

**Electrical & Mechanical Services
Industry**

**Lift and Escalator Engineering
Branch**

**Specification of
Competency Standards**

1st Edition

June 2011

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Chapter 1

Preface

Background of the Industry

Hong Kong is renowned for the great number of high-rises, and it has the highest density of lifts--an important facility for high-rises--in the world. According to the statistics published by an international lift periodical, there were more than 46,000 lifts in Hong Kong from 1996 to 2000, which means on average we had one lift for every 144 persons. In the United States, one of the most economically developed countries in the world, the lift-man ratio is 1/421 only. Lift design in Hong Kong is also among the most advanced in the world. According to the government information, we have double-deck lift, inclined lift, curved-door lift and high speed lifts at 9m/s.

Characteristics of the lifts in Hong Kong	
<u>Characteristics</u>	<u>Location</u>
Fastest Lift (rated speed 9m/s)	Cheung Kong Center, Central
Largest Lift (carrying capacity 45 tons)	HK Convention & Exhibition Centre, Wanchai
Oldest Lift (installed in 1948)	12, Pedder Street, Central
Double-deck Lift	IFC Hall, Central and Sun Hung Kai Centre, Waichai
Inclined Lift	Po Fook Hill, Shatin
Curved-door Lift	Grand Hyatt Hotel, Wanchai

2. According to the statistics in 2007, there were some 60,000 lifts and escalators in Hong Kong. Hong Kong has a dense population and small land area of about 1,070 km², and most people live in the urban area of 177 km² only. So we have to live in high-rises. The reliability of lifts and escalators becomes very important. The lift and escalator installations in Hong Kong are mainly from the United States, Britain, Japan, Europe, Korea and China. There is no lift and escalator manufacturer in Hong Kong, and local lift companies are mainly contractors of installation and maintenance, or agencies of lift or escalator manufacturers of other countries.

Current Situation of the Industry

3. Lift and escalator engineering services is one of the important industries in Hong Kong. According to the Lifts and Escalators (Safety) Ordinance Chapter 327, only the registered lift/escalator contractors and registered lift/escalator engineers in Hong Kong are authorized to perform maintenance, testing and inspection on lifts and escalators. It is required by the Ordinance Chapter 327 that the owner of every lift or escalator should arrange a registered contractor to perform periodic maintenance including the inspecting, cleaning, oiling and adjusting of the lift or escalator. The lift should be examined at least once a year and be tested on loaded operation at least every 5 years. The escalator should be examined at intervals not exceeding 6 months and be tested at intervals not exceeding 12 months.

4. At present, there are 48 registered lift/escalator contractors in Hong Kong. According to the Consumer Council's Study Report on Competition in the Market for Lift Maintenance (2002), there were close to 50,000 lifts for commercial and residential buildings in Hong Kong, and the annual maintenance charges tend to be around 3.6 billion dollars. In other words, the monthly maintenance charges per lift are about 6,000 dollars.

5. In the past few decades, lift and escalator technologies have been advancing. As there are more and more skyscrapers and people's demand for comfortable vertical transport has been increasing, the lift and escalator engineering industry has greater room for development. The extensive scope for lift maintenance work covers the installation of mechanical and electrical installations and computer software programming and applications that need a lot of workers. Frontline technical personnel, therefore, should be highly skilled and knowledgeable; otherwise it will affect the safe operation of lifts.

Specification of Competency Standards

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

7. 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 developmental trend of both the industry and the society.

8. In the long run, the industry-recognized 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.

9. The E&M Industry Training Advisory Committee (ITAC), comprising representatives of employers, employees and professional bodies of the industry, has prepared a preliminary version of "SCS for the E&M Industry- the Lift and Escalator 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

10. The E&M Industry Training Advisory Committee (ITAC) was set up 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.

11. The E&M Industry Training Advisory Committee (ITAC) is responsible for the development of its industry-specific, task-based Specification of Competency Standards (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 credit.

12. 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.

13. 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

14. 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 noting 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.

15. 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 Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

16. As proposed by the Electrical and Mechanical ITAC, the Specification of Competency Standards (SCS) of the Lift and Escalator Engineering Branch may consist of the following major functional areas:

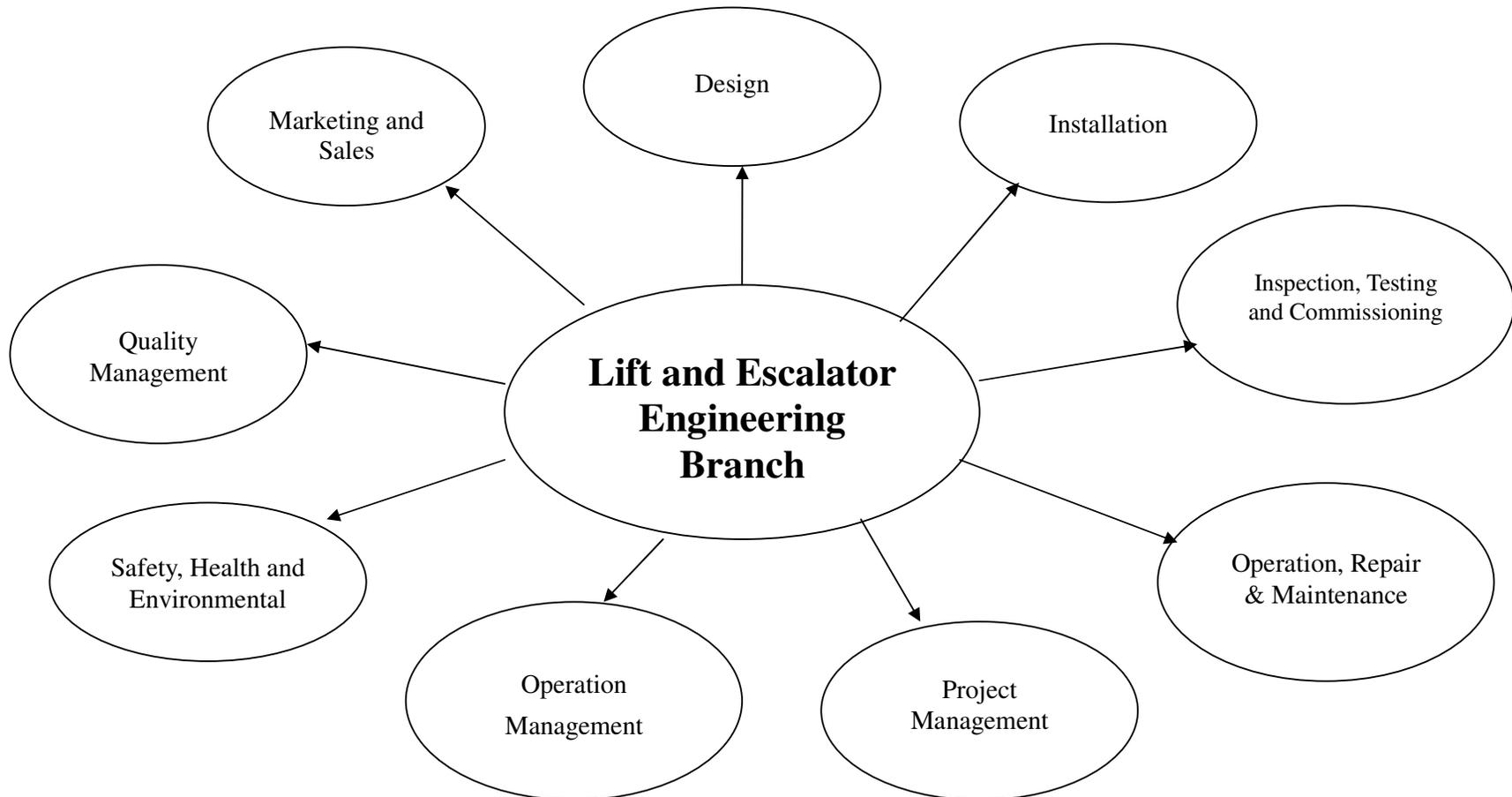
(i)	Design
	This functional area covers the designs of new installation, alteration and upgrading of lifts and escalators. New installation designs focus on the construction and mechanical parts whereas alteration and upgrading works may also involve electrical and control circuit design and computer programming. Practitioners should possess knowledge relevant to the code of practice, engineering computing, mechanical structure, automation theories and computer programming.
(ii)	Installation
	This functional area covers the craftsmanship in lift and escalator machinery and electrical installations. Practitioners should possess technical skills in installing all kinds of mechanical equipment and electrical components; understand installation drawings and the use of tools/auxiliaries/instruments/meters. The installation of lifts and escalators should be carried out in correct procedures so that they are safe and good riding comfort.
(iii)	Inspection, Testing and Commissioning
	This functional area mainly covers the inspection of the installation of lifts and escalators as a whole, ensuring that the installation skills comply with safety indicators and relevant codes of practice and specifications. Through testing and adjustment, the mechanical equipment and electrical components can comply with the requirements for safe operation and use. Practitioners should understand that the purpose of the testing & commissioning is to ensure that the lifts and escalators are safe and good riding comfort.
(iv)	Operation, Repair and Maintenance
	This functional area covers all the operation, repair and maintenance work after the lifts and escalators are installed and commissioned. This includes periodic maintenance, minor repair, overhaul, emergency repair, renewal, safety inspection and testing. Periodic maintenance and emergency repair require practitioners to master general mechanical adjustment and safety standards and be familiar with electrical knowledge related to lifts and escalators such as drive control theory and automatic control circuit. Minor repair requires practitioners to assist in the works that periodic maintenance and emergency repair could not cover within the time limit. Overhaul and renewal, including mechanical installation, replacement and alteration, require practitioners to spend more

	time than they do for general repair. Safety inspection and testing of lifts and escalators should be carried out as required by the law. Practitioners should master the methods of inspecting and testing all the safety devices for lifts and escalators and the standards for measurement.
(v)	Project Management
	This functional area involves managing, planning, organizing, coordinating, monitoring and controlling lift and escalator installation and alteration works for better efficiency and performance. Thus, the works can complete on time through effective project management and the cost effectiveness of the enterprise be enhanced.
(vi)	Operation Management
	This functional area covers the knowledge, planning, organization and control of operation management in the areas of sales, installation, repair, maintenance, inventory of material supply and contract of lifts and escalators, aiming to enhance the management efficiency and performance of the enterprise. Practitioners should master general knowledge of business operation, including engineering management, finance, logistics, commercial laws and human resources.
(vii)	Safety, Health and Environmental Protection
	This functional area requires practitioners to apply safety and health management knowledge and skills in conducting risk assessment, formulating safety and health guidelines and the code of practice for the working environment of lifts and escalators according to relevant legislations, and formulating a safety, health and environmental protection system for the protection of the workers and passengers.
(viii)	Quality Management
	This functional area requires practitioners to master the methods of inspecting and controlling the quality of the installation, repair and maintenance of lifts and escalators, ensuring that the quality complies with the client's and statutory requirements.
(ix)	Marketing and Sales
	This functional area requires practitioners to analyze and master the market situation, in order to promote lift and escalator repair and maintenance services to clients and to formulate effective tender price.

Please refer to Diagram 1 for further information.

17. 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 Lift and Escalator Engineering Branch
in the Electrical & Mechanical Services Industry**



Competency Standards

18. 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

19. 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. Credit
6. Competency
7. Assessment Criteria
8. Remarks

Recognition of Prior Learning

20. 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.

21. Since in-house training has long been the major training opportunity for employees of the Lift and Escalator Engineering 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 Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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.46)	Use typical electrical meters (3 Credits) <u>EMCUDE101A</u> (P.46)	Use typical electrical meters (3 Credits) <u>EMCUDE101A</u> (P.46)	Use typical electrical meters (3 Credits) <u>EMCUDE101A</u> (P.46)				Perform quality assurance (3 Credits) <u>EMCUQM101A</u> (P.45)	
		Use general loading and lifting equipment (9 Credits) <u>EMCUIN102A</u> (P.41)		Use general loading and lifting equipment (9 Credits) <u>EMCUIN102A</u> (P.41)		Basic knowledge of electrical and mechanical services management (6 Credits) <u>EMCUOM102A</u> (P.48)			
		Apply basic bench fitting techniques and use small typical hand tools (9 Credits) <u>EMCUIN106A</u> (P.43)	Apply basic bench fitting techniques and use small typical hand tools (9 Credits) <u>EMCUIN106A</u> (P.43)	Apply basic bench fitting techniques and use small typical hand tools (9 Credits) <u>EMCUIN106A</u> (P.43)					
		Use general personal protective equipment (3 Credits) <u>EMCUSH108A</u> (P.35)	Use general personal protective equipment (3 Credits) <u>EMCUSH108A</u> (P.35)	Use general personal protective equipment (3 Credits) <u>EMCUSH108A</u> (P.35)			Use general personal protective equipment (3 Credits) <u>EMCUSH108A</u> (P.35)		
		Perform manual handling operation (3 Credits) <u>EMCUSH109A</u> (P.36)	Perform manual handling operation (3 Credits) <u>EMCUSH109A</u> (P.36)	Perform manual handling operation (3 Credits) <u>EMCUSH109A</u> (P.36)			Perform manual handling operation (3 Credits) <u>EMCUSH109A</u> (P.36)		

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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 general properties of different types of typical electrical and mechanical engineering materials (3 Credits) <u>EMCUDE109A</u> (P.47)	Identify general properties of different types of typical electrical and mechanical engineering materials (3 Credits) <u>EMCUDE109A</u> (P.47)	Identify general properties of different types of typical electrical and mechanical engineering materials (3 Credits) <u>EMCUDE109A</u> (P.47)	Identify general properties of different types of typical electrical and mechanical engineering materials (3 Credits) <u>EMCUDE109A</u> (P.47)					
		Safety operation in confined spaces (3 Credits) <u>EMCUSH110A</u> (P.37)	Safety operation in confined spaces (3 Credits) <u>EMCUSH110A</u> (P.37)	Safety operation in confined spaces (3 Credits) <u>EMCUSH110A</u> (P.37)			Safety operation in confined spaces (3 Credits) <u>EMCUSH110A</u> (P.37)		
		Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P.38)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P.38)	Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P.38)			Comply with the legal requirements on electrical and mechanical occupational safety and health (3 Credits) <u>EMCUSH111A</u> (P.38)		
		Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P.39)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P.39)	Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P.39)			Comply with the legal requirements on environmental protection (3 Credits) <u>EMCUSH112A</u> (P.39)		
		Handle general chemicals safely (3 Credits) <u>EMCUSH113A</u> (P.40)	Handle general chemicals safely (3 Credits) <u>EMCUSH113A</u> (P.40)	Handle general chemicals safely (3 Credits) <u>EMCUSH113A</u> (P.40)			Handle general chemicals safely (3 Credits) <u>EMCUSH113A</u> (P.40)		

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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		Install lift mechanical accessories (3 Credits) EMLEIN101A (P.49)		Perform the lift works in periodic maintenance schedule (3 Credits) EMLEOR101A (P.55)					
		Install lift electrical installations (3 Credits) EMLEIN102A (P.51)		Perform the escalator works in periodic maintenance schedule (3 Credits) EMLEOR102A (P.56)					
		Use lift and escalator installation and maintenance tools (3 Credits) EMLEOR103A (P.57)		Use lift and escalator installation and maintenance tools (3 Credits) EMLEOR103A (P.57)					
		Distribute escalator mechanical installations and accessories (3 Credits) EMLEIN103A (P.52)							
		Install escalator electrical installations (3 Credits) EMLEIN104A (P.54)							

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair & Maintenance	Project Management	Operation Management	Safety, Health and Environmental	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	Select general electrical materials and electrical equipment (6 Credits) <u>EMCUDE204A</u> (P.72)	Select general electrical materials and electrical equipment (6 Credits) <u>EMCUDE204A</u> (P.72)	Select general electrical materials and electrical equipment (6 Credits) <u>EMCUDE204A</u> (P.72)	Select general electrical materials and electrical equipment (6 Credits) <u>EMCUDE204A</u> (P.72)		Apply effective communication skills in discussions of electrical and mechanical issues (3 Credits) <u>EMCUOM204A</u> (P.75)			
	Use computer to draw mechanical drawings (8 Credits) <u>EMCUDE212A</u> (P.73)			Service generators and accessories (4 Credits) <u>EMCUMA205A</u> (P.70)					
	Use computer to draw electrical drawings (8 Credits) <u>EMCUDE213A</u> (P.74)	Apply basic risk assessment methods (3 Credits) <u>EMCUSH205A</u> (P.60)	Apply basic risk assessment methods (3 Credits) <u>EMCUSH205A</u> (P.60)	Apply basic risk assessment methods (3 Credits) <u>EMCUSH205A</u> (P.60)			Apply basic risk assessment methods (3 Credits) <u>EMCUSH205A</u> (P.60)		
		Perform routine wiring tasks (9 Credits) <u>EMCUIN208A</u> (P.65)		Perform routine wiring tasks (9 Credits) <u>EMCUIN208A</u> (P.65)			Implement work site occupational health and safety management (3 Credits) <u>EMCUSH206A</u> (P.61)		
		Replace mechanical parts and devices of electric motors (3 Credits) <u>EMCUIN221A</u> (P.67)		Replace mechanical parts and devices of electric motors (3 Credits) <u>EMCUIN221A</u> (P.67)			Handle general industrial accidents (3 Credits) <u>EMCUSH208A</u> (P.62)		

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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		Basic manual metal arc welding (MMAW)/shielded metal arc welding (SMAW) (6 Credits) <u>EMCUIN225A</u> (P.68)		Basic manual metal arc welding (MMAW)/shielded metal arc welding (SMAW) (6 Credits) <u>EMCUIN225A</u> (P.68)			Obtain data and information of occupational safety and health and environmental protection to compile relevant statistics (3 Credits) <u>EMCUSH211A</u> (P.63)		
		Perform measuring works on lift well (3 Credits) <u>EMLEIN201A</u> (P.76)		Maintain traction machines of general lift (3 Credits) <u>EMLEOR201A</u> (P.91)			Implement preventive measures on general occupational safety and health (3 Credits) <u>EMCUSH212A</u> (P.64)		
		Install mechanical equipment of lift system at the upper machine room (3 Credits) <u>EMLEIN202A</u> (P.77)		Maintain control cabinet of general lift (3 Credits) <u>EMLEOR202A</u> (P.92)					
		Install general lift landing doors (3 Credits) <u>EMLEIN203A</u> (P.79)		Maintain general lift overspeed governor and safety gear (3 Credits) <u>EMLEOR203A</u> (P.93)					
		Intall lift guide rail brackets (3 Credits) <u>EMLEIN204A</u> (P.81)		Maintain braking system of general lift (3 Credits) <u>EMLEOR204A</u> (P.94)					

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(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		Install general lift suspension ropes (3 Credits) EMLEIN205A (P.83)		Maintain general lift landing devices (3 Credits) EMLEOR205A (P.95)					
		Install lift electrical conduits and trunkings (3 Credits) EMLEIN206A (P.85)		Maintain general lift car and counterweight (3 Credits) EMLEOR206A (P.96)					
		Perform measuring tasks in escalator pit (3 Credits) EMLEIN207A (P.86)		Maintain general lift buffers (3 Credits) EMLEOR207A (P.97)					
		Install basic mechanical equipment of escalators (3 Credits) EMLEIN208A (P.87)		Maintain suspension ropes and compensating ropes of general lift (3 Credits) EMLEOR208A (P.98)					
		Install electrical conduits and trunkings of escalator (3 Credits) EMLEIN209A (P.89)		Maintain general lift well equipment (3 Credits) EMLEOR209A (P.100)					

