubber gaskets or pads at proper positions to prevent leakage <p>6.3 Professionalism in pipe overhaul and installation</p> <ul style="list-style-type: none"> ◆ Capable to use correct tools in simple installation of copper or aluminium pipes according to requirements ◆ Perform pipe installation according to legal requirements and the code of safety; pass the leakage test
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to install common copper or aluminum pipes and fittings correctly and safely according to pipe-laying and legal requirements and the code of safety; pass the leakage test.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of mechanics and installation skills.

1. Title	Install cast iron pipes and fittings
2. Code	EMCUIN219A
3. Range	<p>Perform simple installation of cast iron pipes and fittings, and common parts at general industrial plants, power plants or premises/work sites where boat, fire fighting, water, gas or pipe works is involved.</p> <p>Perform simple installation of typical copper or aluminum pipes and fittings, at general industrial plants, power plants, ship repair, fire & plumbing, gas engineering or work sites where installation work is involved.</p>
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types of pipes and fitting materials</p> <ul style="list-style-type: none"> ◆ Know about the types of pipes, accessories and materials, including: <ul style="list-style-type: none"> • Types of pipes • Types of flanges • Bends and tees • Expansion joints • Joint accessories • Fill materials • Bedding and coating materials • Heat preservation materials <p>6.2 Methods of installing and jointing pipes</p> <ul style="list-style-type: none"> ◆ Capable to apply general repairing and bench fitting techniques, including marking, sawing, chiselling, drilling, scraping, grinding, jointing and sealing, in pipe installation according to requirements ◆ Capable to joint pipes by iron welding, tungsten gas electric arc welding, compressing, threading, flanging, etc ◆ Place rubber gaskets or pads at proper positions to prevent leakage <p>6.3 Professionalism in pipe overhaul and installation</p> <ul style="list-style-type: none"> ◆ Capable to use correct tools in simple installation of cast iron pipes according to requirements ◆ Perform pipe installation according to legal requirements and the code of safety; pass leakage test.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to install common cast iron pipes and fittings correctly and safely according to pipe-laying and legal requirements and the code of safety; pass the leakage test.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of mechanics and installation skills.

1. Title	Replace mechanical parts and devices of electric motors
2. Code	EMCUIN221A
3. Range	Capable to replace mechanical parts and devices of electric motors in electrical and mechanical workshops or worksites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Operating principles of motor machinery ♦ Understand the operating principles of motor machinery and method of replacing the mechanical parts and devices</p> <p>6.2 Mechanical parts and devices of electric motors ♦ Operate mechanical parts and devices of an electric motor, such as the driving units like bearing, connector, gear, etc., and replace mechanical parts and devices of the motor</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to understand the principles and methods of operating motor machinery; and</p> <p>(ii) Capable to replace mechanical parts and devices safely of the specified motor.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic electrical and mechanical knowledge.

1. Title	Basic manual metal arc welding (MMAW)/shielded metal arc welding (SMAW)		
2. Code	EMCUIN225A		
3. Range	Perform basic MMAW/SMAW on typical carbon-steel metals at electrical and mechanical welding workshops or work sites.		
4. Level	2		
5. Credit	6		
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Code of practice and safety regulations for MMAW/SMAW</p> <ul style="list-style-type: none"> ◆ Understand relevant code of practice and safety regulations for MMAW/SMAW, including: <ul style="list-style-type: none"> • Wearing proper personal protective gear • Protecting against electric shock • Protecting against fire and explosion • Protecting against harmful arc ray effectively • Protecting against harmful gases and poisonous fumes ◆ Know about the preparations for MMAW/ SMAW, including: <ul style="list-style-type: none"> • Understanding the general application and their limitations of MMAW/SMAW • Understanding the types of MMAW/SMAW machines and their functions • Knowing about the specifications, applications, uses and storage of common mild-steel electrodes (such as E6013) for MMAW/SMAW • Knowing about the maintenance of MMAW/SMAW equipment <p>6.2 Methods and procedures for operating MMAW/SMAW</p> <ul style="list-style-type: none"> ◆ Apply MMAW/SMAW technique in welding <ul style="list-style-type: none"> • Select proper parameters for welding, such as polarity, current, welding speed and angle of electrode • Perform tasks including: <ul style="list-style-type: none"> ▸ Performing linear surface buildup at flat position ▸ Joining two or more work pieces together at flat position ▸ Performing two sides square edge butt welding at flat position ▸ Performing fillet weld at flat position ◆ Maintenance of electric arc welding equipment <ul style="list-style-type: none"> • Undertake maintenance of MMAW/SMAW equipment • Use and store common instruments and welding materials <p>6.3 Professionalism in MMAW/SMAW</p> <ul style="list-style-type: none"> ◆ Perform MMAW/SMAW tasks according to relevant safety guidelines and code of practice 		

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to complete basic MMAW/SMAW tasks without causing obvious surface weld defects; and (ii) Capable to perform MMAW/SMAW tasks safely.
8. Remarks	This unit of competency is applicable to general electrical and mechanical welding practitioners.

1. Title	Basic oxy-acetylene welding(OAW) / oxyfuel and arc cutting(OAC)
2. Code	EMCUIN226A
3. Range	Perform OAW / OAC tasks for electrical and mechanical works at electrical and mechanical welding workshops or work sites.
4. Level	2
5. Credit	5
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Code of practice and preparations for OAW / OAC</p> <ul style="list-style-type: none"> ◆ Understand relevant code of practice and safety regulation for OAW / OAC, including: <ul style="list-style-type: none"> • Operating OAW / OAC equipment and accessories, including handling of gaseous cylinder, correctly and safely • Wearing proper personal protective gear • Protecting against fire and explosion • Protecting against harmful arc ray effectively • Protecting against harmful gases and poisonous fumes • Following the legislations and safety guidelines on OAW / OAC ◆ Know about the preparations for OAW / OAC: <ul style="list-style-type: none"> • Understand the general application and their limitations of OAW / OAC • Understand functions of various OAW / OAC equipment, including high pressure gaseous cylinder, pressure regulator, flashback arrestor, welding torch and cutting torch , etc. • Identify the requirements of welding materials for oxyacetylene welding and cutting such welding rods, welding flux, etc ◆ Perform quality inspection on weld profile <ul style="list-style-type: none"> • Identify various types of common and simple surface weld defects at welded joints, such as undercut, overlap and porosities • Avoid causing the simple surface weld defects mentioned above

	<p>6.2 Methods and procedures for operating OAW / OAC</p> <ul style="list-style-type: none"> ◆ Apply OAW / OAC techniques <ul style="list-style-type: none"> • Select proper parameters for welding, such as gas flowrate and pressure, angle of welding and cutting torch, welding or cutting speed, etc. • Perform following tasks: <ul style="list-style-type: none"> ▸ Perform linear surface buildup at flat position ▸ Perform plate cutting at flat position ▸ Perform two sides square edge butt weld at flat position and horizontal position ▸ Perform fillet weld at flat position and horizontal position ▸ Perform plate cutting at horizontal position and vertical position <p>6.3 Professionalism in OAW / OAC</p> <ul style="list-style-type: none"> ◆ Perform OAW / OAC tasks according to relevant safety guidelines and code of practice
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to complete basic OAW / OAC tasks without causing obvious surface weld defects; and (ii) Capable to perform OAW / OAC tasks safely.
8. Remarks	<p>This unit of competency is applicable to general electrical and mechanical welding practitioners.</p>

1. Title	Perform basic installation tasks for water-based fire service mechanical installations
2. Code	EMFSIN201A
3. Range	Perform basic installation tasks for water-based fire service mechanical installations at workshops or fire equipment installation points under supervision in predictable and structured working environments.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Functions and basic installation knowledge of water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Understand the construction and functions of general water-based fire service mechanical installations such as: <ul style="list-style-type: none"> • Sprinkler system • Fire hydrant/hose reel system • Drencher system • Deluge system • Water spray system ◆ Capable to read simple installation drawings of water-based fire service mechanical installations ◆ Understand basic installation requirements and specifications of such equipment <p>6.2 Perform basic installation tasks for water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Master basic installation procedures and methods for water-based fire service mechanical installations, including the procedures of material checking, cleaning, assembly, adjustment and simple testing ◆ Prepare auxiliary materials and tools for installing water-based fire service mechanical installations ◆ Install and set fire pipes, pumps, switches, hose reels, fire hydrants, fire service inlets, etc. at suitable locations under supervision in predictable and structured working environments ◆ Use basic workshop equipment and tools for class 2 fire service mechanical installation contractors, e.g. threading machine, electric drill, bench fitting tools and welding machine etc. ◆ Use basic testing tools to assist the performance of functional tests after installation
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete basic installation of water-based fire service mechanical installations effectively under supervision in predictable and structured working environments.</p>
8. Remarks	This unit of competency is applicable to practitioners who are engaged in the installation of water-based fire service mechanical installations.

1. Title	Perform basic installation tasks for non-water-based fire service mechanical installations
2. Code	EMFSIN202A
3. Range	Perform basic installation tasks for non-water-based fire service mechanical installations at workshops or fire equipment installation points under instruction in predictable and structured working environments.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Functions and basic installation knowledge of non-water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Understand the construction and functions of general non-water-based fire service mechanical installations such as: <ul style="list-style-type: none"> • Carbon dioxide system • FM200 system • NAFSIII system • Other similar extinguishing agent systems ◆ Capable to read simple installation drawings of non-water-based fire service mechanical installations ◆ Understand basic installation requirements and specifications of such equipment <p>6.2 Perform basic installation tasks for non-water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Master basic installation procedures and methods for non-water-based fire service mechanical installations, including the procedures of material checking, cleaning, assembly, adjustment and simple testing ◆ Prepare auxiliary materials and tools for installing non-water-based fire service mechanical installations ◆ Install and set fire service pipes, gas cylinders, switches, exhaust valves, detectors, nozzles, etc. at suitable locations under instruction in predictable and structured working environments ◆ Use basic workshop equipment and tools for class 2 fire service mechanical installation contractors, e.g. threading machine, electric drill, bench fitting tools and welding machine ◆ Use basic testing tools to assist the performance of functional tests after installation
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete basic installation of non-water-based fire service mechanical installations effectively under instruction in predictable and structured working environments.</p>
8. Remarks	This unit of competency is applicable to practitioners who are engaged in the installation of non-water-based fire service mechanical installations.

1. Title	Perform basic installation tasks for fire detection and alarm systems and equipment
2. Code	EMFSIN203A
3. Range	Perform basic installation tasks for fire detection and alarm systems and equipment at workshops or fire equipment installation points under instruction.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Functions and basic installation knowledge of fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the construction and functions of general fire detection and alarm systems and equipment such as: <ul style="list-style-type: none"> • Conventional (electronic) type • Addressable (intelligent) type ◆ Capable to read simple installation drawings of fire detection and alarm systems and equipment ◆ Understand basic installation requirements and specifications of such equipment <p>6.2 Perform basic installation tasks for fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Master basic installation procedures and methods for fire detection and alarm systems and equipment, including the procedures of material checking, cleaning, assembly, adjustment and simple testing ◆ Prepare auxiliary materials and tools for installing fire detection and alarm systems and equipment ◆ Install and set heat, smoke and flame detectors, audio/visual advisory systems, annunciation panels, batteries and chargers, etc. at suitable locations under instruction ◆ Use basic workshop equipment and tools for class 1 fire service installation contractors, e.g. threading tools (for conduit), electric drill, bench fitting tools and multi-meter ◆ Use basic testing tools to assist the performance of functional tests after installation
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete basic installation of fire detection and alarm systems and equipment effectively under instruction.</p>
8. Remarks	This unit of competency is applicable to practitioners who are engaged in the installation of fire detection and alarm systems and equipment.

1. Title	Perform basic installation tasks for fire service power supply and control equipment
2. Code	EMFSIN204A
3. Range	Perform basic installation tasks for fire service power supply and control equipment at workshops or fire equipment installation points under instruction. This unit of competency does not include the competency of installing the electrical installations of fire detection and alarm systems.
4. Level	2
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Functions and basic installation knowledge of fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Understand the construction and functions of general fire service power supply and control equipment such as: <ul style="list-style-type: none"> • AC/DC electrical power distribution system • Electrical control circuit and control panel • Electrical protection device • Fire-resistant cable (including copper-sheathed cable) ◆ Capable to read simple installation drawings of fire service power supply and control equipment ◆ Understand basic installation requirements and specifications of such equipment <p>6.2 Perform basic installation tasks for fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Master basic installation procedures and methods for fire service power supply and control equipment, including the procedures of material checking, cleaning, assembly, adjustment and simple testing ◆ Prepare auxiliary materials and tools for installing fire service power supply and control equipment ◆ Install and set distribution board, wire, conduit, switchgear, control panel, pump motor starter, relay and indicator light, etc. at suitable locations under instruction ◆ Use basic workshop equipment and tools for class 2 fire service electrical installation contractors, e.g. threading tools (for conduits), electric drill, bench fitting tools and multi-meter ◆ Use basic testing tools to assist the performance of functional tests after installation
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete basic installation of fire service power supply and control equipment systematically and efficiently under instruction.</p>
8. Remarks	This unit of competency is applicable to practitioners who are engaged in the installation of fire service power supply and control equipment.

1. Title	Apply commonly used regulations and international standards relevant to electrical installations
2. Code	EMCUIT203A
3. Range	Apply the Electricity (Wiring) Regulations and their Code of Practice, the power supply regulations of the electricity company, and relevant international standards for electrical installations to arrange for simple electricity supply equipment installation where the electrical and mechanical inspection, commissioning and testing works are involved.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Commonly used regulations and international standards relevant to electrical installations</p> <ul style="list-style-type: none"> ◆ Understand commonly used regulations and international standards relevant to electrical installations, such as: <ul style="list-style-type: none"> • Electricity Ordinance of Hong Kong, Electricity (Registration) Regulations, Electricity (Wiring) Regulations and their Code of Practice, Electrical Products (Safety) Regulation, etc. <p>6.2 Apply commonly used regulations and international standards relevant to electrical installations to perform electrical and mechanical work</p> <ul style="list-style-type: none"> ◆ Understand all contract terms and drawings, and apply commonly used regulations and international standards relevant to electrical installations to perform the installation of low-voltage distribution underground cable direct electricity supply system, including the design, installation, inspection, commissioning, testing, running, repair and maintenance, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply commonly used regulations and international standards relevant to electrical installations to arrange for the design, installation, inspection, commissioning, testing, running, repair and maintenance, etc. of the electricity supply network and installation work.</p>
8. Remarks	This unit of competency is applicable to electrical and mechanical practitioners in general.

1. Title	Apply basic fire service installation testing instruments
2. Code	EMFSIT201A
3. Range	Apply basic testing instruments, under supervision, to inspect and test fire service installations in normal, predictable and structured working environments at installation or repair sites.
4. Level	2
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of fire service installation testing instruments</p> <ul style="list-style-type: none"> ◆ Understand the types, applications and uses of basic fire service installation testing instruments and tools <ul style="list-style-type: none"> • Pressure gauge • Flow meter • Noise meter • Hydraulic pump • Multi-meter • Insulation tester • Detector tester ◆ Know about calibration requirements of local regulations and international standards on all kinds of testing instruments <p>6.2 Apply basic fire service installation testing instruments</p> <ul style="list-style-type: none"> ◆ Master basic operation of fire service installation testing instruments ◆ Select, inspect and maintain testing and measuring instruments correctly according to instructions ◆ Apply various testing instruments and tools, under supervision, to inspect and test fire service installations in normal, predictable and structured working environments
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to follow codes of practice and safety guidelines required by the law to apply various testing instruments and tools correctly, under supervision, to inspect and test fire service installations in normal, predictable and structured working environments.</p>
8. Remarks	This unit of competency is applicable to practitioners of fire service installation, repair and commissioning in general.

1. Title	Perform basic tests for fire service installations
2. Code	EMFSIT202A
3. Range	Perform basic tests for fire service installations under instruction in predictable and structured working environments at installation or repair sites.
4. Level	2
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge for inspection and testing of fire service installations</p> <ul style="list-style-type: none"> ◆ Understand basic methods of inspecting and testing fire service installations, including static check, dynamic test and pressure test, etc. ◆ Understand the uses and applications of basic testing instruments and tools <ul style="list-style-type: none"> • Pressure gauge • Flow meter • Noise meter • Hydraulic pump • Multi-meter • Insulation tester • Detector tester <p>6.2 Perform basic tests for fire service installations</p> <ul style="list-style-type: none"> ◆ Master basic procedures of testing fire service installations ◆ Prepare the testing instruments according to instructions ◆ Perform basic tests for fire service installations under instruction in predictable and structured working environments, including: <ul style="list-style-type: none"> • Using a pressure gauge to measure static and operating pressure of the fire system • Using a flow meter to measure the water flow rate of the fire system • Using a noise meter to measure the noise level of the fire system • Using a hydraulic pump to conduct pressure test for leakage detection • Using a multi-meter to measure the operating current and voltage of the water pump motor ◆ Know the use of basic workshop equipment and tools for fire service installation contractors

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to follow codes of practice and safety guidelines required by the law to perform basic tests for fire service installations under instruction in predictable and structured working environments.
8. Remarks	This unit of competency is applicable to practitioners of fire service installation, repair and commissioning in general.

1. Title	Basic repair and maintenance of water-based fire service mechanical installations
2. Code	EMFSOR201A
3. Range	Perform basic repair and maintenance of water-based fire service mechanical installations, under instruction, at repair workshops or work sites according to repair instructions.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and basic principles of water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Understand the types, applications, construction and basic principles of general water-based fire service mechanical installations, including: <ul style="list-style-type: none"> • sprinkler system • Fire hydrant/hose reel system • Drencher system • Deluge system • Water spray system <p>6.2 Basic repair and maintenance of water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of basic maintenance and repair of fixed water-based fire service mechanical installations, including the procedures of regular inspection, cleaning, installation, removal, replacement, simple repair and testing ◆ Examine the damage condition of accessories such as water tanks, pipes, pumps, switches, fire hydrants, fire service inlets under certain degree of instruction and according to repair instructions ◆ Repair or replace damaged accessories under instruction ◆ Know how to use basic workshop equipment and tools for class 2 fire service mechanical installation contractors ◆ Use basic testing equipment to assist in conducting functional tests after repair
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete the task of repairing and maintaining water-based fire service mechanical installations effectively under instruction.</p>
8. Remarks	This unit of competency is applicable to general practitioners of water-based fire-fighting mechanism repair and maintenance.

1. Title	Basic repair and maintenance of non-water-based fire service mechanical installations
2. Code	EMFSOR202A
3. Range	Perform basic repair and maintenance of non-water-based fire service mechanical installations, under instruction, at repair workshops or work sites according to repair instructions.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and basic principles of non-water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Understand the types, applications, construction and basic principles of general non-water-based fire service mechanical installations, including: <ul style="list-style-type: none"> • Carbon dioxide system • FM200 system • NAFSIII system • Other similar extinguishing agent systems <p>6.2 Basic repair and maintenance of non-water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of basic maintenance and repair of fixed non-water-based fire service mechanical installations, including the procedures of regular inspection, cleaning, installation, removal, replacement, simple repair and testing ◆ Examine the damage condition of accessories such as pipes, gas cylinders, switches, exhaust valves, nozzles, detectors and control panels under certain degree of instruction and according to repair instructions ◆ Repair or replace damaged accessories under instruction ◆ Know how to use basic workshop equipment and tools for class 2 fire service mechanical installation contractors ◆ Use basic testing equipment to assist in conducting functional tests after repair
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete the task of repairing and maintaining non-water-based fire service mechanical installations effectively under instruction.</p>
8. Remarks	This unit of competency is applicable to general practitioners of non-water-based fire-fighting mechanism repair and maintenance.

1. Title	Basic maintenance and repair of fire detection and alarm systems and equipment
2. Code	EMFSOR203A
3. Range	Perform basic maintenance and repair of fire detection and alarm systems and equipment, under supervision, at repair workshops or work sites according to repair instructions.
4. Level	2
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and basic principles of fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the types, applications, construction and basic principles of fire detection and alarm systems and equipment, including: <ul style="list-style-type: none"> • Conventional (electronic) type • Addressable (intelligent) type <p>6.2 Basic repair and maintenance of fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of basic maintenance and repair of fire detection and alarm systems and equipment, including the procedures of regular inspection, cleaning, installation, removal, replacement, simple repair and testing ◆ Examine the damage condition of accessories such as heat, smoke and flame detectors, audio/visual advisory systems, annunciation panels, batteries and chargers under supervision and according to repair instructions ◆ Repair or replace damaged accessories under instruction ◆ Know how to use basic workshop equipment and tools for class 1 fire service installation contractors ◆ Use basic testing equipment to assist in conducting functional tests after repair
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete the task of repairing and maintaining fire detection and alarm systems and equipment effectively under supervision.</p>
8. Remarks	This unit of competency is applicable to practitioners of basic repair and maintenance of fire detection and alarm systems and equipment.

1. Title	Basic maintenance and repair of fire service power supply and control equipment
2. Code	EMFSOR204A
3. Range	Perform basic maintenance and repair of fire service power supply and control equipment, under supervision, at repair workshops or work sites according to repair instructions. This unit of competency does not include the competency of maintaining and repairing the electrical installations of fire detection and alarm systems.
4. Level	2
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and basic principles of fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Understand the types, applications, construction and basic principles of fire service power supply and control equipment, including: <ul style="list-style-type: none"> • AC/DC power distribution system • Electrical control circuit and control panel • Electrical protection device • Fire-resistant cable (including copper-sheathed cable) <p>6.2 Basic repair and maintenance of fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of basic maintenance and repair of fire service power supply and control equipment, including the procedures of regular inspection, cleaning, installation, removal, replacement, simple repair and testing ◆ Examine the damage condition of accessories such as distribution board, wire, conduit, switchgear, control panel, pump motor starter, relay and indicator light under supervision and according to repair instructions ◆ Repair or replace damaged accessories under instruction ◆ Know how to use basic workshop equipment and tools for class 2 fire service electrical installation contractors ◆ Use basic testing equipment (e.g. multi-meter, insulation tester, etc.) to assist in conducting functional tests after repair
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete the task of repairing and maintaining fire service power supply and control equipment effectively under supervision.</p>
8. Remarks	This unit of competency is applicable to practitioners of basic repair and maintenance of fire service power supply and control equipment.

1. Title	Basic maintenance and repair of portable fire extinguishing equipment
2. Code	EMFSOR205A
3. Range	Perform basic maintenance and repair of portable fire extinguishing equipment, under supervision, at repair workshops or work sites according to repair instructions and specifications.
4. Level	2
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and basic principles of fire extinguisher and fire blanket</p> <ul style="list-style-type: none"> ◆ Understand the construction, functions and basic principles of portable fire extinguishing equipment, including: <ul style="list-style-type: none"> • Carbon dioxide fire extinguisher • Water type fire extinguisher • Dry powder fire extinguisher • Clean agent fire extinguisher • Foam fire extinguisher • Fire blanket <p>6.2 Basic repair and maintenance of portable fire extinguishing equipment</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of basic maintenance and repair of portable fire extinguishing equipment, including the procedures of inspection, cleaning, installation, removal, replacement, simple repair and testing ◆ Refill or replace extinguishing agents under instruction ◆ Examine the damage condition of accessories such as discharge tubes, strainers and nozzles under supervision and according to repair instructions ◆ Repair or replace damaged accessories under instruction ◆ Know how to use basic workshop equipment and tools for class 3 fire service installation contractors ◆ Use basic testing equipment to assist in conducting functional tests after repair, including hydraulic test and discharge test to ensure that the extinguishers are in good condition and function properly
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete the task of repairing and maintaining portable fire extinguishing equipment effectively under supervision.</p>
8. Remarks	This unit of competency is applicable to practitioners of basic repair and maintenance of portable fire extinguishing equipment.

1. Title	Apply basic quantity measurement techniques
2. Code	EMFSPM201A
3. Range	Master basic quantity measurement techniques to perform basic quantity measurement and checking tasks, under supervision, for project cost management.
4. Level	2
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of quantity measurement ♦ Know about the basic principles and methods of quantity measurement, including:</p> <ul style="list-style-type: none"> • Content and usage of bills of quantities • Standard methods of measurement • Units of measurement • Cost list • Basic knowledge of contract drawing <p>6.2 Apply quantity measurement techniques ♦ Master basic quantity measurement techniques to perform basic quantity measurement and checking tasks under supervision: including</p> <ul style="list-style-type: none"> • Estimate quantities of materials required according to the drawings • Draft rates of quantities • Draw up a cost list in detail <p>6.3 Professionalism in quantity measurement ♦ Assist in the tasks of quantity measurement according to the trade practice</p>
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to master basic quantity measurement techniques to perform basic quantity measurement and checking tasks under supervision according to the trade practice.</p>
8. Remarks	This unit of competency is applicable to new entrants of the electrical and mechanical trade.

1. Title	Apply effective communication skills in discussions of electrical and mechanical issues
2. Code	EMCUOM204A
3. Range	With regard to electrical and mechanical operation management, apply effective communication skills to actively discuss, exchange ideas and respond to electrical and mechanical related issues (e.g. design, installation, inspection, commissioning, testing, running, repair, maintenance, occupational safety and health, project management, quality management, sales and marketing, etc.).
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Effective communication skills</p> <ul style="list-style-type: none"> ◆ Understand effective communication skills, including speaking skill, listening skill, summarizing skill and interpersonal skill ◆ Understand the functions of different communication media / tools <ul style="list-style-type: none"> • Using email or fax • Using telephone for liaison and communication • Holding meetings, etc. ◆ Understand common terminology and technical terms used in the electrical and mechanical engineering services industry <p>6.2 Understand work scope of the electrical and mechanical services, and apply effective communication skills to exchange ideas and foster discussion</p> <ul style="list-style-type: none"> ◆ Understand the work scope of the electrical and mechanical services, such as design, installation, inspection, commissioning, testing, running, repair, maintenance, occupational safety and health, project management, quality management, sales and marketing, etc.; and be capable to apply effective communication skills to exchange ideas and foster discussion so as to achieve the purpose of idea exchange and information delivery
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply effective communication skills and common terminology and technical terms used in the industry to take part in the discussion of electrical and mechanical issues.</p>
8. Remarks	This unit of competency is applicable to electrical and mechanical practitioners in general.

1. Title	Apply basic risk assessment methods
2. Code	EMCUSH205A
3. Range	Capable to apply basic risk assessment methods to perform basic risk assessment related to electrical and mechanical engineering in electrical and mechanical work sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic risk assessment methods</p> <ul style="list-style-type: none"> ◆ Understand basic risk assessment methods, including <ul style="list-style-type: none"> • Manual handling operation • Works in confined spaces • Work site hazards • Simple mechanism for risk grading • Risk assessment guidelines • Operating hazards analysis <p>6.2 Conduct basic risk assessment</p> <ul style="list-style-type: none"> ◆ Apply basic risk assessment methods to conduct simple risk assessment of the hazards and risks likely to occur in the electrical and mechanical work site, including the identification of hazards, the acceptability of risks, the clearance and minimization of risks, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply basic risk assessment methods to effectively conduct simple risk assessment related to electrical and mechanical engineering services.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses basic occupational safety knowledge and competency of the following units of competency:</p> <p>EMCUSH108A Use general personal protective equipment</p> <p>EMCUSH109A Implement manual handling operation</p> <p>EMCUSH110A Safety operation in confined spaces</p> <p>EMCUSH111A Comply with the legal requirements on electrical and mechanical occupational safety and health.</p>

1. Title	Implement work site occupational health and safety management
2. Code	EMCUSH206A
3. Range	Apply basic occupational health and safety management in electrical and mechanical workshops or work sites to assist in performing work site occupational health and safety management so as to minimize the risks in work sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of occupational safety management</p> <ul style="list-style-type: none"> ◆ Understand general knowledge of occupational health and safety and its application ◆ Understand the basic requirements on occupational health and safety for general work sites <p>6.2 Application of basic occupational health and safety management</p> <ul style="list-style-type: none"> ◆ Capable to apply basic knowledge of occupational safety management to assist in performing occupational health and safety management in work sites so as to minimize the risks. <p>Management items include:</p> <ul style="list-style-type: none"> • Work site safety inspection • Follow-up of protective measures • Basic risk assessment • Follow-up investigation of accident • Assisting in safety promotion events • Assisting in the implementation of safety policy and management targets for the company or clients • Assisting in organizing group meetings
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to perform occupational health and safety management and implement management items correctly and effectively in electrical and mechanical workshops or work sites.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic occupational safety knowledge.

1. Title	Handle general industrial accidents
2. Code	EMCUSH208A
3. Range	Handle general industrial accidents in electrical and mechanical engineering workplaces according to the code of practice for industrial accidents.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Common industrial accidents</p> <ul style="list-style-type: none"> ◆ Understand types and causes of general industrial accidents, including: electric shock, fall of person, fire, burn, gas poisoning, explosion, contusion, etc. ◆ Understand ways of handling and preventing general industrial accidents, such as preventive measures, working guidelines, working permit system, emergency handling measures, safety management system, occupational safety and health scheme, personal protection facilities, etc. <p>6.2 Handle general industrial accidents</p> <ul style="list-style-type: none"> ◆ Capable to handle general industrial accidents on site, including adopting simple contingencies, according to the code of practice for accidents <p>6.3 Professionalism in handling industrial accidents</p> <ul style="list-style-type: none"> ◆ Handle general industrial accidents properly according to the requirements of the code of practice for industrial accidents ◆ Timely report to the supervisor
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to understand types and causes of general industrial accidents; and</p> <p>(ii) Capable to implement and complete measures on handling general industrial accidents, including adopting simple contingencies, according to the code of practice for accidents, and timely report to the supervisor.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic occupational safety knowledge.

1. Title	Obtain data and information of occupational safety and health and environmental protection to compile relevant statistics
2. Code	EMCUSH211A
3. Range	Obtain data and information of occupational safety and health and environmental protection, and use percentage and graphic data to make simple analysis and statistics.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Data and information of occupational safety and health and environmental protection</p> <ul style="list-style-type: none"> ◆ Understand how to use percentage and graphic data to make simple calculations and statistics for the performance of occupational safety and health and environmental protection <ul style="list-style-type: none"> • Analyze information and data of occupational safety and health and environmental protection; use percentage and graphs to make simple calculations and statistics based on the data obtained, and come up with simple conclusions <p>6.2 Compile relevant statistics according to data and information of occupational safety and health and environmental protection</p> <ul style="list-style-type: none"> ◆ Use percentage and graphs to compile relevant statistics based on the data and information of occupational safety and health and environmental protection ◆ Obtain data and information of occupational safety and health and environmental protection to compile relevant statistics, and come up with simple conclusions <ul style="list-style-type: none"> • Obtain data required from all kinds of engineering information including accident investigation report, risk assessment report, operational hazards analysis report, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to obtain data required from engineering information to make analysis for the performance of occupational safety and health and environmental protection; use percentage and graphs to compile statistics, and come up with simple conclusions</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic calculation knowledge.

1. Title	Implement preventive measures on general occupational safety and health
2. Code	EMCUSH212A
3. Range	Understand the characteristics and limitations of the workplace and take preventive measures on general occupational safety and health for occupational safety and avoid accidents in electrical and mechanical engineering workplaces.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Protection for general occupational safety and health</p> <ul style="list-style-type: none"> ◆ Understand ways for occupational safety and health, and hazards that may occur, and to prevent accidents ◆ Understand the restrictions of electrical and mechanical engineering workplace, and follow the safety working procedures to take effective protection steps for the following: <ul style="list-style-type: none"> • Work at height • Chemicals • Noisy environment • Biohazard • High humidity and temperature • Remote areas <p>6.2 Preventive measures on occupational safety and health</p> <ul style="list-style-type: none"> ◆ Implement preventive measures on general occupational safety and health according to safety legislations and working instructions for occupational safety and health and avoid accidents during electrical and mechanical engineering works. Preventive measures include: <ul style="list-style-type: none"> • Eye protector • Ear protector • Safety belt • Chemical handling procedures • Environmental hygiene, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Under different conditions/environments, choose different working procedures and use appropriate preventive measures on occupational safety and health so as to comply with the legal requirements and work safety instructions.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic occupational safety knowledge.

1. Title	Provide basic customer services
2. Code	EMFSMS201A
3. Range	Know about fire engineering service projects and relevant products for sale, and provide basic customer services in normal, predictable and structured environments.
4. Level	2
5. Credit	2
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Know about products and projects</p> <ul style="list-style-type: none"> ◆ Know about fire service products and fire engineering service projects for sale ◆ Understand the merits of products, such as energy-saving property, efficiency, durability, reliability, applications, etc., according to the sales and marketing information of the products ◆ Understand other competitive products and projects <p>6.2 Provide basic customer services</p> <ul style="list-style-type: none"> ◆ Provide basic customer services in daily, predictable and structured environments <ul style="list-style-type: none"> • Apply customer communication skills in sales and marketing of fire service product • Explain clearly to customers the merits and characteristics of the fire service equipment or fire engineering services • Explain the fire service product/technical information and contract details • Explain the scope of after-sales services for the fire service products
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to know about fire service products and fire engineering service projects; and</p> <p>(ii) Capable to provide basic customer services in normal, predictable and structured environments, such as explain clearly to customers the information about the fire service equipment or fire engineering service projects, the scope of after-sales services for the fire service products, etc.</p>
8. Remarks	This unit of competency is applicable to fire installation sales practitioners in general.

Competency Level 3

1. Title	Use computer to draw complicated mechanical engineering drawings
2. Code	EMCUDE315A
3. Range	Use computer to draw complicated mechanical engineering drawings in electrical and mechanical workplaces.
4. Level	3
5. Credit	5
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Computer engineering drawing techniques and methods</p> <ul style="list-style-type: none"> ◆ Understand the techniques and methods of using computer to draw complicated mechanical engineering drawings <p>6.2 Application of computer in drawing electrical and mechanical drawings</p> <ul style="list-style-type: none"> ◆ Use the computer to draw complicated mechanical engineering drawings according to design <ul style="list-style-type: none"> • Draw 3D drawings for mechanical parts <ul style="list-style-type: none"> ▸ Full 3D drawings ▸ Sectional 3D drawings ▸ Perspective 3D drawings • Draw different shapes of air ducts <ul style="list-style-type: none"> ▸ Cylindrical pipe ▸ Conical pipe ▸ Irregular surface pipe ▸ Air duct unit • Draw mechanical equipment assembly drawings <ul style="list-style-type: none"> ▸ Weld joints of pipes with different diameters ▸ Assembly of mechanical parts
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to draw a 3D mechanical equipment assembly drawings according to the design; and</p> <p>(ii) Capable to integrate several complicated mechanical components drawings into an integrated mechanical assembly drawing, including the developing drawings and assembly drawings, according to the design.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses the competency of drawing basic electrical and mechanical engineering drawings using computer.

1. Title	Use computer to draw for complicated electrical engineering drawings
2. Code	EMCUDE316A
3. Range	Use computer to draw complicated electrical engineering drawings in electrical and mechanical workplaces.
4. Level	3
5. Credit	5
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Techniques and methods of using computer to draw electrical engineering drawings</p> <ul style="list-style-type: none"> ◆ Understand the techniques and methods of using computer to draw complicated electrical engineering drawings <p>6.2 Use computer to draw complicated mechanical engineering drawings</p> <ul style="list-style-type: none"> ◆ Use the computer to draw complicated electrical engineering drawings according to design <ul style="list-style-type: none"> • Draw the main circuit layout of multi-layer power system and electrical installation with protection device according to design • Draw the circuit wiring layout of multi-layer power system and electrical installation with protective and control equipment according to design • Draw the complex control circuit layout according to design <ul style="list-style-type: none"> ▸ Logic electronic circuit ▸ Electrical and electronic control equipment circuits
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to draw a main circuit layout, control circuit layout and wiring layout of an electrical installation, including the electrical and electronic control equipment, according to design; and</p> <p>(ii) Capable to integrate several electrical distribution and wiring layouts into a comprehensive power supply and wiring layout for a multi-storey building according to design.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses the competency of drawing basic electrical and mechanical drawings with computer.

1. Title	Use computer to draw combined services drawings of building services
2. Code	EMCUDE317A
3. Range	Use computer to draw combined services drawings of building services as electrical and mechanical engineering design is involved.
4. Level	3
5. Credit	5
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Computer engineering drawing techniques and methods</p> <ul style="list-style-type: none"> ◆ Understand the techniques and methods of using computer to draw combined services drawings of building services, including: <ul style="list-style-type: none"> • Setting layer rules for combined services drawings of building services • Difference between drawing the equipment on layout plan directly and drawing on external reference drawings • Management and application of external reference drawings • Setting of configuration and drawing specifications <p>6.2 Application of computer in engineering drawing</p> <ul style="list-style-type: none"> ◆ Use the computer to draw combined services drawings of building services, including: <ul style="list-style-type: none"> • Copy the electrical and mechanical drawing layer needed from an electrical and mechanical layout plan to another electrical and mechanical layout plan to form a combined services drawings of building services • Compile the drawing layer of electrical and mechanical facilities with reference to external sources • Use information saved in files or databank to improve the efficiency of drawing ◆ Retrieve, manage and apply external reference drawings efficiently
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to draw a combined services drawings of building services according to design by including and merging building services drawings of different floors of the building and form a comprehensive building services drawing ; and</p> <p>(ii) Capable to use information saved in files or databank, including the external reference drawings, to improve the efficiency of drawing.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses the competency of drawing basic electrical and mechanical drawings with computer.

1. Title	Choose typical materials for electrical and mechanical work
2. Code	EMCUDE318A
3. Range	Choose appropriate materials commonly used in electrical and mechanical work to perform the work of design, installation and repair.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Functions, properties and range of application of common electrical and mechanical materials</p> <ul style="list-style-type: none"> ◆ Understand the functions, properties and range of application of common metallic and non-metallic materials, including: <ul style="list-style-type: none"> • Physical properties and chemical properties such as electric induction, thermal induction, expansion and contraction, anti-corrosion, solubility, etc. • Mechanical properties such as strength, hardness, resilience, fatigue limit, high-temperature strength, etc. • Processing properties such as casting, extension, welding, machining, heat treatment, etc. • Understand the functions and range of application of common metallic and non-metallic materials, such as their functions, application conditions and limitations for applying to the branches of electricity, air-conditioning, ship repair machinery and plant engineering, etc. <p>6.2 Choose electrical and mechanical materials needed</p> <ul style="list-style-type: none"> ◆ Capable to choose appropriate materials commonly used in electrical and mechanical work according to their properties and range of application as well as the engineering requirements and specifications in order to perform the work of electrical and mechanical design, installation and repair ◆ Capable to choose and check the materials to ensure that they comply with the safety specifications
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to choose appropriate materials commonly used in electrical and mechanical work according to their functions, properties and range of applications as well as the safety specifications in order to perform the work of electrical and mechanical design, installation and repair.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of electrical and mechanical materials.

1. Title	Apply the Code of Practice for Fire Service Installations and Equipment and relevant legislations
2. Code	EMFSDE301A
3. Range	Apply the Code of Practice for Fire Service Installations and Equipment and relevant legislations at workplaces where design, installation, operation, repair, maintenance and project management of fire systems and equipment are involved so that legal requirements are met.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of the Code of Practice for Fire Service Installations and Equipment and relevant legislations</p> <ul style="list-style-type: none"> ◆ Understand the Code of Practice for Fire Service Installations and Equipment and relevant legislations, including: <ul style="list-style-type: none"> • Required fire systems and their extents in various types of buildings • Specifications, regulations and standards of various types of fire service installations • Modes and methods of inspecting and testing fire service installations and equipment <p>6.2 Application of the Code of Practice for Fire Service Installations and Equipment and relevant legislations</p> <ul style="list-style-type: none"> ◆ Communicate with clients effectively on issues relevant to the design, installation, inspection, testing, commissioning, operation, repair and maintenance of fire service installations and equipment ◆ Apply the Code of Practice for Fire Service Installations and Equipment and relevant legislations to tasks of designing, installing, inspecting, testing, commissioning, operating, repairing and maintaining fire service installations and equipment in predicable and planned situations so that legal requirements are met
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to understand the Code of Practice for Fire Service Installations and Equipment and relevant legislations;</p> <p>(ii) Capable to communicate with clients effectively on issues relevant to the design, installation, inspection, testing, commissioning, operation, repair and maintenance of fire service installations and equipment; and</p> <p>(iii) Capable to apply the Code of Practice for Fire Service Installations and Equipment and relevant legislations in designing, installing, inspecting, testing, commissioning, operating, repairing and maintaining fire service installations and equipment in predicable and planned situations so that legal requirements are met.</p>
8. Remarks	This unit of competency is applicable to general fire engineering practitioners.

1. Title	Apply the knowledge of centrifugal water pumps and piping systems	
2. Code	EMFSDE302A	
3. Range	Master the knowledge of centrifugal water pumps and piping systems and, in predicable and regular situations, undertake the tasks of designing, installing, commissioning, operating, repairing and maintaining fire systems at design offices or sites where such systems are installed.	
4. Level	3	
5. Credit	4	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of centrifugal water pumps and piping systems</p> <ul style="list-style-type: none"> ◆ Understand the working principles and construction of centrifugal pumps, including: <ul style="list-style-type: none"> • The working principles of centrifugal pumps • The construction of single-stage horizontal centrifugal pumps • The construction of multi-stage centrifugal pumps ◆ Understand the characteristics of centrifugal pumps, including: <ul style="list-style-type: none"> • Definition of flow rate, head, power, efficiency, rotational speed and net positive suction head • Select a suitable centrifugal pump based on the characteristic curve • Locate and modify operating points based on the pump characteristic curve and piping system characteristic curve ◆ Understand the water piping system and the construction, functions and working principles of pipe accessories, including: <ul style="list-style-type: none"> • Types and uses of valves • The formation of water hammer and its prevention and remedy ◆ Understand the criteria and methods adopted for pipe sizing, including: <ul style="list-style-type: none"> • The relationship of diameter, flow rate, flow velocity and pressure loss of fitted pipes • Pressure loss of pipe fittings and valves <p>6.2 Application of the knowledge of centrifugal water pumps and plumbing systems</p> <ul style="list-style-type: none"> ◆ Apply the knowledge of centrifugal pumps and piping system, including: <ul style="list-style-type: none"> • Selecting proper centrifugal pumps and pipe fittings according to liquid properties, working conditions, water flow rate and head • Calculating the diameter of pipes, pressure loss, flow velocity and flow rate 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to apply the knowledge of centrifugal water pumps and piping systems to solve the problems involved in designing, installing, commissioning, operating, repairing and maintaining fire systems in predicable and regular situations.
8. Remarks	This unit of competency is applicable to practitioners who are engaged in designing, installing, commissioning, operating, repairing and maintaining fire systems.

1. Title	Apply the knowledge of fire pump motors and control circuits
2. Code	EMFSDE303A
3. Range	Apply the knowledge of fire pump motors and control circuits and, in predicable and regular situations, undertake the tasks of design, installation, testing, commissioning, operation, repair, maintenance and project management of such motors at design offices, workshops or fire pump rooms.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of fire pump motors and control circuits</p> <ul style="list-style-type: none"> ◆ Understand the types, functions and basic principles of fire pump motors ◆ Understand the starting methods of fire pump motors and their characteristics, including: <ul style="list-style-type: none"> • Direct starting • Star-delta starting • Autotransformer starting ◆ Understand the operation of control circuits, starters, protective devices, and control panels in different motor-starting methods ◆ Understand the calculation of the power, current and voltage of a motor <p>6.2 Apply the knowledge of fire pump motors and control circuits</p> <ul style="list-style-type: none"> ◆ Select proper single-phase or three-phase fire pump motors and starting control circuits in predicable and regular situations according to pump characteristics and loading ◆ Set the line/phase current and the power consumption of a motor ◆ Set the conductor size according to wiring length and physical environment
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply the knowledge of fire pump motors and control circuits to tasks of design, installation, testing, commissioning, operation, repair, maintenance and project management of such fire pump motors in predicable and regular situations.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic electrical knowledge.

1. Title	Draw engineering drawings of fire service installations	
2. Code	EMFSDE304A	
3. Range	Perform varying degrees of tasks of producing engineering drawings of fire service installations, at design offices, drawing rooms or work sites.	
4. Level	3	
5. Credit	9	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of production of engineering drawings of fire service installations</p> <ul style="list-style-type: none"> ◆ Understand the information included in schematic drawings of fire service installations, such as drawing list, building floor plan, abbreviations, symbol and explanatory note ◆ Understand the details of engineering drawings of fire service installations, and the production of drawings, including: <ul style="list-style-type: none"> • Layout plan • Vertical system schematic diagram • Electrical power and control wiring diagram • 3D assembly drawing ◆ Understand the details and requirements of sketch designs of general fire service installations ◆ Understand the conventions and standards for production of engineering drawings of fire service installations <p>6.2 Methods and procedures of producing engineering drawings of fire service installations</p> <ul style="list-style-type: none"> ◆ Know about the procedures and methods of producing engineering drawings of fire service installations ◆ Use standard drawing symbols and different techniques independently to draw fire service layout plans, vertical system schematic diagram and electrical power and control wiring diagrams of varying degrees of difficulty ◆ Indicate the equipment position, size and type, and wiring and conduit path on the drawings accurately ◆ Draw 3D assembly drawings of fire service installations ◆ Modify engineering drawings of fire service installations <p>6.3 Professionalism in production of engineering drawings of fire service installations</p> <ul style="list-style-type: none"> ◆ Produce various types of engineering drawings of fire service installations according to trade standards ◆ Understand legal requirements and relevant codes of practice when undertaking the production of engineering drawings of fire service installations 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to complete the production of engineering drawings of fire service installations systematically and effectively, such as using standard drawing symbols and different techniques independently to draw layout plans, vertical system schematic diagrams and electrical power and control wiring diagrams of varying degrees of difficulty.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge and techniques of producing engineering drawings of fire service installations.

1. Title	Apply the knowledge of water-based fire systems and equipment	
2. Code	EMFSDE305A	
3. Range	Apply the knowledge of water-based fire systems and equipment and undertake the tasks of designing, installing, commissioning, operating, repairing and maintaining such systems at design offices or work sites.	
4. Level	3	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of water-based fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the types, structure, construction, applications and working principles of typical water-based fire systems and equipment, including: <ul style="list-style-type: none"> • Sprinkler system • Fire hydrant/hose reel system • Drencher/deluge/water spray system ◆ Understand the construction and uses of components, and the impact of different accessories on system operation ◆ Understand the operation sequence and performance requirements of typical water-based fire systems ◆ Read the drawings of water-based fire systems and components ◆ Know about relevant specifications and guidelines stated in the Code of Practice for Fire Service Installations and Equipment <p>6.2 Application of water-based fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Communicate with clients effectively on issues relevant to the design, installation, commissioning, operation, repair and maintenance of water-based fire systems ◆ Apply the knowledge of water-based fire systems and equipment to the tasks of design, installation, commissioning, operation, repair and maintenance, including: <ul style="list-style-type: none"> • Select proper water-based fire systems and equipment according to building types and uses • Ensure that the selected water-based fire systems and equipment meet the requirements and guidelines stated in the Code of Practice for Fire Service Installations and Equipment • Perform assessments and tests of the general installation, operation and maintenance work of water-based fire systems and equipment and make proposals for solving the problems 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to communicate with clients effectively on issues relevant to the design, installation, commissioning, operation, repair and maintenance of water-based fire systems; and (ii) Capable to apply the knowledge of water-based fire systems and equipment in the selection of proper systems for the client and to solve the problems relevant to the design, installation, commissioning, operation, repair and maintenance of such systems.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of fire service installations.

1. Title	Apply the knowledge of non-water-based fire systems and equipment	
2. Code	EMFSDE306A	
3. Range	Apply the knowledge of non-water-based fire systems and equipment to the design, installation, commissioning, operation, repair and maintenance of such systems at design offices or work sites.	
4. Level	3	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of non-water-based fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the types, construction, functions, applications and working principles of typical non-water-based fire systems and equipment, including: <ul style="list-style-type: none"> • Carbon dioxide • FM200 • NAFSIII • Other similar extinguishing agents ◆ Understand the construction and uses of components, and the impact of different accessories on system operation ◆ Understand the operation sequence and performance requirements of typical non-water-based fire systems ◆ Read the drawings of non-water-based fire systems and components ◆ Know about relevant specifications and guidelines stated in the Code of Practice for Fire Service Installations and Equipment <p>6.2 Application of non-water-based fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Communicate with clients effectively on issues relevant to the design, installation, commissioning, operation, repair and maintenance of non-water-based fire systems ◆ Apply the knowledge of non-water-based fire systems and equipment to the design, installation, commissioning, operation, repair and maintenance tasks, including: <ul style="list-style-type: none"> • Select proper non-water-based fire systems and equipment according to building types and uses • Ensure that the selected non-water-based fire systems and equipment meet the requirements and guidelines stated in the Code of Practice for Fire Service Installations and Equipment • Perform assessments and tests of the general installation, operation and maintenance work of non-water-based fire systems and equipment and make proposals for solving the problems 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to communicate with clients effectively on issues relevant to the design, installation, commissioning, operation, repair and maintenance of non-water-based fire systems; and (ii) Capable to apply the knowledge of non-water-based fire systems and equipment in the selection of proper systems for the client and to solve the problems involved in the design, installation, commissioning, operation, repair and maintenance of such systems.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of fire service installations.

1. Title	Apply the knowledge of fire detection and alarm systems and equipment
2. Code	EMFSDE307A
3. Range	Apply the knowledge of fire detection and alarm systems and equipment to the design, installation, operation, repair, maintenance and project management of such systems at design offices or work sites.
4. Level	3
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the types, construction, functions, applications and working principles of typical fire detection and alarm systems and equipment, including: <ul style="list-style-type: none"> • Audio/visual advisory system • Fire detection system (conventional electronic type and addressable intelligent type) • Fire alarm system ◆ Understand the construction, uses and selection of components, and the impact of different accessories on system operation ◆ Understand the operation sequence and performance requirements of typical fire detection and alarm systems ◆ Understand system drawings and component drawings ◆ Understand relevant specifications and guidelines stated in the Code of Practice for Fire Service Installations and Equipment <p>6.2 Application of the knowledge of fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Communicate with the sector and clients on issues relevant to the design, installation, commissioning, operation, repair and maintenance of detection and alarm systems and equipment, including: <ul style="list-style-type: none"> • Select suitable fire detection and alarm systems and equipment according to building types and uses • Ensure that the selected components meet the requirements stated in the Code of Practice for Fire Service Installations and Equipment • Perform assessments of general installation, operation and maintenance of fire detection and alarm systems, and identify solutions for solving the problems
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply the knowledge of detection and alarm systems and equipment and to solve the problems involved in the design, installation, commissioning, operation, repair and maintenance of such systems; to communicate with the sector and clients.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of fire service installations.

1. Title	Perform electrical and mechanical installation and testing according to the drawings and specifications of electrical devices and wiring
2. Code	EMCUIN306A
3. Range	Interpret the engineering drawings of electrical devices, circuits and wiring and able to apply relevant information for electrical and mechanical works.
4. Level	3
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Uses of the drawings of electrical devices, circuits and wiring</p> <ul style="list-style-type: none"> ◆ Understand the uses of various types of engineering drawings of electrical works ◆ Identify different versions of engineering drawings of electrical works ◆ Capable to apply electrical symbols, scaling calculations and relevant engineering drawings of electrical works <p>6.2 Obtain relevant information of electrical devices, control circuits and wiring drawings to complete installation and testing of electrical systems</p> <ul style="list-style-type: none"> ◆ Obtain suitable electrical engineering drawings according to project requirements ◆ Capable to obtain relevant information of the main circuit, including: <ul style="list-style-type: none"> • Connection of the main circuit • Details of power distribution • Power switch interlock ◆ Capable to obtain relevant information of electrical equipment and control circuits, including: <ul style="list-style-type: none"> • Principles of control • Control circuits • Control components, including circuit breakers, relays, push-buttons and their contacts • Electronic control circuits ◆ Capable to obtain information of control circuit and wiring drawings, including: <ul style="list-style-type: none"> • Selection of cables • Classification of cables • Laying of cables • Wiring conduits • Wiring trunkings • Identification and marking of cables • Connection of cables

	<ul style="list-style-type: none"> ◆ Capable to obtain relevant information from drawings of electrical devices, circuits and wiring for performing an electrical and mechanical task, such as the information below for installation and testing of a starter circuit for a three-phase AC motor: <ul style="list-style-type: none"> • Principles of control circuit interlock • Conduits and trunkings required • Laying of cables • Connection of cables • Identification and marking of cables
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to select suitable engineering drawings of electrical works, and obtain relevant information from drawings for completion of installation and testing of an electrical and mechanical system and equipment, such as the installation and testing of a power distribution system in a multi-storey building.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of electricity.</p>

1. Title	Perform general lifting machinery and lifting equipment inspection
2. Code	EMCUIN313A
3. Range	Perform general lifting machinery and lifting equipment inspection, according to relevant legal requirements, in general industrial plants or electrical and mechanical workplaces where lifting and handling work is involved, and be capable to perform related inspection independently and assist the registered professional engineer in arranging trial loading test for large lifting machinery.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Operating principles of general lifting machinery and lifting equipment and legislations related to inspection</p> <ul style="list-style-type: none"> ◆ Understand the operating principles of general lifting machinery and lifting equipment ◆ Understand the legal requirements on general lifting machinery and lifting equipment inspection ◆ Understand the overhauling procedures for general lifting equipment, including the operation, repair, maintenance, inspection, complete check, testing and components of lifting machinery <p>6.2 General lifting machinery and lifting equipment inspection</p> <ul style="list-style-type: none"> ◆ Perform regular inspection on general lifting machinery according to legal requirements and working instructions, including performing routine check, assisting the registered professional engineer to conduct the overhaul and loading test, etc. ◆ Perform regular inspection on general lifting equipment according to legal requirements and working instructions
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to perform routine check for general lifting machinery and lifting equipment according to legal requirements, and assist the registered professional engineer to conduct thorough inspection and loading test.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses the competency of using general loading and lifting equipment.