List of Competencies for Practitioners of the Lift and Escalator 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 & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</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				Maintain the hydraulic power units of general hydraulic lifts (3 Credits) EMLEOR210A (P.101)					
				Maintain general hydraulic lift jacks (3 Credits) EMLEOR211A (P.103)					
				Overhaul general lift traction machines (3 Credits) EMLEOR212A (P.104)					
				Overhaul control cabinet of general lift (3 Credits) EMLEOR213A (P.106)					
				Overhaul overspeed governor and safety gear of general lift (3 Credits) EMLEOR214A (P.107)					
				Overhaul braking sysem of general lift (3 Credits) EMLEOR215A (P.108)					

List of Competencies for Practitioners of the Lift and Escalator 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 & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
<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				Overhaul landing devices of general lift (3 Credits) EMLEOR216A (P.109)					
				Overhaul general lift cars and counterweights (3 Credits) EMLEOR217A (P.110)					
				Overhaul buffers of general lift (3 Credits) EMLEOR218A (P.112)					
				Overhaul suspension ropes of general lift (3 Credits) EMLEOR219A (P.113)					
				Overhaul general lift well equipment (3 Credits) EMLEOR220A (P.115)					
				Maintain driving devices of general escalators (3 Credits) EMLEOR221A (P.117)					

List of Competencies for Practitioners of the Lift and Escalator 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 & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
<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				Maintain steps driving components of general escalator (3 Credits) EMLEOR222A (P.118)					
				Maintain handrail devices of general escalators (3 Credits) EMLEOR223A (P.119)					
				Maintain electrical components of general escalator (3 Credits) EMLEOR224A (P.120)					
				Maintain different guards of general escalators (3 Credits) EMLEOR225A (P.121)					
				Maintain driving station and return station devices of general escalators (3 Credits) EMLEOR226A (P.122)					

List of Competencies for Practitioners of the Lift and Escalator 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 & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
<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				Overhaul driving devices of general escalators (3 Credits) EMLEOR227A (P.124)					
				Overhaul steps driving components of general escalator (3 Credits) EMLEOR228A (P.126)					
				Overhaul handrail devices of general escalators (3 Credits) EMLEOR229A (P.128)					
3									Apply sales and marketing techniques (3 Credits) EMCUMS301A (P.144)
				Repair electrical devices for electric traction control system (6 Credits) EMCUMA302A (P.138)				Handle and review customers' complaints about electrical and mechanical product or service quality (3 Credits) EMCUQM302A (P.141)	

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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				Repair electronic control equipment for traction control system and main current transformer (9 Credits) <u>EMCUMA303A</u> (P.139)				Implement quality control and quality assurance (4 Credits) <u>EMCUOM303A</u> (P.142)	
		Repair and rewind three-phase motors (9 Credits) <u>EMCUIN304A</u> (P.132)		Repair and rewind three-phase motors (9 Credits) <u>EMCUIN304A</u> (P.132)				Formulate simple quality assurance plan and quality assurance reports (6 Credits) <u>EMCUOM304A</u> (P.143)	
							Investigate general industrial accidents (3 Credits) <u>EMCUSH305A</u> (P.130)		
	Use programmable logic controller (PLC) to write circuit control programme (6 Credits) <u>EMCUDE306A</u> (P.145)		Use programmable logic controller (PLC) to write circuit control programme (6 Credits) <u>EMCUDE306A</u> (P.145)	Use programmable logic controller (PLC) to write circuit control programme (6 Credits) <u>EMCUDE306A</u> (P.145)					

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair & Maintenance	Project Management	Operation Management	Safety, Health and Environmental	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		Perform electrical and mechanical installation and testing according to the drawings and specifications of electrical devices and wiring (4 Credits) <u>EMCUIN306A</u> (P.133)		Perform electrical and mechanical installation and testing according to the drawings and specifications of electrical devices and wiring (4 Credits) <u>EMCUIN306A</u> (P.133)					
							Perform occupational safety and health supervision (3 Credits) <u>EMCUSH308A</u> (P.131)		
	Apply diodes and transistors in electronic control circuits (8 Credits) <u>EMCUDE311A</u> (P.146)	Apply diodes and transistors in electronic control circuits (8 Credits) <u>EMCUDE311A</u> (P.146)	Apply diodes and transistors in electronic control circuits (8 Credits) <u>EMCUDE311A</u> (P.146)	Apply diodes and transistors in electronic control circuits (8 Credits) <u>EMCUDE311A</u> (P.146)					
	Use computer to draw complicated mechanical engineering drawings (5 Credits) <u>EMCUDE315A</u> (P.148)	Operate and maintain abrasive wheels safely (3 Credits) <u>EMCUIN315A</u> (P.135)		Operate and maintain abrasive wheels safely (3 Credits) <u>EMCUIN315A</u> (P.135)					

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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	Use computer to draw for complicated electrical engineering drawings (5 Credits) <u>EMCUDE316A</u> (P.149)								
	Choose typical materials for electrical and mechanical work (3 Credits) <u>EMCUDE318A</u> (P.150)	Choose typical materials for electrical and mechanical work (3 Credits) <u>EMCUDE318A</u> (P.150)	Choose typical materials for electrical and mechanical work (3 Credits) <u>EMCUDE318A</u> (P.150)	Choose typical materials for electrical and mechanical work (3 Credits) <u>EMCUDE318A</u> (P.150)					
		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.136)		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.136)					
		Install well plumbing tools of lift (3 Credits) <u>EMLEIN301A</u> (P.151)	Perform the works of commissioning for lift (3 Credits) <u>EMLEIT301A</u> (P.187)	Maintain lift traction machines (3 Credits) <u>EMLEOR301A</u> (P.206)					
		Install lift machine room's mechanical equipment (3 Credits) <u>EMLEIN302A</u> (P.153)	Implement the periodic examination and testing of lifts (3 Credits) <u>EMLEIT302A</u> (P.190)	Maintain lift control cabinets (3 Credits) <u>EMLEOR302A</u> (P.208)					

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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 lift landing doors (3 Credits) EMLEIN303A (P.155)	Perform the check work of lifts (3 Credits) EMLEIT303A (P.195)	Maintain overspeed governors and safety gears of lifts (3 Credits) EMLEOR303A (P.210)					
		Install lift guide-rails (3 Credits) EMLEIN304A (P.157)	Perform commissioning work of escalator (3 Credits) EMLEIT304A (P.198)	Maintain lift brakes (3 Credits) EMLEOR304A (P.212)					
		Install lift car and counterweight (3 Credits) EMLEIN305A (P.159)	Perform periodic escalator safety inspection and testing (3 Credits) EMLEIT305A (P.200)	Maintain lift landing devices (3 Credits) EMLEOR305A (P.214)					
		Install suspension ropes of lift (3 Credits) EMLEIN306A (P.161)	Perform the check works of escalator (3 Credits) EMLEIT306A (P.203)	Maintain lift car and counterweight (3 Credits) EMLEOR306A (P.216)					
		Install lift compensation devices (3 Credits) EMLEIN307A (P.163)		Maintain lift buffers (3 Credits) EMLEOR307A (P.218)					

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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 lift buffers (3 Credits) EMLEIN308A (P.165)		Maintain lift suspension ropes and compensation ropes (3 Credits) EMLEOR308A (P.219)					
		Implement electrical wiring of lift (3 Credits) EMLEIN309A (P.167)		Maintain lift well equipment (3 Credits) EMLEOR309A (P.221)					
		Install escalator pit plumbing tools (3 Credits) EMLEIN310A (P.169)		Maintain the hydraulic power units of hydraulic lifts (3 Credits) EMLEOR310A (P.222)					
		Install escalator truss (3 Credits) EMLEIN311A (P.171)		Maintain hydraulic lift jacks (3 Credits) EMLEOR311A (P.224)					
		Install escalator guide-rails (3 Credits) EMLEIN312A (P.173)		Overhaul lift traction machines (3 Credits) EMLEOR312A (P.226)					
		Install escalator handrail devices (3 Credits) EMLEIN313A (P.175)		Overhaul lift control cabinet (3 Credits) EMLEOR313A (P.228)					

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair & Maintenance	Project Management	Operation Management	Safety, Health and Environmental	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		Install escalator driving devices (3 Credits) EMLEIN314A (P.177)		Overhaul lift overspeed governor and safety gear devices (3 Credits) EMLEOR314A (P.230)					
		Install escalator balustrade devices (3 Credits) EMLEIN315A (P.179)		Overhaul lift brakes (3 Credits) EMLEOR315A (P.232)					
		Install escalator step chains (3 Credits) EMLEIN316A (P.181)		Overhaul lift landing devices (3 Credits) EMLEOR316A (P.234)					
		Install escalator landing plate devices (3 Credits) EMLEIN317A (P.183)		Overhaul lift cars and counterweights (3 Credits) EMLEOR317A (P.236)					
		Perform electrical wiring of escalator (3 Credits) EMLEIN318A (P.185)		Overhaul lift buffers (3 Credits) EMLEOR318A (P.238)					

List of Competencies for Practitioners of the Lift and Escalator 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 & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
<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				Overhaul lift suspension ropes and compensation ropes (3 Credits) EMLEOR319A (P.240)					
				Overhaul lift well equipment (3 Credits) EMLEOR320A (P.243)					
				Overhaul hydraulic lift power units (3 Credits) EMLEOR321A (P.245)					
				Overhaul hydraulic lift jacks (3 Credits) EMLEOR322A (P.247)					
				Repair the faults of lifts (3 Credits) EMLEOR323A (P.249)					
				Perform lift rescue (3 Credits) EMLEOR324A (P.250)					

List of Competencies for Practitioners of the Lift and Escalator 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 & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
<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 escalator driving devices (3 Credits) EMLEOR325A (P.251)					
				Maintain steps driving components of escalator (3 Credits) EMLEOR326A (P.253)					
				Maintain escalator handrail devices (3 Credits) EMLEOR327A (P.255)					
				Maintain electrical components of escalators (3 Credits) EMLEOR328A (P.257)					
				Overhaul escalator driving devices (3 Credits) EMLEOR329A (P.259)					
				Overhaul escalator steps driving components (3 Credits) EMLEOR330A (P.261)					

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)
QF Levels	<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				Overhaul escalator handrail devices (3 Credits) EMLEOR331A (P.263)					
				Overhaul electrical components of escalators (3 Credits) EMLEOR332A (P.265)					
4				Supervise equipment maintenance work to ensure its quality, standard and efficiency (9 Credits) EMCUMA401A (P.268)	Plan the finance, accounts and insurance of engineering projects (6 Credits) EMCUPM401A (P.273)				
								Implement quality management in electrical and mechanical engineering services (6 Credits) EMCUQM402A (P.270)	
								Promote quality management culture at working level (3 Credits) EMCUQM403A (P.271)	

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair & Maintenance	Project Management	Operation Management	Safety, Health and Environmental	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 the commissioning works of lift (3 Credits) EMLEIT401A (P.274)					Conduct site survey and quality control (3 Credits) EMCUOM404A (P.272)	
5	Analyze and assess performance of electrical system and equipment (9 Credits) EMCUDE501A (P.290)				Formulate project procedures and schedule (9 Credits) EMCUPM501A (P.296)				
	Use programmable logic controller (PLC) to upgrade control equipment (9 Credits) EMCUDE502A (P.291)					Implement engineering operation and supervisory management (6 Credits) EMCUOM502A (P.297)	Implement risk management for electrical and mechanical services (9 Credits) EMCUSH502A (P.277)		
								Formulate and implement quality management courses and training programmes (4 Credits) EMCUQM503A (P.285)	

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	<u>Design</u>	<u>Installation</u>	<u>Inspection, Testing and Commissioning</u>	<u>Operation, Repair & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</u>	<u>Quality Management</u>	<u>Marketing and Sales</u>	
	(DE)	(IN)	(IT)	(OR)	(PM)	(OM)	(SH)	(QM)	(MS)	
QF Levels	<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>	
5	Analyze quality of electricity data and design suitable device to improve electricity quality (6 Credits) <u>EMCUDE504A</u> (P.293)						Formulate occupational safety and health management system (3 Credits) <u>EMCUSH504A</u> (P.279)	Formulate and analyze quality assurance reports (3 Credits) <u>EMCUQM504A</u> (P.286)		
							Formulate occupational safety and health and environmental protection schemes (6 Credits) <u>EMCUSH505A</u> (P.280)	Formulate schemes to enhance staff's awareness of quality management (5 Credits) <u>EMCUQM505A</u> (P.287)		
	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)	Write all kinds of electrical and mechanical engineering reports in Chinese (6 Credits) <u>EMCUDE506A</u> (P.294)
							Perform risk assessment for electrical and mechanical work (3 Credits) <u>EMCUSH506A</u> (P.282)	Implement quality management training courses (9 Credits) <u>EMCUQM506A</u> (P.288)		

List of Competencies for Practitioners of the Lift and Escalator Engineering Branch in the Electrical & Mechanical Services Industry

Functional Areas	Design	Installation	Inspection, Testing and Commissioning	Operation, Repair & Maintenance	Project Management	Operation Management	Safety, Health and Environmental	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						
5							Formulate environmental protection management system (3 Credits) <u>EMCUSH507A</u> (P.283)	Implement quality management standards of International Organization for Standardization (ISO) (3 Credits) <u>EMCUQM507A</u> (P.289)	
	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)	Write all kinds of electrical and mechanical engineering reports in English (6 Credits) <u>EMCUDE507A</u> (P.295)
							Implement occupational safety and health and environmental protection courses and training programmes (3 Credits) <u>EMCUSH508A</u> (P.284)		

List of Competencies for Practitioners of the Lift and Escalator 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 & Maintenance</u>	<u>Project Management</u>	<u>Operation Management</u>	<u>Safety, Health and Environmental</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					Apply project management skills and professional knowledge to handle unfulfilled or unperformed contracts effectively (20 Credits) <u>EMCUPM601A</u> (P.308)		Formulate overall safety, health and environmental protection policy (20 Credits) <u>EMCUSH601A</u> (P.299)	Formulate quality management strategy (20 Credits) <u>EMCUQM601A</u> (P.305)	
							Formulate improvement plans for occupational safety and health (20 Credits) <u>EMCUSH602A</u> (P.301)	Implement total quality management plan (20 Credits) <u>EMCUQM602A</u> (P.306)	
							Formulate environmental protection improvement plans (20 Credits) <u>EMCUSH603A</u> (P.303)		
7						Formulate overall operation development direction and strategy (20 Credits) <u>EMCUOM701A</u> (P.310)			

**Competencies for Practitioners of
the Lift and Escalator Engineering Branch
in the Electrical & Mechanical Services
Industry**

Competency Level 1

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. Credits	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 requirement of this unit of competency is:</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. Credits	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 requirement of this unit of competency is:</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. Credits	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. Credits	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. Credits	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. Credits	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	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to handle general chemicals safely and prevent chemical hazards.</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 health.

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. Credits	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 safety code of practice and legal requirements for goods handling</p> <ul style="list-style-type: none"> ◆ Understand the safety code of practice 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 safety code of practice 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	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to use general loading and lifting machines and devices correctly and safely for handling general electrical and mechanical equipment.</p>
8. Remarks	<p>(i) This unit of competency is applicable to electrical and mechanical practitioners in general.</p> <p>(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 “Perform manual handling operation” °</p>

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. Credits	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 • Capable to use portable power drills and drilling machines correctly 		

	<ul style="list-style-type: none"> ◆ Apply basic bench fitting techniques and use small typical hand tools <ul style="list-style-type: none"> • 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 ◆ 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>6.3 Code of practice for bench fitting</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	<p>This unit of competency is applicable to new entrants of the electrical and mechanical trade.</p>

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. Credits	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.

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. Credits	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 safety code of practice 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 safety code of practice 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 safety code of practice 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. Credits	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	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. Credits	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	Install lift mechanical accessories
2. Code	EMLEIN101A
3. Range	Carry out installation of lift mechanical installation accessories under supervision at construction sites.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift mechanical installations, construction drawings and mechanical installation drawings</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of machine room’s mechanical installations including: <ul style="list-style-type: none"> • control cabinet • overspeed governor ◆ Understand the structure and working principles of landing mechanical installations including: <ul style="list-style-type: none"> • landing indicator • landing call button ◆ Understand the structure and working principles of lift pit mechanical installations including: <ul style="list-style-type: none"> • energy accumulation buffers • energy dissipation buffers ◆ Understand the relationship between machine room construction drawings and machine room mechanical installation drawings ◆ Understand the relationship between the construction drawings of landings and landing mechanical installation drawings ◆ Understand the relationship between lift pit construction drawings and lift pit mechanical installation drawings <p>6.2 Install lift mechanical installation accessories</p> <ul style="list-style-type: none"> ◆ Apply machine room mechanical installation drawings, landing mechanical installation drawings and lift pit installation drawings to install mechanical installation accessories in place, including: <ul style="list-style-type: none"> • supporter of control cabinet • supporter of overspeed governor • base box of landing indicator • base box of landing call button • supporter of energy accumulation buffer • supporter of energy dissipation buffer

	<ul style="list-style-type: none"> ◆ Use general tools effectively for installation of mechanical installation accessories including: <ul style="list-style-type: none"> • supporter of control cabinet • supporter of overspeed governor • base box of landing indicator • base box of landing call button • supporter of energy accumulation buffer • supporter of energy dissipation buffer
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to carry out installation of accessories of lift machine room, landings and lift pit mechanical installations under supervision according to instructions.</p>
8. Remarks	

1. Title	Install lift electrical installations
2. Code	EMLEIN102A
3. Range	Use general installation tools to carry out installation of lift electrical installations at construction sites.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 General electrical installation and construction drawings for lifts</p> <ul style="list-style-type: none"> ◆ Understand electrical installation drawings including: <ul style="list-style-type: none"> • lift machine room • lift landing • lift shaft • lift pit • lift car ◆ Understand the meanings of the symbols of electrical installations and general electrical symbols in the drawings ◆ Understand the names and installation location of electrical installations <p>6.2 Methods and procedures of installing lift electrical installations</p> <ul style="list-style-type: none"> ◆ Know the assembly of lift electrical installations including the procedures relating to the installation location and dimensions ◆ Know how to install the electrical installation works including: <ul style="list-style-type: none"> • lift machine room • lift landing • lift well • lift pit • lift car ◆ Use general electrical installation tools effectively <p>6.3 Professionalism in assembling lift electrical installations</p> <ul style="list-style-type: none"> ◆ Follow working drawing's instructions to carry out the installation of electrical and safety installations ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform electrical installation tasks
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to point out the names and locations of the electrical components in the construction drawings; and</p> <p>(ii) Capable to use correct tools to complete the installation of electrical installations according to instructions.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using basic installation tools.