1. Title	Operate and maintain abrasive wheels safely
2. Code	EMCUIN315A
3. Range	Operate all kinds of abrasive wheels in workshops or work sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Methods of operating abrasive wheels</p> <ul style="list-style-type: none"> ◆ Be familiar with the safe operation of abrasive wheels, including: <ul style="list-style-type: none"> • Maximum permissible speed of abrasive wheel in different size (speed of abrasive wheel) • Speed of spindle • Protective guard for moving abrasive wheel • Gap between the cutter block and abrasive wheel • Ensure that the abrasive wheel has been fitted securely before use • Effective devices to connect and disconnect power supply must be available for the abrasive wheel used in the machinery • Suitable working environment e.g. no materials without tied <p>6.2 Maintenance of abrasive wheel</p> <ul style="list-style-type: none"> ◆ Be familiar with the maintenance of abrasive wheel, including: <ul style="list-style-type: none"> • Repair of the protective guard • Repair of the rest • Reconditioning of the abrasive wheel <p>6.3 Operation and maintenance procedures for abrasive wheel</p> <ul style="list-style-type: none"> ◆ Know how to choose suitable abrasive wheels for different kinds of work ◆ Know the needs and principles of regularly repairing and maintaining abrasive wheel, including the procedures of inspection, maintenance and alignment ◆ Use general repairing and checking instruments and tools effectively
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to operate abrasive wheels safely;</p> <p>(ii) Capable to choose suitable abrasive wheels for different kinds of work; and</p> <p>(iii) Capable to perform routine maintenance and fault repair of abrasive wheels effectively.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of occupational safety and machinery/materials.

1. Title	Perform manual metal arc welding (MMAW) / shielded metal arc welding (SMAW) on different kinds of steel according to drawings	
2. Code	EMCUIN321A	
3. Range	Perform general MMAW/SMAW tasks for common carbon steel, high carbon steel or stainless steel, according to drawings, at electrical and mechanical welding workshops or work sites.	
4. Level	3	
5. Credit	4	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Preparations for MMAW/SMAW</p> <ul style="list-style-type: none"> ◆ Read the drawings correctly (including symbolisation of welding symbols and welding processes) ◆ Understand the code of safety for MMAW/SMAW ◆ Understand the application of different electrodes ◆ Understand technical requirements of different kinds of steel on different electrodes ◆ Understand the classification of weld examination ◆ Understand the mechanical properties of metals ◆ Understand weld defects such as undercut, overlap, porosities, cracks and slag inclusions <p>6.2 Perform MMAW/SMAW according to drawings</p> <ul style="list-style-type: none"> ◆ Estimate the impact of welding procedure on the dimensions of work piece ◆ Perform assembly (including root opening, tack weld and anti-distortion procedure) according to the drawing ◆ Inspect the dimensions of weld and surface weld defects ◆ Select electrodes according to the properties of steels ◆ Use different electrodes for welding ◆ Perform welding tasks according to the properties of different kinds of steel <p>6.3 Professionalism in MMAW/ SMAW</p> <ul style="list-style-type: none"> ◆ Perform MMAW/ SMAW tasks according to relevant safety guidelines and code of practice 	

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to follow the safety instructions and code of practice to apply MMAW/ SMAW in one-side full-penetration welding at flat position, at horizontal position, at vertical up position and at overhead position, according to drawings, on different kinds of steel; (ii) Capable to apply MMAW/ SMAW in fillet welding at flat position, at horizontal position, at vertical up position, at vertical down position and at overhead position, according to drawings, on different kinds of steel; and (iii) Capable to point out the classification, specification and application of different electrodes and to select proper electrodes according to the properties of different kinds of steel.
8. Remarks	<p>This unit of competency is suitable for enhancing the competency of electrical and mechanical welding practitioners. The credit value of this unit of competency is set on the presumption that the person already possesses the competency of EMCUIN225A “Basic manual metal arc welding (MMAW) / shielded metal arc welding (SMAW)”.</p>

1. Title	Perform oxy-acetylene welding(OAW) / oxyfuel and arc cutting(OAC) according to drawings
2. Code	EMCUIN323A
3. Range	Perform OAW / OAC tasks according to drawings at electrical and mechanical welding workshops or work sites.
4. Level	3
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Code of safety and preparations for OAW / OAC</p> <ul style="list-style-type: none"> ◆ Understand the code of safety for OAW / OAC ◆ Know about the preparations for OAW / OAC ◆ Understand functions of various OAW / OAC equipment, including high pressure cylinder, pressure regulator, flashback arrestor, welding torch and cutting torch, etc. ◆ Understand the OAW / OAC technical requirements on welding materials (e.g. welding rods, welding flux etc.) ◆ Read the drawings correctly (including symbolisation of welding symbol and welding processes) <p>6.2 Perform OAW / OAC according to drawings</p> <ul style="list-style-type: none"> ◆ Estimate the impact of welding procedures on the dimensions of work piece ◆ Perform assembly (including root opening, tack weld and anti-distortion procedure) according to the drawing ◆ Perform visual examination on weld profile <p>6.3 Professionalism in handling OAW / OAC</p> <ul style="list-style-type: none"> ◆ Perform OAW / OAC tasks according to relevant safety guidelines and code of practice
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to perform OAW / OAC at flat position, at horizontal position, at vertical up position and at overhead positions according to drawings.</p>
8. Remarks	This unit of competency is suitable for enhancing the competency of electrical and mechanical welding practitioners. The credit value of this unit of competency is set on the presumption that the person already possesses the competency of EMCUIN226A “Basic oxy-acetylene welding (OAW) / oxyfuel and arc cutting (OAC)”.

1. Title	Install water-based fire service mechanical equipment	
2. Code	EMFSIN301A	
3. Range	Perform different levels of tasks of installing water-based fire service mechanical equipment at workshops or equipment installation points.	
4. Level	3	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of installing water-based fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Understand the operating principles of various types of water-based fire service mechanical installations such as: <ul style="list-style-type: none"> • sprinkler system • Fire hydrant/hose reel system • Drencher system • Deluge system • Water spray system ◆ Understand installation drawings of water-based fire service mechanical installations ◆ Understand the installation requirements and specifications of such equipment <p>6.2 Methods and procedures of installing water-based fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Master the installation procedures and methods for water-based fire service mechanical installations, including the procedures of material checking, assembly, adjustment and testing; and instruct subordinates to carry out installation work safely and of high quality ◆ Select and use suitable water-based fire service mechanical equipment components and materials ◆ Install and set fire pipes, pumps, switches, hose reels, fire hydrants, fire service inlets, etc. independently at suitable locations ◆ Select, use and maintain basic workshop equipment and tools for class 2 fire service mechanical installation contractors, e.g. threading machine, electric drill, bench fitting tools and welding machine ◆ Use testing tools to conduct functional tests independently after installation <p>6.3 Professionalism in installing water-based fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Perform different levels of tasks of installing water-based fire service mechanical equipment according to installation instructions ◆ Undertake installation work of water-based fire service mechanical installations according to safety guidelines required by the law and codes of practice 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to complete different levels of installation tasks systematically and efficiently for water-based fire service mechanical equipment; and(ii) Capable to undertake installation work of water-based fire service mechanical installations according to codes of practice and safety guidelines required by the law.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in installing water-based fire service mechanical installations.

1. Title	Install non-water-based fire service mechanical equipment	
2. Code	EMFSIN302A	
3. Range	Perform different levels of tasks of installing non-water-based fire service mechanical equipment at workshops or equipment installation points.	
4. Level	3	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of installing non-water-based fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Understand the operating principles of various types of non-water-based fire service mechanical installations such as: <ul style="list-style-type: none"> • Carbon dioxide system • FM200 system • NAFSIII system • Other similar extinguishing agent systems ◆ Understand installation drawings of non-water-based fire service mechanical installations ◆ Understand the installation requirements and specifications of such equipment <p>6.2 Methods and procedures of installing non-water-based fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Master the installation procedures and methods for non-water-based fire service mechanical installations, including the procedures of material checking, assembly, adjustment and testing ◆ Instruct subordinates to carry out installation work safely and of high quality ◆ Select and use suitable non-water-based fire service mechanical equipment components and materials ◆ Install and set fire pipes, gas cylinders, switches, exhaust valves, detectors and nozzles, etc. independently at suitable locations ◆ Select, use and maintain basic workshop equipment and tools for class 2 fire service mechanical installation contractors, e.g. threading machine, electric drill, bench fitting tools and welding machine ◆ Use testing tools to conduct functional tests independently after installation <p>6.3 Professionalism in installing non-water-based fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Perform different levels of tasks of installing non-water-based fire service mechanical equipment according to installation instructions ◆ Undertake installation work of non-water-based fire service mechanical installations according to safety guidelines required by the law and codes of practice 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to complete different levels of installation tasks systematically and efficiently for non-water-based fire service mechanical equipment; and (ii) Capable to undertake installation work of non-water-based fire service mechanical installations according to codes of practice and safety guidelines required by the law.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in installing non-water-based fire service mechanical installations.

1. Title	Install fire detection and alarm systems and equipment	
2. Code	EMFSIN303A	
3. Range	Perform different levels of tasks of installing fire detection and alarm systems and equipment at workshops or equipment installation points.	
4. Level	3	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of installing fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the operating principles of various types of fire detection and alarm systems and equipment such as: <ul style="list-style-type: none"> • Conventional (electronic) type • Addressable (intelligent) type ◆ Understand installation drawings of fire detection and alarm systems and equipment ◆ Understand the installation requirements and specifications of such equipment <p>6.2 Methods and procedures of installing fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the installation procedures and methods for fire detection and alarm systems and equipment, including the procedures of material checking, assembly, adjustment and testing ◆ Instruct subordinates to carry out installation work safely and of high quality ◆ Select and use suitable fire detection and alarm systems and equipment components and materials ◆ Install and set heat, smoke and flame detectors, audio/visual advisory systems, annunciation panels, batteries and chargers, etc. independently at suitable locations ◆ Select, use and maintain basic workshop equipment and tools for class 1 fire service installation contractors, e.g. threading tools (for conduit), electric drill, bench fitting tools and multi-meter ◆ Use testing tools to conduct functional tests independently after installation <p>6.3 Professionalism in installing fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Perform different levels of tasks of installing fire detection and alarm systems and equipment according to installation instructions ◆ Undertake installation work of fire detection and alarm systems and equipment according to safety guidelines required by the law and codes of practice 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to complete different levels of installation tasks systematically and efficiently for fire detection and alarm systems and equipment; and (ii) Capable to undertake installation work of fire detection and alarm systems and equipment according to codes of practice and safety guidelines required by the law.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in installing fire detection and alarm systems and equipment.

1. Title	Install fire service power supply and control equipment	
2. Code	EMFSIN304A	
3. Range	Perform different levels of tasks of installing fire service power supply and control equipment at workshops or equipment installation points. This unit of competency does not include the competency of installing the electrical installations of fire detection and alarm systems.	
4. Level	3	
5. Credit	4	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of installing fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Understand the operating principles of various types of fire service power supply and control equipment such as: <ul style="list-style-type: none"> • AC/DC electrical power distribution system • Electrical control circuit and control panel • Electrical protection device • Fire-resistant cable (including copper-sheathed cable) ◆ Understand installation drawings of fire service power supply and control equipment ◆ Understand the installation requirements and specifications of such equipment <p>6.2 Methods and procedures of installing fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Master the installation procedures and methods for fire service power supply and control equipment, including the procedures of material checking, assembly, adjustment and testing ◆ Instruct subordinates to carry out installation work safely and of high quality ◆ Select and use suitable fire service power supply and control equipment components and materials ◆ Install and set distribution board, wire, conduit, switchgear, control panel, pump motor starter, relay and indicator light, etc. independently at suitable locations ◆ Select, use and maintain basic workshop equipment and tools for class 2 fire service electrical installation contractors, e.g. threading tools (for conduit), electric drill, bench fitting tools and multi-meter ◆ Use testing tools to conduct functional tests independently after installation <p>6.3 Professionalism in installing fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Perform different levels of tasks of installing fire service power supply and control equipment according to installation instructions ◆ Undertake installation work of fire service power supply and control equipment according to safety guidelines required by the law and codes of practice 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to complete different levels of installation tasks systematically and efficiently for fire service power supply and control equipment; and (ii) Capable to undertake installation work of fire service power supply and control equipment according to codes of practice and safety guidelines required by the law.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in installing fire service power supply and control equipment.

1. Title	Install fire pumps	
2. Code	EMFSIN305A	
3. Range	Master knowledge of fire pump installation and, in predictable and structured situations, perform installation tasks at general fire service work sites or locations where installation of fire pumps is involved.	
4. Level	3	
5. Credit	3	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of fire pump installation</p> <ul style="list-style-type: none"> ◆ Understand the installation requirements for various types of fire pumps when reading assembly drawings: <ul style="list-style-type: none"> • Requirements for pump foundations • Requirements for couplings • Requirements for the pump inlet and outlet system <p>6.2 Methods and procedures for installation of fire pumps</p> <ul style="list-style-type: none"> ◆ Use alignment and levelling instruments to take measurements of a fire pump and its motor foundation, including: <ul style="list-style-type: none"> • Methods of alignment and levelling and calculation of adjustments • Methods of centring and calculation of adjustments ◆ Use various types of levelling and alignment instruments, such as level gauges and steel wire, to take measurements on-site, including: <ul style="list-style-type: none"> • Horizontal level of foundation surface • Vertical level of foundation bolts ◆ Draw the layout of supporting frame according to the dimensions of the equipment base ◆ Measure and adjust the radial movement of couplings ◆ Fasten foundation bolts according to specification ◆ Inspect the moving parts of various types of fire pumps after fastening, and conduct functional tests after installation ◆ Compile reports on installation of fire pumps ◆ State clearly the operation conditions of fire pumps <p>6.3 Professionalism in fire pump installation</p> <ul style="list-style-type: none"> ◆ Install fire pumps according to drawings and works specifications ◆ Control the progress of installation to meet works specifications and quality standards ◆ Understand the legal requirements on work safety, the code of practice and the supplier's guidelines when performing tasks of fire pump installation 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to install fire pumps effectively in predictable and structured situations; (ii) Capable to complete work tests, including proper execution of leveling and alignment procedures and installation procedures, recording data and adjusting of equipment to required standards; and (iii) Capable to compile reports on installation of fire pumps and state clearly their operation.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of mechanics and installation skills.

1. Title	Test fire service installations
2. Code	EMFSIT301A
3. Range	Test fire installations independently in all kinds of predictable and regular situations at installation or servicing points.
4. Level	3
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of testing fire service installations</p> <ul style="list-style-type: none"> ◆ Understand the methods of inspecting and testing general fire service installations, including static inspection, dynamic test and pressure test ◆ Understand the uses and working principles of various kinds of testing instruments and tools ◆ Understand the requirements of local regulations and international standards on testing various kinds of fire systems and installations, including: <ul style="list-style-type: none"> • Code of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installation and Equipment • Rules of the Loss Prevention Council, UK • Codes of National Fire Protection Association, US <p>6.2 Methods and procedures of testing fire service installations</p> <ul style="list-style-type: none"> ◆ Master the methods and procedures of testing general fire service installations ◆ Select and check the testing and measuring instruments correctly ◆ Perform more complicated testing tasks ◆ Prepare documents for testing and adjustment (e.g. checklist, testing report, etc) ◆ Record and evaluate data measured ◆ Use worksite equipment and tools from fire service installation contractors safely <p>6.3 Professionalism in testing fire service installations</p> <ul style="list-style-type: none"> ◆ Undertake routine testing for fire service installations according to the code of practice
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to complete tasks of testing and measuring operating parameters of general fire systems systematically and efficiently; and</p> <p>(ii) Capable to undertake tasks of testing and measuring mechanical devices of fire systems according to the code of practice.</p>
8. Remarks	This unit of competency is applicable to general practitioners engaged in installing, repairing and commissioning mechanical devices of fire systems.

1. Title	Apply fault finding techniques to find the root causes of fault
2. Code	EMCUOR301A
3. Range	Analyze the fault and performance information on the maintenance records of the electrical and mechanical equipment, and apply the fault finding techniques to find out the root causes of fault.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Analyze the fault and record of the electrical and mechanical equipment</p> <ul style="list-style-type: none"> ◆ Understand the classification and techniques to retrieve fault information on the maintenance of the electrical and mechanical equipment <p>6.2 Apply fault finding techniques to find the root of fault</p> <ul style="list-style-type: none"> ◆ Analyze the fault information and performance record of the equipment, and enhance the effectiveness of fault finding with the help of the following : <ul style="list-style-type: none"> • Bathtub curve • The failure of similar equipment ◆ Apply the following fault finding techniques to enhance the effectiveness detecting the electrical and mechanical faults <ul style="list-style-type: none"> • Middle point tracing technique • Input signals injection technique for tracing fault origin • Use potential divider method to calculate the location of fault
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to retrieve and analyze the fault information effectively on maintenance record of the electrical and mechanical equipment, and apply the fault finding techniques to find out the root cause of fault effectively.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic electrical and mechanical knowledge.

1. Title	Maintain and repair water-based fire service mechanical installations
2. Code	EMFSOR301A
3. Range	Carry out maintenance and repair of water-based fire service mechanical installations independently at repair workshops or work sites according to repair instructions and standards.
4. Level	3
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and operating principles of water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Understand the functions and operating principles of various types of water-based fire service mechanical installations, including: <ul style="list-style-type: none"> • sprinkler system • Fire hydrant/hose reel system • Drencher system • Deluge system • Water spray system <p>6.2 Repair and maintenance methods and procedures of water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of maintenance and repair of various types of fixed water-based fire service systems and mechanical installations, including the procedures of inspection, repair and testing ◆ Instruct subordinates to carry out maintenance and repair safely and of high quality ◆ Examine the damage condition of accessories independently, such as water tanks, pipes, pumps, switches, fire hydrants, fire service inlets, according to repair instructions ◆ Diagnose the problems and repair or replace damaged accessories ◆ Select, use and maintain general workshop equipment and tools for class 2 fire service mechanical installation contractors ◆ Use appropriate testing equipment to conduct functional tests independently after repair <p>6.3 Professionalism in maintenance and repair of water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Carry out maintenance and repair of water-based fire service mechanical installations independently according to repair instructions and specifications ◆ Undertake maintenance and repair work of water-based fire service mechanical installations according to safety guidelines required by the law and codes of practice

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to carry out maintenance and repair of water-based fire service mechanical installations independently; and(ii) Capable to undertake maintenance and repair work of water-based fire service mechanical installations according to codes of practice.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in repairing and maintaining water-based fire service mechanical installations.

1. Title	Maintain and repair non-water-based fire service mechanical installations
2. Code	EMFSOR302A
3. Range	Carry out maintenance and repair of non-water-based fire service mechanical installations independently at repair workshops or work sites according to repair instructions and standards.
4. Level	3
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and operating principles of non-water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Understand the functions and operating principles of various types of non-water-based fire service mechanical installations, including: <ul style="list-style-type: none"> • Carbon dioxide system • FM200 system • NAFSIII system • Other similar extinguishing agent systems <p>6.2 Repair and maintenance methods and procedures of non-water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of maintenance and repair of various types of fixed non-water-based fire service systems and mechanical installations, including the procedures of inspection, repair and testing ◆ Examine the damage condition of accessories independently, such as pipes, gas cylinders, switches, exhaust valves, nozzles, detectors and control panels, according to repair instructions ◆ Diagnose the problems and repair or replace damaged accessories ◆ Select, use and maintain general workshop equipment and tools for class 2 fire service mechanical installation contractors ◆ Use appropriate testing equipment to conduct functional tests independently after repair ◆ Instruct subordinates to carry out maintenance and repair work properly <p>6.3 Professionalism in maintenance and repair of non-water-based fire service mechanical installations</p> <ul style="list-style-type: none"> ◆ Carry out maintenance and repair of non-water-based fire service mechanical installations independently according to repair instructions and specifications ◆ Undertake maintenance and repair work of non-water-based fire service mechanical installations according to safety guidelines required by the law and codes of practice

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to carry out maintenance and repair of non-water-based fire service mechanical installations independently; and (ii) Capable to undertake maintenance and repair work of non-water-based fire service mechanical installations according to codes of practice and legal requirements on safety.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in repairing and maintaining non-water-based fire service mechanical installations.

1. Title	Maintain and repair fire detection and alarm systems and equipment
2. Code	EMFSOR303A
3. Range	Carry out maintenance and repair of fire detection and alarm systems and equipment independently at repair workshops or work sites according to repair instructions and standards.
4. Level	3
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and operating principles of fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the functions and operating principles of various types of fire detection and alarm systems and equipment, including: <ul style="list-style-type: none"> • Conventional (electronic) type • Addressable (intelligent) type <p>6.2 Repair and maintenance methods and procedures of fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of maintenance and repair of various types of fire detection and alarm systems and equipment, including the procedures of inspection, repair and testing ◆ Examine the damage condition of accessories independently, such as heat, smoke and flame detectors, audio/visual advisory systems, annunciation panels, batteries and chargers, according to repair instructions ◆ Diagnose the problems and repair or replace damaged accessories ◆ Select, use and maintain general workshop equipment and tools for class 1 fire service installation contractors ◆ Use appropriate testing equipment to conduct functional tests independently after repair ◆ Instruct subordinates to carry out maintenance and repair work properly <p>6.3 Professionalism in maintenance and repair of fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Carry out maintenance and repair of fire detection and alarm systems and equipment independently according to repair instructions and specifications ◆ Undertake maintenance and repair work of fire detection and alarm systems and equipment according to safety guidelines required by the law and codes of practice
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to carry out maintenance and repair of fire detection and alarm systems and equipment independently; and</p> <p>(ii) Capable to undertake maintenance and repair work of fire detection and alarm systems and equipment according to codes of practice and legal requirements on safety.</p>

8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in repairing and maintaining fire detection and alarm systems and equipment.
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1. Title	Maintain and repair fire service power supply and control equipment
2. Code	EMFSOR304A
3. Range	Carry out maintenance and repair of fire service power supply and control equipment independently at repair workshops or work sites according to repair instructions and standards. This unit of competency does not include the competency of repairing the electrical installations of fire detection and alarm systems.
4. Level	3
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and operating principles of fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Understand the functions and operating principles of various types of fire service power supply and control equipment, including: <ul style="list-style-type: none"> • AC/DC power distribution system • Electrical control circuit and control panel • Electrical protection device • Fire-resistant cable (including copper-sheathed cable) <p>6.2 Repair and maintenance methods and procedures of fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of maintenance and repair of various types of fire service power supply and control equipment, including the procedures of inspection, repair and testing ◆ Examine the damage condition of accessories independently, such as distribution board, wire, conduit, switchgear, control panel, pump motor starter, relay and indicator light, according to repair instructions ◆ Diagnose the problems and repair or replace damaged accessories ◆ Select, use and maintain general workshop equipment and tools for class 2 fire service electrical installation contractors ◆ Use appropriate testing equipment (e.g. multi-meter, insulation tester, etc.) to conduct functional tests independently after repair ◆ Instruct subordinates to carry out maintenance and repair work properly <p>6.3 Professionalism in maintenance and repair of fire service power supply and control equipment</p> <ul style="list-style-type: none"> ◆ Carry out maintenance and repair of fire service power supply and control equipment independently according to repair instructions and specifications ◆ Undertake maintenance and repair work of fire service power supply and control equipment according to safety guidelines required by the law and codes of practice

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to carry out maintenance and repair of fire service power supply and control equipment independently; and (ii) Capable to undertake maintenance and repair work of fire service power supply and control equipment according to codes of practice and legal requirements on safety.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in repairing and maintaining fire service power supply and control equipment.

1. Title	Maintain and repair portable fire extinguishing equipment
2. Code	EMFSOR305A
3. Range	Carry out maintenance and repair of portable fire extinguishing equipment independently at repair workshops or work sites in all kinds of predictable and structured contexts according to repair instructions and standards.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and operating principles of fire extinguisher and fire blanket</p> <ul style="list-style-type: none"> ◆ Understand the construction, functions and operating principles of various types of portable fire extinguishing equipment, including: <ul style="list-style-type: none"> • Carbon dioxide fire extinguisher • Water type fire extinguisher • Dry powder fire extinguisher • Clean agent fire extinguisher • Foam fire extinguisher • Fire blanket <p>6.2 Repair and maintenance methods and procedures of portable fire extinguishing equipment</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of maintenance and repair of various types of portable fire extinguishing equipment, including the procedures of inspection, repair and testing ◆ Determine the condition and weight of the extinguishing agent and refill or replace accordingly ◆ Examine the damage condition of accessories independently, such as discharge tube, strainers and nozzles, according to repair instructions ◆ Select, use and maintain workshop equipment and tools for class 3 fire service installation contractors ◆ Use appropriate testing equipment to conduct functional tests independently after repair, including hydraulic test and discharge test, to ensure that the extinguishers are in good condition and function properly ◆ Instruct subordinates to carry out maintenance and repair work properly <p>6.3 Professionalism in maintenance and repair of portable fire extinguishing equipment</p> <ul style="list-style-type: none"> ◆ Carry out maintenance and repair of portable fire extinguishing equipment independently according to repair instructions and specifications ◆ Undertake maintenance and repair work of portable fire extinguishing equipment according to safety guidelines required by the law and codes of practice

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to carry out maintenance and repair of portable fire extinguishing equipment independently; and (ii) Capable to undertake maintenance and repair work of portable fire extinguishing equipment according to codes of practice and legal requirements on safety.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in repairing and maintaining portable fire extinguishing equipment.

1. Title	Draw up rates of quantities and costing of project
2. Code	EMFSPM301A
3. Range	Set reasonable tender prices according to the tender drawings and documents, bills of quantities, estimated materials, manpower and profits, etc. for the cost management of fire service projects.
4. Level	3
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Content of tender documents, drawings and bills of quantities</p> <ul style="list-style-type: none"> ◆ know about details of standard tender documents and drawings such as: <ul style="list-style-type: none"> • scope and terms of contract • Project schedule • Payment method • Tender procedures • Tender specifications ◆ Submit counter-proposals on tender documents ◆ Negotiate with customers on and modify the content of tenders <p>6.2 Draw up rates of quantities and costing of project</p> <ul style="list-style-type: none"> ◆ Measure bills of quantities according to the contract terms, tender specifications or drawings ◆ Negotiate with suppliers on prices of materials and transport ◆ Estimate labour costs ◆ Consider the marginal profits and set a reasonable tender price
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to draw up rates of quantities and costing of project according to tender documents and set a reasonable tender price.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of quantity survey.

1. Title	Apply basic construction techniques
2. Code	EMFSPM302A
3. Range	Apply various basic construction techniques to coordinate with fire service installations, in all kinds of predictable and structured contexts, at fire service installation work sites.
4. Level	3
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of building construction techniques</p> <ul style="list-style-type: none"> ◆ Know about types of building structures ◆ Understand general building architectural and structural plan ◆ Know about types and properties of structural and non-structural building materials ◆ Understand basic forms and methods of inside building construction and the relationship with electrical and mechanical installations ◆ Know about the Buildings Ordinance and its subsidiary legislations <p>6.2 Coordination of fire service installation and building construction</p> <ul style="list-style-type: none"> ◆ Analyze the building design and allocate adequate inside space of building necessary for fire equipment installation in all kinds of predictable and structured contexts ◆ List builder's work requirements necessary for fire service installation, such as: <ul style="list-style-type: none"> • Size of service room • Capacity of water tank • Size and position of wall or floor openings planned • Concrete plinth etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply all kinds of basic construction techniques effectively to coordinate with fire service installations, and analyze the building design and allocate adequate inside space of building necessary for fire equipment installation in all kinds of predictable and structured contexts.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of fire services.

1. Title	Procure simple electrical and mechanical engineering equipment and materials
2. Code	EMCUOM301A
3. Range	Know how to procure simple electrical and mechanical engineering equipment and materials, and control the procurement cost for the electrical and mechanical operation management.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Procurement procedures for general and simple electrical and mechanical engineering equipment and materials</p> <ul style="list-style-type: none"> ◆ Understand the procurement procedures for general and simple electrical and mechanical engineering equipment and materials, such as liaising with suppliers, assessing the quality and prices of materials from the suppliers, general ordering and payment procedures, etc. <p>6.2 Procure simple electrical and mechanical engineering equipment and materials</p> <ul style="list-style-type: none"> ◆ List out correctly the details, specifications and standards of the equipment and materials to be procured ◆ Procure equipment and materials needed according to the specifications and requirements for procurement of general and simple electrical and mechanical engineering equipment and materials ◆ Bargain with the suppliers so as to control the procurement costs of the equipment and materials
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to list out the specifications and requirements for procurement of general electrical and mechanical engineering equipment and materials; and</p> <p>(ii) Capable to control the procurement costs of general electrical and mechanical engineering equipment and materials.</p>
8. Remarks	This unit of competency is applicable to electrical and mechanical practitioners in general.

1. Title	Apply basic operation management techniques
2. Code	EMFSOM301A
3. Range	Apply basic engineering operation and supervisory management techniques to daily operation management of fire services and human resources management.
4. Level	3
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of engineering operation and supervisory management</p> <ul style="list-style-type: none"> ◆ Understand basic engineering operation management techniques, including: <ul style="list-style-type: none"> • Engineering project supervisory management techniques • Human resources management techniques • Organizational environment management techniques • Work flow of engineering project <p>6.2 Perform engineering operation and supervisory management</p> <ul style="list-style-type: none"> ◆ Use basic engineering operation and supervisory management techniques to carry out fire engineering processes and operation management ◆ Master operation goals including full compliance with the contract, no accident, no delay, prompt delivery of materials, balanced budget, etc. ◆ Perform engineering supervisory management tasks, such as analyzing and arranging works, so as to complete the project on time ◆ Perform human resources management tasks including staff training and recruitment, performance appraisal, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to master basic knowledge of engineering operation and supervisory management to perform engineering operation, supervisory management and human resources management tasks such as carrying out the engineering processes properly, analyzing and arranging works, carrying out staff training and recruitment, etc.</p>
8. Remarks	This unit of competency is applicable to fire engineering management staff in general.

1. Title	Investigate general industrial accidents
2. Code	EMCUSH305A
3. Range	Investigate industrial accidents related to electrical and mechanical services and propose solutions to improve occupational safety and health, and be capable to write accident investigation reports.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 General industrial accident investigation</p> <ul style="list-style-type: none"> ◆ Understand procedures for industrial accident investigation, including investigating by accident type, recording the happening of accident, collecting information and reporting the accident to relevant departments <p>6.2 Handle industrial accidents</p> <ul style="list-style-type: none"> ◆ Investigate industrial accidents related to electrical and mechanical services <ul style="list-style-type: none"> • Be capable to handle and investigate industrial accidents related to electrical and mechanical services according to the code of practice required for handling industrial accidents, including informing employers concerned, the Labour Department, the police and the families of the victims; filling in declaration form; investigating and recording the people, place, time and date, the machinery involved, the course of the accident, causes for it, etc. • Use objective methods and techniques to investigate and collect information. The investigation works include on-the-spot investigation, interviewing the victims/witnesses in person or on the phone, using questionnaire, etc. ◆ Report the accident to relevant departments ◆ Assist relevant departments to investigate the accident ◆ Improvement plans <ul style="list-style-type: none"> • Make improvement plans to reduce similar industrial accidents • Understand the causes of industrial accidents and ways of prevention ◆ Write accident investigation reports <ul style="list-style-type: none"> • Understand the document format and wording required and write accident investigation reports
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to handle and investigate industrial accidents related to electrical and mechanical services according to the code of practice required for handling industrial accidents, to make improvement plans and write accident investigation reports.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic occupational safety knowledge.

1. Title	Perform occupational safety and health supervision
2. Code	EMCUSH308A
3. Range	Master safety management techniques and occupational safety and health knowledge to perform occupational safety and health supervision in electrical and mechanical workplaces in order to comply with relevant safety legislations and the engineering contract requirements.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Concepts and techniques of occupational safety and health supervision</p> <ul style="list-style-type: none"> ◆ Understand the concepts and techniques of safety management in order to perform safety supervision, including: <ul style="list-style-type: none"> • Work safety requirements of the electrical and mechanical engineering contract • Safety inspection • Accident investigation • Safety audit and check • Work site tidiness and hygiene • Safety promotion • Risk assessment • Safety committee • Knowledge of latest safety legislations and their recent amendments <p>6.2 Occupational safety and health supervision</p> <ul style="list-style-type: none"> ◆ Apply knowledge and techniques of occupational safety and health supervision to perform occupational safety and health supervision for electrical and mechanical work in order to comply with relevant safety legislations and the engineering contract requirements
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply safety management techniques and occupational safety and health knowledge to perform occupational safety and health supervision for electrical and mechanical work according to relevant safety legislations and contract requirements.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic occupational safety and health knowledge.

1. Title	Handle and review customers' complaints about electrical and mechanical product or service quality
2. Code	EMCUQM302A
3. Range	With regard to electrical and mechanical service quality management, analyze, review and handle customers' complaints properly, in clearly-defined conditions, according to in-house instructions.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 In-house instructions on handling customers' complaints</p> <ul style="list-style-type: none"> ◆ Understand in-house instructions on handling customers' complaints about electrical and mechanical product or service quality <p>6.2 Analyze, handle and review customers' complaints about electrical and mechanical product quality</p> <ul style="list-style-type: none"> ◆ Analyze and handle customers' complaints about electrical and mechanical product or service quality properly according to in-house instructions, including: <ul style="list-style-type: none"> • Referring the complaints to departments concerned to follow up and review of causes of the issues • Analyzing causes of the complaints and solving the problems with departments concerned • Handling and responding to the customers' complaints about quality or service ◆ review customers' complaints about electrical and mechanical product quality or service <ul style="list-style-type: none"> • analyze customers' satisfaction on the handling of complaints based on information from survey questionnaire on complaints • review the way of handling complaints • review the performance of handling complaints
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to analyze and handle customers' complaints about electrical and mechanical product quality, and make reviews.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of quality management.

1. Title	Implement quality control and quality assurance
2. Code	EMCUQM303A
3. Range	Implement quality control and quality assurance according to engineering procedures for electrical and mechanical services to achieve high quality engineering performance.
4. Level	3
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Engineering procedures and quality control points of electrical and mechanical services</p> <ul style="list-style-type: none"> ◆ Understand the engineering procedures for electrical and mechanical services ◆ Understand quality monitoring points of each engineering procedure, including the electrical and mechanical installation procedure, inspection procedure, debugging procedure, commissioning procedure and servicing procedure ◆ Understand the quality control system of the organization and ensure that the service quality meet the requirements, including: <ul style="list-style-type: none"> • Ensuring that the engineering procedures meet the quality requirements and performance indicators • Confirming and rectifying procedures not complying with regulations • Organize teams to formulate quality improvement plans <p>6.2 Implement quality control and quality assurance</p> <ul style="list-style-type: none"> ◆ Follow the quality management scheme, quality assurance procedures and verification specifications to implement quality assurance ◆ Strictly examine the major monitoring points of each engineering procedure to ensure the quality performance of procedures ◆ Record various engineering quality problems and report to the management through the communication mechanism
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to implement quality control and quality assurance system, master the verification specifications and examine the major monitoring points of each engineering procedure to ensure the quality performance.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of quality management.

1. Title	Formulate simple quality assurance plan and quality assurance reports
2. Code	EMCUQM304A
3. Range	With regard to electrical and mechanical engineering design, and in clearly-defined conditions, formulate simple quality assurance plan for all process for electrical and mechanical services and compile quality assurance reports on electrical and mechanical services.
4. Level	3
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Format, key points and relevant concerns of quality assurance reports</p> <ul style="list-style-type: none"> ◆ Understand the format, key points and relevant concerns of quality assurance reports on electrical and mechanical services <p>6.2 Compile quality assurance reports on electrical and mechanical services and formulate simple quality assurance plan</p> <ul style="list-style-type: none"> ◆ Compile quality assurance reports on electrical and mechanical services with correct format ◆ Formulate simple quality assurance plan, including: <ul style="list-style-type: none"> • Quality management standards and technical requirements • Quality management staff's responsibilities • Quality management resources arrangement • Quality management work instructions • Quality monitoring points of electrical and mechanical engineering process • Confirm the method and items of quality assurance and check • Measures to rectify quality deviations • Internal quality audit • File record management system
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to compile quality assurance reports on electrical and mechanical services and formulate simple quality assurance plan.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of quality management.

1. Title	Record quality issues on electrical and mechanical services
2. Code	EMCUQM306A
3. Range	With regard to quality management of electrical and mechanical services, record all the quality main points of each engineering process, quality issues and problems to provide information for the management to formulate quality assurance reports.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Format and key points of quality assurance report on electrical and mechanical services</p> <ul style="list-style-type: none"> ◆ Understand format, key points and record required of quality assurance report on electrical and mechanical services <p>6.2 Record all kinds of engineering quality issues and problems</p> <ul style="list-style-type: none"> ◆ Strictly examine the major quality main points of each engineering process and record all kinds of engineering quality issues and problems <ul style="list-style-type: none"> • Follow the quality plan in order to execute quality assurance system, master the verification specifications, strictly examine the major control points of each engineering process, record all quality related issues, such as quality level for each action, non-compliance with regulations, errors, defects, deviation, excesses or shortfalls, etc. ◆ Quantify issues and problems on quality management so as to provide sufficient data or information for the management to produce the quality assurance reports
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to examine each engineering process; quantify quality management issues and problems so as to provide sufficient data or information for the management to produce the quality assurance reports.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic concepts of quality management.

1. Title	Apply sales and marketing techniques
2. Code	EMCUMS301A
3. Range	Apply sales and marketing techniques, in workplaces where electrical sales and marketing is involved, to perform sales and marketing related to engineering projects.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic concepts of sales and marketing</p> <ul style="list-style-type: none"> ◆ Understand basic concepts of sales and marketing ◆ Understand the relationship between sales and marketing and different process of an engineering project: <ul style="list-style-type: none"> • Quotation • Preparations for the project • Design and procurement • Electrical and mechanical equipment installation • Requirement details of the inspection, debugging and commissioning of electrical and mechanical equipment • Requirement details of the operation, maintenance and servicing of electrical and mechanical equipment <p>6.2 Sales and marketing techniques</p> <ul style="list-style-type: none"> ◆ Know the application of all types of sales and marketing methods such as: <ul style="list-style-type: none"> • Sales and marketing techniques for general electrical and mechanical installation products and engineering services, e.g. general newspaper advertisement and leaflets by post • Sales and marketing techniques for specific electrical and mechanical installation products and engineering services, e.g. professional advertisement for engineering and business-to-business direct sale • Sales and marketing manpower organizational chart • Authority and responsibilities of sales and marketing staff at different levels • Concepts and limitations of local sales and marketing network • Sales and marketing flowchart • Sales and marketing review
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply sales and marketing techniques to perform sales and marketing related to engineering projects.</p>
8. Remarks	This unit of competency is applicable to electrical and mechanical practitioners in general.

1. Title	Fire installation sales and after-sales services
2. Code	EMFSMS301A
3. Range	Carry out marketing plans and follow up after-sales services for fire products or fire engineering services after completion in all kinds of predictable and structured contexts.
4. Level	3
5. Credit	2
6. Competency	<u>Performance Requirements</u>
	<p>6.1 Knowledge of fire installation / product or fire engineering service marketing</p> <ul style="list-style-type: none"> ◆ Know about the market situation of fire products or services, including: <ul style="list-style-type: none"> • Opportunities and challenges to the company brought by the macro and micro situations • Concepts of market division such as purpose of market division, positioning of products, etc. • Consumers' purchasing patterns and types ◆ Basic knowledge of marketing <ul style="list-style-type: none"> • Target customers • Design the purpose and strategy of promotion • Determine the key points of the promotion campaign • Make use of information technology in sales and promotion <ul style="list-style-type: none"> ▸ Application of multi-media technology and software ▸ Using multi-media peripherals, e.g. digital camera, digital video recorders, servers, etc. ▸ Application of e-commerce and the internet <p>6.2 Follow up after-sales services for fire products or services after completion</p> <ul style="list-style-type: none"> ◆ Follow up after-sales services for fire products or services after completion in all kinds of predictable and structured contexts <ul style="list-style-type: none"> • Master customers' expectations and needs for the fire products and services • After-sales services such as customer opinion survey for quality assurance, liaison with customers, etc • Repair enquiries and follow up • Maintenance enquiries and follow up • Handle customer complaints • Handle general customer records and information
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to carry out marketing plans in all kinds of predictable and structured contexts to boost product sales; and</p> <p>(ii) Capable to follow up after-sales services for fire products or services after completion, such as providing fire product related information, handling customer complaints, etc.</p>
8. Remarks	This unit of competency is applicable to general fire product sales and services practitioners.

Competency Level 4

1. Title	Formulate effective storage and updating system for drawings
2. Code	EMCUDE405A
3. Range	Formulate effective storage and updating systems for drawings to support electrical and mechanical services for electrical and mechanical organization.
4. Level	4
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Storage system for electrical and mechanical engineering documents</p> <ul style="list-style-type: none"> ◆ Understand the entire storage system for electrical and mechanical engineering documents, including the correlational series and classification of typical drawings , and document storage system <p>6.2 Processing of electrical and mechanical engineering documents</p> <ul style="list-style-type: none"> ◆ Arrange drawings and classification of information <ul style="list-style-type: none"> • With engineering senses, classify the correlational series of typical drawings and information effectively for easy management ◆ Formulate system for the issuance of drawings and information, including: <ul style="list-style-type: none"> • Record of drawings and information issued • Marking of versions and dates issued ◆ Formulate retrieval mechanism for old drawings and information <ul style="list-style-type: none"> • Trace the locations of old drawings and information according to the issuance record, and be able to issue the most updated versions of drawings and information • Establish effective communication channels with users of the drawings and information ◆ Make use of information technology to enhance the efficiency of the storage and updating system for drawings and information <ul style="list-style-type: none"> • Use information technology and techniques to formulate systems to enhance the efficiency of storing, issuing, tracing and updating drawings and information
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to formulate an effective storage and updating system for drawings and information to effectively support the electrical and mechanical services.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of electrical and mechanical drawing plans.

1. Title	Apply the knowledge of specialized fire systems and equipment	
2. Code	EMFSDE401A	
3. Range	Apply the expertise, in different situations/conditions, to the design, installation, operation, repair, maintenance and project management of specialized fire systems at design offices or work sites.	
4. Level	4	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the types, construction, functions, applications and working principles of specialized fire systems and equipment, including: <ul style="list-style-type: none"> • Fixed foam system • Dry chemical system • Water mist system • Improvised sprinkler system ◆ Understand the construction, uses and selection of components, and the impact of different accessories on system operation ◆ Understand the operation sequence and performance requirements of specialized fire systems ◆ Read the drawings of specialized fire systems and components ◆ Understand relevant specifications and guidelines stated in the Code of Practice for Fire Service Installations and Equipment <p>6.2 Application of the knowledge of specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Communicate with clients effectively on issues relevant to the design, installation, commissioning, operation, repair and maintenance of specialized fire systems ◆ Apply the knowledge of specialized fire systems and equipment, in different situation/conditions, to design, installation, commissioning, operation, repair and maintenance tasks, including: <ul style="list-style-type: none"> • Select suitable specialized fire systems and equipment according to building types and uses • Ensure that the selected specialized fire systems and equipment meet the requirements and guidelines stated in the Code of Practice for Fire Service Installations and Equipment • Perform assessments and tests of general installation, operation and maintenance of specialized fire systems and equipment and make proposals for solving the problems 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to communicate with clients effectively on issues relevant to the design, installation, commissioning, operation, repair and maintenance of specialized fire systems; and (ii) Capable to apply the knowledge of specialized fire systems and equipment, in different situations/conditions, in the selection of proper systems for the client and to solve the problems involved in the design, installation, commissioning, operation, repair and maintenance of such systems.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of fire service installations.

1. Title	Perform basic tasks of designing fire service mechanical equipment
2. Code	EMFSDE402A
3. Range	Perform regular tasks of designing fire service mechanical equipment independently according to plans and specifications.
4. Level	4
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of designing fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Understand the construction, working principles and characteristics of various types of fire service mechanical equipment ◆ Understand the basic requirements for designing fire service mechanical equipment ◆ Have a basic understanding of the contents of the design standards and codes, including: <ul style="list-style-type: none"> • The Code of Practice for Fire Service Installations and Equipment • Recognized international standards (BSEN, NFPA) <p>6.2 Perform basic tasks of designing fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Perform various types of basic tasks of designing fire service mechanical equipment according to design outline, recognized standards and relevant local regulations, including: <ul style="list-style-type: none"> • Designing schematic drawings and layout plans of various types of fire service mechanical equipment • Calculating and determining the size of components, such as: <ul style="list-style-type: none"> ▸ Pipe diameter ▸ Pump flow rate and pressure requirement ▸ Tank capacity • Formulate the specifications of various types of fire service mechanical equipment and select relevant equipment <p>6.3 Professionalism in basic design of fire service mechanical equipment</p> <ul style="list-style-type: none"> ◆ Perform basic tasks of designing fire service mechanical equipment according to instructions, legal requirements, codes of practice and design standards
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to complete the basic tasks of designing fire service mechanical equipment effectively according to outline and local regulations relevant to fire systems and installations, including designing schematic drawings and layout plans and formulating specifications for various types of fire service mechanical equipment and selecting relevant equipment.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of fire service mechanical equipment.

1. Title	Perform basic tasks of designing fire service electrical equipment	
2. Code	EMFSDE403A	
3. Range	Perform regular tasks of designing fire service electrical equipment in familiar situations according to plans.	
4. Level	4	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of designing fire service electrical equipment</p> <ul style="list-style-type: none"> ◆ Understand the construction, working principles and characteristics of various types of fire service electrical equipment (such as power supply, control and alarm devices) ◆ Understand the basic requirements for designing fire service electrical equipment ◆ Understanding the contents of design standards and codes, including: <ul style="list-style-type: none"> • The Code of Practice for Fire Service Installations and Equipment • The supply rules • Recognized international standards (BSEN, NFPA) <p>6.2 Basic methods and procedures of designing fire service electrical equipment</p> <ul style="list-style-type: none"> ◆ Perform various types of basic tasks of designing fire service electrical equipment in familiar situations according to design outline, recognized standards and relevant local regulations ◆ Formulate schematic drawings and layout plans of various types of fire service electrical equipment ◆ Calculate and determine the size and position of components, such as: <ul style="list-style-type: none"> • Size of cable • Capacity of backup battery • Number of detectors and alarms ◆ Formulate the specifications of various types of fire service electrical equipment and select relevant equipment <p>6.3 Professionalism in basic design of fire service electrical equipment</p> <ul style="list-style-type: none"> ◆ Perform basic tasks of designing fire service electrical equipment according to instructions, legal requirements, codes of practice and standards 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to complete the basic tasks of designing fire service electrical equipment effectively in familiar situations, according to outline, recognized standards and relevant local regulations, including formulating schematic drawings and layout plans, and specifications of various types of fire service electrical equipment and selecting relevant equipment.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of fire service electrical equipment.

1. Title	Basic application of fire system computer-aided design (CAD) software
2. Code	EMFSDE404A
3. Range	Apply basic CAD software in familiar situations to support fire system design.
4. Level	4
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of fire system CAD software</p> <ul style="list-style-type: none"> ◆ Understand the uses and basic principles of typical fire system CAD software, such as: <ul style="list-style-type: none"> • Calculation software for clean agent flow • Calculation software for water flow and pressure in pipes of sprinkler and water spray system ◆ Understand the characteristics, design criteria and limitations of fire system CAD software <p>6.2 Basic application of fire system CAD software</p> <ul style="list-style-type: none"> ◆ Apply basic CAD software in familiar situations to support fire system design according to manufacturer guidelines ◆ Input correct data to obtain reasonable results <p>6.3 Professionalism in handling computer application software</p> <ul style="list-style-type: none"> ◆ Use computer application software developed under local and international standards
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply basic CAD software in familiar situations to support fire system design.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of fire system design.

1. Title	Supervise fire equipment installation	
2. Code	EMFSIN401A	
3. Range	Supervise, coordinate and support the fire equipment installation team to perform installation tasks in a range of varied and specific situations/environments.	
4. Level	4	
5. Credit	9	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Procedures, standards and requirements for fire equipment installation</p> <ul style="list-style-type: none"> ◆ Understand the general procedures, standards and requirements for fire equipment installation ◆ Understand the fire equipment installation instructions and techniques <p>6.2 Supervise fire equipment installation</p> <ul style="list-style-type: none"> ◆ Supervise fire equipment installation in a range of varied and specific situations/environments <ul style="list-style-type: none"> • Support and coordinate fire equipment installation <ul style="list-style-type: none"> ▸ Provide technical support and make resources allocation for the installation ▸ Coordinate all installation tasks and keep track of their progress • Monitor and supervise the installation <ul style="list-style-type: none"> ▸ Random check of work quality according to the importance of the installation process ▸ Taking appropriate action to rectify installation work that is below standard, and ensure that the rectification has a continuous effect ▸ Employ different skills to solve a wide range of installation problems • Procure appropriate tools and equipment to enhance the efficiency of installation <ul style="list-style-type: none"> ▸ Make use of installation processes and techniques and procure adequate number of appropriate tools and equipment to enhance the efficiency of installation ▸ Formulate and carry out installation tools and equipment maintenance plan <p>6.3 Quality, standards and efficiency of fire equipment installation</p> <ul style="list-style-type: none"> ◆ Carry out the supervision of fire equipment installation according to legal requirements and codes of practice ◆ Ensure the quality, standards and efficiency of installation 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to use the expertise, and allocate and organize all kinds of resources to complete the supervision of fire equipment installation effectively in a range of varied and specific situations/environments.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of fire equipment installation.

1. Title	Install specialized fire systems and equipment	
2. Code	EMFSIN402A	
3. Range	Perform different levels of tasks of installing specialized fire systems and equipment at workshops or equipment installation points in a range of varied and specific situations/environments.	
4. Level	4	
5. Credit	4	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of installing specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the construction and operating principles of various types of specialized fire systems and equipment such as: <ul style="list-style-type: none"> • Fixed foam system • Dry chemical system • Water mist system • Improvised sprinkler system ◆ Read and understand installation drawings of specialized fire systems and equipment ◆ Understand the installation requirements and specifications of such equipment <p>6.2 Methods and procedures of installing specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the installation procedures and methods for specialized fire systems and equipment, including the procedures of material checking, assembly, adjustment and testing ◆ Select and use suitable specialized fire systems and equipment components and materials ◆ Install and set fire pipes, pumps, nozzles, containers, starters, switches and foam generators, etc. at suitable locations ◆ Use basic workshop equipment and tools for class 2 fire service mechanical installation contractors, e.g. threading machine, electric drill, bench fitting tools and welding machine ◆ Use testing tools to conduct functional tests independently after installation <p>6.3 Professionalism in installing specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Perform different levels of tasks of installing specialized fire systems and equipment according to installation instructions ◆ Undertake installation work of specialized fire systems and equipment according to safety guidelines required by the law and codes of practice 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to complete different levels of installation tasks effectively for specialized fire systems and equipment in a range of varied and specific situations/environments; and (ii) Capable to undertake installation work of specialized fire systems and equipment according to codes of practice and safety guidelines required by the law.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skill in installing general fire service mechanical installations.