1. Title	Distribute escalator mechanical installations and accessories
2. Code	EMLEIN103A
3. Range	Distribute escalator mechanical installations and accessories under supervision at construction sites.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator mechanical installations and mechanical installation packing list</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of mechanical installations in upper driving machine room including: <ul style="list-style-type: none"> • traction machine • overspeed governor • auxiliary brakes • upper landing platform • handrail entry box ◆ Understand the structure and working principles of mechanical installations in escalator truss including: <ul style="list-style-type: none"> • handrail system such as handrail driving devices, handrail compensation devices and handrail guide-rails • balustrade such as balustrade exterior panelling, balustrade exterior decking, balustrade interior panelling, balustrade interior decking, skirting, skirt panel deflector devices and any safeguards ◆ Understand the structure and working principles of mechanical installations in lower return station room including: <ul style="list-style-type: none"> • step chain tension device • lower landing platform • handrail entry box ◆ Understand mechanical installation packing list and identify mechanical installations and their accessories including: <ul style="list-style-type: none"> • upper driving station (machine room) • escalator truss • lower return station room

	<p>6.2 Distribution of escalator mechanical installations and their accessories</p> <ul style="list-style-type: none"> ◆ Apply the mechanical installation packing list to collect and distribute mechanical installations and their accessories including: <ul style="list-style-type: none"> • upper driving machine room e.g. upper landing platform and handrail entry box • handrail system e.g. handrail driving devices, handrail compensation devices and handrail guide rail • balustrade e.g. balustrade such as balustrade exterior panelling, balustrade exterior decking, balustrade interior panelling, balustrade interior decking, skirting, skirt panel deflector devices and any safeguards • lower return station room e.g. lower landing platform and handrail entry box
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to collect and distribute mechanical installations and their accessories for escalator upper driving machine room, escalator truss and lower return station room under supervision according to instructions.</p>
8. Remarks	

1. Title	Install escalator electrical installations
2. Code	EMLEIN104A
3. Range	Use general installation tools to carry out installation of escalator electrical installations at construction sites.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 General electrical installation and construction drawings for escalators</p> <ul style="list-style-type: none"> ◆ Understand electrical installation drawings including: <ul style="list-style-type: none"> • upper driving machine room • lower return station room • escalator truss ◆ Understand the electrical installations and general electrical symbols in the drawings ◆ Understand the names and installation location of electrical installations <p>6.2 Methods and procedures of installing escalator electrical installations</p> <ul style="list-style-type: none"> ◆ Know the assembly of escalator electrical installations including the procedures relating to the installation location and dimensions ◆ Know how to install escalator electrical installations including: <ul style="list-style-type: none"> • upper driving machine room • lower return station room • escalator truss ◆ Effectively use the general electrical tools to perform the work <p>6.3 Professionalism in assembling escalator electrical installations</p> <ul style="list-style-type: none"> ◆ Follow working drawing's instructions to carry out the electrical and safety devices installations ◆ Understand the requirements of safety guidelines and the code of practice for escalators in order to perform electrical installation works
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to point out the names and locations of the electrical components in the construction drawings; and</p> <p>(ii) Capable to use correct tools to complete the installation of electrical installations according to instructions.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using basic installation tools.

1. Title	Perform the lift works in periodic maintenance schedule
2. Code	EMLEOR101A
3. Range	Perform the lift works in periodic maintenance schedule under general situations at field.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of lift, including: <ul style="list-style-type: none"> • Physical structure • Classification • Ranges of the speed and the applications • Basic driving methods • Basic operation methods <p>6.2 Methods and procedures for lift periodic maintenance</p> <ul style="list-style-type: none"> ◆ Know lift repair and maintenance including the procedures of inspection, cleaning and oiling ◆ Know how to perform works stated in the periodic maintenance schedule, including machine room, well, pit, car, landings and notices and facilities required by the law ◆ Use general repairing tools effectively <p>6.3 Professionalism in lift periodic maintenance</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to carry out the works stated in the periodic maintenance schedule ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform periodic maintenance
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to complete works stated in lift periodic maintenance schedule under clear instruction; and</p> <p>(ii) Capable to clearly explain the key points of the periodic maintenance schedule.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing tools.

1. Title	Perform the escalator works in periodic maintenance schedule
2. Code	EMLEOR102A
3. Range	Perform the escalator works in periodic maintenance schedule under general situations at field.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of escalator, including: <ul style="list-style-type: none"> • Physical structure of escalator • Main components in upper driving machine room • Main components outside of escalator truss • Main components inside of escalator truss • Main components in lower return station room <p>6.2 Methods and procedures for escalator periodic maintenance</p> <ul style="list-style-type: none"> ◆ Know escalator repair and maintenance including the procedures of inspection, cleaning and oiling ◆ Know how to perform works stated in the periodic maintenance schedule, including upper machine room, lower machine room, inside of escalator truss, outside of escalator truss and notices and facilities required by the law ◆ Use general repairing tools effectively <p>6.3 Professionalism in escalator periodic maintenance</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to carry out the works stated in the periodic maintenance schedule ◆ Understand the requirements of safety guidelines and the code of practice for escalators in order to perform periodic maintenance
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to complete works stated in escalator periodic maintenance schedule under clear instruction; and</p> <p>(ii) Capable to clearly explain the key points of the periodic maintenance schedule.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing tools.

1. Title	Use lift and escalator installation and maintenance tools
2. Code	EMLEOR103A
3. Range	Use lift and escalator installation and maintenance the tools under supervision to perform measuring tasks at field locations or construction sites.
4. Level	1
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Names and uses of lift and escalator installation and maintenance tools</p> <ul style="list-style-type: none"> ◆ Understand the names and uses of measuring tools for lifts and escalators, including: <ul style="list-style-type: none"> • Plumbing tools at well • Plumbing tools at pit ◆ Understand the names and uses of thermal treatment tools for lifts and escalators, including: <ul style="list-style-type: none"> • Liquefied blowtorch • Kerosene blowtorch • Bearing heater ◆ Understand the names and uses of measuring instruments for lifts and escalators, including: <ul style="list-style-type: none"> • Air flow meter • Noise meter • Vibration meter • Speedometer • Photometer <p>6.2 Operation of lift and escalator installation and maintenance tools</p> <ul style="list-style-type: none"> ◆ Use measuring tools effectively to measure mechanical installations for lifts and escalators including: <ul style="list-style-type: none"> • Fabrication dimensions of landing door architrave ◆ Use thermal treatment tools effectively on mechanical installations for lifts and escalators including: <ul style="list-style-type: none"> • Bearing thermal treatment • Rope end (Bobby alloying) treatment

	<ul style="list-style-type: none"> ◆ Use measuring instruments effectively to perform measuring tasks on lift and escalator installations, including: <ul style="list-style-type: none"> • Measuring air flow of lift car • Measuring running noise of lift and escalator • Measuring running vibration of lift and escalator • Measuring running speed of lift and escalator handrail • Measuring brightness of lift car lighting and escalator landing lighting
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to under supervision according to instructions perform measuring tasks on lifts and escalators.</p>
8. Remarks	

**Competencies for Practitioners of
the Lift and Escalator Engineering Branch
in the Electrical & Mechanical Services
Industry**

Competency Level 2

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. Credits	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic risk assessment methods ♦ Understand basic risk assessment methods, including</p> <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 ♦ 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.</p>
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 Perform 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. Credits	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. Management items include: <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. Credits	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. Credits	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. Credits	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	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. Credits	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 General principles of electrical wiring</p> <ul style="list-style-type: none"> ◆ Understand the basic requirements, code of practice and relevant standards for wiring, including: <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</p> <ul style="list-style-type: none"> ◆ Make electrical wiring conduits according to instructions <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 ◆ Make electrical wiring trunkings according to instructions <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 ◆ Make electrical wiring trunkings according to instructions <ul style="list-style-type: none"> • Install low voltage sheathed cables and armoured cables correctly ◆ Undertake electrical wiring properly according to instructions <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 ◆ 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

	<ul style="list-style-type: none"> • 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	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. Credits	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. Credits	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 requirement of this unit of competency is: (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	Service generators and accessories	
2. Code	EMCUMA205A	
3. Range	Use typical servicing and inspection instruments and tools or tailor-made mechanical tools to repair or maintain single-phase or three-phase AC and DC generators and accessories at generator and accessories servicing workshops or locations with generators.	
4. Level	2	
5. Credits	4	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of generators and accessories</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of single-phase or three-phase AC and DC generators, including: <ul style="list-style-type: none"> • Stator and winding • Rotor and winding • Exciter winding rectifier • Other kinds of winding e.g. interlope freed compensation • Mechanical parts e.g. bearing • Commutator ◆ Understand the structure and working principles of generator accessories, including: <ul style="list-style-type: none"> • Charging device • Battery <p>6.2 Methods and procedures of servicing generators and accessories</p> <ul style="list-style-type: none"> ◆ Capable to service a generator effectively, including checking, cleaning, measurement, maintenance and commissioning, according to servicing instructions and standards ◆ Capable to service generator accessories effectively, including checking, cleaning, measurement, maintenance and commissioning, according to servicing instructions and standards ◆ Capable to test various devices of generator accessories according to standards ◆ Capable to use typical servicing and inspection instruments and tools or tailor-made tools for generator installation and dismantling effectively <p>6.3 Professionalism in repairing and maintaining generators and accessories</p> <ul style="list-style-type: none"> ◆ Capable to perform general repair and maintenance of generators and accessories according to servicing instructions and standards ◆ Understand the legal requirements on work safety and the code of practice when performing repair and maintenance of generators and accessories 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to check and maintain a three-phase generator effectively and correctly according to servicing standards; and (ii) Capable to commission and set various core accessories effectively.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of servicing electrical equipment.

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. Credits	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	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(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.</p>
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. Credits	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 requirement of this unit of competency is:</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. Credits	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 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. Credits	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	Perform measuring works on lift well
2. Code	EMLEIN201A
3. Range	Perform measuring works on lift well under general situations at construction sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction of lift well plumbing tools and the relationship with construction drawings</p> <ul style="list-style-type: none"> ◆ Understand the names and of well plumbing tool components including: <ul style="list-style-type: none"> • one set of upper plumb support • 10 pieces of plumb line • 10 number of plumb bobs • one set of bottom plumb support ◆ Understand the relationship between lift well plumbing tools and construction drawings including: <ul style="list-style-type: none"> • lift machine room • lift landing • lift well wall • lift pit <p>6.2 Measurements for lift construction</p> <ul style="list-style-type: none"> ◆ Effectively use well plumbing tools to measure construction dimensions including: <ul style="list-style-type: none"> • lift machine room • lift landing • lift well wall • lift pit
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and efficiently measure the construction dimensions of lift machine room, well, landing and pit in compliance with the prescribed standards.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing lift mechanical accessories.

1. Title	Install mechanical equipment of lift system at the upper machine room
2. Code	EMLEIN202A
3. Range	Install lift mechanical equipment (traction machine of worm reduction gear with carrying capacity below or equal 680 kg) at upper machine room under general situations at construction sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction, working principles and installation drawings of lift mechanical equipment at machine room</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general traction machines including: <ul style="list-style-type: none"> • traction machine of worm reduction gear (carrying capacity 680kg or below) ◆ Understand the structure and working principles of general control cabinets including: <ul style="list-style-type: none"> • variable voltage AC drive (carrying capacity 680kg or below) control cabinet • variable voltage variable frequency AC drive (carrying capacity 680kg or below) control cabinet ◆ Understand the structure and working principles of general overspeed governors including: <ul style="list-style-type: none"> • one-way horizontal centrifugal governor ◆ Understand the installation drawings for general machine room's mechanical equipment including: <ul style="list-style-type: none"> • worm reduction gear (load capacity 680kg or below) traction machine • variable voltage AC drive (carrying capacity 680kg or below) control cabinet • variable voltage variable frequency AC drive (carrying capacity 680kg or below) control cabinet • one-way horizontal centrifugal governor

	<p>6.2 Installation methods and procedures for machine room's mechanical equipment</p> <ul style="list-style-type: none"> ◆ Know the installation procedure lists for general machine room's mechanical equipment including: <ul style="list-style-type: none"> • worm reduction gear (carrying capacity 680kg or below) traction machines • variable voltage AC drive (carrying capacity 680kg or below) control cabinet • variable voltage variable frequency AC drive (carrying capacity 680kg or below) control cabine • one-way horizontal centrifugal governor ◆ Effectively use general lifting gear to lift machine room's mechanical equipment ◆ Effectively use general tools and machine room's mechanical equipment installation drawings to install machine room's mechanical equipment <p>6.3 Professionalism in full installation of machine room's mechanical equipment</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's installation instructions and the code of practice for safety at work for lift to install machine room's mechanical equipment ◆ Understand manufacturer's installation instructions and the code of practice for lift design and construction to adjust and test the machine room's mechanical equipment including: <ul style="list-style-type: none"> • worm reduction gear (carrying capacity 680kg or below) traction machines • variable voltage AC drive (carrying capacity 680kg or below) control cabinet • variable voltage variable frequency AC drive (carrying capacity 680kg or below) control cabine • one-way horizontal centrifugal governor
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to systematically and efficiently install lift top machine room's mechanical equipment in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing lift mechanical accessories.</p>

1. Title	Install general lift landing doors
2. Code	EMLEIN203A
3. Range	Install lift landing doors (horizontally sliding type) under general situations at construction sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure, working principles and installation drawings of lift landing doors (horizontal sliding type)</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general horizontally sliding type landing doors including:2-panel centre opening horizontally sliding doors (CO) <ul style="list-style-type: none"> • 2-panel side opening horizontally sliding doors (2S-L / 2S-R) ◆ Understand the installation drawings for general horizontally sliding type landing doors including :2-panel centre opening horizontally sliding doors (CO) <ul style="list-style-type: none"> • 2-panel side opening horizontally sliding doors (2S-L / 2S-R) <p>6.2 Installation methods and procedures for landing doors (horizontal sliding type)</p> <ul style="list-style-type: none"> ◆ Know the installation procedure lists for general horizontally sliding type landing doors including: <ul style="list-style-type: none"> • 2-panel centre opening horizontally sliding doors (CO) • 2-panel side opening horizontally sliding doors (2S-L / 2S-R) ◆ Effectively use general tools, well plumbing line and the installation drawings to perform the installation works that including: <ul style="list-style-type: none"> • mechanical interlock • door sill • door hanger • door tracks • door panel and frame

	<p>6.3 Professionalism in full installation of landing doors (horizontal sliding type)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s installation instructions and the code of practice for lift work safety to install general horizontally sliding type landing doors ◆ Understand manufacturer’s installation instructions and the code of practice for lift design and construction to test general horizontally sliding type landing doors including: <ul style="list-style-type: none"> • 2-panel centre opening horizontally sliding doors (CO) • 2-panel side opening horizontally sliding doors (2S-L / 2S-R)
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to systematically and efficiently install and test lift horizontally sliding type landing doors in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing lift mechanical accessories.</p>

1. Title	Intall lift guide rail brackets
2. Code	EMLEIN204A
3. Range	Intall lift guide rail brackets under general situations at construction sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types with installation format and installation drawings for lift guide rail brackets</p> <ul style="list-style-type: none"> ◆ Understand different types of lift guide rail brackets including: <ul style="list-style-type: none"> • T-shaped brackets • U-shaped brackets • L-shaped brackets ◆ Understand different types of rail brackets including: <ul style="list-style-type: none"> • rail brackets embedded in well wall • rail brackets hidden in well wall bolts ◆ Understand the relationship between well plumbing line and installation drawings of different types rail brackets including: <ul style="list-style-type: none"> • lift guide rail brackets of individual lift well with rear side counterweight • lift guide rail brackets of individual lift well with side counterweight • lift guide rail brackets of common well with rear side counterweight • lift guide rail brackets of common well with side counterweight <p>6.2 Installation methods and procedures of lift guide rail brackets</p> <ul style="list-style-type: none"> ◆ Know the installation procedure lists for different types of guide rail brackets including: <ul style="list-style-type: none"> • lift guide rail brackets of individual lift well with rear side counterweight • lift guide rail brackets of individual lift well with side counterweight • lift guide rail brackets of common well with rear side counterweight • lift guide rail brackets of common well with counterweight

	<ul style="list-style-type: none"> ◆ Effectively use general tools, well plumbing line and rail brackets mounting plans to perform and adjust different types of rail brackets including: <ul style="list-style-type: none"> • welding of well wall bars and rail brackets • filling of gaps between well wall bars and rail brackets with cement • mounting of bolts inside well wall • vertical and horizontal adjustment of rail brackets
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to systematically and efficiently mount and adjust lift different types of rail brackets in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses the knowledge and skills in lift well measurement.</p>

1. Title	Install general lift suspension ropes	
2. Code	EMLEIN205A	
3. Range	Install lift suspension ropes (single wrap with roping ratio 1:1 and carrying capacity 680kg or below) under general situations at construction sites.	
4. Level	2	
5. Credit	3	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types, structure and tensile strength of lift suspension ropes and headroom calculations of car and counterweight</p> <ul style="list-style-type: none"> ◆ Understand the types of general suspension ropes including: <ul style="list-style-type: none"> ordinary lay ◆ Understand the structure of general suspension ropes including: <ul style="list-style-type: none"> • fiber core • strands • wires ◆ Understand the tensile strength of general suspension ropes including: <ul style="list-style-type: none"> • single tensile • dual tensile ◆ Understand the calculation of general car and counterweight headroom, excluding: <ul style="list-style-type: none"> • reduction of overhead runby by terminal slowdown device • reduction of overhead runby by anti-rebound device <p>6.2 Methods and procedures of installing suspension ropes (single wrap with roping ratio 1:1 and carrying capacity 680kg or below)</p> <ul style="list-style-type: none"> ◆ Know the lifting methods and procedures for general cars including: <ul style="list-style-type: none"> • single wrap with roping ratio 1:1 • safety precautions against creeping ◆ Effectively use general lifting gear to lift the car ◆ Use general tools effectively to install suspension ropes including: <ul style="list-style-type: none"> • laying and winding • termination and socket • tension adjustment <p>6.3 Professionalism in installing suspension ropes (single wrap with rope ratio 1:1 and carrying capacity 680kg or below)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's installation instructions and the code of practice for lift work safety to install suspension ropes ◆ Understand manufacturer's installation instructions and the code of practice for lift design and construction to test suspension ropes including: <ul style="list-style-type: none"> • termination sockets • rope slacking device • equalization of tension devices 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to systematically and efficiently install and test lift suspension ropes (single wrap with roping ratio 1:1 and carrying capacity 680kg or below) in compliance with the prescribed standards.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift hoists.

1. Title	Install lift electrical conduits and trunkings
2. Code	EMLEIN206A
3. Range	Use general installation tools to carry out installation of lift electrical conduits and trunkings at construction sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 General lift electrical installation and construction drawings</p> <ul style="list-style-type: none"> ◆ Understand electrical installation drawings including: <ul style="list-style-type: none"> • lift machine room • lift landings • lift well • lift pit • lift car ◆ Understand the electrical installations in the drawings and the general electrical symbols ◆ Understand the types and names of electrical conduits and trunkings <p>6.2 Methods and procedures of installing lift electrical conduits and trunkings</p> <ul style="list-style-type: none"> ◆ Know the procedures of cutting, bending and connecting for different kinds of conduit ◆ Know the procedures of cutting, connecting and drilling for different kinds of trunking ◆ Know how to measure and install conduits and trunkings ◆ Know how to install lift electrical conduits and trunkings including: <ul style="list-style-type: none"> • the connection of conduits and lift electrical installations • the connection of trunkings and lift electrical installations • the connection of conduits, trunkings and junction box ◆ Use general electrical installation tools effectively <p>6.3 Professionalism in assembling lift electrical conduits and trunkings</p> <ul style="list-style-type: none"> ◆ Follow working drawing's instructions to carry out the installation of electrical conduits and trunkings ◆ Understand safety guidelines and code of practice for lifts and Code of Practice for the Electricity (Wiring) Regulations in order to perform the installation of electrical conduits and trunkings
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to use tools to finish the combination installation of conduits, trunkings and lift electrical installations according to working drawings; and</p> <p>(ii) Capable to point out the types of and names of electrical conduits and trunkings.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using basic installation tools.