1. Title	Test and commission water-based fire system's electrical and mechanical installations	
2. Code	EMFSIT401A	
3. Range	Lead the testing and commissioning of water-based fire system's electrical and mechanical installations at systems' installation points.	
4. Level	4	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of water-based fire system's electrical and mechanical installation testing and commissioning</p> <ul style="list-style-type: none"> ◆ Understand the operating principles and performance requirements of various types of water-based fire service electrical and mechanical installations, including: <ul style="list-style-type: none"> • sprinkler system • Fire hydrant/hose reel system • Drencher system • Deluge system • Water spray system ◆ Understand requirements of codes on fire service installations and equipment, design and installation specifications, and approved standards on various types of water-based fire system and installations for testing and commissioning ◆ Understand the content of testing and commissioning documents (checklist, testing report form, etc.) <p>6.2 Methods and procedures of water-based fire system's electrical and mechanical installation testing and commissioning</p> <ul style="list-style-type: none"> ◆ Know the methods and procedures of testing and commissioning water-based fire system's electrical and mechanical installations, including conducting inspection, calibration and testing independently ◆ Lead the testing and commissioning of water-based fire system's electrical and mechanical installations, including: <ul style="list-style-type: none"> • Static check of system • Functional test of system • Calibration of components to ensure normal operation of system • Measurement of operation data ◆ Analyze abnormal testing results and troubleshoot the problems ◆ Use relevant tools and equipments safely and effectively to test and calibrate water-based fire system and installations 	

	<p>6.3 Professionalism in testing and commissioning water-based fire system and installations</p> <ul style="list-style-type: none"> ◆ Conduct testing and commissioning of water-based fire system and installations according to legal requirements, codes of practice and standards of the trade ◆ Record, analyze and report on the testing and commissioning results of water-based fire system and installations
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to use the expertise to complete the testing and commissioning of water-based fire system's electrical and mechanical installations.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of installing and testing general water-based fire system's electrical and mechanical installations.</p>

1. Title	Test and commission non-water-based fire system's electrical and mechanical installations	
2. Code	EMFSIT402A	
3. Range	Lead the testing and commissioning of non-water-based fire system's electrical and mechanical installations at systems' installation points.	
4. Level	4	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of non-water-based fire system's electrical and mechanical installation testing and commissioning</p> <ul style="list-style-type: none"> ◆ Understand the operating principles and performance requirements of various types of non-water-based fire service electrical and mechanical installations, including: <ul style="list-style-type: none"> • Carbon dioxide system • FM200 system • NAFSIII system • Other similar gas extinguishing systems ◆ Understand requirements of codes on fire service installations and equipment, design and installation specifications, and approved standards on various types of non-water-based fire system and installations for testing and commissioning ◆ Understand the content of testing and commissioning documents (checklist, testing report form, etc.) <p>6.2 Methods and procedures of non-water-based fire system's electrical and mechanical installation testing and commissioning</p> <ul style="list-style-type: none"> ◆ Know the methods and procedures of testing and commissioning non-water-based fire system's electrical and mechanical installations, including conducting inspection, calibration and testing independently ◆ Lead the testing and commissioning of non-water-based fire system's electrical and mechanical installations, including: <ul style="list-style-type: none"> • Static check of system • Functional test of system • Calibration of components to ensure normal operation of system • Measurement of operation data ◆ Analyze abnormal testing results and troubleshoot the problems ◆ Use relevant tools and equipments safely and effectively to test and calibrate non-water-based fire system and installations <p>6.3 Professionalism in testing and commissioning non-water-based fire system and installations</p> <ul style="list-style-type: none"> ◆ Conduct testing and commissioning of non-water-based fire system and installations according to legal requirements, codes of practice and standards of the trade ◆ Record, analyze and report on the testing and commissioning results of non-water-based fire system and installations 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to use the expertise to complete the testing and commissioning of non-water-based fire system's electrical and mechanical installations.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of installing and testing general non-water-based fire system's electrical and mechanical installations.

1. Title	Test and commission fire detection and alarm systems and installations	
2. Code	EMFSIT403A	
3. Range	Lead the testing and commissioning of fire detection and alarm systems and installations at their installation points.	
4. Level	4	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of fire detection and alarm system and installation testing and commissioning</p> <ul style="list-style-type: none"> ◆ Understand the operating principles and performance requirements of various types of fire detection and alarm systems and installations, including: <ul style="list-style-type: none"> • Conventional (electronic) type • Addressable (intelligent) type ◆ Understand requirements of codes on fire service installations and equipment, design and installation specifications, and approved standards on various types of fire detection and alarm systems and installations for testing and commissioning ◆ Understand the content of testing and commissioning documents (checklist, testing report form, etc.) <p>6.2 Methods and procedures of fire detection and alarm system and installation testing and commissioning</p> <ul style="list-style-type: none"> ◆ Know the methods and procedures of testing and commissioning fire detection and alarm systems and installations, including conducting inspection, calibration and testing independently ◆ Lead the testing and commissioning of fire detection and alarm systems and installations, including: <ul style="list-style-type: none"> • Static check of system • Functional test of system • Calibration of components to ensure normal operation of system • Measurement of operation data ◆ Analyze abnormal testing results and troubleshoot the problems ◆ Use relevant tools and equipments safely and effectively to test and calibrate fire detection and alarm systems and installations <p>6.3 Professionalism in testing and commissioning fire detection and alarm systems and installations</p> <ul style="list-style-type: none"> ◆ Conduct testing and commissioning of fire detection and alarm systems and installations according to legal requirements, codes of practice and standards of the trade ◆ Record, analyze and report on the testing and commissioning results of fire detection and alarm systems and installations 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to use the expertise to complete the testing and commissioning of fire detection and alarm systems and installations.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of installing and testing general fire detection and alarm systems and installations.

1. Title	Test and commission specialized fire systems and equipment	
2. Code	EMFSIT404A	
3. Range	Lead the testing and commissioning of specialized fire systems and equipment at their installation points.	
4. Level	4	
5. Credit	4	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of specialized fire system and equipment testing and commissioning</p> <ul style="list-style-type: none"> ◆ Understand the operating principles and performance requirements of various types of specialized fire systems and equipment, including: <ul style="list-style-type: none"> • Fixed foam system • Dry chemical system • Water mist system • Improvised sprinkler system ◆ Understand requirements of codes on fire service installations and equipment, design and installation specifications, and approved standards on various types of specialized fire systems and equipment for testing and commissioning ◆ Understand the content of testing and commissioning documents (checklist, testing report form, etc.) <p>6.2 Methods and procedures of specialized fire system and equipment testing and commissioning</p> <ul style="list-style-type: none"> ◆ Know the methods and procedures of testing and commissioning specialized fire systems and equipment, including conducting inspection, calibration and testing independently ◆ Lead the testing and commissioning of specialized fire systems and equipment, including: <ul style="list-style-type: none"> • Static check of system • Functional test of system • Calibration of components to ensure normal operation of system • Measurement of operation data ◆ Analyze abnormal testing results and troubleshoot the problems ◆ Use relevant tools and equipments safely and effectively to test and calibrate specialized fire systems and equipment <p>6.3 Professionalism in testing and commissioning specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Conduct testing and commissioning of specialized fire systems and equipment according to legal requirements, codes of practice and standards of the trade ◆ Record, analyze and report on the testing and commissioning results of specialized fire systems and equipment 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to use the expertise to complete the testing and commissioning of specialized fire systems and equipment.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of installing and testing general specialized fire systems and equipment.

1. Title	Supervise equipment maintenance work to ensure its quality, standard and efficiency	
2. Code	EMCUMA401A	
3. Range	Supervise, coordinate and support the maintenance working team to perform the repair work for electrical and mechanical engineering equipment.	
4. Level	4	
5. Credit	9	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Procedures, standard and requirements for repairing engineering equipment</p> <ul style="list-style-type: none"> ◆ Understand the general procedures, standard and requirements for repairing engineering equipment, and analyze and set the procedures, standard and requirements for repairing them according to the repairing instructions and knowledge of relevant repairing techniques <p>6.2 Supervise equipment maintenance work to ensure its quality</p> <ul style="list-style-type: none"> ◆ Support and coordinate the repair work <ul style="list-style-type: none"> • Support the repair work technically and in the aspect of resource allocation • Coordinate all items of repair and pay attention to the progress of crucial procedures ◆ Monitor the repair work <ul style="list-style-type: none"> • Check randomly the repair quality according to the importance of procedure • Take appropriate steps to rectify the repair work not up to the standard, and ensure that rectification continues to be effective and the job can be finished in time ◆ Purchase suitable tools and equipment to enhance the repairing efficiency <ul style="list-style-type: none"> • Apply repairing procedures and techniques, and purchase adequate suitable repairing tools and equipment to enhance the repairing efficiency • Formulate and implement repairing tools and equipment maintenance plan ◆ Maintain good human resources management, time management and interpersonal relationship <ul style="list-style-type: none"> • Analyze and formulate manpower training plans • Implement good time management • Maintain good interpersonal relationship 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to support, coordinate and monitor effectively the implementation of repair work; work out methods to ensure the quality, standard and efficiency of the repair work; formulate long-term plans for equipment maintenance with human resources concerned; and maintain good staff interpersonal relationship.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic management knowledge

1. Title	Formulate fire equipment maintenance and repair plans
2. Code	EMFSOR401A
3. Range	Formulate different types of fire equipment maintenance and repair plans and repair instructions in familiar situations for all kinds of fire systems according to the requirements of the maintenance and repair items.
4. Level	4
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Requirements and scope of the fire equipment maintenance and repair plan</p> <ul style="list-style-type: none"> ◆ Understand the requirements of maintenance and repair plans, including all the provisions of the tender or quotation, contract details, project schedule, etc.; analyze all the information and devise the necessary maintenance and repair items <p>6.2 Formulate different types of fire equipment maintenance and repair plans</p> <ul style="list-style-type: none"> ◆ Formulate maintenance and repair plans in familiar situations for all kinds of fire systems and installation according to the requirements of the projects and manufacturers' advice. The plans include: <ul style="list-style-type: none"> • Maintenance and repair procedures and methods • Maintenance and repair schedule • Checklist and report of maintenance and repair • Arrangement of technical personnel to take part in the maintenance and repair • Provision of spare parts required
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to formulate fire service installation maintenance and repair plans and repair instructions in familiar situations, such as formulating maintenance and repair procedures and methods, arranging technical personnel to take part in the maintenance and repair, etc.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining and repairing all kinds of fire service installations.

1. Title	Maintain and repair specialized fire systems and equipment
2. Code	EMFSOR402A
3. Range	Carry out maintenance and repair of specialized fire systems and equipment at repair workshops or work sites in all kinds of predictable and structured contexts according to repair instructions and specifications.
4. Level	4
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and operating principles of specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Understand the construction, functions and operating principles of various types of specialized fire systems and equipment, including: <ul style="list-style-type: none"> • Fixed foam system • Dry chemical system • Water mist system • Improvised sprinkler system <p>6.2 Repair and maintenance methods and procedures of specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the procedures and methods of maintenance and repair of various types of specialized fire systems and equipment in all kinds of predictable and structured contexts, including the procedures of inspection, cleaning, installation, removal, replacement, repair and testing ◆ Examine the damage condition of accessories, such as pipes, pumps, nozzles, containers, starters, switches and foam generators, according to repair instructions ◆ Diagnose the problems and repair or replace damaged accessories ◆ Use effectively general workshop equipment and tools for class 2 fire service mechanical installation contractors ◆ Use appropriate testing equipment to conduct functional tests independently after repair <p>6.3 Professionalism in maintenance and repair of specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Carry out maintenance and repair of specialized fire systems and equipment according to repair instructions and specifications ◆ Undertake maintenance and repair work of specialized fire systems and equipment according to safety guidelines required by the law and codes of practice
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to carry out maintenance and repair of specialized fire systems and equipment effectively in all kinds of predictable and structured contexts; and</p> <p>(ii) Capable to undertake maintenance and repair work of specialized fire systems and equipment according to codes of practice and safety guidelines required by the law.</p>

8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses elementary knowledge and skill in repairing and maintaining general fire service mechanical installations.
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1. Title	Plan the finance, accounts and insurance of engineering projects
2. Code	EMCUPM401A
3. Range	Make proper financial, accounting and insurance arrangements for the management of electrical and mechanical projects.
4. Level	4
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Cost accounting techniques and concepts of financial and insurance arrangements for electrical and mechanical projects</p> <ul style="list-style-type: none"> ◆ Understand the cost accounting techniques for electrical and mechanical projects in order to assess the funding needs. The accounting techniques include making use of the statement of assets and liabilities, calculation of interest rates, calculation of basic cash flow, calculation of present value, accounting items, etc. ◆ Understand the company's concepts of financial and insurance arrangements for the engineering project <p>6.2 Finance and engineering insurance</p> <ul style="list-style-type: none"> ◆ Know about the financial arrangements, including the arrangements of different kinds of loans, mortgage, lease, hedging, futures, etc. ◆ Know about all kinds of insurance arrangements, including third party insurance, accident insurance, labour insurance, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to plan the financial, accounting and insurance arrangements for the electrical and mechanical project properly to ensure the finance of the project is sound and cost-effective.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of finance, accounting and insurance.

1. Title	Perform fire service project management
2. Code	EMFSPM401A
3. Range	Apply all kinds of project management techniques, in a range of varied and specific situations, at fire service work sites to ensure smooth completion of projects.
4. Level	4
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Content of fire service project and knowledge of project management</p> <ul style="list-style-type: none"> ◆ Understand the content of fire service project, including contract details, working drawing, project schedule, etc. ◆ Understand all kinds of project management theory, e.g. work breakdown structure (WBS), manpower organization, project schedule, income and expenditure list, etc. ◆ Understand project planning, job allocation, authority and responsibilities ◆ Understand supervisory techniques for project management such as mastering the engineering processes, giving orders for different jobs, communicating and reporting effectively, etc. ◆ Understand problems concerning project management, e.g. problem solving mechanism, making reports, etc. <p>6.2 Perform fire service project management</p> <ul style="list-style-type: none"> ◆ Perform project management for fire equipment and installations in a range of varied and specific situations according to project management plan, including: <ul style="list-style-type: none"> • Mastering the key points of work for fire equipment and installations • Arranging the work flow, including: dismantling, installation, inspection, testing, commissioning, repair and maintenance • Arranging the transport of materials and fire equipment • Contact different kinds of engineering personnel to coordinate the engineering activities for a smooth completion of every work process • Inspect and report on the progress and problems of the fire installation project
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange the work flow and transport of materials and fire equipment in a range of varied and specific situations; and</p> <p>(ii) Capable to set up a reporting mechanism to coordinate the engineering activities for a smooth completion of every work process.</p>
8. Remarks	

1. Title	Write tenders
2. Code	EMFSPM402A
3. Range	Analyze rationally information like the content, contract details and material requirements of the fire service tender, and write a tender to bid the project.
4. Level	4
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Understand information like the content, contract details and material requirements of tender</p> <ul style="list-style-type: none"> ◆ Understand the content and requirements of the tender on techniques, workmanship and materials ◆ Understand other contract details and interpretation of provisions <p>6.2 Write competitive tender</p> <ul style="list-style-type: none"> ◆ Analyze the content of the tender, including technical and material requirements for the fire service project ◆ Consider alternative materials to reduce material costs ◆ Consider sub-contracting jobs to transfer risk, reduce manpower resources and assure the profits ◆ Consider other counter-proposals to reduce contract constraints ◆ Write a competitive tender
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to analyze rationally information like the content, contract details and material requirements of the tender; and</p> <p>(ii) Capable to write a competitive tender.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of engineering contract.

1. Title	Formulate job sequence and project management plan
2. Code	EMFSPM403A
3. Range	Master the chain relationship of different work processes and formulate job sequence and project management plan of the fire installation project in a range of varied and specific situations.
4. Level	4
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Understand job sequence of fire installation project</p> <ul style="list-style-type: none"> ◆ Understand details and procedures of every single work process ◆ Analyze the chain relationship of different work processes <p>6.2 Formulate job sequence and project management plan of fire installation project</p> <ul style="list-style-type: none"> ◆ Formulate job sequence and project management plan of the fire installation project in a range of varied and specific situations, including: <ul style="list-style-type: none"> • Goals and scope of project • work breakdown structure (WBS) of project, including the design, installation, inspection, testing, commissioning, sourcing of materials and resources arrangement of all kinds of components • Monitoring schedule of project plan • Income and expenditure estimates of project plan • Material sourcing management mechanism of project plan • Manpower structural plan, authority and responsibilities for different job positions, and communication mechanism of project plan • Work progress and problem reporting mechanism of project plan <p>6.3 Professionalism in handling job sequence and project management plan</p> <ul style="list-style-type: none"> ◆ Follow the code of practice and guidelines to formulate job sequence and project management plan
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to master the chain relationship of different work processes of a fire installation project; and</p> <p>(ii) Capable to formulate job sequence and project management plan of fire installation project in a range of varied and specific situations.</p>
8. Remarks	This unit of competency is suitable for enhancing the competency of fire service project management staff.

1. Title	Implement quality management in electrical and mechanical engineering services
2. Code	EMCUQM402A
3. Range	Plan, organize and control effectively the working procedures prior to and during the project so as to achieve the result of minimal cost and high quality for electrical and mechanical project.
4. Level	4
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Division of procedure for electrical and mechanical installation project</p> <ul style="list-style-type: none"> ◆ Understand and analyze the division of process for electrical and mechanical installation project; set the following for quality control before the project starts: <ul style="list-style-type: none"> • Check points for different stages of the project • Quality management goals such as completion dates for different stages of the project, alert level for the number of items not conforming to the plan, accident rate, productivity, etc. <p>6.2 Implement the quality management plan and organized working procedure of the quality control system effectively</p> <ul style="list-style-type: none"> ◆ Confirm and analyze items not conforming to the rules at different stages of the project, and formulate improvement plans with working teams concerned ◆ Performance indicators for different stages of the project should be set with reference to level of performance specified by the contract, code of practice, and international standards, etc. ◆ Formulate quality management plan, including the following, to control procedure costs and quality in an organized and effective way: <ul style="list-style-type: none"> • Division of procedure for the project • Check points of ‘planning-implementation-commissioning-rectification’ for quality management at different stages of the project • Performance indicators at different stages of the project • Ways to handle items not conforming to the rules • Quality management goals • Mechanism to communicate with relevant teams and formulation of timetables for improvement plans, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to formulate quality management plans effectively, monitor project quality, control costs and improve process not conforming to the rules.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic concept of quality management.

1. Title	Promote quality management culture at working level
2. Code	EMCUQM403A
3. Range	Master the knowledge of quality management, lead the quality management working group to promote and foster basic level quality management culture for the electrical and mechanical services.
4. Level	4
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of quality management management</p> <ul style="list-style-type: none"> ◆ Understand the concept of quality management ◆ Understand the goals of organizational quality management culture <p>6.2 Promote and foster basic level quality management culture</p> <ul style="list-style-type: none"> ◆ Promote basic level quality management culture, including: <ul style="list-style-type: none"> • Implement on-the-job training on quality knowhow for frontline staff • Set up frontline staff quality monitoring group to foster quality management culture at working level • Organize quality management culture promotional activities, such as quiz competitions, quality circle, visits, seminars, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to master the knowledge of quality management, and lead the quality management working group to promote and foster quality management culture at working level.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic concept of quality management.

1. Title	Conduct site survey and quality control
2. Code	EMCUQM404A
3. Range	Investigate the characteristics and limitations of the work site and conduct quality control and monitoring of engineering projects.
4. Level	4
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Quality control and monitoring requirements on work site environment</p> <ul style="list-style-type: none"> ◆ Master the progress of design, installation, operation, maintenance and repair, inspection, commissioning and testing necessary for the engineering projects, and understand the quality control and monitoring requirements on work site environment <p>6.2 Conduct site survey and clear obstacles so as to implement quality control of electrical and mechanical installation project</p> <ul style="list-style-type: none"> ◆ Investigate and analyze the characteristics and limitations of the work site, and point out potential problems in and obstacles to the electrical and mechanical design, installation, operation, maintenance and repair, inspection, commissioning and testing of the projects there so as to ensure: <ul style="list-style-type: none"> • The effective implementation of all engineering projects • The effective implementation of quality control scheme • The effective operation of the flow chart of quality control procedures ◆ Suggest solutions to clear the obstacles so as to implement quality control of the electrical and mechanical installation projects
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to demonstrate how to conduct site survey and clear obstacles in order to assist in quality control of the electrical and mechanical installation projects.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of quality management.

1. Title	Promote products and marketing services
2. Code	EMFSMS401A
3. Range	Use analysis techniques and suitable software to handle marketing strategies in a range of varied and specific situations at work places where sales and marketing of fire products / fire engineering services are involved.
4. Level	4
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Analyze fire products / fire engineering services</p> <ul style="list-style-type: none"> ◆ Understand various fire products and fire engineering services in the market <ul style="list-style-type: none"> • Master the trend of fire products / fire engineering services • Need for fire products / fire engineering services to add value • Understand the market share of fire products / fire engineering services ◆ Understand customer demand for fire products / fire engineering services ◆ Understand the threats from competitors <p>6.2 Formulate marketing plan</p> <ul style="list-style-type: none"> ◆ Position fire products / fire engineering services correctly ◆ Consider to enhance or improve the fire products / fire engineering services ◆ Maintain or boost the market share of the fire products / fire engineering services ◆ Target customers and offer preferential terms ◆ Launch promotion schemes properly ◆ Use computer software to handle sales and marketing information <ul style="list-style-type: none"> • Set up customer databank <ul style="list-style-type: none"> ▸ Access customer information ▸ Issue publications regularly such as annual report, new product / service introduction, etc. ▸ Establish sales statistics charts to monitor the sales condition • Establish corporate website to facilitate customer contact and enquiry
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to use marketing techniques to enhance the recognition of fire products / fire engineering services in a range of varied and specific situations; and</p> <p>(ii) Capable to use computer software to handle and evaluate sales and marketing information.</p>
8. Remarks	This unit of competency is applicable to fire engineering service sales and marketing practitioners in general.

Competency Level 5

1. Title	Write all kinds of electrical and mechanical engineering reports in Chinese
2. Code	EMCUDE506A
3. Range	For electrical and mechanical engineering design and operation, use correct report format to write all kinds of electrical and mechanical engineering reports in Chinese, including project management progress report, operation management report, engineering progress report, equipment fault report, accident investigation report, etc.
4. Level	5
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Key points of all kinds of electrical and mechanical engineering reports and their presentation</p> <ul style="list-style-type: none"> ◆ Understand the key points and purposes of all kinds of electrical and mechanical engineering reports, including: <ul style="list-style-type: none"> • Equipment fault report • Equipment inspection report • Accident investigation report • Operation management report <ul style="list-style-type: none"> ▸ Financial status of the company ▸ Balance of account ▸ Engineering budget • Engineering project management progress report <ul style="list-style-type: none"> ▸ Progress of crucial procedures ▸ Status of implementation of work plan, delay and causes, monitoring indicators and solutions ◆ Understand formats the above-mentioned electrical and mechanical engineering reports and common technical terms of electrical and mechanical services <p>6.2 Write all kinds of electrical and mechanical engineering reports in Chinese</p> <ul style="list-style-type: none"> ◆ Use correct report format to write all kinds of the above-mentioned electrical and mechanical engineering reports in Chinese ◆ Use drawings to strengthen and enrich the contents of the reports, including bar chart, square chart, pie chart, circular chart and flow chart, etc ◆ Write in fluent Chinese
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to write all kinds of electrical and mechanical engineering reports in fluent Chinese with graphs which conform to official document standards.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic Chinese level.

1. Title	Write all kinds of electrical and mechanical engineering reports in English
2. Code	EMCUDE507A
3. Range	For electrical and mechanical engineering design and operation, use correct report format to write all kinds of electrical and mechanical engineering reports in English, including project management progress report, operation management report, engineering progress report, equipment fault report, accident investigation report, etc.
4. Level	5
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Key points of all kinds of electrical and mechanical engineering reports and their presentation</p> <ul style="list-style-type: none"> ◆ Understand the key points and purposes of all kinds of electrical and mechanical engineering reports, including: <ul style="list-style-type: none"> • Equipment fault report • Equipment inspection report • Accident investigation report • Operation management report <ul style="list-style-type: none"> ▸ Financial status of the company ▸ Balance of account ▸ Engineering budget • Engineering project management progress report <ul style="list-style-type: none"> ▸ Progress of crucial procedures ▸ Status of implementation of work plan, delay and causes, monitoring indicators and solutions ◆ Understand formats the above-mentioned electrical and mechanical engineering reports and common technical terms of electrical and mechanical services <p>6.2 Write all kinds of electrical and mechanical engineering reports in English</p> <ul style="list-style-type: none"> ◆ Use correct report format to write all kinds of the above-mentioned electrical and mechanical engineering reports in English ◆ Use drawings to strengthen and enrich the contents of the reports, including bar chart, square chart, pie chart, circular chart and flow chart, etc ◆ Write in fluent English
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to write all kinds of electrical and mechanical engineering reports in fluent English with graphs which conform to official document standards.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic English level.