1. Title	Perform measuring tasks in escalator pit
2. Code	EMLEIN207A
3. Range	Perform measuring tasks in escalator pit under general situations at construction sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Relationship between the construction of plumbing tools in escalator pit and construction drawings</p> <ul style="list-style-type: none"> ◆ Understand the names and number of components of plumbing tool in the escalator pit including: <ul style="list-style-type: none"> • plumb lines supporter at upper machine room (driving station) x 1 • plumb line x 4 • weight x 4 • plumb lines supporter at lower machine room (return station) x 1 ◆ Understand the relationship between plumb lines in escalator pit and different mechanical equipment in installation drawings including: <ul style="list-style-type: none"> • mechanical equipment in the upper machine room (driving station) • mechanical equipment in the escalator truss • mechanical equipment in the lower machine room (return station) <p>6.2 Measurements for escalator construction</p> <ul style="list-style-type: none"> ◆ Effectively use escalator pit plumbing tools to measure the construction dimensions of different escalator construction projects including: <ul style="list-style-type: none"> • the dimension of vertical rising height for the escalator of upper machine room • the dimension of opening width for the escalator pit (framework) • the dimension of pit dept for the escalator of lower machine room (return station)
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and efficiently measure the construction dimensions of escalator upper machine room (driving station), escalator pit (framework) and lower machine room (return station) in compliance with the prescribed standards.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing escalator mechanical installations and accessories.

1. Title	Install basic mechanical equipment of escalators
2. Code	EMLEIN208A
3. Range	Install basic mechanical equipment of escalators under general situations at construction sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure, working principles and installation drawings of basic mechanical equipment of escalators</p> <ul style="list-style-type: none"> ◆ Understand the mechanical structure and working principles of general escalator truss oil drip trays including: 2-piece modular escalator truss <ul style="list-style-type: none"> • 3-piece modular escalator truss ◆ Understand the mechanical structure and working principles of general escalator's steps including: one-piece modular steps <ul style="list-style-type: none"> • 2-piece modular steps • 3-piece modular steps ◆ Understand the structure and working principles of general escalator's safety guards including:the safety guard between the exterior panel and safety barrier / wall <ul style="list-style-type: none"> • at the upper landing side, the safety guard locate between exterior panels of two parallel escalators • at the lower landing side, the safety guard locate above the balustrade decking • at the lower landing side, the safety guard locate between exterior panels of two parallel escalators • the safety guard between the handrail and obstacles (example: cylindrical columns, square columns and vertical walls) • intersection guards between two adjacent criss-cross escalators ◆ Understand the structure and working principles of skirt panel deflector devices including: <ul style="list-style-type: none"> • rubber strip-type • brush bristles type ◆ Understand the installation drawings for basic mechanical equipment of escalators including: <ul style="list-style-type: none"> • oil drip trays • safety guards • skirt panel deflector devices

	<p>6.2 Installation methods and procedures for basic mechanical equipment</p> <ul style="list-style-type: none"> ◆ Know the installation procedure list of basic mechanical equipment for general escalator including: <ul style="list-style-type: none"> • oil drip trays • steps • safety guards • skirt panel deflector device ◆ Effectively use general tools and installation drawings to install basic mechanical equipment including: oil drip trays <ul style="list-style-type: none"> • steps • safety guards • skirt panel deflector device <p>6.3 Professionalism in installing basic mechanical installations</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s installation instructions and the code of practice for escalator work safety to install general basic mechanical equipment ◆ Understand manufacturer’s installation instructions and the code of practice for escalator design and construction to test general basic mechanical installations including: <ul style="list-style-type: none"> • clearances between steps • safety guards • skirt panel deflector device
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to systematically and efficiently install and test escalator’s basic mechanical equipment in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in distributing escalator mechanical installations and accessories.</p>

1. Title	Install electrical conduits and trunkings of escalator
2. Code	EMLEIN209A
3. Range	Use general installation tools to carry out installation work of electrical conduits and trunkings for escalator at construction sites.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 General electrical installation and construction drawings of escalator</p> <ul style="list-style-type: none"> ◆ Understand electrical installation drawings including: <ul style="list-style-type: none"> • upper machine room • lower machine room • truss ◆ Understand the electrical installations in the drawings and the general of electrical symbols ◆ Understand the types and names of electrical conduits and trunkings <p>6.2 Installation methods and procedures of electrical conduits and trunkings</p> <ul style="list-style-type: none"> ◆ Know the working procedures of different conduits for the works of cutting, bending and connecting ◆ Know the working procedures of different trunkings for the works of cutting, connecting and drilling ◆ Know how to measure and install conduits and trunkings ◆ Know how to install escalator electrical conduits and trunkings including: <ul style="list-style-type: none"> • the connection of conduits and escalator electrical installations • the connection of trunkings and escalator electrical installations • the combination connection of conduits, trunkings and junction box ◆ Use general electrical installation tools effectively <p>6.3 Professionalism in assembling escalator electrical conduits and trunkings</p> <ul style="list-style-type: none"> ◆ Follow working drawing's instructions to carry out the installation of electrical conduits and trunkings ◆ Understand safety guidelines and code of practice for escalators and Code of Practice for the Electricity (Wiring) Regulations in order to perform the installation of electrical conduits and trunkings

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to use tools to finish the combination installation of conduits, trunkings and escalator electrical installations according to working drawings; and (ii) Capable to point out the types of and names of electrical conduits and trunkings.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using basic installation tools.

1. Title	Maintain traction machines of general lift
2. Code	EMLEOR201A
3. Range	Maintain lift traction machines (worm reduction gear and carrying capacity 680kg or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift traction machines (worm reduction gear)</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general traction motor including: <ul style="list-style-type: none"> • DC motor • AC motor ◆ Understand the structure and working principles of general traction machines including: <ul style="list-style-type: none"> • worm shaft upper type • worm shaft lower type <p>6.2 Maintenance methods and procedures of lift traction machine</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of general traction machines and include the procedures of inspection, cleaning and oiling ◆ Know general motor repair and maintenance including: <ul style="list-style-type: none"> • commutator • carbon brush of commutator • motor bearing ◆ Know general gearbox repair and maintenance including: <ul style="list-style-type: none"> • gearbox bearing • gearbox worm shaft • gearbox worm gear • traction sheave ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in handling lift traction machines</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain traction machines ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to maintain traction machines
7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to systematically and effectively complete the maintenance of general lift traction machines; and (ii) Capable to clearly explain the construction and key points of maintenance of traction machines.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain control cabinet of general lift
2. Code	EMLEOR202A
3. Range	Maintain lift control cabinet (AC1 and AC2) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<u>Performance Requirements</u>
	<p>6.1 Structure and working principles of lift control cabinet</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general control cabinet including: <ul style="list-style-type: none"> • AC single speed driven (AC 1) control cabinet • AC double speed driven (AC 2) control cabinet ◆ Understand the structure and working principles of general control cabinet components including: transformers, rectifiers, protection devices, resistors, reactors, capacitors, contactors and relays <p>6.2 Methods and procedures of maintaining lift control cabinet</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of general control cabinets including the procedures of inspection, cleaning and oiling ◆ Know the repair and maintenance of general control cabinet components including: <ul style="list-style-type: none"> • enclosure and internal part of control cabinet • cooling system • control cabinet components • terminal ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in handling lift control cabinet</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to carry out control cabinet maintenance ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform control cabinet maintenance
7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to systematically and effectively complete the maintenance of general lift control cabinets; and (ii) Capable to clearly explain the construction and key points of maintenance of control cabinet.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain general lift overspeed governor and safety gear
2. Code	EMLEOR203A
3. Range	Maintain lift overspeed governor (horizontal centrifugal) and safety gear (instantaneous) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift overspeed governor (horizontal centrifugal) and safety gear (instantaneous)</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general overspeed governors including one-way horizontal centrifugal governor ◆ Understand the structure and working principles of general safety gears including one-way instantaneous type safety gear <p>6.2 Methods and procedures of maintaining overspeed governor and safety gear</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of overspeed governor and safety gear including the procedures of inspection, cleaning and oiling ◆ Know the repair and maintenance of overspeed governor including: <ul style="list-style-type: none"> • moving part of overspeed governor • governor bearing • governor electrical switch • governor rope ◆ Know the repair and maintenance of safety gear including: <ul style="list-style-type: none"> • moving part of safety gear • action bar of safety gear ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining overspeed governor and safety gear</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to carry out the maintenance of overspeed governor and safety gear ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to maintain overspeed governor and safety gear
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively complete overspeed governor and safety gear maintenance; and</p> <p>(ii) Capable to clearly explain the construction and key points of maintenance of overspeed governor and safety gear.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain braking system of general lift
2. Code	EMLEOR204A
3. Range	Carry out the maintenance works of lift braking system (worm reduction gear of traction machine) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift braking system with the traction machine of worm reduction gear</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general brakes (electro-mechanical) including: <ul style="list-style-type: none"> • brake drum type (upper worm shaft of worm reduction gear traction machine) • brake drum type (lower worm shaft of worm reduction gear traction machine) <p>6.2 Maintenance methods and procedures of braking system</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of brakes including the procedures of inspection, cleaning and oiling ◆ Know the repair and maintenance of brakes including: <ul style="list-style-type: none"> • brake drum • brake lining • mechanical brake components • electromagnetic coil ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining brakes</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to carry out the maintenance of brakes ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform maintenance of brakes
7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to systematically and effectively complete brake maintenance; and (ii) Capable to clearly explain the construction and key points of maintenance of brakes.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain general lift landing devices
2. Code	EMLEOR205A
3. Range	Carry out the maintenance works of lift landing devices (horizontally sliding doors) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift landing devices</p> <ul style="list-style-type: none"> ◆ Understand the general basic principles of hall-call electronics buttons, hall indicator and arrival sounding devices ◆ Understand the structure and working principles of general landing doors (horizontally sliding doors) devices including: <ul style="list-style-type: none"> • single speed side opening (1S-L / 1S-R) • centre opening with two panels (CO) <p>6.2 Maintenance methods and procedures of landing devices</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of landing devices including the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of landing door devices including: <ul style="list-style-type: none"> • door head frame • door panel • linkage system • locking /unlocking devices • self-closing devices ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining lift landing devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain landing devices ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to maintain landing devices
7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to systematically and effectively complete landing device maintenance; and (ii) Capable to clearly explain the construction and the key points of maintenance of landing devices.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain general lift car and counterweight
2. Code	EMLEOR206A
3. Range	Carry out the maintenance works of lift car and counterweight (single wrap with roping ratio 1:1 and carrying capacity 680kg or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure of lift car and counterweight (single wrap with roping ratio 1:1)</p> <ul style="list-style-type: none"> ◆ Understand the structure of general lift cars (carrying capacity 680kg or below and single wrap with roping ratio 1:1) ◆ Understand the structure of general counterweights (load capacity 680kg or below and single wrap with roping ratio 1:1) <p>6.2 Maintenance methods and procedures of lift car and counterweight</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of lift car and counterweight and the works include with the procedures of inspection, cleaning and oiling ◆ Know car repair and maintenance including: <ul style="list-style-type: none"> ● car ventilation devices ● car lighting and alarm devices ● car door devices ● car top devices ● car safety devices ● display and push button equipment ● car guide-shoes ◆ Know counterweight repair and maintenance including: <ul style="list-style-type: none"> ● counterweight block stabilizing devices ● counterweight guide-shoes ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining lift car and counterweight</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to carry out car and counterweight maintenance ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform car and counterweight the maintenance
7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to systematically and effectively complete car and counterweight maintenance; and (ii) Capable to clearly explain the construction and the key points of maintenance of car and counterweight.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain general lift buffers
2. Code	EMLEOR207A
3. Range	Carry out the maintenance works of lift buffer (energy accumulation type) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift buffers (energy accumulation type)</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of buffers including: <ul style="list-style-type: none"> • energy accumulation buffers <p>6.2 Maintenance methods and procedures of buffers</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of buffers and the works include with the procedures of inspection and cleaning ◆ Know mechanical repair and maintenance of buffers including: <ul style="list-style-type: none"> • welding parts • fixed parts ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining buffers</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to carry out buffer maintenance ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform buffer maintenance
7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to systematically and effectively complete buffer maintenance; and (ii) Capable to clearly explain the construction and key points of maintenance of buffers.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain suspension ropes and compensating ropes of general lift
2. Code	EMLEOR208A
3. Range	Carry out the maintenance works of suspension ropes (single wrap with roping ration 1:1) and compensation ropes under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types, structure and tensile strength of lift suspension ropes</p> <ul style="list-style-type: none"> ◆ Understand the types of general ropes including: <ul style="list-style-type: none"> • ordinary lay suspension ropes • ordinary lay compensating ropes ◆ Understand the structure of general ropes including: <ul style="list-style-type: none"> • fiber core • strands • wires ◆ Understand the tensile strength of general ropes including: <ul style="list-style-type: none"> • single tensile • dual tensile <p>6.2 Maintenance methods and procedures of suspension ropes and compensation ropes</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of suspension ropes and compensation ropes and the works include with the procedures of inspection, cleaning and oiling ◆ Know the repair and maintenance of suspension ropes and compensation ropes including : <ul style="list-style-type: none"> • tension adjustment • rope termination devices • rope diameter measurement • rope wear measurement ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining suspension ropes and compensating ropes</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain suspension ropes and compensation ropes ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to maintain suspension ropes and compensating ropes

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to complete the maintenance of suspension ropes and compensation ropes systematically and effectively; and (ii) Capable to clearly explain the types of suspension ropes and compensation ropes and key points of their maintenance.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain general lift well equipment
2. Code	EMLEOR209A
3. Range	Carry out the maintenance works of lift well equipment (rated speed 1.75m/s or below and carrying capacity 680kg or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift well equipment</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general well equipment including: <ul style="list-style-type: none"> • travelling cables • car levelling devices • lift shaft lighting • hoistway emergency doors • terminal limited switches • car and counterweight guide-shoes <p>6.2 Maintenance methods and procedures of lift well equipment</p> <ul style="list-style-type: none"> ◆ Carry out the repair and maintenance works of lift well equipment under the supervision and the works include with inspection, cleaning and oiling. ◆ Carry out the repair and maintenance works of lift well equipment under the supervision including: <ul style="list-style-type: none"> • travelling cables • car levelling devices • lift shaft lighting • hoistway emergency doors • terminal limited switches • car and counterweight guide-shoes ◆ Effectively use the testing instruments and tools to carry out the repair and maintenance works under the supervision <p>6.3 Professionalism in maintaining lift well equipment</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain well equipment ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to maintain well equipment
7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to clearly explain the construction and the key points of maintenance of well equipment; and (ii) Capable to effectively complete well equipment maintenance under instruction.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain the hydraulic power units of general hydraulic lifts
2. Code	EMLEOR210A
3. Range	Carry out the maintenance works of hydraulic power units (AC star-delta controlled motor) of hydraulic lifts under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of the hydraulic power units of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general 3-phase AC motors including: <ul style="list-style-type: none"> • AC star-delta controlled motor ◆ Understand the structure and working principles of general hydraulic oil pumps including: <ul style="list-style-type: none"> • screw-type hydraulic oil pumps ◆ Understand the structure and working principles of general oil valve controllers including: <ul style="list-style-type: none"> • single speed oil valve controllers <p>6.2 Maintenance methods and procedures for hydraulic lift power units</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance procedures for general hydraulic power units including: <ul style="list-style-type: none"> • inspection, cleaning and oiling ◆ Know the repair and maintenance of general hydraulic power units including: <ul style="list-style-type: none"> • AC star-delta controlled motor such as bearing, belt pulley and coupling • screw-type hydraulic oil pumps such as bearing, belt pulley, coupling, oil seal and packing seal • single speed oil valve controllers such as manual hydraulic pump, hydraulic pressure gauge, oil seal and packing seal • hydraulic oil cooling devices such as oil cooling pump, cooling oil tank and cooling fan ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in handling the hydraulic power units of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain the hydraulic power units ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to maintain hydraulic power units

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to systematically and effectively complete the maintenance of the hydraulic power units of general hydraulic lifts; and(ii) Capable to clearly explain the construction and the key points of maintenance of hydraulic power units.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in using general repairing and testing instruments and tools.

1. Title	Maintain general hydraulic lift jacks
2. Code	EMLEOR211A
3. Range	Carry out the maintenance works of the hydraulic jacks of hydraulic lifts (single-acting) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of the hydraulic jacks of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general hydraulic jacks including: <ul style="list-style-type: none"> • single-acting hydraulic jacks <p>6.2 Maintenance methods and procedures for the hydraulic jacks of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance procedures for general hydraulic jacks including: <ul style="list-style-type: none"> • inspection, cleaning and oiling ◆ Know the repair and maintenance of general hydraulic jacks including: <ul style="list-style-type: none"> • single-acting hydraulic jack shell • single-acting hydraulic jack piston • single-acting hydraulic jack piston guiding devices • single-acting hydraulic jack piston oil seal and packing seal • leaked oil collection devices for single-acting hydraulic jacks ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in handling the hydraulic jacks of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain hydraulic jacks ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to maintain hydraulic jacks
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively complete the maintenance of the hydraulic jacks of general hydraulic lifts; and</p> <p>(ii) Capable to clearly explain the construction and the key points of maintenance of hydraulic jacks.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in using general repairing and testing instruments and tools.

1. Title	Overhaul general lift traction machines
2. Code	EMLEOR212A
3. Range	Overhaul lift traction machines (worm reduction gear and carrying capacity 680kg or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift traction machines (worm reduction gear)</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general traction motor including: <ul style="list-style-type: none"> • DC motor • AC motor ◆ Understand the structure and working principles of general traction machines including: <ul style="list-style-type: none"> • upper worm shaft type • lower worm shaft type <p>6.2 Overhaul methods and procedures for traction machines (worm reduction gear with carrying capacity 680kg or below)</p> <ul style="list-style-type: none"> ◆ Know general lifting methods and procedures of lift car including: <ul style="list-style-type: none"> • the procedures of shutdown the lift • safety lifting the lift car (single wrap with roping ratio 1:1) • the procedures of resume the lift ◆ Know lifting methods and procedures for general traction machines including: <ul style="list-style-type: none"> • upper worm shaft type • lower worm shaft type ◆ Effectively use general lifting gear to hoist lift car and traction machines ◆ Use general tools effectively to disassemble and assemble traction machines <p>6.3 Professionalism in disassembling and assembling traction machines (worm reduction gear and carrying capacity 680kg or below)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions and the code of practice for lift work safety to disassemble and assemble traction machines ◆ Understand manufacturer's repair instructions and the code of practice for lift design and construction to adjust and test traction machines including: <ul style="list-style-type: none"> • 3-phase AC upper worm shaft worm reduction gear traction machines • 3-phase AC and DC lower worm shaft worm reduction gear traction machines

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to systematically and efficiently disassemble, assemble and adjust lift traction machines (worm reduction gear and carrying capacity 680kg or below) in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift traction machines.

1. Title	Overhaul control cabinet of general lift
2. Code	EMLEOR213A
3. Range	Overhaul lift control cabinet (AC single speed and AC double speed) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift control cabinet</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general control cabinets including: <ul style="list-style-type: none"> • AC single speed driven (AC 1) control cabinet • AC double speed driven (AC 2) control cabinet ◆ Understand the structure and working principles of general control cabinet components including: <ul style="list-style-type: none"> • transformers, rectifiers, protection devices, resistors, reactors, capacitors, contactors and relays <p>6.2 Overhaul methods and procedures for control cabinet (AC single speed and AC double speed)</p> <ul style="list-style-type: none"> ◆ Know the lifting methods and procedures for general control cabinets including: <ul style="list-style-type: none"> • the work of shutdown procedures • AC single speed driven (AC 1) control cabinet • AC double speed driven (AC 2) control cabinet • the work of resumption operation ◆ Effectively use general lifting gear to hoist lift control cabinet ◆ Use general tools effectively to disassemble and assemble control cabinet components <p>6.3 Professionalism in disassembling and assembling control cabinet (AC single speed and AC double speed)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions to disassemble and assemble control cabinet components ◆ Understand manufacturer's repair instructions and the code of practice for lift design and construction to adjust and test control cabinet components including: <ul style="list-style-type: none"> • control cabinet transformers, rectifiers, protection devices, resistors, reactors, capacitors, contactors and relays
7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to systematically and efficiently disassemble, assemble and adjust lift control cabinet (AC single speed and AC double speed) components in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift control cabinets.

1. Title	Overhaul overspeed governor and safety gear of general lift
2. Code	EMLEOR214A
3. Range	Overhaul lift overspeed governor (horizontal centrifugal) and safety gear (instantaneous) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift overspeed governor (horizontal centrifugal) and safety gear (instantaneous)</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general overspeed governors including one-way horizontal centrifugal governor ◆ Understand the structure and working principles of general safety gears including one-way instantaneous type safety gear <p>6.2 Overhaul methods and procedures for overspeed governor (horizontal centrifugal)and safety gear (instantaneous)</p> <ul style="list-style-type: none"> ◆ Enable to correctly carry out the preparation and resumption works for overspeed governor and safety gear including: <ul style="list-style-type: none"> • the work of shutdown procedures • the work of resumption operation ◆ Effectively use general lifting gear to lift safety ropes including: <ul style="list-style-type: none"> • car safety ropes • counterweight safety ropes ◆ Use general tools effectively to disassemble and assemble overspeed governor and safety gear including: <ul style="list-style-type: none"> • one-way horizontal centrifugal governor • one-way instantaneous type safety gear <p>6.3 Professionalism in disassembling and assembling overspeed governor (horizontal centrifugal) and safety gear (instantaneous)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s repair instructions and the code of practice for lift work safety to disassemble and assemble overspeed governor and safety gear ◆ Understand manufacturer’s repair instructions and the code of practice for lift design and construction to adjust and test overspeed governor and safety gear including: <ul style="list-style-type: none"> • one-way horizontal centrifugal governor • one-way instantaneous type safety gear
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and efficiently disassemble, assemble, adjust and test lift overspeed governor (horizontal centrifugal) and safety gear (instantaneous) in compliance with the prescribed standards of repair.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift overspeed governor and safety gear.

1. Title	Overhaul braking system of general lift
2. Code	EMLEOR215A
3. Range	Overhaul lift braking system at the traction machine of worm reduction gear under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift braking system</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general electro-mechanical brakes including: <ul style="list-style-type: none"> • Brake drum type (worm reduction gear traction machine of worm shaft upper type) • Brake drum type (worm reduction gear traction machine of worm shaft lower type) <p>6.2 Methods and procedures of overhaul lift braking system</p> <ul style="list-style-type: none"> ◆ Enable to correctly carry out the preparation and resumption works for brakes at the worm reduction gear traction machine including: <ul style="list-style-type: none"> • the work of shutdown procedures • the work of manual creeping upward • the work of resumption operation ◆ Use general tools effectively to disassemble and assemble brakes at the traction machine of worm reduction gear including: <ul style="list-style-type: none"> • brake drum type (worm reduction gear traction machine of worm shaft upper type) • brake drum type (worm reduction gear traction machine of worm shaft lower type) <p>6.3 Professionalism in disassembling and assembling brakes (worm screw traction machines)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions to disassemble, assemble and adjust brakes (electromechanical type) ◆ Understand manufacturer's repair instructions and the code of practice for lift design and construction to test brakes (electromechanical) including: <ul style="list-style-type: none"> • brake drum type (worm reduction gear traction machine of worm shaft upper type) • brake drum type (worm reduction gear traction machine of worm shaft lower type)
7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to systematically and efficiently disassemble, assemble, adjust and test lift braking system at the traction machine of worm reduction gear in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift brakes.

1. Title	Overhaul landing devices of general lift
2. Code	EMLEOR216A
3. Range	Overhaul lift landing door devices (horizontally sliding doors) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift landing doors (horizontally sliding doors)</p> <ul style="list-style-type: none"> ◆ Understand the mechanical structure and working principles of general landing doors (horizontally sliding doors) including: <ul style="list-style-type: none"> • single speed side opening (1S-L / 1S-R) • centre opening (CO) <p>6.2 Methods and procedures of overhaul lift landing doors (horizontally sliding doors)</p> <ul style="list-style-type: none"> ◆ Enable to correctly carry out the preparation and resumption works for lift landing doors (horizontally sliding doors) including: <ul style="list-style-type: none"> • the work of shutdown procedures • the work of operation the car • the work of resumption operation ◆ Use general tools effectively to disassemble and assemble lift landing doors (horizontally sliding doors) including: <ul style="list-style-type: none"> • locking devices • door sills • suspensions and hangers • door tracks • panels and frames <p>6.3 Professionalism in disassembling and assembling lift landing doors (horizontally sliding doors)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions to disassemble, assemble and adjust lift landing doors (horizontally sliding doors) ◆ Understand manufacturer's repair instructions and the code of practice for lift design and construction to test lift landing doors (horizontally sliding doors) including: <ul style="list-style-type: none"> • single speed side opening (1S-L / 1S-R) • centre opening (CO)
7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to systematically and efficiently disassemble, assemble, adjust and test lift landing doors (horizontally sliding doors) in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift landing devices.

1. Title	Overhaul general lift cars and counterweights
2. Code	EMLEOR217A
3. Range	Overhaul lift cars and counterweights (single wrap with roping ratio 1:1 and carrying capacity 680kg or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure of lift car and counterweight</p> <ul style="list-style-type: none"> ◆ Understand the mechanical structure of general cars including: <ul style="list-style-type: none"> • carrying capacity 680kg or below • single wrap with roping ratio 1:1 ◆ Understand the mechanical structure of general counterweights including: <ul style="list-style-type: none"> • carrying capacity 680kg or below • single wrap with roping ratio 1:1 <p>6.2 Methods and procedures of overhaul car and counterweight</p> <ul style="list-style-type: none"> ◆ Enable to correctly carry out the preparation and resumption works for cars and counterweights (carrying capacity 680kg or below) including: <ul style="list-style-type: none"> • the preparation work of modulation the weights of counterweight • the work of shutdown procedures • the safety work of prevention creeping • the work of resumption of operation ◆ Use general tools effectively to disassemble and assemble car and counterweight (carrying capacity 680kg or below) including: <ul style="list-style-type: none"> • car roof panels • car wall panels • car platform • car door sill • car apron • car door hanger • car door rail • car door panels and car door frame • counterweight frame and counterweight weights

	<p>6.3 Professionalism in disassembling and assembling car and counterweight (single wrap with roping ratio 1:1)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s repair instructions and the code of practice for lift work safety to disassemble and assemble car and counterweight (carrying capacity 680kg or below) ◆ Understand manufacturer’s repair instructions and the code of practice for lift design and construction to test cars (carrying capacity 680kg or below) including: <ul style="list-style-type: none"> • ventilation and air change of lift car • balance load ratio between car and counterweight • traction • overload protection device • braking system • safety gear
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to systematically and efficiently disassemble, assemble and test lift cars and counterweights (single wrap with roping ratio 1:1 and carrying capacity 680kg or below) in compliance with the prescribed standards of repair.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift car and counterweight.</p>

1. Title	Overhaul buffers of general lift
2. Code	EMLEOR218A
3. Range	Overhaul lift buffers (energy accumulation type) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift buffers (energy accumulation type)</p> <ul style="list-style-type: none"> ◆ Understand the mechanical structure and working principles of general buffers of energy accumulation type <p>6.2 Methods and procedures of overhaul buffers (energy accumulation type)</p> <ul style="list-style-type: none"> ◆ Enable to correctly carry out the preparation and resumption works for buffers including: <ul style="list-style-type: none"> • the work of shutdown procedures • the work of resumption operation ◆ Effectively use general lifting gear to lift buffers ◆ Use general tools effectively to perform disassembly, cleaning, painting and assembly on buffers <p>6.3 Professionalism in disassembling and assembling buffers (energy accumulation type)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions and the code of practice for lift work safety to disassemble and assemble buffers ◆ Understand manufacturer's repair instructions and the code of practice for lift design and construction to test buffers of energy accumulation type
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to systematically and efficiently perform disassembly, rust removal and prevention, assembly and testing on lift buffers (energy accumulation type) in compliance with the prescribed standards of repair.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift buffers (energy accumulation type).

1. Title	Overhaul suspension ropes of general lift
2. Code	EMLEOR219A
3. Range	Overhaul lift suspension ropes (single wrap with roping ratio 1:1 and carrying capacity 680kg or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types, structure and tensile strength of lift suspension ropes and calculation of car and counterweight overhead runby</p> <ul style="list-style-type: none"> ◆ Understand the types of general suspension ropes of ordinary lay ◆ Understand the structure of general suspension ropes including: <ul style="list-style-type: none"> • fiber core • strands • wires ◆ Understand the tensile strength of general suspension ropes including: <ul style="list-style-type: none"> • single tensile • dual tensile ◆ Understand the calculation of general car and counterweight headroom, excluding: <ul style="list-style-type: none"> • reduction of overhead runby by terminal slow down device • reduction of overhead runby by anti-rebound device <p>6.2 Methods and procedures of overhaul suspension ropes (single wrap with roping ratio 1:1 and carrying capacity 680kg or below)</p> <ul style="list-style-type: none"> ◆ Know the lifting methods and procedures for general cars including: <ul style="list-style-type: none"> • the work of shutdown procedures • the work of safe lifting the car • the work of prevention creeping • the work of resumption operation ◆ Effectively use general lifting gear to lift the car ◆ Use general tools effectively to disassemble and assemble suspension ropes including: <ul style="list-style-type: none"> • the work of prevention creeping of old suspension ropes • the work of termination sockets of old suspension ropes • the work of termination sockets of new suspension ropes • the work of connection between old and new suspension ropes • the work of tension inspection and adjustment

	<p>6.3 Professionalism in disassembling and assembling suspension ropes (half wrap 1:1 roping method and load capacity 680kg or below)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s repair instructions and the code of practice for lift work safety to disassemble and assemble suspension ropes ◆ Understand manufacturer’s repair instructions and the code of practice for lift design and construction to test suspension ropes including: <ul style="list-style-type: none"> • termination sockets • rope slacking devices • equalization of tension devices
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and efficiently disassemble, assemble and test lift suspension ropes (single wrap with roping ratio 1:1 and carrying capacity 680kg or below) in compliance with the prescribed standards of repair.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift suspension ropes.</p>

1. Title	Overhaul general lift well equipment
2. Code	EMLEOR220A
3. Range	Overhaul lift well equipment (rated speed 1.75m/s or below and carrying capacity 680kg or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift well equipment</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general well equipment including: <ul style="list-style-type: none"> • travelling cables • car levelling devices • lift shaft lighting • hoistway emergency doors • terminal limited switches • car and counterweight guid-shoes <p>6.2 Overhaul methods and procedures for lift well equipment</p> <ul style="list-style-type: none"> ◆ Enable to correctly carry out the preparation and resumption works for lift well equipment including: <ul style="list-style-type: none"> • the work of shutdown procedures • the work of resumption operation ◆ Use general tools effectively to perform disassembly, cleaning, painting and assembly on well equipment including: <ul style="list-style-type: none"> • flat travelling cables • lift shaft lighting • hoistway emergency doors • levelling devices including switches and plates • terminal limited switches • car and counterweight guide rails (8kg or below) <p>6.3 Professionalism in disassembling and assembling well equipment</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions and the code of practice for lift work safety to disassemble and assemble well equipment ◆ Understand manufacturer's repair instructions and the code of practice for lift design and construction to test well equipment including: <ul style="list-style-type: none"> • travelling cables • car levelling devices • lift shaft lighting

	<ul style="list-style-type: none"> • hoistway emergency doors • terminal limited switches • car and counterweight guid-shoes
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to systematically and efficiently perform disassembly, rust removal and prevention, assembly and testing on lift (rated speed 1.75m/s or below and carrying capacity 680kg or below) well equipment in compliance with the prescribed standards of repair.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general lift well equipment.</p>

1. Title	Maintain driving devices of general escalators
2. Code	EMLEOR221A
3. Range	Maintain escalator driving devices (worm reduction gear and vertical height 3m or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator driving machines (worm reduction gear)</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general driving motors of 3-phase AC induction type ◆ Understand the structure and working principles of general driving machines of vertical type worm reduction gear ◆ Understand the structure and working principles of general electro-mechanical brakes including: <ul style="list-style-type: none"> • brake drum of operating brakes • auxiliary brakes <p>6.2 Methods and procedures of maintaining driving devices</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of driving devices and the works include with the inspection, cleaning and oiling ◆ Know the repair and maintenance of driving machines including: <ul style="list-style-type: none"> • motor • gearbox • brakes • driving system ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining escalator driving devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain the driving devices ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain the driving devices
7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to systematically and effectively complete the maintenance of escalator driving devices; and (ii) Capable to clearly explain the construction and the key points of maintenance of driving devices.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain steps driving components of general escalator
2. Code	EMLEOR222A
3. Range	Maintain escalator steps driving components (vertical height 3m or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator steps driving devices</p> <ul style="list-style-type: none"> ◆ Understand the mechanical structure and working principles of general step chain driving sprockets including: <ul style="list-style-type: none"> • multi-section step chain driving wheels • multi-section step chain driving gear ◆ Understand the structure and working principles of general step chains including: <ul style="list-style-type: none"> • multi-section step chain ◆ Understand the structure and working principles of general step chain tension wheels including: <ul style="list-style-type: none"> • multi-section step chain tension wheels • multi-section step chain tension gear <p>6.2 Methods and procedures of maintaining steps driving elements</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of steps driving elements including the procedures of inspection, cleaning and oiling ◆ Know the repair and maintenance of steps driving elements including: <ul style="list-style-type: none"> • driving wheels • driving chains • tension wheels of the driving chains ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining escalator steps driving elements</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain the steps driving elements ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain the steps driving elements
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively complete the maintenance of escalator steps driving elements; and</p> <p>(ii) Capable to clearly explain the construction and the key points of maintenance of steps driving assembly.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain handrail devices of general escalators
2. Code	EMLEOR223A
3. Range	Maintain escalator handrail devices (vertical height 3m or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator handrail devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general handrail devices including: <ul style="list-style-type: none"> • handrail • handrail guiding device • handrail driving device • handrail elongating compensation device • handrail inlet protection device • broken handrail device <p>6.2 Methods and procedures of maintaining handrail devices</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of handrail devices including the procedures of inspection, cleaning and oiling ◆ Know the repair and maintenance of handrail devices including: <ul style="list-style-type: none"> • handrail inlet protection device • broken handrail device • handrail guiding device • handrail driving device ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining handrail devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain handrail devices ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain handrail devices
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively complete the maintenance of escalator handrail devices; and</p> <p>(ii) Capable to clearly explain the construction and the key points of maintenance of handrail devices</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain electrical components of general escalator
2. Code	EMLEOR224A
3. Range	Maintain electrical components of escalator under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of electrical components of escalator</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of control cabinets including: <ul style="list-style-type: none"> • AC single speed driving system ◆ Understand the structure and working principles of the lighting including: <ul style="list-style-type: none"> • step lighting ◆ Understand the structure and working principles of starting devices including: <ul style="list-style-type: none"> • manually-operated key ◆ Understand the structure and working principles of general stop devices including handrail inlet protection device, emergency stop devices, combplate safety devices, skirting safety device <p>6.2 Methods and procedures of maintaining electrical components</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of electrical components including the procedures of inspection, cleaning and oiling ◆ Know the repair and maintenance of electrical components including: <ul style="list-style-type: none"> • control cabinet • lighting • starting devices • stopping devices ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining escalator's electrical assembly</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain the electrical assembly ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain the electrical assembly
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively complete the maintenance of escalator's electrical assembly; and</p> <p>(ii) Capable to clearly explain the construction and the key points of maintenance of electrical assembly.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain different guards of general escalators
2. Code	EMLEOR225A
3. Range	Maintain different guards of escalators under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and layout drawing of different guards of escalators</p> <ul style="list-style-type: none"> ◆ Understand the structure and layout drawing of different guards including: <ul style="list-style-type: none"> • guards between escalator’s exterior panel and barrier or wall • guards between two adjacent parallel escalators • guards between two adjacent criss-cross escalators • guards between handrail and obstacles <p>6.2 Methods and procedures of maintaining guards</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of guards including the inspecting and measuring procedures: <ul style="list-style-type: none"> • installation specifications of guards • suspension condition of guards • fixing condition of guards ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in maintaining all kinds of guards for escalators</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s maintenance instructions to maintain all kinds of guards ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain all kinds of guards
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively complete the maintenance of all kinds of guards for escalators; and</p> <p>(ii) Capable to clearly explain the specifications and the key points of maintenance of all kinds of guards.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of using general repairing and testing instruments and tools.

1. Title	Maintain driving station and return station devices of general escalators
2. Code	EMLEOR226A
3. Range	Maintain driving station and return station devices of escalators under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator driving station and reversing station devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general driving station devices including: <ul style="list-style-type: none"> • all the switching systems • lubricating system • driving system • auxiliary braking system ◆ Understand the structure and working principles of general return station devices including: <ul style="list-style-type: none"> • all the switching systems • step chain tension system <p>6.2 Maintenance methods and procedures for escalator driving station and return station</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance procedures for general driving station and return station devices including: <ul style="list-style-type: none"> • inspection, cleaning and oiling ◆ Know the repair and maintenance of general driving station and return station devices including: <ul style="list-style-type: none"> • all the switching systems such as main power switching device, lighting device, power socket, inspection socket and inspection control button • lubricating system such as free-drip oiler, time-control oiler and pulse-control oiler • driving system such as main driving chains tension device and main broken driven chain device • auxiliary braking system such as auxiliary disc brake and auxiliary ratchet brakes • step chain tension system such as step chain tension device and broken step chain device ◆ Use general repairing and testing instruments and tools effectively <p>6.3 Professionalism in handling escalator driving station and return station devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain driving station and return station devices ◆ Understand the requirements of safety guidelines and the code of practice for escalators in order to maintain driving station and reversing station devices

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to systematically and effectively complete the maintenance of general escalator driving station and return station devices; and(ii) Capable to clearly explain the construction and the key points of maintenance of escalator driving station and return station devices.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in using general repairing and testing instruments and tools.