1. Title	Design water-based fire systems and equipment	
2. Code	EMFSDE501A	
3. Range	Analyze, reorganize, assess and integrate information critically by dealing with abstract ideas and concepts; instruct subordinates to perform different levels of tasks of designing water-based fire systems and equipment according to client needs, building codes and limitations.	
4. Level	5	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of designing water-based fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the construction, working principles and characteristics of different types of water-based fire systems and equipment, including: <ul style="list-style-type: none"> • Sprinkler system • Fire hydrant/hose reel system • Drencher system • Deluge system • Water spray system ◆ Understand building uses, architectural design codes and client needs ◆ Understand the design standards and major requirements of water-based fire systems and equipment, including: <ul style="list-style-type: none"> • The Code of Practice for Fire Service Installations and Equipment • Recognized international standards (BSEN, NFPA) <p>6.2 Design water-based fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Lead subordinates to perform various types of tasks of designing water-based fire systems and equipment according to client needs, manufacturer guidelines, recognized standards and relevant local regulations ◆ Formulate the system drawings and outline design layout plans of various types of equipment according to building codes and limitations ◆ Calculate and determine the performance requirements and the size of pumps and other water-based systems and equipment according to building codes and limitations, including: <ul style="list-style-type: none"> • Calculating the resistance of piping system • Determining the required pump flow rate and pressure • Tank capacity • Calculating other operation data of the water-based system ◆ Formulate the specifications of various types of water-based fire systems and equipment and select relevant equipment 	

	<p>6.3 Professionalism in designing water-based fire systems and equipment</p> <p>◆ Lead subordinates to design water-based fire systems according to legal requirements, codes of practice and design standards</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to apply special and innovative techniques and lead subordinates to perform tasks of designing water-based fire systems and equipment according to client needs and building codes and limitations; and</p> <p>(ii) Capable to provide the sector and clients with designs of water-based fire systems and equipment.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of water-based fire systems and equipment.</p>

1. Title	Design non-water-based fire systems and equipment	
2. Code	EMFSDE502A	
3. Range	Apply the expertise in fire system design; analyze, reorganize, assess and integrate information critically by dealing with abstract ideas, concepts and thoughts; instruct subordinates to perform different levels of tasks of designing non-water-based fire systems and equipment according to client needs, building codes and limitations.	
4. Level	5	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of designing non-water-based fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the construction, working principles and characteristics of different types of non-water-based fire systems and equipment, including: <ul style="list-style-type: none"> • Carbon dioxide system • FM200 system • NAFSIII system • Other similar extinguishing agent system ◆ Understand building uses, architectural design codes and client needs ◆ Understand the design standards and major requirements of non-water-based fire systems and equipment, including: <ul style="list-style-type: none"> • The Code of Practice for Fire Service Installations and Equipment • Recognized international standards (BSEN, NFPA) <p>6.2 Design non-water-based fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Lead subordinates to perform various types of tasks of designing non-water-based fire systems and equipment according to client needs, manufacturer guidelines, recognized standards and relevant local regulations ◆ Formulate the system drawings and outline design layout plans of various types of equipment according to building codes and limitations ◆ Calculate and determine the performance requirements and the size of non-water-based systems and equipment according to building codes and limitations, including: <ul style="list-style-type: none"> • Calculating gas volume • Determining pipe diameter and nozzle size • Number of containers • Calculating other operation data of non-water-based systems and equipment ◆ Formulate the specifications of various types of non-water-based systems and equipment and select relevant equipment 	

	<p>6.3 Professionalism in designing non-water-based systems and equipment</p> <p>◆ Lead subordinates to design non-water-based fire systems and equipment according to legal requirements, codes of practice and design standards</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to apply special and innovative techniques and lead subordinates to perform tasks of designing non-water-based fire systems and equipment according to client needs and building codes and limitations; and</p> <p>(ii) Capable to provide the sector and clients with designs of non-water-based fire systems and equipment.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of non-water-based fire systems and equipment.</p>

1. Title	Design fire detection and alarm systems and equipment	
2. Code	EMFSDE503A	
3. Range	Analyze, reorganize, assess and integrate information critically by dealing with abstract ideas, concepts and thoughts; instruct subordinates to perform different levels of tasks of designing fire detection and alarm systems and equipment according to client needs, building codes and limitations.	
4. Level	5	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of designing fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the construction, working principles and characteristics of different types of detection and alarm systems and equipment, including: <ul style="list-style-type: none"> • Conventional (electronic) type • Addressable (intelligent) type ◆ Understand building uses, architectural design codes and client needs ◆ Understand the design standards and major requirements of fire detection and alarm systems and equipment, including: <ul style="list-style-type: none"> • The Code of Practice for Fire Service Installations and Equipment • Recognized international standards (BSEN, NFPA) <p>6.2 Design fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Lead subordinates to perform various types of tasks of designing fire detection and alarm systems and equipment according to client needs, manufacturer guidelines, recognized standards and relevant local regulations ◆ Formulate the system drawings and outline design layout plans of various types of equipment according to building codes and limitations ◆ Analyze and select appropriate types of equipment ◆ Calculate and determine the quantities and positions of fire detection and alarm systems and equipment according to building codes and limitations ◆ Formulate the specifications of various types of fire detection and alarm systems and equipment <p>6.3 Professionalism in designing fire detection and alarm systems and equipment</p> <ul style="list-style-type: none"> ◆ Lead subordinates to design fire detection and alarm systems and equipment according to legal requirements, codes of practice and design standards 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to apply special and innovative techniques and lead subordinates to perform tasks of designing fire detection and alarm systems and equipment according to client needs and building codes and limitations; and (ii) Capable to provide the sector and clients with designs of fire detection and alarm systems and equipment.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of fire detection and alarm systems and equipment.

1. Title	Design specialized fire systems and equipment	
2. Code	EMFSDE504A	
3. Range	Analyze, reorganize, assess and integrate information critically by dealing with abstract ideas, concepts and thoughts; instruct subordinates to perform different levels of tasks of designing specialized fire systems and equipment according to client needs, building codes and limitations.	
4. Level	5	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of designing specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Master the construction, working principles and characteristics of different types of specialized fire systems and equipment, including: <ul style="list-style-type: none"> • Fixed foam system • Dry chemical system • Water mist system ◆ Understand building uses, architectural design codes and client needs ◆ Understand the design standards and major requirements of specialized fire systems <ul style="list-style-type: none"> • The Code of Practice for Fire Service Installations and Equipment • Recognized international standards (BSEN, NFPA) <p>6.2 Design specialized fire systems and equipment</p> <ul style="list-style-type: none"> ◆ Lead subordinates to perform various types of tasks of designing specialized fire systems and equipment according to client needs, manufacturer guidelines, recognized standards and relevant local regulations ◆ Formulate the system drawings and outline design layout plans of various types of equipment according to building codes and limitations ◆ Calculate and determine the performance requirements and the size of specialized fire systems and equipment according to building codes and limitations, including: <ul style="list-style-type: none"> • Determining pipe diameter and nozzle size • Number of containers or storage capacity • Calculating other operation data of specialized fire systems and equipment ◆ Formulate the specifications of various types of specialized fire systems and equipment and select relevant equipment 	

	<p>6.3 Professionalism in designing specialized fire systems and equipment</p> <p>◆ Lead subordinates to design specialized fire systems and equipment according to legal requirements, codes of practice and design standards</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to apply special and innovative techniques and lead subordinates to perform tasks of designing specialized fire systems and equipment according to client needs and building codes and limitations; and</p> <p>(ii) Capable to provide the sector and clients with designs of specialized fire systems and equipment.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of specialized fire systems and equipment.</p>

1. Title	Formulate conventional fire system design reports
2. Code	EMFSDE505A
3. Range	Apply professional design techniques to formulate various types of reports for fire service design.
4. Level	5
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Relevant information and details of conventional fire system design report</p> <ul style="list-style-type: none"> ◆ Master building uses, architectural design codes, project schedules and the design criteria of conventional fire systems ◆ Understand different types of design report formats and highlights <p>6.2 Formulate the reports of conventional fire system design</p> <ul style="list-style-type: none"> ◆ Draft and analyze different design proposals <ul style="list-style-type: none"> • Analyze client needs and relevant information of various types of fire service installation design • Draft and analyze different feasibility design proposals and their merits and demerits • Prepare and integrate all the information relevant to the design of fire service installations, including: <ul style="list-style-type: none"> ▸ Descriptions of proposed systems ▸ Design criteria and specifications ▸ System drawings ▸ Project estimates ▸ Project schedules ◆ Compile different types of design reports in an organized and systematic way, including: <ul style="list-style-type: none"> • Feasibility reports • Outline design reports • Scheme design reports
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply professional design techniques to formulate conventional fire system design reports systematically, such as outline design reports and scheme design reports.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of fire system design.

1. Title	Apply fire system computer-aided design (CAD) software
2. Code	EMFSDE506A
3. Range	Apply CAD software to support different levels of fire system design tasks.
4. Level	5
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of fire system CAD software</p> <ul style="list-style-type: none"> ◆ Understand the uses and principles of fire system CAD software, such as: <ul style="list-style-type: none"> • Calculation software for clean agent flow • Calculation software for water flow and pressure in pipes of sprinkler and water spray system ◆ Understand the characteristics, design criteria and limitations of fire system CAD software <p>6.2 Application of fire system CAD software</p> <ul style="list-style-type: none"> ◆ Apply CAD software to support different levels of fire system design tasks according to manufacturer guidelines ◆ Improve the system design through evaluation and analysis of computational results so as to maximize the efficiency <p>6.3 Professionalism in handling computer application software</p> <ul style="list-style-type: none"> ◆ Use computer application software developed under local and international standards
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply CAD software to support different levels of fire system design tasks effectively.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of fire system CAD design software.

1. Title	Formulate fire service installation plan and instructions	
2. Code	EMFSIN501A	
3. Range	Analyze various types of fire service installations and equipment and formulate fire service installation plan and instructions according to the installation contract requirements; lead the technical staff to perform fire service installation tasks.	
4. Level	5	
5. Credit	9	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Requirements for fire system and equipment installation</p> <ul style="list-style-type: none"> ◆ Understand the content and requirements of installation contracts for various types of fire systems and equipment, including general specifications and particular specifications of contract, relevant international standards, project schedule, details of work process, contract details, relevant drawings, etc. ◆ Master the installation procedures and methods for various types of fire systems and equipment <p>6.2 Formulate fire system and equipment installation plan and instructions</p> <ul style="list-style-type: none"> ◆ Analyze, reorganize, evaluate and synthesize a wide range of information in order to formulate the fire system and equipment installation plan and instructions <ul style="list-style-type: none"> • Installation schedule • Formulate installation procedures and methods for the fire system and equipment according to client's tender provisions, contract details, drawings, etc. • Formulate documents of fire system and equipment installation instructions • Lead the technical staff to perform fire service installation tasks • Select materials conforming to the technical requirements for installation and prepare relevant instruments • Set rules for the material storage in the work site • Introduce advanced installation techniques and equipment, and formulate training schemes for relevant installation staff <p>6.3 Professionalism in fire service installation planning</p> <ul style="list-style-type: none"> ◆ Undertake the formulation of fire service installation plans and instructions according to contract requirements and codes of practice 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to analyze, reorganize, evaluate and synthesize information related to fire service installation; lead the technical staff to perform fire service installation tasks; and formulate the fire service installation plan and instructions in varied situations/environments according to contract requirements.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of installing various types of fire systems.

1. Title	Formulate fire system testing and commissioning plans
2. Code	EMFSIT501A
3. Range	As regards the testing and commissioning of fire systems and equipment, critically analyze, reorganize, evaluate and synthesize a wide range of information; and apply a wide range of technical and professional skills to formulate a fire system testing and commissioning plan.
4. Level	5
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Requirements for fire system testing and commissioning</p> <ul style="list-style-type: none"> ◆ Understand commonly-adopted standards and legal requirements for testing and commissioning of various types of fire systems ◆ Master the project schedule and the scope of testing and commissioning ◆ Understand procedures and methods of testing and commissioning various types of fire systems ◆ Understand the content and importance of the fire system testing and commissioning documents <p>6.2 Fire system testing and commissioning plan</p> <ul style="list-style-type: none"> ◆ Critically analyze, reorganize, evaluate and synthesize a wide range of information; and formulate a fire system testing and commissioning plan according to the project schedule. The plan includes: <ul style="list-style-type: none"> • Schedule for testing and commissioning • Procedures and methods of testing and commissioning fire systems and installations • Forms and reports of fire system and installation testing and commissioning • Training arrangement for operating and maintenance staff • Technical staff and instruments for the testing and commissioning <p>6.3 Professionalism in planning fire system testing and commissioning</p> <ul style="list-style-type: none"> ◆ Undertake the planning of fire system testing and commissioning according to the legal requirements and codes of practice, and prepare relevant documents
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to critically analyze, reorganize, evaluate and synthesize a wide range of information; and formulate a fire system testing and commissioning plan, in which the methods, procedures, forms and reports of, and technical staff training for the testing and commissioning of fire systems and installations are included.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of testing and commissioning various types of fire systems.

1. Title	Formulate fire system enhancement proposals
2. Code	EMFSOR501A
3. Range	Critically analyze, reorganize, evaluate and synthesize a wide range of information at the workplace where the existing fire system is located; and analyze information of the fault and operation record of the existing fire system so as to formulate a fire system enhancement proposal.
4. Level	5
5. Credit	12
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Operation of the existing fire system and factors affecting operational efficiency</p> <ul style="list-style-type: none"> ◆ Understand the operation and fault record of the existing fire system, and compare to relevant benchmarks ◆ Master professional skills in investigating system operation ◆ Understand internal and external factors affecting the operational efficiency of the existing fire system <p>6.2 Formulate fire system enhancement proposal</p> <ul style="list-style-type: none"> ◆ Analyze information of the fault and operation record of the existing fire system so as to assess critically the demerits of the existing fire system as well as causes and effects of relevant internal and external factors ◆ Formulate short-term and long-term enhancement plans, including modifying the operation, repair and maintenance plan, replacing part of or all of the installations, etc. ◆ Devise procedures, schedule and financial budget for the enhancement plan
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply professional skills to explore the demerits and underlying problems of the existing system, so as to work out a system enhancement proposal.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of general fire equipment operation, maintenance and repair.

1. Title	Perform fire service installation operation, repair and maintenance management	
2. Code	EMFSOR502A	
3. Range	Apply various skills and management techniques to conduct analyses and assessment of all kinds of information, and perform fire system operation, repair and maintenance management at operational sites or repair workshops of fire service installations.	
4. Level	5	
5. Credit	12	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of fire service installation operation, repair and maintenance management</p> <ul style="list-style-type: none"> ◆ Understand the principles and techniques of fire service installation operation, repair and maintenance management ◆ Understand the contract requirements of fire service installation operation, repair and maintenance project, including general specifications, particular specifications, project schedule, work process details, quotation list, tender, etc. <p>6.2 Perform fire service installation operation, repair and maintenance management</p> <ul style="list-style-type: none"> ◆ Apply various skills and management techniques to conduct analyses and assessment of all kinds of information, and perform fire service installation operation, repair and maintenance management according to client's or contract requirements, including: <ul style="list-style-type: none"> • Select materials, tools and instruments, e.g. all kinds of spare accessories, hand tools and lifting appliances, etc., according to the technical requirements on operation, repair and maintenance • Arrange repair and maintenance tools, with reference to the characteristics and limitations of the workplace, according to the technical requirements on operation, repair and maintenance • Formulate documents for inspection record of operation, repair and maintenance • Use computer software to enhance work effectiveness • Perform emergency procedures and contingency measures ◆ Determine, coordinate, arrange and monitor matters relevant to operation, repair and maintenance; and communicate with clients or contractors to ensure the operation, repair and maintenance work be carried out smoothly 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to apply various skills and management techniques to conduct analysis and assessment of all kinds of information, and perform effectively fire service installation operation, repair and maintenance management according to the requirements of the operation, repair and maintenance management contract.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of general fire system operation, maintenance and repair.

1. Title	Formulate project procedures and schedule
2. Code	EMCUPM501A
3. Range	Formulate project procedures and schedule for electrical and mechanical services according to the specifications, scope and targets of the project.
4. Level	5
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Principles and techniques of electrical and mechanical project management</p> <ul style="list-style-type: none"> ◆ Understand the principles and techniques of electrical and mechanical engineering project management, including the formulation of project procedures, schedule, contingency plan and review mechanism <p>6.2 Formulate procedures, schedule, contingency plans and review mechanism for electrical and mechanical projects</p> <ul style="list-style-type: none"> ◆ Draft project procedures <ul style="list-style-type: none"> • Confirm the project specifications, scope and targets according to the contract and related information • Analyze the work breakdown structure and organisational breakdown structure • Pay attention to safety, health and environmental protection ordinances and codes, the protection of intellectual property and quality management system of the organization when drafting project procedures ◆ Formulate project schedule <ul style="list-style-type: none"> • Apply project management techniques to formulate project schedule according to the contract and related information as well as project procedures drafted and the following arrangements: <ul style="list-style-type: none"> ▸ Critical path and flow chart ▸ Arrangements of equipment, materials and parts ▸ Arrangements of human resources ◆ Formulate contingency mechanism and review mechanisms <ul style="list-style-type: none"> • Conduct risk assessment for the projects and formulate contingency mechanism ◆ Formulate review mechanism for the project to ensure that targets of the project be achieved
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to formulate project procedures and schedules for electrical and mechanical projects according to the project specifications and targets; and</p> <p>(ii) Capable to formulate effective review check points and review mechanism for the projects.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of operation management.

1. Title	Formulate contract documents for fire service projects
2. Code	EMFSPM501A
3. Range	As regards fire service project management, critically analyze, reorganize, evaluate and synthesize a wide range of information about a fire service project, so as to draft and formulate the contract documents for the project.
4. Level	5
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Terms and details of engineering contract</p> <ul style="list-style-type: none"> ◆ Understand all kinds of contract terms, their execution and spirit of the law ◆ Understand the nature and content of all kinds of engineering contract, including: <ul style="list-style-type: none"> • Fire equipment procurement contract • Engineering service contract • Engineering design and installation contract <p>6.2 Formulate contract documents for fire service projects</p> <ul style="list-style-type: none"> ◆ Critically analyze, reorganize, evaluate and synthesize a wide range of information about a fire service project, so as to formulate the contract documents for the project <ul style="list-style-type: none"> • Draft and formulate general contract terms and details, including: <ul style="list-style-type: none"> ▸ General contract terms ▸ General technical provisions ▸ Tender form • Draft and formulate special contract terms and details, including: <ul style="list-style-type: none"> ▸ Standard technical provisions ▸ Special contract terms ▸ Special technical provisions ▸ Tender drawing ▸ Tender schedule
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to critically analyze, reorganize, evaluate and synthesize a wide range of information about a fire service project, so as to formulate general and special contract terms and details for the project.</p>
8. Remarks	This unit of competency is suitable for enhancing the competency of fire service project management staff.

1. Title	Perform management for fire service tender bids
2. Code	EMFSPM502A
3. Range	As regards fire service project management, apply a wide range of expertise to the management of fire service tender bids.
4. Level	5
5. Credit	12
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of managing fire service tender bids</p> <ul style="list-style-type: none"> ◆ Understand the content and characteristics of fire service tender invitations and bids, including: <ul style="list-style-type: none"> • Content of tender invitations and bids • Characteristics of tender invitations and bids • Procedures of general engineering tender invitations and bids <p>6.2 Methods and procedures of managing fire service tender bids</p> <ul style="list-style-type: none"> ◆ Apply a wide range of expertise to project planning in bidding fire service tenders, including: <ul style="list-style-type: none"> • Setting goals for tender planning • Formulate resources arrangement and organizational structure for fire service project according to the goals for tender planning ◆ Conduct tender price evaluation, including: <ul style="list-style-type: none"> • Formulate the costing of the fire service project according to contract conditions • Submit counter-proposals to reduce the project price or raise the quality ◆ Determine the lump sum for a tender bid, including: <ul style="list-style-type: none"> • Conduct market price analysis of fire services • Analyze the accuracy of cost evaluation • Consider all factors to determine the lump sum for a tender bid <p>6.3 Professionalism in managing fire service tender bids</p> <ul style="list-style-type: none"> ◆ Perform management for fire service tender bids according to legal requirements and codes of practice
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply a wide range of expertise and analyze all kinds of information to complete the management tasks for a fire service tender bid, including evaluating tender price and determining lump sum for the tender bid.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of fire system and engineering project management.

1. Title	Perform cost management for fire service projects
2. Code	EMFSPM503A
3. Range	Apply a wide range of expertise to perform cost management for fire service projects at projects management office.
4. Level	5
5. Credit	12
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of cost management for fire service projects</p> <ul style="list-style-type: none"> ◆ Understand the content of project cost management, including: <ul style="list-style-type: none"> • Functions, principles and the content of project cost management • Importance of project cost management <p>6.2 Methods and procedures of cost management for fire service projects</p> <ul style="list-style-type: none"> ◆ Formulate resources plan for the fire service project according to projects documents and information ◆ Audit the costing of the fire service projects, including: <ul style="list-style-type: none"> • Accuracy of costing • Inclusion of any other additional costs in the costing due to other factors ◆ Apply a wide range of expertise to control the costs of the fire service projects, including: <ul style="list-style-type: none"> • Implement cost control at the decision-making stage of project investment • Implement cost control at the stage of project design • Implement cost control at the stage of calling for or bidding tender • Implement cost control at the working stage • Implement cost control at the stage of completion of project <p>6.3 Professionalism in managing fire service project costs</p> <ul style="list-style-type: none"> ◆ Perform cost management for fire service projects according to legal requirements and codes of practice
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply a wide range of expertise and analyze all kinds of information to complete the cost management tasks for fire service projects.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of fire system and engineering project management.

1. Title	Implement engineering operation and supervisory management
2. Code	EMCUOM502A
3. Range	Coordinate engineering operation, supervisory management and human resources management for electrical and mechanical services.
4. Level	5
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Understand engineering operation and supervisory areas and techniques</p> <ul style="list-style-type: none"> ◆ Understand engineering operation management including: <ul style="list-style-type: none"> • Supervisory management techniques for projects • Management techniques for work site environment • Workflow of electrical works project <p>6.2 Implement engineering operation and supervisory management</p> <ul style="list-style-type: none"> ◆ Implement engineering operation management to ensure that all engineering procedures be carried out properly. The engineering operation management targets include zero breach of contract, zero accident rate, zero delay, timely delivery of material, balance of income and expenditure, etc. ◆ Implement engineering supervisory management such as analyzing and arranging works so that the project can complete in time ◆ Understand the tendering strategy and assist the company in project quotation and bidding tenders
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to implement engineering operation, supervisory and management in different technical areas of work in order to achieve the targets.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of electrical and mechanical operation.

1. Title	Formulate operation and financial management plan
2. Code	EMFSOM502A
3. Range	Analyze the internal operation management status and financial management issues of a fire installation organization, and, according to the data/information of costs, expenditure, profits, etc., formulate an operation and financial management plan in the best interests of the organization.
4. Level	5
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Organizational operation management status and financial management theory</p> <ul style="list-style-type: none"> ◆ Master the operation management status of all projects, including their project life cycle, peak rate of manpower and capital demand, capital flow, delivery of materials, profits and liabilities, etc. ◆ Understand financial management theory and strategy <ul style="list-style-type: none"> • Understand financial statement analysis, including: <ul style="list-style-type: none"> ▸ Statement of assets and liabilities ▸ Profit and loss statement ▸ Cash flow statement ▸ Forecast report • Understand methods of financial planning and forecast • Master the calculation of project's cash flow <p>6.2 Formulate operation and financial management plan</p> <ul style="list-style-type: none"> ◆ Analyze the internal operation management status and financial management issues of the organization, and, according to the data/information of costs, expenditure, profits, etc., formulate an operation and financial management plan <ul style="list-style-type: none"> • Formulate an organizational operation management plan <ul style="list-style-type: none"> ▸ Investigate thoroughly all works that are far below standard or do not comply with regulations ▸ Analyze, review, consolidate, extend and judge the information collected for further improvement of the existing operation management system ▸ Formulate an effective operation management plan to deal with defects of the existing operation management plan

	<ul style="list-style-type: none"> • Master the project life cycle, capital flow, delivery of materials, expenditure, etc. of all projects and formulate an overall financial management plan including financial analysis reports concerning loan interest analysis, internal rate of return (IRR), capital flow, foreign currency risk hedging, etc. <ul style="list-style-type: none"> ▶ Formulate capital budget strategy ▶ Formulate cost control strategy ▶ Formulate risk and return management strategy
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to formulate an effective operation management plan to deal with defects of the existing operation management plan; and</p> <p>(ii) Capable to analyze the financial management issues of the organization, and, according to the data/information of costs, expenditure, profits, etc., formulate an operation and financial management plan.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses general knowledge of operation management and financial management of fire engineering services.</p>

1. Title	Implement risk management for electrical and mechanical services	
2. Code	EMCUSH502A	
3. Range	Apply risk assessment and management techniques to formulate and implement risk management plans.	
4. Level	5	
5. Credit	9	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Know about different kinds of electrical and mechanical engineering risks and their management methods</p> <ul style="list-style-type: none"> ◆ Understand different kinds of electrical and mechanical engineering risks such as: <ul style="list-style-type: none"> • Different kinds of potential hazards and risks caused by them • Risk analysis modes such as HAZOP(Hazard and Operability Studies) 、QRA(Quality Risk Assessment) 、FMEA(Failure Modes and Effects Analysis) and FTA(Fault Tree Analysis), etc. • Other risk related factors such as occupational safety and health, management systems, Factories and Industrial Undertakings Ordinance, etc. • Risk control and risk management plans <p>6.2 Implement risk management for electrical and mechanical services</p> <ul style="list-style-type: none"> ◆ Identify potential hazards and their kinds (e.g. chemical hazards, electrical hazards, etc.), the chance of happening and the consequences ◆ Conduct risk assessment and analysis <ul style="list-style-type: none"> • Conduct risk assessment for the working procedure, work type, machinery and organization according to the chance of happening and the consequences of the hazard • Analyze the price for the accident and the advantages of safe operation • Consider comprehensively the aspects of occupational safety and health as well as environmental protection when conducting risk assessment ◆ Control and management risks <ul style="list-style-type: none"> • Formulate risk control levels based on risk assessment data • Formulate the risk control and management plan according to risk control levels and by taking into consideration of the OHSAS18000 Occupational Health and Safety Assessment Series and Factories and Industrial Undertakings Ordinance and regulations • Implement risk management for electrical and mechanical services according to the risk control and management plan 	

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to identify hazards and assess risks according to the activities and nature of the electrical and mechanical services; and(ii) Capable to devise a risk control and management plan according to the hazards identified, risk assessment and other considerations.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of occupational safety management.

1. Title	Formulate occupational safety and health management system
2. Code	EMCUSH504A
3. Range	Master the knowledge of occupational safety and health so as to formulate a basic occupational safety and health management system.
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of occupational safety and health</p> <ul style="list-style-type: none"> ◆ Understand the operation of the occupational safety and health management system, including: <ul style="list-style-type: none"> • Goals of the management system • Monitoring mechanism • Training methods • Contingency measures • Review measures <p>6.2 Formulation of basic occupational safety and health management system</p> <ul style="list-style-type: none"> ◆ Formulate occupational safety and health management system according to the requirements of the occupational safety and health ordinances as well as the operation of the company. The tasks include: <ul style="list-style-type: none"> • Setting goals for the management system • Organizing management committee and setting its terms of reference • Establishing management system mechanism • Designing monitoring mechanism • Formulating training plans • Establishing work site contingency measures • Formulating review measures
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to formulate an effective and basic occupational safety and health management system according to the requirements of the occupational safety and health ordinances as well as the operation of the company.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of occupational safety management.