1. Title	Overhaul driving devices of general escalators
2. Code	EMLEOR227A
3. Range	Overhaul escalator driving devices (worm reduction gear box and vertical height 3m or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator driving machines (worm reduction gear box)</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general drive motors including: <ul style="list-style-type: none"> • 3-phase AC induction motor ◆ Understand the structure and working principles of general driving machines including: <ul style="list-style-type: none"> • vertical worm reduction gear driving machine ◆ Understand the structure and working principles of general electro-mechanical brakes including: <ul style="list-style-type: none"> • brake drum of electromagnetic brakes • auxiliary brakes <p>6.2 Overhaul methods and procedures for driving machines (worm reduction gear box)</p> <ul style="list-style-type: none"> ◆ Know how to perform the safety measures at general work sites including: <ul style="list-style-type: none"> • the safety work of shutdown procedures • safety measurement for working • the safety work of resumption operation ◆ Know lifting methods and procedures for general driving machines including: <ul style="list-style-type: none"> • vertical worm reduction gear driving machines ◆ Effectively use general lifting gear to lift driving machines ◆ Use general tools effectively to disassemble and assemble driving machines <p>6.3 Professionalism in disassembling and assembling driving machines (worm screw)</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions and the code of practice for escalator work safety to disassemble and assemble driving machines ◆ Understand manufacturer's repair instructions and the code of practice for escalator design and construction to adjust and test driving machines including: <ul style="list-style-type: none"> • 3-phase AC vertical worm reduction gear driving machines

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to systematically and efficiently disassemble, assemble and adjust escalator driving devices (worm reduction gear box and vertical height 3m or below) in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general escalator driving devices.

1. Title	Overhaul steps driving components of general escalator
2. Code	EMLEOR228A
3. Range	Overhaul escalator steps driving elements (vertical height 3m or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator steps driving devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general step chain driving wheels including: <ul style="list-style-type: none"> • multi-section step chain driving wheels • multi-section step chain driving gear ◆ Understand the structure and working principles of general step chains including: <ul style="list-style-type: none"> • multi-section step chain ◆ Understand the structure and working principles of general step chain tension wheels including: <ul style="list-style-type: none"> • multi-section step chain tension wheels • multi-section step chain tension gear <p>6.2 Overhaul methods and procedures for step driving devices</p> <ul style="list-style-type: none"> ◆ Know how to perform safety measures at general work sites including: <ul style="list-style-type: none"> • the safety work of shutdown procedures • safety measurement for working • the safety work of resumption operation ◆ Know lifting methods and procedures for general step driving devices including: <ul style="list-style-type: none"> • multi-section step chain driving wheels • multi-section step chain driving gear • multi-section step chain • multi-section step chain tension wheels • multi-section step chain tension gear ◆ Effectively use general lifting gear to lift step driving devices ◆ Use general tools effectively to disassemble and assemble step driving devices

	<p>6.3 Professionalism in disassembling and assembling step driving devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s repair instructions and the code of practice for escalator work safety to disassemble and assemble step driving devices ◆ Understand manufacturer’s repair instructions and the code of practice for escalator design and construction to adjust and test step driving devices including <ul style="list-style-type: none"> • multi-section step chain driving wheels • multi-section step chain driving gear • multi-section step chain • multi-section step chain tension wheels • multi-section step chain tension gear
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency is:</p> <p>(i) Capable to systematically and efficiently disassemble, assemble and adjust escalator steps driving components (vertical height 3m or below) in compliance with the prescribed standards of repair.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general escalator steps driving assembly.</p>

1. Title	Overhaul handrail devices of general escalators
2. Code	EMLEOR229A
3. Range	Overhaul escalator handrail driving devices (vertical height 3m or below) under general situations at field locations.
4. Level	2
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and principles of escalator handrail driving devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of general handrail driving devices including: <ul style="list-style-type: none"> • handrail • handrail guiding device • handrail driving device • handrail elongating compensation device • handrail inlet protection device • broken handrail device <p>6.2 Overhaul methods and procedures for handrail driving devices</p> <ul style="list-style-type: none"> ◆ Know how to perform safety measures at general work sites including: <ul style="list-style-type: none"> • the safety work of shutdown procedures • safety measurement for working • the safety work of resumption operation ◆ Use general tools effectively to disassemble and assemble handrail driving devices <p>6.3 Professionalism in disassembling and assembling handrail driving devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions and the code of practice for escalator work safety to disassemble and assemble handrail driving devices ◆ Understand manufacturer's repair instructions and the code of practice for escalator design and construction to adjust and test handrail driving devices including: <ul style="list-style-type: none"> • handrail inlet protection device • broken handrail device • allowable deviation of handrail running speed • clearances between handrail outlet and guide or handrail bracket
7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to systematically and efficiently disassemble, assemble and adjust escalator handrail driving devices (vertical height 3m or below) in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining general escalator handrail driving devices.

**Competencies for Practitioners of
the Lift and Escalator Engineering Branch
in the Electrical & Mechanical Services
Industry**

Competency Level 3

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. Credits	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 work 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. Credits	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	Repair and rewind three-phase motors
2. Code	EMCUIN304A
3. Range	Understand the construction and types of three-phase motors, and repair and rewind them in servicing stations or work sites.
4. Level	3
5. Credits	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure, type, working principles and examination method of three-phase motor</p> <ul style="list-style-type: none"> ◆ Understand the structure, types, working principles and range of application of three-phase motor, including: <ul style="list-style-type: none"> • General induction motor • Multipolar three-phase motor • Two-speed three-phase motor ◆ Understand the winding design of three-phase motor, including number of slots for each pole, number of winds, method of winding connection, etc. ◆ Understand the methods to examine the faults of three-phase motor, including: <ul style="list-style-type: none"> • testing of short circuit • testing of circuit break • testing of earth fault • testing of wiring fault • testing of bearing fault ◆ Methods of dismantling and assembling three-phase motor ◆ Methods of replacing bearing <p>6.2 Repair three-phase motor faults</p> <ul style="list-style-type: none"> ◆ Identify the faults of a three-phase motor and repair them according to procedures ◆ Rewind a three-phase motor
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to understand the structure, types and working principles of three-phase motor;</p> <p>(ii) Capable to identify the faults of a three-phase motor and repair them according to procedures; and</p> <p>(iii) Capable to rewind a three-phase 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	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. Credits	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	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. Credits	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. Credits	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 safety code of practice 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 requirement of this unit of competency is:</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	Repair electrical devices for electric traction control system
2. Code	EMCUMA302A
3. Range	Repair devices for electric traction control system, with the use of electrical and pneumatic equipment, at servicing stations or work sites.
4. Level	3
5. Credits	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Principles of devices for electric traction control system</p> <ul style="list-style-type: none"> ◆ Understand the structure and principles of devices for electric traction control system <p>6.2 Methods of repairing electrical devices for electric traction control system</p> <ul style="list-style-type: none"> ◆ Repair DC traction motor <ul style="list-style-type: none"> • Apply repairing techniques in maintenance of DC traction motors, including commutators, brushes and brush holders, winding, bearing and insulation devices, according to instructions • Measure and replace brushes; grind brush springs and adjust their strength • Test the performance of DC motors ◆ Repair AC traction motors <ul style="list-style-type: none"> • Apply repairing techniques in maintenance of AC traction motors, including checking and repairing winding, bearing and insulation devices, according to instructions • Test the performance of AC motors ◆ Repair the control circuit and equipment of traction motors <ul style="list-style-type: none"> • Check and maintain control equipment, including forward/reverse switches, contactors and relays, according to repairing instructions • Perform visual inspection of the control circuit of a traction motor • Check and maintain transmission gear and gearboxes according to repairing instructions
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to repair DC traction motors and adjust the strength of their brush springs correctly and effectively according to instructions;</p> <p>(ii) Capable to repair DC motors, measure the resistance of winding and test the motor performance correctly and effectively according to repairing instructions; and</p> <p>(iii) Capable to repair the control circuits and equipment of traction motors correctly and effectively according to instructions.</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	Repair electronic control equipment for traction control system and main current transformer	
2. Code	EMCUMA303A	
3. Range	Use electronic control equipment repairing techniques to service electronic control equipment for traction control system and main current transformer at servicing stations or work sites.	
4. Level	3	
5. Credits	9	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Basic principles of operating control equipment for traction control system and main current transformer</p> <ul style="list-style-type: none"> ◆ Understand the basic principles of operating control equipment for traction control system and main current transformer, including: <ul style="list-style-type: none"> • Main electronic power circuit equipment for traction control system • Electronic power control circuit equipment for traction control system • Main electronic power circuit equipment for main current transformer • Electronic power control circuit equipment for main current transformer <p>6.2 Methods of repairing traction control system and main current transformer</p> <ul style="list-style-type: none"> ◆ Use electronic power control equipment repairing techniques to repair main electronic power circuit equipment for traction control system, including: <ul style="list-style-type: none"> • Power control components • Reactor • Main circuit ◆ Use electronic control equipment repairing techniques to repair electronic power control circuit equipment for traction control system, including: <ul style="list-style-type: none"> • Testing electronic power protection devices • Set various electronic control units ◆ Use inverter repairing techniques to repair service main electronic power circuit equipment for main current transformer, including: <ul style="list-style-type: none"> • Power control components • Reactor • Main circuit ◆ Use electronic control equipment repairing techniques to repair electronic power control circuit equipment for main current transformer, including: <ul style="list-style-type: none"> • Testing electronic power protection devices • Set various electronic control units • Check and test data logging functions 	

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to repair, test and set all electronic power control units for traction control system correctly and effectively; and (ii) Capable to repair, test and set all electronic power control units for main current transformer correctly and effectively.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of electronic control equipment for traction control system and main current transformer.

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. Credits	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. Credits	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. Credits	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	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. Credits	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	Use programmable logic controller (PLC) to write circuit control programme
2. Code	EMCUDE306A
3. Range	Use PLC high level programming commands to write circuit control programme for electrical and mechanical engineering design, and compare and upgrade the PLC control programme.
4. Level	3
5. Credits	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Principles of computing and concept of information coding</p> <ul style="list-style-type: none"> ◆ Understand the principles of computing, including the conversion and arithmetics of binary number, decimal number, hexadecimal number ◆ Understand the concept of information coding, and the principles of binary coding (BCD code) and ASC II code <p>6.2 Use PLC to write circuit control programme and test it</p> <ul style="list-style-type: none"> ◆ Use PLC basic and high level programming commands to write control programme for general electrical and mechanical work, e.g. control circuit of the carpark vehicle access management system, control circuit of the automatic switching system for several water pumps, etc. ◆ Test, rectify and upgrade PLC control programme <ul style="list-style-type: none"> • Test the circuit control programme written with basic and high level programmed commands • Debug and rectify the PLC control programme • Compare and upgrade the PLC control programme
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to use PLC basic and high level programming commands to write circuit control programme for general electrical and mechanical work according to the functional requirements, and test and debug the programme; and</p> <p>(ii) Capable to use PLC high level programming commands to upgrade the PLC control programme according to the functional requirements.</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 diodes and transistors in electronic control circuits
2. Code	EMCUDE311A
3. Range	Understand the structure, properties and working principles of basic electronic components (diode and transistor); and use these components in rectifier, amplifying and logic circuits to meet the functional requirements of the control circuit design.
4. Level	3
5. Credits	8
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure, properties and working principles of diode and transistor</p> <ul style="list-style-type: none"> ◆ Understand the structure, properties and working principles of diode and transistor ◆ Understand the working principles of rectifier circuit and stabilizing circuit <p>6.2 Use diodes and transistors in electronic control circuits</p> <ul style="list-style-type: none"> ◆ Use diodes and related components to design the following electronic control circuits according to the functional requirements of the control circuit design <ul style="list-style-type: none"> • Bridge type rectifier circuit • stabilizing circuit ◆ Use transistors in amplifying circuit and switch circuits according to the functional requirements of the circuit design <ul style="list-style-type: none"> • Use transistors and related components to connect as an amplifying circuit based on the understanding in the structure of transistor and working principles of amplifying circuit and • Apply the following connecting methods to achieve different amplifying effects and results <ul style="list-style-type: none"> ▸ common base connection ▸ common emitter connection ▸ common collector connection • use transistors and related components to design a switch circuit according to the functional requirements of the circuit design ◆ Use diodes and transistors in logic circuits according to the functional requirements of the circuit design <ul style="list-style-type: none"> • Use diodes, transistors and related components to connect in the following logic circuits <ul style="list-style-type: none"> ▸ 'OR' Gate ▸ 'AND' Gate ▸ 'Not' Gate ▸ 'Exclusive OR' Circuit ▸ 'NAND' Gate ▸ 'NOR' Gate

7. Assessment Criteria	The integrated outcome requirement of this unit of competency is: (i) Capable to design an electronic control circuit according to the functional requirements of the circuit design, with the functions of full wave rectification and stabilization, electronic control switch, logic control and signal amplification.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses basic knowledge of electricity.

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. Credits	5
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Computer engineering drawing techniques and methods ♦ Understand the techniques and methods of using computer to draw complicated mechanical engineering drawings</p> <p>6.2 Application of computer in drawing electrical and mechanical drawings ♦ Use the computer to draw complicated mechanical engineering drawings according to design</p> <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. Credits	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	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. Credits	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	Install well plumbing tools of lift
2. Code	EMLEIN301A
3. Range	Arrange and implement the installation of lift well plumbing tools at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and working principles of lift well plumbing tools and the relationship with mechanical equipment installation drawings</p> <ul style="list-style-type: none"> ◆ Understand the names and quantity of well plumbing tool components including: <ul style="list-style-type: none"> • upper plumbing supporter x one set • plumbing lines x 10 • weights x 10 • lower plumbing supporter x one set ◆ Understand well plumbing tools and the relationship with mechanical equipment installation drawings including: <ul style="list-style-type: none"> • lift machine room's mechanical equipment installation drawing • lift landing mechanical equipment installation drawing • lift well wall mechanical equipment installation drawing • lift pit mechanical equipment installation drawing <p>6.2 Installation methods and procedures for well plumbing tools</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for well plumbing tools including: <ul style="list-style-type: none"> • upper plumbing supporter x one set • plumbing lines x 10 • weights x 10 • lower plumbing supporter x one set ◆ Analyze measurements of construction dimensions of different construction projects and formulate the revised procedure lists for the final installation location of well plumbing tools including: <ul style="list-style-type: none"> • lift machine room construction dimensions • lift landing construction dimensions • lift well wall construction dimensions • lift pit construction dimensions ◆ Effectively use all kinds of tools to implement and assign the completed installation and revision work for the final installation location of well plumbing tools

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to arrange and assign the revised procedures for completed installation and the final installation location of lift well plumbing tools systematically and through effective communication; and(ii) Capable to implement the completed installation and revision work for the final installation location of lift well plumbing tools under general or complicated situations in compliance with the prescribed standards.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in performing measuring tasks on lift well.

1. Title	Install lift machine room's mechanical equipment
2. Code	EMLEIN302A
3. Range	Arrange and implement the installation of lift machine room's mechanical equipment at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure, working principles and installation drawings of lift machine room's mechanical equipment</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different traction machines including: <ul style="list-style-type: none"> • 3-phase AC worm reduction gear traction machines • 3-phase AC helical gear traction machines • 3-phase AC gearless traction machines ◆ Understand the structure and working principles of different control cabinets including: <ul style="list-style-type: none"> • AC Variable Voltage (ACVV) control cabinet • AC Variable Voltage Variable Frequency (ACVVVF) control cabinet ◆ Understand the structure and working principles of different overspeed governors including: <ul style="list-style-type: none"> • one-way horizontal centrifugal governor • two-way horizontal centrifugal governor • one-way vertical flyball overspeed governor ◆ Understand the installation drawings of different machine room's mechanical equipment and the drawings include: <ul style="list-style-type: none"> • different traction machines • different control cabinets • different overspeed governors <p>6.2 Installation methods and procedures for machine room's mechanical equipment</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different machine room's mechanical equipment including: <ul style="list-style-type: none"> • different traction machines • different control cabinets • different overspeed governors ◆ Effectively use different lifting gears to implement and assign full lifting work for different machine room's mechanical equipment

	<p>6.3 Professionalism in full installation of machine room's mechanical equipment</p> <ul style="list-style-type: none"> ◆ Effectively use different tools and installation drawings of different machine room's mechanical equipment to implement and assign full installation work for all kinds of machine room's mechanical equipment ◆ Apply manufacturer's installation instructions and the code of practice for lift work safety to implement and assign full installation work for all kinds of machine room's mechanical equipment ◆ Apply manufacturer's installation instructions and the code of practice for lift design and construction to implement and assign full adjustment and testing work for different machine room's mechanical equipment including: <ul style="list-style-type: none"> • 3-phase AC worm reduction gear traction machines • 3-phase AC helical gear traction machines • 3-phase AC gearless traction machines • AC Variable Voltage variable (ACVV) control cabinet • AC Variable Voltage Variable Frequency (ACVVVF) control cabinet • one-way horizontal centrifugal governor • two-way horizontal centrifugal governor • one-way vertical flyball overspeed governor
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign full installation and adjustment procedures for different lift machine room's mechanical equipment systematically and through effective communication; and</p> <p>(ii) Capable to implement full installation and adjustment different lift machine room's mechanical equipment under general or complicated situations in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing lift top machine room's mechanical equipment.</p>

1. Title	Install lift landing doors
2. Code	EMLEIN303A
3. Range	Arrange and implement the installation of lift landing door devices at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure, working principles and installation drawings of lift landing doors</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of landing doors including: 2-panel side opening horizontally sliding door (2S-L / 2S-R) <ul style="list-style-type: none"> • 3-panel side opening horizontally sliding door (3S-L / 3S-R) • 4-panel centre opening horizontally sliding door (2CO) • 6-panel centre opening horizontally sliding door (3CO) • 2-panel upward opening vertically sliding door (2U) • 2-panel centre opening vertically sliding door (CO) ◆ Understand the installation drawings of different kinds of landing doors including: <ul style="list-style-type: none"> • 2-panel side opening horizontally sliding door (2S-L / 2S-R) • 3-panel side opening horizontally sliding door (3S-L / 3S-R) • 4-panel centre opening horizontally sliding door (2CO) • 6-panel centre opening horizontally sliding door (3CO) • 2-panel upward opening vertically sliding door (2U) • 2-panel centre opening vertically sliding door (CO) <p>6.2 Installation methods and procedures for landing doors</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of landing door including: <ul style="list-style-type: none"> • horizontally sliding doors • vertically sliding doors ◆ Effectively use different kinds of lifting gear to implement and assign full lifting work for horizontally sliding doors and vertical sliding doors

	<ul style="list-style-type: none"> ◆ Effectively use different kinds of tool, well plumbing line and installation drawing of landing doors to implement and assign full installation works for horizontally sliding doors and vertically sliding doors including: <ul style="list-style-type: none"> • locking devices • landing door sill • horizontally sliding door suspension • horizontally sliding door tracks • vertically sliding door suspension devices • vertically sliding door guiding devices • landing door panel and landing door frame <p>6.3 Professionalism in completed installation of landing doors</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation instructions and the code of practice for lift work safety to implement and assign completed installation works for horizontally sliding doors and vertically sliding doors ◆ Apply manufacturer’s installation instructions and the code of practice for lift design and construction to implement and assign completed testing work for horizontally sliding doors and vertically sliding door including: <ul style="list-style-type: none"> • 2-panel side opening horizontally sliding door (2S-L / 2S-R) • 3-panel side opening horizontally sliding door (3S-L / 3S-R) • 4-panel centre opening horizontally sliding door (2CO) • 6-panel centre opening horizontally sliding door (3CO) • 2-panel upward opening vertically sliding door (2U) • 2-panel centre opening vertically sliding door (CO)
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign full installation and testing procedures for different kinds of lift landing door systematically and through effective communication; and</p> <p>(ii) Capable to implement full installation and testing for different kinds of lift landing door under general or complicated situations in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing general lift landing doors.</p>