1. Title	Formulate occupational safety and health and environmental protection schemes	
2. Code	EMCUSH505A	
3. Range	Analyze areas that have to be enhanced regarding staff's awareness of occupational safety and health and environmental protection, and to formulate schemes to enhance staff's awareness of occupational safety and health and environmental protection.	
4. Level	5	
5. Credit	6	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Occupational safety and health and environmental protection scheme</p> <ul style="list-style-type: none"> ◆ Understand the importance of occupational safety and health and environmental protection to staff; and draft a scheme relevant to occupational safety and health and environmental protection including the following: <ul style="list-style-type: none"> • Scheme targets • schedule • Effectiveness review • Manpower arrangement • Budget, etc. <p>6.2 Formulation of occupational safety and health and environmental protection scheme</p> <ul style="list-style-type: none"> ◆ Identify the difference between the company's targets and staff awareness of occupational safety and health and environmental protection <ul style="list-style-type: none"> • Collect opinions of staff on occupational safety and health and environmental protection management • Set the company's targets on occupational safety and health and environmental protection management • Identify the difference between the company's targets and staff awareness of occupational safety and health and environmental protection management ◆ Formulate plans to enhance staff's awareness of occupational safety and health and environmental protection management <ul style="list-style-type: none"> • Analyze company's occupational safety and health and environmental protection management culture, and draft proposals for the enhancement scheme such as training courses, seminars and quiz competitions, etc. • Collect staff's opinions on safety, health and environmental improvement • Collect staff's opinions on the enhancement scheme • Use other organizations' successful experience in organizing activities to enhance staff's awareness of occupational safety and health and environmental protection 	

	<ul style="list-style-type: none"> • Formulate a scheme to enhance staff's awareness of occupational safety, health environmental protection, including the formulation of scheme targets, implementation methods and schedule, expected performance, budget, measuring methods, etc. • Manpower arrangement for the implementation of the scheme ◆ Review the effectiveness of the scheme <ul style="list-style-type: none"> • Ensure good communication during the implementation of the scheme • Measure and review the effectiveness of the scheme after implementation
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to formulate and implement schemes to enhance staff's awareness of occupational safety and health and environmental protection; and to review their effectiveness.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of occupational safety management.</p>

1. Title	Perform risk assessment for electrical and mechanical work
2. Code	EMCUSH506A
3. Range	Apply the knowledge and skills of risk assessment with the understanding of the electrical and mechanical work to perform risk assessment. The competency of this unit is applicable to safety management of the electrical and mechanical services.
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Engineering work and environment</p> <ul style="list-style-type: none"> ◆ Understand the engineering work and environment according to engineering working guidelines and on-site observation ◆ Understand the potential risks and hazards according to the accident reports <p>6.2 Perform risk assessment</p> <ul style="list-style-type: none"> ◆ Apply risk assessment skills to perform risk assessment for electrical and mechanical procedures, such as HAZOP (Hazard and Operability), FTA (Fault Tree Analysis), fault-finding analysis, status analysis, and the use of tools under different circumstances and handling of dangerous goods and scope of application ◆ Compile risk assessment reports for engineering procedures, including <ul style="list-style-type: none"> • Hazards and their identification • Risk assessment methods • Calculation and assessment of risks • Methods to reduce or eliminate risks • Conclusions and recommendations
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to perform effectively risk assessment and to write proposals for electrical and mechanical work and environment, and come up with conclusions and recommendations.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses the competency of using basic risk assessment methods.

1. Title	Formulate environmental protection management system
2. Code	EMCUSH507A
3. Range	Master the legal requirements on environmental protection so as to formulate a basic environmental protection management system.
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic knowledge of environmental protection</p> <ul style="list-style-type: none"> ◆ Understand the legal requirements on environmental protection, including the areas of emissions, waste water, noise, solid waste, chemical waste, etc. ◆ Understand the operation of a basic environmental protection management system, including: <ul style="list-style-type: none"> • Goals of the management system • Monitoring mechanism • Contingency measures • Review measures • ISO 14001, etc. <p>6.2 Formulation of basic environmental protection management system</p> <ul style="list-style-type: none"> ◆ Formulate a basic environmental protection management system according to the legal requirements on environmental protection, including the following: <ul style="list-style-type: none"> • Goals of the management system • Management system mechanism • Monitoring mechanism • Contingency measures • Review measures
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to formulate an effective basic environmental protection management system for the electrical and mechanical services according to the legal requirements on environmental protection, and review its effectiveness.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of environmental protection.

1. Title	Implement occupational safety and health and environmental protection courses and training programmes
2. Code	EMCUSH508A
3. Range	Implement occupational safety and health and environmental protection courses and training programmes, and enhance safety awareness of staff.
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Contents of general occupational safety and health and environmental protection courses and training</p> <ul style="list-style-type: none"> ◆ Understand the objectives and contents of general occupational safety and health and environmental protection courses and training ◆ Understand the characteristics and needs of training targets <p>6.2 Implementation of general occupational safety and health and environmental protection courses and training</p> <ul style="list-style-type: none"> ◆ Investigate the needs of training targets within the organization <ul style="list-style-type: none"> • Use different methods to help investigate the needs of training targets within the organization for occupational safety and health and environmental protection training, such as questionnaire, staff appraisal report, company policy, etc. ◆ Implement occupational safety and health and environmental protection courses and training projects <ul style="list-style-type: none"> • Make relevant arrangements for enrolment and admission procedures, venue and duration for the course, teaching materials and aids, etc ◆ Enhance staff's safety awareness <ul style="list-style-type: none"> • Encourage the staff to participate actively in occupational safety and health and environmental protection courses and training programmes through continuous staff training, merit assessment, performance incentives, extracurricular activities
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to use different methods to investigate and analyze effectively the needs of training targets on occupational safety and health and environmental protection within the organization;</p> <p>(ii) Capable to organize training courses and programmes, and implement relevant activities effectively according to the internal needs of the organization; and</p> <p>(iii) Capable to formulate and implement encouragement measures to enhance staff's safety awareness.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses the knowledge of occupational safety management.

1. Title	Formulate and implement quality management courses and training programmes
2. Code	EMCUQM503A
3. Range	Formulate and implement quality management courses and training programmes by targeting the weaknesses in electrical and mechanical engineering quality management so as to enhance the staff's awareness of quality management.
4. Level	5
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Electrical and mechanical engineering quality management concept and culture</p> <ul style="list-style-type: none"> ◆ Understand the electrical and mechanical engineering quality management concept and culture, including the 'Plan-Do-Check-Act' Quality Management Cycle <p>6.2 Formulate and implement quality management courses and training programmes</p> <ul style="list-style-type: none"> ◆ Formulate and implement quality management courses and training programmes by targeting the weaknesses in electrical and mechanical engineering quality management such as the basic quality management in various procedures, including installation, checking, debugging, commissioning and repair, etc. ◆ Formulate the basic course on 'Plan-Do-Check-Act' Quality Management Cycle ◆ Formulate basic level quality management courses or training programmes ◆ Implement quality management courses or training programmes to enhance the staff's awareness of quality management, including: <ul style="list-style-type: none"> • Basic requirements and application of ISO 9000 quality management and quality assurance standards • Promoting quality management culture • Urging the staff to constantly review and improve the engineering process performance ◆ Review and improve the quality management courses regularly to enhance the effectiveness of staff training
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to formulate and implement quality management courses and training programmes effectively by targeting the weaknesses in electrical and mechanical engineering quality management, and review and improve the quality management courses effectively.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic concepts of quality management.

1. Title	Formulate and analyze quality assurance reports
2. Code	EMCUQM504A
3. Range	With regard to quality management of electrical and mechanical services, analyze information generated from quality monitoring points of each engineering procedure, quality issues and problems, and formulate quality assurance reports.
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Format and key points of quality assurance report on electrical and mechanical services</p> <ul style="list-style-type: none"> ◆ Understand the format and key points of quality assurance report on electrical and mechanical services <p>6.2 Formulate and analyze quality assurance reports</p> <ul style="list-style-type: none"> ◆ Base on records of the major monitoring points of each service procedure and all quality related issues, such as quality level for each action, non-compliance with regulations, errors, defects, deviation, excesses or shortfalls and other causes, etc., to quantify quality management issues and problems so as to provide sufficient data or information to produce the quality assurance reports <ul style="list-style-type: none"> • Analyze all quality management issues and problems, formulate quality assurance reports and report to the management
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to effectively monitor each service procedure, quantify quality management issues and problems, analyze data and information, and formulate quality assurance reports.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic concepts of quality management.

1. Title	Formulate schemes to enhance staff's awareness of quality management
2. Code	EMCUQM505A
3. Range	Analyze what areas in quality management of electrical and mechanical services that the staff should improve, and formulate schemes to enhance staff's awareness of quality management.
4. Level	5
5. Credit	5
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Culture and targets of organization in quality management</p> <ul style="list-style-type: none"> ◆ Understand the culture and targets of the organization in quality management <p>6.2 Plan to enhance staff's awareness of quality management and review the effectiveness of scheme</p> <ul style="list-style-type: none"> ◆ Collect staff's understanding and opinions on quality management ◆ Identify the deviation between targets of the organization and staff's performance on quality management ◆ Analyze the quality management culture of the organization, and draft forms of enhancement measures, such as training courses, quiz competitions and seminars, etc. ◆ Collect staff's opinions on the enhancement scheme ◆ Implement Quality Circle activities ◆ Formulate suitable schemes to enhance staff's awareness of quality management, including the formulation of schemes' targets, implementation methods and schedule, expected performance, budget and means for measuring the effectiveness, etc. ◆ Measure and review the effectiveness of the scheme after implementation
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to analyze the quality management culture of the organization, draft a proposal to enhance staff's awareness of quality management, and review the effectiveness of the enhancement scheme after implementation.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses a fair basis of quality management.

1. Title	Implement quality management training courses
2. Code	EMCUQM506A
3. Range	Master knowledge and skills in quality management of electrical and mechanical services to implement quality management courses.
4. Level	5
5. Credit	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Quality management system</p> <ul style="list-style-type: none"> ◆ Understand quality management system, such as: <ul style="list-style-type: none"> • ISO 9000 • Total quality management • Quality circle • Business Process Re-engineering <p>6.2 Implement quality management courses</p> <ul style="list-style-type: none"> ◆ Set targets for the courses <ul style="list-style-type: none"> • Identify staff's training needs and formulate a training plan accordingly • Set targets for each course according to the training plan ◆ Apply the knowledge of quality management system and the pre-set quality standard and system of the organization when formulating courses, including: <ul style="list-style-type: none"> • Working procedure system • Working instruction system • Document control system ◆ Set the teaching mode of the quality management courses, including: <ul style="list-style-type: none"> • Lesson mode • Interactive mode • Workshop mode • Assessment mode ◆ Review the effectiveness of courses <ul style="list-style-type: none"> • Use questionnaires to collect opinions of the staff concerned • Check with the department-in-charge the progress of the staff concerned after receiving the training
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply the knowledge of quality management system and the quality management policy of the organization to formulate effective quality management courses, and review the courses effectively after implementation.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses a fair basis of quality management.

1. Title	Implement quality management standards of International Organization for Standardization (ISO)
2. Code	EMCUQM507A
3. Range	Apply ISO quality management standards in quality management work of electrical and mechanical services.
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 ISO quality management standards</p> <ul style="list-style-type: none"> ◆ Understand ISO 9000 Quality Management and Quality Assurance Standard Series, including the quality assurance system and management mechanism <p>6.2 Implement ISO quality management standards</p> <ul style="list-style-type: none"> ◆ Implement ISO 9000 Quality Management and Quality Assurance Standard Series, including: <ul style="list-style-type: none"> • Quality management responsibilities of staff at different levels • Quality assurance system • Inspection mechanism • Document and information management mechanism • Procurement management mechanism • Work process audit mechanism • Improper works control and correction system • Quality record control system • Internal quality audit system
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to implement effectively ISO 9000 Quality Management and Quality Assurance Standard Series and review its effectiveness.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic concepts of quality management.

1. Title	Formulate marketing plans	
2. Code	EMFSMS501A	
3. Range	Analyze the entire overseas and local fire installation market to develop comprehensive, systematic and innovative marketing plans, so as to enhance the overseas and local target markets' knowledge in and promote the sales of fire products / services for the organization.	
4. Level	5	
5. Credit	4	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Understand the entire operation of the marketing and sales system</p> <ul style="list-style-type: none"> ◆ Understand the entire operation concept of the marketing and sales system of the organization, and conduct elementary analysis on different markets to determine the marketing and sales methods ◆ Understand markets of different areas including the local market, Mainland market, each target overseas market, etc. ◆ Analyze the market situation, including: <ul style="list-style-type: none"> • Development potential of each target overseas market • Marketing structure • Current market leader • Market life cycle <p>6.2 Formulate marketing plans</p> <ul style="list-style-type: none"> ◆ Formulate effective, comprehensive marketing plans for overseas and local markets <ul style="list-style-type: none"> • Expand the market and attract new customers apart from identifying target customers • Use “Relationship Marketing” to maintain existing customers and find new customers • Use “Relationship Marketing” to strengthen customers’ loyalty to the products and services provided • Master good communication skills to open up overseas market • Formulate marketing portfolio, prepare budgets according to the financial situation of the organization and arrange the priorities • Understand the functions of exhibitions and use them to expand local and overseas markets • Assess marketing results <ul style="list-style-type: none"> ▸ Master the results and information of the marketing plans, so as to analyze and develop future marketing plans ▸ Develop and manage the comprehensive marketing plans to ensure they are in harmony and conduct assessment 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to submit comprehensive marketing plans for overseas and local markets to the management according to the market planning, financial budgets and strategies of the organization so as to enhance the popularity of and the target markets' knowledge in the organization and enlarge the market share.
8. Remarks	This unit of competency is suitable for enhancing the competency of fire installation sales and marketing personnel.

Competency Level 6

1. Title	Apply fire dynamics and fire simulation techniques
2. Code	EMFSDE601A
3. Range	Master the principles of fire dynamics and the application of computational fluid dynamics (CFD) simulation software, in a number of complicated situations/conditions, at locations where the design of major fire systems is involved.
4. Level	6
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Theory of fire dynamics</p> <ul style="list-style-type: none"> ◆ Understand the theory of the complicated combustion phenomena, including: <ul style="list-style-type: none"> • Heat current effect generated by flames • Fume generated in combustion and its flow change • Heat release rate, heat energy and temperature change related to flames and fume • Combustion change inside the space <p>6.2 Methods and applications of fire simulation</p> <ul style="list-style-type: none"> ◆ Master the methods and applications of fire simulation in a number of complicated situations/conditions, including: <ul style="list-style-type: none"> • Zone model • Field model • Use of CFD simulation software (FPETOOL, FIRECAL) for simulating fire scenes
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to predict combustion change data in a number of complicated situations/conditions; and</p> <p>(ii) Capable to use CFD simulation software for evaluation of simulated fire scenes.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of designing various types of conventional fire systems.

1. Title	Design non-conventional fire services
2. Code	EMFSDE602A
3. Range	Capable to apply highly specialized design techniques, in complicated situations, to perform *non-conventional fire services design work at locations of large premises where fire safety design is involved.
4. Level	6
5. Credit	12
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of *non-conventional fire services design</p> <ul style="list-style-type: none"> ◆ Understand the uses of large buildings, special architectural design requirements, project schedules and the design criteria of *non-conventional fire systems ◆ Master the principles of fire dynamics ◆ Understand the performance-based fire services design methods and their major codes, including: <ul style="list-style-type: none"> • The Code of Practice for Fire Service Installations and Equipment and relevant legislations • Recognized international standards (BSEN, NFPA) <p>6.2 Perform tasks of *non-conventional fire services design</p> <ul style="list-style-type: none"> ◆ Apply the expertise, in cases with inadequate information, to undertake major tasks of designing performance-based fire services, including: <ul style="list-style-type: none"> • Determine performance-based design goals and acceptable criteria • Assess fire hazards • Analyze feasibility design packages ◆ Master the system configurations and equipment specifications of *non-conventional fire service design ◆ Apply CFD simulation software to perform complicated fire modelling computations and analyze the computed results
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency is:</p> <p>(i) Capable to apply highly specialized design techniques to perform tasks of non-conventional fire services design in complicated situations; and</p> <p>(ii) Capable to master the system configurations and equipment specifications of *non-conventional fire service design; apply CFD simulation software to handle complicated fire modelling computation and analysis.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of conventional fire system design.</p> <p>*Non-conventional fire service design replaces the prescriptive provisions of the Code of Practice for Fire Service Installations and Equipment with fire engineering design methods that require highly specialized techniques and a set of designs acceptable to the Fire Services Department.</p>

1. Title	Formulate maintenance and repair management system and policy	
2. Code	EMFSOR601A	
3. Range	Fully master knowledge and techniques of fire system maintenance and repair management and, in the absence of complete or consistent data/information, formulate a maintenance and repair management system and policy for the organization.	
4. Level	6	
5. Credit	12	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of maintenance and repair management system and policy</p> <ul style="list-style-type: none"> ◆ Understand the content of maintenance and repair management system and policy, including: <ul style="list-style-type: none"> • Policy goals • Operation mode of management system • Monitoring procedures • Measurement of performance • Review mechanism ◆ Understand characteristics of various methods and management strategies for maintenance and repair <p>6.2 Formulate operation, maintenance and repair management system and strategy</p> <ul style="list-style-type: none"> ◆ Formulate operation, maintenance and repair management strategy for the fire system in the absence of complete or consistent data/information, including: <ul style="list-style-type: none"> • Goals for the maintenance and repair management policy • Using different strategies for repair, for the training of staff who undertake system operation, repair and maintenance, and for the overall management of operation, repair and maintenance sub-contractors to maximize cost-effectiveness ◆ Formulate operation, maintenance and repair management system for the fire equipment, including: <ul style="list-style-type: none"> • Formulating operation, repair and maintenance staff structure • Formulating operation, repair and maintenance work flow • Formulating operation, repair and maintenance staff training system • Using computer software to enhance the efficiency of operation, repair and maintenance management 	
7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to formulate suitable operation, maintenance and repair management strategy and system in the absence of complete or consistent data/information.	
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of managing general fire system and equipment operation, maintenance and repair.	

1. Title	Apply project management skills and professional knowledge to handle unfulfilled or unperformed contracts effectively
2. Code	EMCUPM601A
3. Range	Use professional knowledge to analyze the reasons and impact of non-fulfillment or non-performance of project contracts, as far as electrical and mechanical project management is concerned, and apply project management knowledge and skills to handle these contracts effectively.
4. Level	6
5. Credit	20
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Reasons for non-fulfillment or non-performance of contract</p> <ul style="list-style-type: none"> ◆ Use professional knowledge and knowledge of engineering environment to analyze the reasons of non-fulfillment or non-performance of project contracts by considering the following factors: <ul style="list-style-type: none"> • Technical concerns • Cost effectiveness • Change in project environment • Political, social and legal concerns • Contractor-related concerns <p>6.2 Handle unfulfilled or unperformed project contracts</p> <ul style="list-style-type: none"> ◆ Consider all solutions according to the above concerns, and calculate the costs and price for each solution ◆ Identify the most beneficiary solution to both sides and draft details of the solution ◆ Base on the drafted solution to negotiate with the contractor in order to come up with a solution accepted by both sides ◆ Know which part of the contract is unfulfilled or unperformed, and arrange to call for tender for that part again ◆ Be capable to provide sufficient and clear information should legal actions are required to solve the contract issues
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to apply project management skills and professional knowledge to handle unfulfilled or unperformed project contracts, draft solutions effectively and calculate costs and prices for the solutions.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of engineering business management.

1. Title	Formulate project management strategies
2. Code	EMFSPM601A
3. Range	Master project planning and management methods applicable to fire service project management and, in the absence of complete or consistent data/information, formulate project management strategies.
4. Level	6
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Master project planning and management methods</p> <ul style="list-style-type: none"> ◆ Master project planning and scope ◆ Master methods and steps of project control ◆ Analyze resources allocation and solve related problems <p>6.2 Formulate project management strategies</p> <ul style="list-style-type: none"> ◆ Formulate project management strategies, including the strategies of project cost management, procurement management, quality management, human resources management, risk management, etc., in the absence of complete or consistent data/information, for maximized cost effectiveness
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to master project planning and management methods; and</p> <p>(ii) Capable to formulate project management strategies in the absence of complete or consistent data/information.</p>
8. Remarks	This unit of competency is suitable for enhancing the competency of fire installation project management staff.

1. Title	Formulate overall safety, health and environmental protection policy	
2. Code	EMCUSH601A	
3. Range	Master comprehensive knowledge and techniques of safety, health and environmental protection; review comprehensively the organization's safety, health and environmental protection management system; and formulate a forward-looking, overall safety, health and environmental protection policy and management system.	
4. Level	6	
5. Credit	20	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Overall safety, health and environmental protection policy and management system of the organization</p> <ul style="list-style-type: none"> ◆ Understand the safety, health and environmental protection management system and policy goals of the organization, including: <ul style="list-style-type: none"> • Long-term and short-term goals • Measurement of performance • Management system • Review mechanism <p>6.2 Overall safety, health and environmental protection policy of the organization</p> <ul style="list-style-type: none"> ◆ Formulate long-term and short-term goals for the overall safety, health and environmental protection policy <ul style="list-style-type: none"> • Draw the experience of other organizations that have won safety, health and environmental protection awards, and formulate forward-looking, long-term and short-term goals for the overall safety, health and environmental protection management ◆ Identify the deviations between safety, health and environmental protection management goals and current performance <ul style="list-style-type: none"> • Identify and confirm the deviations between safety, health and environmental protection management goals and current performance of the organizational management system, including the items and operating mode ◆ Formulate and implement safety, health and environmental protection management policy <ul style="list-style-type: none"> • Analyze deviations between safety, health and environmental protection goals and current system performance, staff's awareness of safety, health and environmental protection, and formulate an overall safety, health and environmental protection management policy, including: <ul style="list-style-type: none"> ▸ Safety, health and environmental protection policy ▸ Long-term and short-term goals for safety, health and environmental protection 	

	<ul style="list-style-type: none"> ▶ Resources arrangement for implementation of the safety, health and environmental protection policy and performance review ▶ Operating mode of the management system for the safety, health and environmental protection policy ▶ Measurement of performance of the safety, health and environmental protection management system ▶ Review mechanism ▶ Improvement mechanism ▶ Communication channels
7. Assessment 'Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to identify the deviations between safety, health and environmental protection goals and current performance of the organization according to activities and nature of the organization; and</p> <p>(ii) Capable to formulate a forward-looking safety, health and environmental protection management policy and system according to deviations identified and other factors of consideration, and review its performance and make modifications after implementation.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of occupational safety management.

1. Title	Formulate improvement plans for occupational safety and health	
2. Code	EMCUSH602A	
3. Range	Formulate improvement plans for working procedures and mechanical protection and systems that do not comply with the safety and health management standards, and to do so continuously according to views and recommendations generated after the reviews on safety and health policy and management system.	
4. Level	6	
5. Credit	20	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Occupational safety and health policy and management system</p> <ul style="list-style-type: none"> ◆ Understand the occupational safety and health policy and management system of the enterprise, such as: <ul style="list-style-type: none"> • Work safety and health pledge made by the enterprise and its safety policy • Framework for the implementation of the work safety and health pledge • Staff trained with the knowledge of working safely in conditions not hazardous to their health • Internal safety regulations to attain the goal of safety management • Identify dangers and conduct remedial inspection schemes accordingly on a regular basis or as deemed necessary • Identify potential dangers to workers and work out plans to deal with these dangers • Safety committee • Enhance, develop and maintain the awareness of safety and health at work site <p>6.2 Improvement plans for occupational safety and health</p> <ul style="list-style-type: none"> ◆ Formulate improvement plans for working procedures and mechanical protection and systems that do not comply with the safety and health management standards <ul style="list-style-type: none"> • Formulate improvement plans which include the goals, operating modes, training, implementation and monitoring, according to the investigation as well as the safety and health audit results; and formulate improvement plans for system management with respect to the overall system, financial estimates, performance measurement and review, workflow and schedule of implementation 	

	<ul style="list-style-type: none"> ◆ Formulate improvement plans according to views and recommendations generated after the reviews on safety and health policy and management system <ul style="list-style-type: none"> • Identify and confirm items or operating mode of the system that need to be improved according to views and recommendations generated after the reviews on safety and health policy and management system • Formulate an overall management system improvement plan for items or operating mode of the system that need to be improved ◆ Formulate improvement plans for the occupational safety and health management system for benchmarking enhancement <ul style="list-style-type: none"> • Identify and confirm items or operating mode of the system that need to be improved for benchmarking enhancement • Formulate an overall management system improvement plan for items or operating mode of the system that need to be improved ◆ Consult and communicate sufficiently when formulating improvement plans <ul style="list-style-type: none"> • Consult the staff and stakeholders extensively and establish good communication channels with them during the formulation of the improvement plans
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to formulate effective improvement plans for working procedures and mechanical protection and systems that do not comply with the safety and health management standards; and (ii) Capable to formulate effective improvement plans for benchmarking enhancement of the organization.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of occupational safety management.</p>

1. Title	Formulate environmental protection improvement plans	
2. Code	EMCUSH603A	
3. Range	Formulate improvement plans for working procedures and mechanical protection that do not comply with the environmental protection management standards, and to do so continuously according to views and recommendations generated after the reviews on environmental protection policy and management system.	
4. Level	6	
5. Credit	20	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Environmental protection policy and management system</p> <ul style="list-style-type: none"> ◆ Understand the environmental protection policy and management system of the organization, including: <ul style="list-style-type: none"> • Policy goals • Operating mode of the management system • Monitoring procedures • Measurement of performance <p>6.2 Environmental protection improvement plans</p> <ul style="list-style-type: none"> ◆ Formulate improvement plans for areas of emissions, waste water, light pollution, noise, solid waste, chemical waste, ecological environment, etc. that do not comply with the environmental protection management standards: <ul style="list-style-type: none"> • Operating mode • Implementation and monitoring • System management • budgeting • Measurement of performance • Review, workflow and schedule for implementation ◆ Formulate improvement plans according to views and recommendations generated after the reviews on environmental protection policy and management system <ul style="list-style-type: none"> • Identify and confirm items or operating mode of the system that need to be improved • Formulate an overall management system improvement plan for items or operating mode of the system that need to be improved ◆ Consult and communicate sufficiently when formulating improvement plans <ul style="list-style-type: none"> • Consult the staff and stakeholders extensively and establish good communication channels with them during the formulation of the improvement plans 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to formulate improvement plans for the organization for areas that do not comply with the environmental protection management standards.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of environmental protection.

1. Title	Formulate quality management strategy
2. Code	EMCUQM601A
3. Range	Fully master the knowledge and techniques of quality management as well as business strategy and quality management culture of the organization and be able to formulate a forward-looking quality management strategy applicable to electrical and mechanical workplaces.
4. Level	6
5. Credit	20
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Quality management goals</p> <ul style="list-style-type: none"> ◆ Understand the concept of excellent quality management awards such as: <ul style="list-style-type: none"> • Deming Prize • Baldrige Quality Award • European Quality Award • Hong Kong Award for Industry <p>6.2 Formulation of quality management strategy</p> <ul style="list-style-type: none"> ◆ Identify the deviations between quality management goals and the current quality management system ◆ Identify the deviations between quality management goals and the performance of current quality management system ◆ Formulate quality management strategy <ul style="list-style-type: none"> • Analyze the deviations between quality management goals and the current quality management system, and quality management culture and quality costs of the organization in order to formulate the quality management strategy including: <ul style="list-style-type: none"> ▶ Quality management policy ▶ Quality management goals ▶ Operating mode of the quality management system under the quality management policy ▶ Measurement of the quality management system performance ▶ Review mechanism ▶ Improvement mechanism ▶ Communication channels
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to formulate an effective quality management strategy according to the deviations between quality management goals and the current quality management system as well as other factors of consideration.</p>
8. Remarks	This unit of competency is suitable for quality management staff enhancement. The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of quality management.