1. Title	Install lift guide-rails
2. Code	EMLEIN304A
3. Range	Arrange and implement the installation of lift guide-rails at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types, installation formats and installation drawings of lift guide-rails</p> <ul style="list-style-type: none"> ◆ Understand different types of rail brackets including: <ul style="list-style-type: none"> • T-shaped brackets • U-shaped brackets • L-shaped brackets ◆ Understand different types of rail brackets including: <ul style="list-style-type: none"> • rail brackets embedded in well wall • rail brackets hidden in well wall bolts ◆ Understand the relationship of well plumbing lines with the mounting plans for different types of rail brackets including: <ul style="list-style-type: none"> • lift rail brackets of independent well rear-mounted counterweight • lift rail brackets of independent well side-mounted counterweight • lift rail brackets of common well rear-mounted counterweight • lift rail brackets of common well side-mounted counterweight <p>6.2 Methods and procedures of mounting rail brackets</p> <ul style="list-style-type: none"> ◆ Implement the mounting procedure lists for different types of rail brackets including: <ul style="list-style-type: none"> • lift rail brackets of independent well rear-mounted counterweight • lift rail brackets of independent well side-mounted counterweight • lift rail brackets of common well rear-mounted counterweight • lift rail brackets common well side-mounted counterweight ◆ Effectively use different kinds of tool to implement and assign the alterative works of plumbing lines' frame including: <ul style="list-style-type: none"> • Alter the plumbing lines' frame from installation of guid-rail brackets to guid-rails

	<p>6.3 Professionalism in full installation of guides</p> <ul style="list-style-type: none"> ◆ Effectively use different lifting gears to implement and assign full lifting work for different guide-rails including: <ul style="list-style-type: none"> • 5 kg guide-rail, 8 kg guide-rail, 13 kg guide-rail, 18 kg guide-rail, 24 kg guide-rail, 30 kg guide-rail, 36 kg guide-rail ◆ Effectively use different tools, well plumbing lines and installation drawings to carry out the installation and adjustment works for different guide-rails including: <ul style="list-style-type: none"> • connection work on the fish-plate • alignment work between the joint of guide-rails • alignment work (perpendicular) of left and right guide-rails • alignment work (parallelism) of left and right guide-rails ◆ Apply manufacturer's installation instructions and the code of practice for lift work safety to implement and assign completed installation and adjustment work for different kinds of guide-rail ◆ Apply manufacturer's installation instructions and the code of practice for lift design and construction to implement and assign completed testing work for different kinds of guide-rail
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed installation and adjustment procedures for different kinds of lift guide-rail systematically and through effective communication; and</p> <p>(ii) Capable to implement completed installation and adjustment of different kinds of lift guide-rail under general or complicated situations in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing lift rail brackets.</p>

1. Title	Install lift car and counterweight
2. Code	EMLEIN305A
3. Range	Arrange and implement the installation of lift car and counterweight at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and installation drawings of lift car and counterweight</p> <ul style="list-style-type: none"> ◆ Understand the structures of different kinds of lift car including: <ul style="list-style-type: none"> • single wrap and roping ratio 1:1 and 2:1 • double wrap and roping ratio 1:1 and 2:1 ◆ Understand the structures of different kinds of counterweight including: <ul style="list-style-type: none"> • single wrap and roping ratio 1:1 and 2:1 • double wrap and roping ratio 1:1 and 2:1 <p>Understand the installation drawings of different kinds of lift car and counterweight including: single wrap and roping ratio 1:1 and 2:1</p> <ul style="list-style-type: none"> • double wrap and roping ratio 1:1 and 2:1 <p>6.2 Installation methods and procedures for car and counterweight</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of lift car and counterweights including: <ul style="list-style-type: none"> • different wrapping and roping ratio of lift cars • different wrapping and roping ratio of counterweights ◆ Effectively use different kinds of lifting gear to implement and assign completed supporting and lifting works for different kinds of lift car and counterweight including: <ul style="list-style-type: none"> • decision the height of scaffolding in the lift well • erection the supporting frames in the lift well for lift cars and counterweights • Safety lifting of car assemblies and counterweight assemblies using different kinds of roping method

	<p>6.3 Professionalism in full installation of car and counterweight</p> <ul style="list-style-type: none"> ◆ Effectively use different tools to implement and assign completed installation work for different kinds of lift car and counterweight including: <ul style="list-style-type: none"> • car roof panels • car wall panels • car platform • car door sill • car apron • car door suspension devices • car door rails • car door and car door frame • counterweight frame and counterweight block ◆ Apply manufacturer's installation instructions and the code of practice for lift work safety to implement and assign completed installation work for different kinds of lift car and counterweight ◆ Apply the code of practice for lift design and construction to implement and assign completed testing work for different kinds of car including: <ul style="list-style-type: none"> • car ventilation • balance load ratio between car and counterweight • traction • overload protection device • braking system • safety gear
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed installation and testing procedures for different kinds of lift car and counterweight systematically and through effective communication; and</p> <p>(ii) Capable to implement completed installation and testing for different kinds of lift car and counterweight under general or complicated situations in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift car and counterweight.</p>

1. Title	Install suspension ropes of lift
2. Code	EMLEIN306A
3. Range	Arrange and implement the installation works of lift suspension ropes at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types, structure and tensile strength of lift suspension ropes and calculation of car and counterweight headroom</p> <ul style="list-style-type: none"> ◆ Understand different suspension ropes including: <ul style="list-style-type: none"> • ordinary lay suspension ropes • regular lay suspension ropes ◆ Understand the structure of different suspension ropes including: <ul style="list-style-type: none"> • fiber core • steel strand • steel wire ◆ Understand the tensile strength of different suspension ropes including: <ul style="list-style-type: none"> • single tensile strength • dual tensile strength ◆ Understand the calculation of overhead runby for different lift cars and counterweights including: <ul style="list-style-type: none"> • reduction of overhead runby by termination slowdown devices • reduction of overhead runby by using anti-rebound devices <p>6.2 Installation methods and procedures for suspension ropes</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different suspension ropes including: <ul style="list-style-type: none"> • Enable to select suitable lifting gears • Enable to formulate the working procedure lists for lifting different lift cars • Enable to formulate the working procedure lists for the suspension ropes with different kinds of wrapping and roping ratio ◆ Effectively use different lifting gears to implement and assign completed lifting work for different lift cars including: <ul style="list-style-type: none"> • lift cars with single wrap and roping ratio 1:1 or 2:1 • lift cars with double wrap and roping ratio 1:1 or 2:1 • anti-creep precautions for lift cars

	<p>6.3 Professionalism in full installation of suspension ropes</p> <ul style="list-style-type: none"> ◆ Effectively use different tools to implement and assign completed installation work for different suspension ropes including: <ul style="list-style-type: none"> • laying of suspension ropes • attachment and termination of suspension rope • tensioners between suspension ropes • anti-creeping works of suspension ropes ◆ Apply manufacturer's installation instructions and the code of practice for lift work safety to implement and assign completed installation work for different suspension ropes ◆ Apply manufacturer's installation instructions and the code of practice for lift design and construction to implement and assign completed testing work for different suspension ropes including: <ul style="list-style-type: none"> • termination sockets of suspension rope • rope slacking devices • equalization of tension devices • safety guards for prevention objects falling into the grooves of pulley
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed installation and testing procedures for different lift suspension ropes systematically and through effective communication; and (ii) Capable to implement completed installation and testing for different lift suspension ropes under general or complicated situations in compliance with the prescribed standards.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing general lift suspension ropes.</p>

1. Title	Install lift compensation devices
2. Code	EMLEIN307A
3. Range	Arrange and implement the installation of lift compensation devices at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types, structure, working principles and installation drawings of lift compensation devices</p> <ul style="list-style-type: none"> ◆ Understand different kinds of compensation device including: <ul style="list-style-type: none"> • single end compensation • single end with double compensation • balance compensation ◆ Understand the structure and working principles of different kinds of compensation device including: <ul style="list-style-type: none"> • compensation chains • compensation ropes ◆ Understand the installation drawings of different kinds of compensation device including: <ul style="list-style-type: none"> • single end compensation chains • single end with double compensation chains • balance compensation chains • balance compensation ropes <p>6.2 Installation methods and procedures for compensation devices</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of compensation device including: <ul style="list-style-type: none"> • compensation chains • compensation ropes ◆ Effectively use different kinds of lifting gears to implement and assign the completed lifting work for compensation rope tension pulley ◆ Effectively use different tools and installation drawings to implement and assign the completed installation works for compensation rope and chain

	<p>6.3 Professionalism in full installation of compensation devices</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation instructions and the code of practice for lift work safety to implement and assign the completed installation work for compensation chains and compensation ropes ◆ Apply manufacturer’s installation instructions and the code of practice for lift design and construction to implement and assign the completed testing work for compensation chains and compensation ropes including: <ul style="list-style-type: none"> • compensation rope suspension device • attachment and termination of compensation rope • compensation rope relaxation device • compensation rope anti-rebound device • tensioners between compensation ropes • safety guards for prevention objects falling into the grooves of pulley
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed installation and testing procedures for lift compensation chains and compensation ropes systematically and through effective communication; and (ii) Capable to implement completed installation and testing for lift compensation chains and compensation ropes under general or complicated situations in compliance with the prescribed standards.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing general lift suspension ropes.</p>

1. Title	Install lift buffers
2. Code	EMLEIN308A
3. Range	Arrange and implement the installation of lift buffers at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure, working principles and installation drawings of lift buffers</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of buffer including: <ul style="list-style-type: none"> • energy accumulation buffers • single-plunger energy dissipation buffers • multi-plunger energy dissipation buffers ◆ Understand installation drawings of different kinds of buffer including: <ul style="list-style-type: none"> • energy accumulation buffers • single-plunger energy dissipation buffers • multi-plunger energy dissipation buffers <p>6.2 Installation methods and procedures for buffers</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of buffer including: <ul style="list-style-type: none"> • different kinds of energy accumulation buffers • different kinds of energy dissipation buffers ◆ Effectively use different kinds of lifting gear to implement and assign completed lifting work for different kinds of buffer ◆ Effectively use different tools and buffers installation drawings to implement and assign completed installation work for different kinds of buffer <p>6.3 Professionalism in full installation of buffers</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's installation instructions and the code of practice for lift work safety to implement and assign completed installation work for different kinds of buffer ◆ Apply manufacturer's installation instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing work for different kinds of buffer including: <ul style="list-style-type: none"> • energy accumulation buffers • single-plunger energy dissipation buffers • multi-plunger energy dissipation buffers

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to arrange and assign completed installation and testing procedures for different kinds of lift buffer systematically and through effective communication; and(ii) Capable to implement completed installation and testing for different kinds of lift buffer under general or complicated situations in compliance with the prescribed standards.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing lift top machine room's mechanical equipment.

1. Title	Implement electrical wiring of lift
2. Code	EMLEIN309A
3. Range	Arrange and implement the installation of electrical wiring of lift at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Principles of electrical wiring of lift</p> <ul style="list-style-type: none"> ◆ Understand electrical wiring drawings including: <ul style="list-style-type: none"> • electrical drawing of lift machine room • electrical drawing of lift floor • electrical drawing of lift well • electrical drawing of lift pit • electrical drawing of lift car ◆ Understand and apply the drawings to formulate the whole set of electrical installation work ◆ Understand the basic requirements and relevant standards for electrical wiring including: <ul style="list-style-type: none"> • types and identification of wires • wire terminal connection method • wire insulation and continuity test <p>6.2 Methods and procedures for electrical wiring of lift</p> <ul style="list-style-type: none"> ◆ Formulate and implement the whole set of electrical wiring procedures including: <ul style="list-style-type: none"> • electrical installations in lift machine room • electrical installations in lift landing • electrical installations in lift well • electrical installations in lift pit • electrical installations in lift car ◆ Know the electrical wiring techniques including: <ul style="list-style-type: none"> • identification of wires • symbols and markings on the wires • wire laying technique • wire terminal connection ◆ Implement wire insulation and continuity test ◆ Effectively use electrical installation tools and general testing instruments

	<p>6.3 Professionalism in electrical wiring of lift</p> <ul style="list-style-type: none"> ◆ Follow working drawing's instructions to carry out electrical wiring ◆ Understand safety guidelines and code of practice for lifts and Code of Practice for the Electricity (Wiring) Regulations in order to perform electrical wiring
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 the whole set of electrical wiring procedures according to drawings; and (ii) Capable to systematically and effectively arrange and implement the installation of electrical wiring.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses the ability in installing lift electrical conduits and trunkings.</p>

1. Title	Install escalator pit plumbing tools
2. Code	EMLEIN310A
3. Range	Arrange and implement the installation of escalator pit plumbing tools at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and working principles of escalator pit plumbing tools and the relationship with mechanical equipment installation drawings</p> <ul style="list-style-type: none"> ◆ Understand the names and quantity of escalator pit plumbing tool components including: <ul style="list-style-type: none"> • plumbing tools supporter at driving station x one set • plumbing lines x 4 pieces • weights x 4 • plumbing tools supporter at return station x one set ◆ Understand escalator pit plumbing line and the relationship with the installation drawings of mechanical equipment including: <ul style="list-style-type: none"> • mechanical equipment in driving station • mechanical equipment inside the truss • mechanical equipment in return station <p>6.2 Installation methods and procedures for escalator pit plumbing tools</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for escalator pit plumbing tools including: <ul style="list-style-type: none"> • plumbing tools supporter at driving station x one set • plumbing lines x 4 pieces • weights x 4 • plumbing tools supporter at return station x one set ◆ Analyze measurements of construction dimensions of different construction projects and formulate the revised procedure lists for the final installation location of escalator pit plumbing tools including: <ul style="list-style-type: none"> • the construction dimension of vertical height of upper machine room (driving station) • the construction dimension of opening width of escalator pit (framework) • the construction dimension of pit dept of lower machine room (return station) ◆ Effectively use different tools to implement and assign the completed installation and revision work for the final installation location of escalator pit plumbing tools

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to arrange and assign the revised procedures for completed installation and the final installation location of escalator pit plumbing tools systematically and through effective communication; and(ii) Capable to implement the completed installation and revision work for the final installation location of escalator pit plumbing tools under general or complicated situations in compliance with the prescribed standards.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in measuring escalator pit.

1. Title	Install escalator truss
2. Code	EMLEIN311A
3. Range	Arrange and implement the installation of escalator trusses at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction, assembly, lifting and installation drawings of escalator truss</p> <ul style="list-style-type: none"> ◆ Understand the structure of different kinds of escalator truss including: <ul style="list-style-type: none"> • one-set escalator truss • two-set escalator truss • three-set escalator truss ◆ Understand the assembly of different kinds of escalator truss including: <ul style="list-style-type: none"> • two-set escalator truss • three-set escalator truss ◆ Understand the lifting method of different kinds of escalator truss including: <ul style="list-style-type: none"> • one -set escalator truss • two-set escalator truss • three-set escalator truss ◆ Understand the installation drawings of different kinds of escalator truss including: <ul style="list-style-type: none"> • one -set escalator truss • two-set escalator truss • three-set escalator truss <p>6.2 Installation methods and procedures for escalator truss</p> <ul style="list-style-type: none"> ◆ Formulate assembling and installation procedure lists for different kinds of escalator truss including: <ul style="list-style-type: none"> • full-set escalator truss • two-set escalator truss • three-set escalator truss ◆ Effectively use different kinds of lifting gears to implement and assign completed lifting work for different kinds of escalator truss

	<ul style="list-style-type: none"> ◆ Effectively use different kinds of tools, escalator pit plumbing line, landing centre line and installation drawings of different kinds of escalator truss to implement and assign full installation work for different kinds of escalator truss including: <ul style="list-style-type: none"> • centering adjustment of driving station and reversing station • levelling adjustment of driving station and reversing station <p>6.3 Professionalism in full installation of all kinds of escalator truss</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation instructions and the code of practice for escalator work safety to implement and assign the completed installation work for different kinds of escalator truss including: <ul style="list-style-type: none"> • one-set escalator truss • two-piece escalator truss • three-piece escalator truss
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed installation and adjustment procedures for different kinds of escalator truss systematically and through effective communication; and (ii) Capable to implement completed installation and adjustment of completed installation for different kinds of escalator truss under general or complicated situations in compliance with the prescribed standards.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing escalator pit plumbing tools.</p>

1. Title	Install escalator guide-rails
2. Code	EMLEIN312A
3. Range	Arrange and implement the installation of escalator guide-rails at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and installation drawings of escalator guide-rails</p> <ul style="list-style-type: none"> ◆ Understand the structure of different kinds of guide-rail including: <ul style="list-style-type: none"> • main drive transition section guides • driving station and truss mid-section guides • reversing station and truss mid-section guides • tension frame transition section guides ◆ Understand installation drawings of all kinds of guide devices including: <ul style="list-style-type: none"> • main drive transition section guide-rail • driving station and truss mid-section guide-rail • reversing station and truss mid-section guide-rail • tension frame transition section guide-rail <p>6.2 Installation methods and procedures for guide devices</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of guide-rail including: <ul style="list-style-type: none"> • safety equipment list at construction site • work procedure lists for main drive transition section guides • work procedure lists for driving station and truss mid-section guides • work procedure lists for reversing station and truss mid-section guides • work procedure lists for tension frame transition section guides ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • work site surrounding safety

	<ul style="list-style-type: none"> ◆ Effectively use different tools, level, truss vertical centre line and installation drawings to implement and assign completed installation and adjustment work for different kinds of guide-rail including: <ul style="list-style-type: none"> • main drive transition section guides such as step chain wheel stop thrust guides, step chain wheel guides, step wheel stop thrust guides and step wheel guides • truss mid-section guides such as step chain wheel guide and step wheel guides • tension frame transition section guides such as step chain wheel stop thrust guides, step chain wheel guides, step wheel stop thrust guides and step wheel guides <p>6.3 Professionalism in full installation of guide devices</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's installation instructions and the code of practice for escalator work safety to implement and assign completed installation and adjustment work for different kinds of guide-rail
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed installation and adjustment procedures for different kinds of escalator guide-rail systematically and through effective communication; and (ii) Capable to implement completed installation and adjustment of different kinds of escalator guide-rail under general or complicated situations in compliance with the prescribed standards.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing basic mechanical installations of escalators.</p>

1. Title	Install escalator handrail devices
2. Code	EMLEIN313A
3. Range	Arrange and implement the installation of escalator handrail devices at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction, working principles and installation drawings of escalator handrail devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of handrail devices including: <ul style="list-style-type: none"> • handrail • handrail guiding device • handrail driving device • handrail elongating compensation device • handrail inlet protection device • broken handrail device ◆ Understand installation drawings of different kinds of handrail devices including: <ul style="list-style-type: none"> • handrail guiding device • handrail driving device • handrail elongating compensation device • handrail inlet protection device • broken handrail device <p>6.2 Installation methods and procedures for handrail devices</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of handrail devices including: <ul style="list-style-type: none"> • different kinds of handrail • different kinds of handrail guiding device • different kinds of handrail driving device • different kinds of handrail elongating compensation device • different kinds of handrail inlet protection device • different kinds of broken handrail device ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • work site surrounding safety ◆ Effectively use different tools to implement and assign completed installation of different kinds of handrail device

	<p>6.3 Professionalism in full installation of handrail devices</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation instructions and the code of practice for escalator work safety to implement and assign completed installation work for different kinds of handrail device ◆ Apply manufacturer’s installation instructions and the code of practice for escalator design and construction to implement and assign completed adjustment and testing work of different kinds of handrail device including: <ul style="list-style-type: none"> • handrail inlet protection device • broken handrail device • allowable deviation of handrail running speed • clearances between handrail outlet and guide or handrail bracket
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed installation, adjustment and testing procedures for escalator handrail devices systematically and through effective communication; and</p> <p>(ii) Capable to implement completed installation, adjustment and testing of escalator handrail devices under general or complicated situations in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing basic mechanical installations of escalators.</p>