1. Title	Implement total quality management plan
2. Code	EMCUQM602A
3. Range	Master the knowledge and techniques of total quality management as well as business strategy and quality management culture of the organization so as to implement the total quality management plan properly for electrical and mechanical works.
4. Level	6
5. Credit	20
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Total quality management theory</p> <ul style="list-style-type: none"> ◆ Understand total quality management (TQM) methods and techniques such as: <ul style="list-style-type: none"> • Quality Function Deployment • Business Process Reengineering • Process Improvement • Strategic Outsourcing • Rapid Product Development ◆ Understand the concepts of quality economics, including: <ul style="list-style-type: none"> • Quality costs • Quality costs calculation system of quality economics <p>6.2 Implementation of total quality management</p> <ul style="list-style-type: none"> ◆ Implement total quality management <ul style="list-style-type: none"> • Apply the following TQM methods to assist the implementation of total quality management strategy <ul style="list-style-type: none"> ▸ Quality Function Deployment ▸ Business Process Reengineering ▸ Process Improvement ▸ Strategic Outsourcing ▸ Rapid Product Development ◆ Build up the concept of catering customers' needs in a correct way <ul style="list-style-type: none"> • implement the concept of catering customers' needs in a correct way, including <ul style="list-style-type: none"> ▸ internal and external customers ▸ customers' voices ▸ customers' level of satisfaction ▸ customers' loyalty ▸ the importance of customers to the organization ◆ Apply the concept of quality economics to analyze quality costs <ul style="list-style-type: none"> • Apply the concept of quality economics to analyze quality costs and implement quality costs system calculated by quality economics, in which the economic value of customers' loyalty is also included

	<ul style="list-style-type: none"> ◆ Improve the quality management system continuously through learning and growth <ul style="list-style-type: none"> • Improve the quality management system continuously through quality management learning and upgrade provided by the organization • Improve the quality management system continuously through improvement of management method and employee empowerment
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to use TQM methods to formulate and implement effective quality management plans for the organization; (ii) Capable to apply the concept of quality economics to analyze quality costs for a specific organization; and (iii) Capable to formulate a mechanism to continuously improve the quality management system of the organization.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of quality management.</p>

1. Title	Lead and oversee the overall sales and marketing
2. Code	EMFSMS601A
3. Range	Review, analyze, assess and judge in industry-related workplaces the overall business environment, in the absence of complete or consistent data/information; formulate overall sales and marketing strategies; and monitor and perform fire installation sales and marketing management.
4. Level	6
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Master overall business environment in different areas</p> <ul style="list-style-type: none"> ◆ Review, analyze, assess and judge the overall business environment in the absence of complete or consistent data/information <ul style="list-style-type: none"> • Assess the business environment, including: <ul style="list-style-type: none"> ▶ Market size ▶ Development potential of the market ▶ Overall value of the market ▶ Number of competitors in the market <p>6.2 Formulate and implement corporate sales and marketing strategies</p> <ul style="list-style-type: none"> ◆ Formulate corporate sales and marketing strategies according to the analysis results of business environment of different areas and the strengths and weaknesses of the organization ◆ Lead, monitor and implement fire installation sales and marketing management plans, including: <ul style="list-style-type: none"> • Organize sales and marketing working group • Implement and monitor sales and marketing activities • Implement and monitor market promotion activities
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to formulate overall sales and marketing strategies in the absence of complete or consistent data/information; and</p> <p>(ii) Capable to implement fire installation sales and marketing management plans, including organizing sales and marketing working group, implementing and monitoring sales and marketing activities and market promotion activities.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses rich knowledge of sales and marketing.

Competency Level 7

1. Title	Design complicated non-conventional fire services
2. Code	EMFSDE701A
3. Range	Capable to apply highly specialized design techniques, in the absence of complete or consistent data/information, to perform complicated, performance-based fire services design work at locations of large premises where sophisticated fire system design is involved.
4. Level	7
5. Credit	15
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Master client needs and methods of designing highly complicated, non-conventional fire services</p> <ul style="list-style-type: none"> ◆ Master the uses of large buildings, special architectural design requirements, project schedules and the design criteria of *non-conventional fire systems ◆ Master the principles of fire dynamics ◆ Understand the performance-based fire service design methods and their major codes, including: <ul style="list-style-type: none"> • The Code of Practice for Fire Service Installations and Equipment, and relevant legislations • Recognized international standards <p>6.2 Tasks of designing complicated, *non-conventional fire services</p> <ul style="list-style-type: none"> ◆ Plan and lead tasks of designing performance-based major fire services, in the absence of complete or consistent data/information, according to client needs, manufacturer guidelines, recognized standards and relevant local regulations, including: <ul style="list-style-type: none"> • Determining performance-based design goals and acceptable criteria • Assessing fire hazards • Analyzing feasibility design packages ◆ Formulate the system configurations and equipment specifications of complicated, *non-conventional fire service design in the absence of complete or consistent data/information ◆ Master the application of CFD simulation software <ul style="list-style-type: none"> • Apply highly specialized and innovative techniques in complicated fire simulation • Analyze results and modify the design for best performance

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to apply highly specialized and innovative techniques, in the absence of complete or consistent data/information, to perform tasks of designing extremely complicated, performance-based fire services; and (ii) Capable to plan and lead tasks of designing performance-based major fire services, including the setting of performance-based design goals and acceptable criteria, and the analysis of feasibility design packages.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of non-conventional fire service design.</p> <p>*Non-conventional fire service design replaces the prescriptive provisions of the Code of Practice for Fire Service Installations and Equipment with fire engineering design methods that require highly specialized techniques and a set of designs acceptable to the Fire Services Department.</p>

1. Title	Formulate the reports for non-conventional fire system design scheme
2. Code	EMFSDE702A
3. Range	Capable to apply performance-based design methods and highly specialized design techniques, in the absence of complete or consistent data/information, to formulate reports for complicated, *non-conventional fire system design scheme.
4. Level	7
5. Credit	12
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Details of *non-conventional fire system design report</p> <ul style="list-style-type: none"> ◆ Master the uses of large buildings, special architectural design codes, project schedules and the design criteria of *non-conventional fire systems ◆ Understand the formats and highlights of *non-conventional fire system design report ◆ Master the performance-based fire design methods and their major codes, including: <ul style="list-style-type: none"> • Local regulations • Recognized international standards <p>6.2 Formulate reports for complicated, performance-based fire system design scheme</p> <ul style="list-style-type: none"> ◆ Formulate the reports for complicated, performance-based fire system design and planning in the absence of complete or consistent data/information <ul style="list-style-type: none"> • Assess the hazards caused by special architectural design and fire • Analyze different feasibility design proposals and their merits and demerits • Integrate all the information relevant to *non-conventional fire system design, including: <ul style="list-style-type: none"> ▸ Descriptions of proposed systems ▸ Design criteria and specifications ▸ System drawings ▸ Project estimates ▸ Project schedules ▸ Fire modelling computations ◆ Compile the reports for performance-based fire system design in an organized and systematic way, including: <ul style="list-style-type: none"> • Feasibility reports • Outline design reports • Scheme design reports

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to formulate reports systematically for complicated *non-conventional fire system design scheme in the absence of complete or consistent data/information.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of *non-conventional fire service design. *Non-conventional fire service design replaces the prescriptive provisions of the Code of Practice for Fire Service Installations and Equipment with fire engineering design methods that require highly specialized techniques and a set of designs acceptable to the Fire Services Department.

1. Title	Master the study of fluid dynamics and fire simulation tools
2. Code	EMFSDE703A
3. Range	Specialize in the theory of fire dynamics and the application of computational fluid dynamics (CFD) simulation software, in the absence of complete or consistent data/information, at locations where complicated fire safety design is involved.
4. Level	7
5. Credit	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Master the theory of fire dynamics</p> <ul style="list-style-type: none"> ◆ Specialize in the calculation and analysis of the data from different combustion phenomena in the absence of complete or consistent data/information, including: <ul style="list-style-type: none"> • Heat current effect generated by flames • Fume generated in combustion and its flow change • Heat release rate, heat energy and temperature change related to flames and fume • Combustion change inside the space <p>6.2 Master the methods and applications of fire simulation study</p> <ul style="list-style-type: none"> ◆ Specialize in applying computation methods for different types of fire simulation in the absence of complete or consistent data/information, including: <ul style="list-style-type: none"> • Zone model • Field model • Master CFD simulation software (FPETOOL, FIRECAL)
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to study combustion data change, under different situations/conditions, in the absence of complete or consistent data/information; and</p> <p>(ii) Capable to use CFD simulation software for complicated fire simulation study and analysis.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of combustion dynamics and fire simulation.

1. Title	Formulate overall operation development direction and strategy							
2. Code	EMCUOM701A							
3. Range	With regard to electrical and mechanical engineering operation management, understand the social conditions, fully master the development trend of the industry as well as the goals and present situation of the organization so as to formulate an overall operation development direction and strategy for the organization; handle very complex / new issues in the absence of complete/consistent data/information, and develop creative response.							
4. Level	7							
5. Credit	20							
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <table border="0"> <tr> <td style="vertical-align: top;">6.1</td> <td style="vertical-align: top;">Knowledge of social, electrical and mechanical industry's environment</td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ◆ Understand the development trends of society and the electrical and mechanical trade ◆ Understand clearly the influence of legislations, especially ordinances related to safety, health and environmental protection, on the industry ◆ Master social and economic information </td> </tr> <tr> <td style="vertical-align: top;">6.2</td> <td style="vertical-align: top;">Formulate overall operation development direction and strategy</td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ◆ Analyze strengths of the organization <ul style="list-style-type: none"> • Use analytical tools to analyze strengths of the organization in operation management, occupational safety and health and environmental protection, quality management, human resources management, financial management, product development management and risk management • Use internal questionnaire survey for analysis and reference • Use the comparison with industrial benchmarking for analysis and reference ◆ Formulate development goals for the organization according to the analysis of the its strengths, the social and industrial environment and trend, and stakeholders' needs ◆ Use operation management techniques to formulate an overall operation development direction and strategy according to development goals, including: <ul style="list-style-type: none"> • Business development strategy • Business operation strategy • Human resources management strategy • Financial strategy • Product development strategy </td> </tr> </table>		6.1	Knowledge of social, electrical and mechanical industry's environment	<ul style="list-style-type: none"> ◆ Understand the development trends of society and the electrical and mechanical trade ◆ Understand clearly the influence of legislations, especially ordinances related to safety, health and environmental protection, on the industry ◆ Master social and economic information 	6.2	Formulate overall operation development direction and strategy	<ul style="list-style-type: none"> ◆ Analyze strengths of the organization <ul style="list-style-type: none"> • Use analytical tools to analyze strengths of the organization in operation management, occupational safety and health and environmental protection, quality management, human resources management, financial management, product development management and risk management • Use internal questionnaire survey for analysis and reference • Use the comparison with industrial benchmarking for analysis and reference ◆ Formulate development goals for the organization according to the analysis of the its strengths, the social and industrial environment and trend, and stakeholders' needs ◆ Use operation management techniques to formulate an overall operation development direction and strategy according to development goals, including: <ul style="list-style-type: none"> • Business development strategy • Business operation strategy • Human resources management strategy • Financial strategy • Product development strategy
6.1	Knowledge of social, electrical and mechanical industry's environment	<ul style="list-style-type: none"> ◆ Understand the development trends of society and the electrical and mechanical trade ◆ Understand clearly the influence of legislations, especially ordinances related to safety, health and environmental protection, on the industry ◆ Master social and economic information 						
6.2	Formulate overall operation development direction and strategy	<ul style="list-style-type: none"> ◆ Analyze strengths of the organization <ul style="list-style-type: none"> • Use analytical tools to analyze strengths of the organization in operation management, occupational safety and health and environmental protection, quality management, human resources management, financial management, product development management and risk management • Use internal questionnaire survey for analysis and reference • Use the comparison with industrial benchmarking for analysis and reference ◆ Formulate development goals for the organization according to the analysis of the its strengths, the social and industrial environment and trend, and stakeholders' needs ◆ Use operation management techniques to formulate an overall operation development direction and strategy according to development goals, including: <ul style="list-style-type: none"> • Business development strategy • Business operation strategy • Human resources management strategy • Financial strategy • Product development strategy 						

	<ul style="list-style-type: none"> • Risk management strategy • Communication channels ◆ Formulate mechanisms to measure, review and improve the operation development direction and strategy ◆ Lead the organization for a forward-looking development according to the following social and industrial changes <ul style="list-style-type: none"> • Product or service requirements • Technological development • Human resources and all kinds of costs in comparison with competitors or the region
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to formulate an overall operation development direction and strategy according to the situation of an electrical and mechanical organization; (ii) Capable to formulate for the organization mechanisms to measure, review and improve the operation development direction and strategy; and (iii) Capable to lead the organization for a forward-looking development according to social and industrial changes.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of engineering operation management.</p>

Appendix I

Generic Level Descriptors

Generic Level Descriptors				
Level	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
1	<ul style="list-style-type: none"> - Employ recall and demonstrate elementary comprehension in a narrow range of areas with dependency on ideas of others - Exercise basic skills - Receive and pass on information - Use, under supervision or prompting, basic tools and materials. - Apply learnt responses to solve problems - Operate in familiar, personal and/or everyday contexts - Take some account, with prompting, of identified consequences of actions. 	<ul style="list-style-type: none"> - Operate mainly in closely defined and highly structured contexts - Carry out processes that are repetitive and predictable - Undertake the performance of clearly defined tasks - Assume a strictly limited range of roles. 	<ul style="list-style-type: none"> - The ability to perform tasks of routine and repetitive nature given clear direction - Carry out directed activity under close supervision - Rely entirely on external monitoring of output and quality 	<ul style="list-style-type: none"> - Use very simple skills with assistance — for example: - Take some part in discussions about straightforward subjects - Read and identify the main points and ideas from documents about straightforward subjects - Produce and respond to a limited range of simple, written and oral communications, in familiar/routine contexts - Carry out a limited range of simple tasks to process data and access information - Use a limited range of very simple and familiar numerical and pictorial data - Carry out calculations, using whole numbers and simple decimals to given levels of accuracy.

Generic Level Descriptors				
Level	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
2	<ul style="list-style-type: none"> - Apply knowledge based on an underpinning comprehension in a selected number of areas - Make comparisons with some valuation and interpret available information - Apply basic tools and materials and use rehearsed stages for solving problems. - Operate in familiar, personal and/or everyday contexts - Take account the identified consequences of actions. 	<ul style="list-style-type: none"> - Choose from a range of procedures performed in a number of contexts, a few of which may be non-routine - Co-ordinate with others to achieve common goals. 	<ul style="list-style-type: none"> - The ability to perform a range of tasks in predictable and structured contexts - Undertake directed activity with a degree of autonomy - Achieve outcomes within time constraints - Accept defined responsibility for quantity and quality of output subject to external quality checking. 	<ul style="list-style-type: none"> - Use skills with some assistance—for example: - Take active part in discussions about identified subjects - Identify the main points and ideas from documents and reproduce them in other contexts - Produce and respond to a specified range of written and oral communications, in familiar/routine contexts - Carry out a defined range of tasks to process data and access information - Use a limited range of familiar numerical and graphical data in everyday contexts - Carry out calculations, using percentages and graphical data to given levels of accuracy.

Generic Level Descriptors				
Level	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
3	<ul style="list-style-type: none"> - Apply knowledge and skills in a range of activities, demonstrating comprehension of relevant theories - Access, organize and evaluate information independently and make reasoned judgements in relation to a subject or discipline - Employ a range of responses to well defined, but sometimes unfamiliar or unpredictable, problems - Make generalizations and predictions in familiar contexts. 	<ul style="list-style-type: none"> - Operate in a variety of familiar and some unfamiliar contexts, using a known range of technical or learning skills - Select from a considerable choice of predetermined procedures - Give presentations to an audience 	<ul style="list-style-type: none"> - The ability to perform tasks in a broad range of predictable and structured contexts which may also involve some non-routine activities requiring a degree of individual responsibility - Engage in self-directed activity with guidance/evaluation - Accept responsibility for quantity and quality of output - Accept well defined but limited responsibility for the quantity and quality of the output of others 	<ul style="list-style-type: none"> - Use a wide range of largely routine and well practiced skills — for example: - Produce and respond to detailed and complex written and oral communication in familiar contexts, and use a suitable structure and style when writing extended documents. - Select and use standard applications to obtain, process and combine information - Use a wide range of numerical and graphical data in routine contexts, which may have some non-routine elements.

Generic Level Descriptors				
Level	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
4	<ul style="list-style-type: none"> - Develop a rigorous approach to the acquisition of a broad knowledge base, with some specialist knowledge in selected areas - Present and evaluate information, using it to plan and develop investigative strategies - Deal with well defined issues within largely familiar contexts, but extend this to some unfamiliar problems - Employ a range of specialised skills and approaches to generate a range of responses. 	<ul style="list-style-type: none"> - Operate in a range of varied and specific contexts involving some creative and non-routine activities - Exercise appropriate judgement in planning, selecting or presenting information, methods or resources - Carry out routine lines of enquiry, development of investigation into professional level issues and problems. 	<ul style="list-style-type: none"> - The ability to perform skilled tasks requiring some discretion and judgement, and undertake a supervisory role - Undertake self-directed and a some directive activity - Operate within broad general guidelines or functions - Take responsibility for the nature and quantity of own outputs - Meet specified quality standards - Accept some responsibility for the quantity and quality of the output of others. 	<ul style="list-style-type: none"> - Use a wide range of routine skills and some advanced skills associated with the subject/discipline — for example: - Present using a range of techniques to engage the audience in both familiar and some new contexts - Read and synthesize extended information from subject documents; organize information coherently, convey complex ideas in well-structured form - Use a range of IT applications to support and enhance work - Plan approaches to obtaining and using information, choose appropriate methods and data to justify results & choices - Carry out multi-stage calculations.

Generic Level Descriptors				
Level	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
5	<ul style="list-style-type: none"> - Generate ideas through the analysis of abstract information and concepts - Command wide ranging, specialized technical, creative and/or conceptual skills - Identify and analyse both routine and abstract professional problems and issues, and formulate evidence-based responses - Analyse, reformat and evaluate a wide range of information - Critically analyse, evaluate and/or synthesize ideas, concepts, information and issues - Draw on a range of sources in making judgments. 	<ul style="list-style-type: none"> - Utilise diagnostic and creative skills in a range of technical, professional or management functions - Exercise appropriate judgement in planning, design, technical and/or supervisory functions related to products, services, operations or processes. 	<ul style="list-style-type: none"> - Perform tasks involving planning, design, and technical skills, and involving some management functions - Accept responsibility and accountability within broad parameters for determining and achieving personal and/or group outcomes - Work under the mentoring of senior qualified practitioners - Deal with ethical issues, seeking guidance of others where appropriate. 	<ul style="list-style-type: none"> - Use a range of routine skills and some advanced and specialized skills in support of established practices in a subject/discipline, for example: - Make formal and informal presentations on standard/mainstream topics in the subject/discipline to a range of audiences - Participate in group discussions about complex subjects; create opportunities for others to contribute - Use a range of IT applications to support and enhance work - Interpret, use and evaluate numerical and graphical data to achieve goals/targets.

Generic Level Descriptors				
Level	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
6	<ul style="list-style-type: none"> - Critically review, consolidate, and extend a systematic, coherent body of knowledge - Utilise highly specialised technical research or scholastic skills across an area of study - Critically evaluate new information, concepts and evidence from a range of sources and develop creative responses - Critically review, consolidate and extend knowledge, skills practices and thinking in a subject/discipline - Deal with complex issues and make informed judgements in the absence of complete or consistent data/information. 	<ul style="list-style-type: none"> - Transfer and apply diagnostic and creative skills in a range of situations - Exercise appropriate judgement in complex planning, design, technical and/or management functions related to products, services operations or processes, including resourcing and evaluation - Conduct research, and/or advanced technical or professional activity - Design and apply appropriate research methodologies. 	<ul style="list-style-type: none"> - Apply knowledge and skills in a broad range of professional work activities - Practice significant autonomy in determining and achieving personal and/or group outcomes - Accept accountability in related decision making including use of supervision - Demonstrate leadership and /or make an identifiable contribution to change and development. 	<ul style="list-style-type: none"> - Communicate, using appropriate methods, to a range of audiences including peers, senior colleagues, specialists - Use a wide range of software to support and enhance work; identify refinements to existing software to increase effectiveness or specify new software - Undertake critical evaluations of a wide range of numerical and graphical data, and use calculations at various stages of the work.

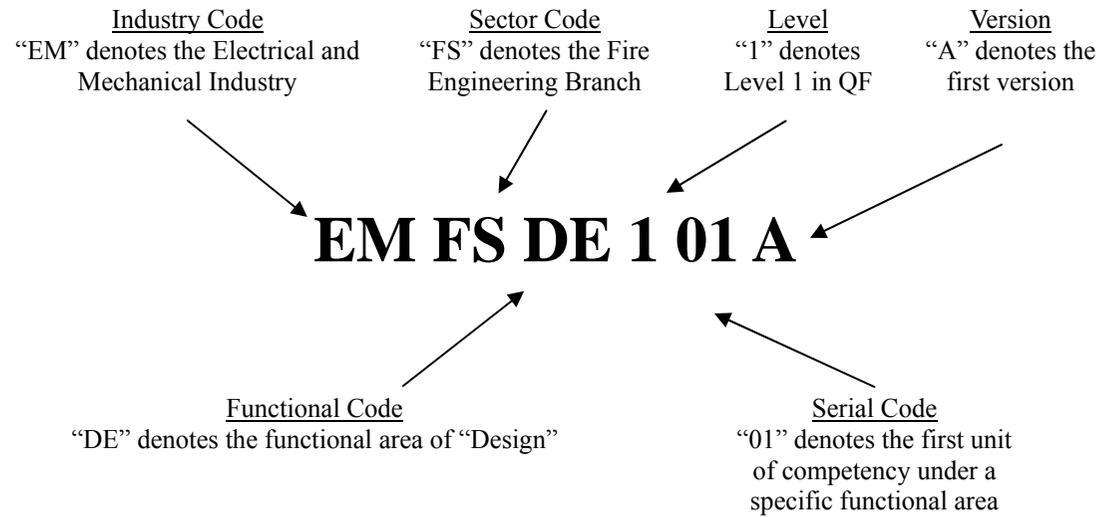
Generic Level Descriptors				
Level	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
7	<ul style="list-style-type: none"> - Demonstrate and work with a critical overview of a subject or discipline, including an evaluative understanding of principal theories and concepts, and of its broad relationships with other disciplines - Identify, conceptualise and offer original and creative insights into new, complex and abstract ideas and information - Deal with very complex and/or new issues and make informed judgements in the absence of complete or consistent data/information - Make a significant and original contribution to a specialised field of inquiry, or to broader interdisciplinary relationships. 	<ul style="list-style-type: none"> - Demonstrate command of research and methodological issues and engage in critical dialogue - Develop creative and original responses to problems and issues in the context of new circumstances. 	<ul style="list-style-type: none"> - Apply knowledge and skills in a broad range of complex and professional work activities, including new and unforeseen circumstances - Demonstrate leadership and originality in tackling and solving problems - Accept accountability in related decision making - High degree of autonomy, with full responsibility for own work, and significant responsibility for others - Deal with complex ethical and professional issues. 	<ul style="list-style-type: none"> - Strategically use communication skills, adapting context and purpose to a range of audiences - Communicate at the standard of published academic work and/or critical dialogue - Monitor, review and reflect on own work and skill development, and change and adapt in the light of new demands - Use a range of software and specify software requirements to enhance work, anticipating future requirements - Critically evaluate numerical and graphical data, and employ such data extensively.

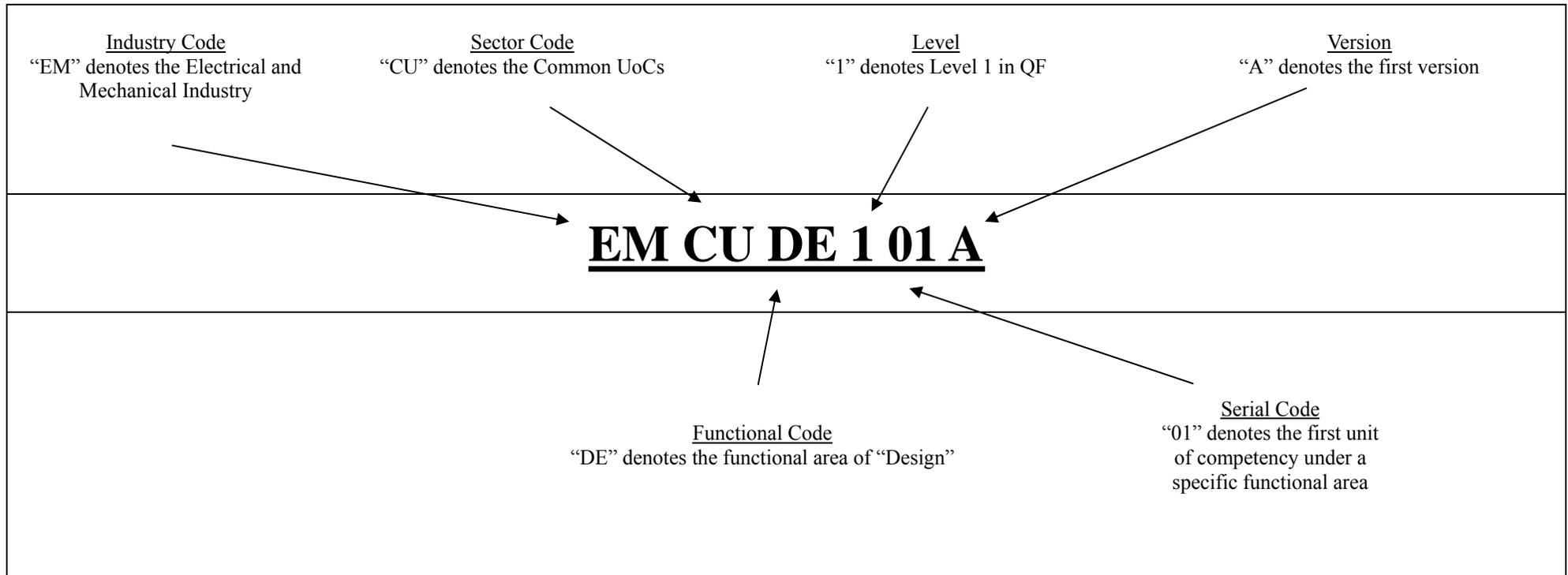
Appendix II

Coding Criteria

Coding Criteria

	Major Functional areas	Codes
(i)	Design	DE
(ii)	Installation	IN
(iii)	Inspection, Testing and Commissioning	IT
(iv)	Operation, Repair and Maintenance	OR
(v)	Project Management	PM
(vi)	Operation Management	OM
(vii)	Safety, Health and Environment	SH
(viii)	Quality Management	QM
(ix)	Marketing and Sales	MS



Common UoCs Coding Criteria (The Common UoCs are applicable to other branches)

- Remarks:
- 1) There is not space in the code.
 - 2) The code must be underlined.