1. Title	Install escalator driving devices
2. Code	EMLEIN314A
3. Range	Arrange and implement the installation of escalator driving devices at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction, working principles and installation drawings of escalator driving devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of drive motor including: <ul style="list-style-type: none"> • 3-phase AC induction motor • 3-phase AC permanent-magnet motor ◆ Understand the structure and working principles of different kinds of driving machine including: <ul style="list-style-type: none"> • helical gear driving machines • vertical worm reduction gear driving machines ◆ Understand the structure and working principles of different kinds of brake (electromechanical) including: <ul style="list-style-type: none"> • electromagnetic drum brakes • magnetic disc brakes • auxiliary brakes ◆ Understand installation drawings of different kinds of driving machine including: <ul style="list-style-type: none"> • Installation drawings for different driving motors • Installation drawings for different driving machines • Installation drawings for different brakes <p>6.2 Installation methods and procedures for driving machines</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of driving machine including: <ul style="list-style-type: none"> • select an appropriated list for lifting gears • work site safety equipment lists • work procedure lists for lifting different driving machines • installation procedure lists for different driving machines ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • work site surrounding safety

	<ul style="list-style-type: none"> ◆ Effectively use different lifting gears to implement and assign completed lifting work for different kinds of driving machines ◆ Effectively use different tools and installation drawings to implement and assign completed installation and adjustment work for different kinds of driving machine <p>6.3 Professionalism in full installation of driving machines</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation instructions and the code of practice for escalator work safety to implement and assign completed installation work for different driving machines ◆ Apply manufacturer’s installation instructions and the code of practice for escalator design and construction to implement and assign completed adjustment and testing work of different driving machines including: <ul style="list-style-type: none"> • working brakes and auxiliary brakes • 3-phase AC helical gear driving machines • 3-phase AC vertical worm reduction gear driving machines
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed installation, adjustment and testing procedures for escalator driving devices systematically and through effective communication; and (ii) Capable to implement completed installation, adjustment and testing of escalator driving devices under general or complicated situations in compliance with the prescribed standards.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing basic mechanical installations of escalators.</p>

1. Title	Install escalator balustrade devices
2. Code	EMLEIN315A
3. Range	Arrange and implement the installation of escalator balustrade devices at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types, construction and installation drawings of escalator balustrade devices</p> <ul style="list-style-type: none"> ◆ Understand different kinds of balustrade device including: <ul style="list-style-type: none"> • glass-type balustrade devices • metal-type balustrade devices ◆ Understand the structure of completed kinds of balustrade device including: <ul style="list-style-type: none"> • balustrade decking • balustrade interior panelling • Interior profile • skirting ◆ Understand installation drawings of different kinds of balustrade device including: <ul style="list-style-type: none"> • glass-type balustrade devices • metal-type balustrade devices <p>6.2 Installation methods and procedures for balustrade devices</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of balustrade device including: <ul style="list-style-type: none"> • balustrade decking • balustrade interior panelling • Interior profile • skirting ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • work site surrounding safety ◆ Effectively use different tools, truss vertical centre line and installation drawings to implement and assign completed installation work for different kinds of balustrade device

	<p>6.3 Professionalism in full installation of balustrade devices</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation instructions and the code of practice for escalator work safety to implement and assign completed installation work for all kinds of balustrade devices ◆ Apply manufacturer’s installation instructions and the code of practice for escalator design and construction to implement and assign completed measurement work for different kinds of handrail device
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed installation and adjustment procedures for different kinds of escalator balustrade device systematically and through effective communication; and (ii) Capable to implement completed installation and adjustment of different kinds of escalator balustrade device under general or complicated situations in compliance with the prescribed standards.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing basic mechanical installations of escalators.</p>

1. Title	Install escalator step chains	
2. Code	EMLEIN316A	
3. Range	Arrange and implement the installation of escalator step chains at construction sites.	
4. Level	3	
5. Credit	3	
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction, working principles and installation drawings of escalator step chain devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of step chain driving wheel including: <ul style="list-style-type: none"> • driving wheels of long pitch (one pitch length /step) step chain driving wheels • driving wheels of short pitch step chain driving wheels ◆ Understand the structure and working principles of different kinds of step chain including: <ul style="list-style-type: none"> • long pitch step chain • short pitch step chain ◆ Understand the structure and working principles of different kinds of step chain tension wheel including: <ul style="list-style-type: none"> • tension wheels of long pitch step chain • tension wheels of short pitch step chain ◆ Understand the installation drawings of different kinds of step chain device including: <ul style="list-style-type: none"> • different step chain driving wheels • different step chain • different step chain tension wheels <p>6.2 Installation methods and procedures for step chain devices</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for different kinds of step chain device including: <ul style="list-style-type: none"> • lists for selecting all kinds of suitable lifting gears • work site safety equipment lists • work procedure lists for different step chain driving wheels • work procedure lists for different step chains • work procedure lists for different step chain tension wheels ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • work site surrounding safety 	

	<ul style="list-style-type: none"> ◆ Effectively use different lifting gears to implement and assign completed lifting work for different kinds of step chain devices ◆ Effectively use different tools to implement and assign completed installation and adjustment work for different step chain devices <p>6.3 Professionalism in full installation of step chain devices</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's installation instructions and the code of practice for escalator work safety to implement and assign completed installation work for different step chain devices ◆ Apply manufacturer's installation instructions and the code of practice for escalator design and construction to implement and assign completed adjustment and testing work of different kinds of step chain device including: <ul style="list-style-type: none"> • long pitch step chain driving devices • short pitch step chain driving devices
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed installation, adjustment and testing procedures for escalator step chain devices systematically and through effective communication; and (ii) Capable to implement completed installation, adjustment and testing of escalator step chain devices under general or complicated situations in compliance with the prescribed standards.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing basic mechanical installations of escalators.</p>

1. Title	Install escalator landing plate devices
2. Code	EMLEIN317A
3. Range	Arrange and implement the installation of escalator landing plate devices at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and installation drawings of escalator landing plate devices</p> <ul style="list-style-type: none"> ◆ Understand the structure of landing plate devices including: <ul style="list-style-type: none"> • landing plate support • movable landing plate • fixed landing plate • combplate ◆ Understand installation drawings of landing plate devices including: <ul style="list-style-type: none"> • landing plate support • movable landing plate • fixed landing plate • combplate <p>6.2 Installation methods and procedures for landing plate devices</p> <ul style="list-style-type: none"> ◆ Formulate the installation procedure lists for landing plate devices including: <ul style="list-style-type: none"> • landing plate support assembly • movable landing plate assembly • fixed landing plate assembly • combplate assembly ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • work site surrounding safety ◆ Effectively use different tools, level, truss vertical centre line and installation drawings to implement and assign the completed installation and adjustment work for landing plate devices <p>6.3 Professionalism in completed installation of landing plate devices</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's installation instructions and the code of practice for escalator work safety to implement and assign the completed installation and adjustment work for landing plate devices

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to arrange and assign completed installation and adjustment procedures for escalator landing plate devices systematically and through effective communication; and (ii) Capable to implement completed installation and adjustment of escalator landing plate devices under general or complicated situations in compliance with the prescribed standards.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing basic mechanical installations of escalators.

1. Title	Perform electrical wiring of escalator
2. Code	EMLEIN318A
3. Range	Arrange and implement the installation of electrical wiring of escalator at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Principles of electrical wiring of escalator</p> <ul style="list-style-type: none"> ◆ Understand electrical wiring drawings including: <ul style="list-style-type: none"> • working drawings of the electrical installations in escalator upper machine room • working drawings of the electrical installations in escalator lower machine room • working drawings of the electrical installations in escalator truss ◆ Understand and use the drawings to formulate the whole set of electrical installation work ◆ Understand the basic requirements and relevant standards for electrical wiring including: <ul style="list-style-type: none"> • types and identification of wires • wire terminal connection method • wire insulation and continuity test <p>6.2 Methods and procedures for electrical wiring of escalator</p> <ul style="list-style-type: none"> ◆ Formulate and implement the whole set of electrical wiring procedures including: <ul style="list-style-type: none"> • electrical installations in escalator upper machine room • electrical installations in escalator lower machine room • electrical installations in escalator truss ◆ Know the electrical wiring techniques including: <ul style="list-style-type: none"> • identification of wires • symbols and markings on wires • wire laying technique • wire terminal connection ◆ Implement wire insulation and continuity test ◆ Effectively use electrical installation tools and general testing instruments

	<p>6.3 Professionalism in electrical wiring of escalator</p> <ul style="list-style-type: none"> ◆ Follow working drawing's instructions to carry out electrical wiring ◆ Understand escalator safety guidelines, code of practice and Code of Practice for the Electricity (Wiring) Regulations in order to perform electrical wiring
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 the whole set of electrical wiring procedures according to drawings; and (ii) Capable to systematically and effectively arrange and implement the installation of electrical wiring.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge in installing electrical conduits and trunkings of escalators.</p>

1. Title	Perform the works of commissioning for lift
2. Code	EMLEIT301A
3. Range	Arrange and implement the works of commissioning for general lift (rated speed 1.75m/s or below) at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Working principles and commissioning data for the devices of lift system</p> <ul style="list-style-type: none"> ◆ Understand the inspection works of all the devices for a lift system before the connection of main power supply, including: <ul style="list-style-type: none"> • all the devices in lift machine room • all the devices inside the lift car • all the devices in the landings • all the devices inside the lift shaft • all the devices in the lift pit ◆ Understand the testing and adjustment works of all the devices when connection the main power supply, including: <ul style="list-style-type: none"> • inspection phase sequence for the three phase power supply • inspection and adjustment the manual operation mode • inspection and adjustment the car door driving devices • testing and adjustment the control voltages • testing and adjustment the stopping devices • testing and adjustment the lift well devices • testing and adjustment the car door locking devices • testing and adjustment the landing doors locking devices ◆ Understand the adjustment works of all the devices before the automatic mode operation, including: <ul style="list-style-type: none"> • adjustment of levelling device • adjustment of floor selector device • final adjustment of braking system • adjustment of car door driving device • adjustment of terminal limited switches devices

	<ul style="list-style-type: none"> ◆ Understand the testing and adjustment works of all the devices when turn to automatic mode operation, including: <ul style="list-style-type: none"> • full load test • testing of levelling device • testing of re-levelling device • testing of terminal slow down device (TSD) • testing and adjustment of lift running profile at different speed range including short-run, mid-run and long-run profile ◆ Understand the works of testing and commissioning for general driving mode including: <ul style="list-style-type: none"> • AC single speed driving mode • AC double speed driving mode • AC variable voltage driving mode • AC variable voltage variable frequency variable driving mode • DC variable voltage with MG set driving mode <p>6.2 Methods and procedures of commissioning for lift system</p> <ul style="list-style-type: none"> ◆ Formulate the testing and commissioning procedure lists for lifts of general driving modes and the procedure lists should be included: <ul style="list-style-type: none"> • the devices before the connection of main power supply • the devices when the connection of main power supply • the devices before operation of automatic mode • the devices when turn on the operation of automatic mode ◆ Effectively use different kinds of tools, measuring instruments and testing and commissioning manuals to implement and assign the works of testing and commissioning for general driving modes including: <ul style="list-style-type: none"> • AC single speed driving mode • AC double speed driving mode • AC variable voltage driving mode • AC variable voltage variable frequency driving mode • DC variable voltage with MG set driving mode <p>6.3 Professionalism in full installation debugging of lift</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's commissioning instructions and the code of practice for lift design and construction to implement and assign completed works of commissioning for lifts of general driving modes
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7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to arrange and assign completed procedures of commissioning for lifts of general driving modes systematically and through effective communication; and(ii) Capable to implement completed works of commissioning for lifts of general driving modes under general or complicated situations in compliance with the prescribed standards.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in implementing the installation of lift mechanical installations and electrical installations.

1. Title	Implement the periodic examination and testing of lifts
2. Code	EMLEIT302A
3. Range	Arrange and implement the periodic examination and testing of lifts at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Working principles and periodic examination report for lifts devices</p> <ul style="list-style-type: none"> ◆ Understand the working principles of lifts devices including: <ul style="list-style-type: none"> • the devices in machine room • the devices inside the lift car • the devices in landings • the devices inside the lift shaft • the devices in the lift pit ◆ Understand the requirements of periodic examination report including: <ul style="list-style-type: none"> • driving motor with associated overload protective devices • brakes with associated components, ensuring no wearing, corrosive and dirty for effect upon the normal operation • control equipment and safety equipment • mechanical and electrical interlocking devices of car door and landing doors • overspeed governor, safety gear and the associated devices • buffer testing at low speed with the car empty • car door safety edges / re-opening devices and door operation • alarm and intercom device • fireman lift operation • insulation resistance and electrical continuity • hydraulic lift control circuit • testing at low speed with the car empty for the hydraulic lift safety devices such as clamping device and pawl device • mechanical creeping and electrical anti-creep • rope / chain attachment & termination devices • the sheaves including driving sheave and deflection sheave • the gearboxes and generators <p>6.2 Methods and procedures for periodic examination and testing of lifts</p> <ul style="list-style-type: none"> ◆ Formulate the inspection and testing procedures of lift devices which are the requirements in periodic examination and testing report including: <ul style="list-style-type: none"> • the devices in machine room

	<ul style="list-style-type: none"> • the devices inside the lift car • the devices in landings • the devices inside the lift shaft • the devices in the lift pit ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • safety procedures for shutdown • safety works for working • safety procedures for resumption operation ◆ Effectively use different kinds of tools, instruments and testing and examination forms to carry out and assign a completed inspection and testing work including: <ul style="list-style-type: none"> • dynamic examination (mechanical) such as <ul style="list-style-type: none"> ▸ jack ▸ suspension ▸ safety gear ▸ energy dissipation buffers ▸ energy accumulation buffers ▸ brakes ▸ overspeed governor ▸ landing door lock devices ▸ ascending car overspeed protection devices • static examination (electrical) such as <ul style="list-style-type: none"> ▸ insulation resistance to earth ▸ earthing ▸ conductor protection ▸ inverting and phase-failure protection • dynamic test such as <ul style="list-style-type: none"> ▸ safety contact/circuit ▸ car top control devices ▸ clearances and runbys ▸ door tests • measurements of the electrical system such as <ul style="list-style-type: none"> ▸ particulars of lift motor ▸ particulars of MG set drive motor /converter ▸ current and speed tests (at mid-point of travel) ▸ overcurrent protection device
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	<ul style="list-style-type: none"> • measurements of the hydraulic and electrical systems such as <ul style="list-style-type: none"> ▸ static pressure of hydraulic oil with rated load in the car ▸ any leakage of hydraulic oil when subject to 200% of full load pressure applied between the non-return valve and the jack ▸ particulars of the pump motor ▸ particulars of the pump ▸ current and speed tests (at mid-point of travel) ▸ operating pressure of the pressure relief valve ▸ operation of the check valve ▸ operation of the rupture valve ▸ operation of the manual lowering valve ▸ precautions against any overheating of the hydraulic oil • overspeed governor tests such as <ul style="list-style-type: none"> ▸ car overspeed governor ▸ counterweight overspeed governor • car safety gear tests such as <ul style="list-style-type: none"> ▸ stopping distance in the test ▸ sloping of 5% from the car floor horizontal after the lift car being brought to a halt • counterweight safety gear tests such as <ul style="list-style-type: none"> ▸ safety gear operating properly when being engaged at rated speed with the car empty • ascending car overspeed protection means tests such as <ul style="list-style-type: none"> ▸ overspeed governor tests ▸ speed reducing element tests • buffer tests such as <ul style="list-style-type: none"> ▸ car buffers ▸ counterweight buffers • traction checks such as <ul style="list-style-type: none"> ▸ with the car empty when travelling upwards at rated speed ▸ with the rated load 125% when travelling downwards at rated speed ▸ with the counterweight resting on the buffers, is it possible for the empty car to be raised under power • emergency stopping distance such as <ul style="list-style-type: none"> ▸ what was the stopping distance of the car travelling in down direction at rated speed and carrying 125% of the rated load
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	<ul style="list-style-type: none"> • anti-creep device / system such as <ul style="list-style-type: none"> ▸ pawl device ▸ clamping device ▸ electrical anti-creep system • duty cycle test such as <ul style="list-style-type: none"> ▸ does the lift operate satisfactorily for a period of at least 0.5 hour when running with rated load and full travel • general inspection (lift work) such as <ul style="list-style-type: none"> ▸ does the fireman’s lift operate properly ▸ are the emergency instructions displayed in the machine room ▸ type of the emergency alarm device ▸ does the overload device operate properly ▸ is the maximum load indicated in the car ▸ does the emergency operation system function correctly in accordance with the design code ▸ does the emergency lighting of the car comply with the design code ▸ are the hoistway emergency doors in compliance with the code of practice on building works for lifts ▸ does the artificial lighting in the lift well comply with the design code ▸ are the safely means of access to equipment in compliance with the code of practice on building works for lifts ▸ are CCTV camera provided in lift car and CCTV monitors provided in management office/machine room • general inspection (other works) such as <ul style="list-style-type: none"> ▸ are the provisions for ventilating the machine room adequate ▸ are the machine room conditions satisfactory ▸ is the machine room artificial lighting adequate ▸ are the machine room doors/locks comply with the code of practice on building works for lifts <p>6.3 Professionalism in full periodic safety inspection and testing of lifts</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions, the code of practice for lift design and construction and code of practice for lift work to implement and assign full periodic safety inspection and testing work for lifts
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7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign full periodic safety inspection and testing procedures for lifts systematically and through effective communication; and (ii) Capable to implement full periodic safety inspection and testing of lifts under general or complicated situations in compliance with the prescribed standards of the code of practice for lift design and construction.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in implementing lift debugging or commissioning.</p>

1. Title	Perform the check work of lifts
2. Code	EMLEIT303A
3. Range	Arrange and implement the check work of lifts at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Installation and check drawings of lift devices</p> <ul style="list-style-type: none"> ◆ Understand the installation requirements for lift devices in machine room including: <ul style="list-style-type: none"> • different kinds of overspeed governor • different kinds of control cabinet • different kinds of traction machine ◆ Understand the installation requirements for landing devices including: <ul style="list-style-type: none"> • locking devices • landing door sill • landing doors hanger devices • landing doors guides • landing door panel and frame • landing display and landing call button ◆ Understand the installation requirements for the devices inside the lift shaft including: <ul style="list-style-type: none"> • levelling device • guide rails and guide brackets for lift car • guide rails and guide brackets for counterweight • terminal slowdown devices (TSD) • monitor deceleration switch device ◆ Understand the installation requirements for the devices in the lift pit including: <ul style="list-style-type: none"> • safety screen of counterweight • car buffers • counterweight buffers • stopping devices

	<ul style="list-style-type: none"> ◆ Understand the installation requirements for car assemblies including: <ul style="list-style-type: none"> • car roof panels • car wall panels • car platform • car door sill • guide-shoes • car apron • car door hanger devices • car door guides • car door and car frame • counterweight frame and counterweight block • mechanism between overspeed governor and safety gear ◆ Understand the installation requirements for counterweight assemblies including: <ul style="list-style-type: none"> • counterweight block • guide-shoes • counterweight frame and pulley • mechanism between overspeed governor and safety gear ◆ Understand the installation requirements for suspension ropes between car and counterweight including: <ul style="list-style-type: none"> • termination of ropes • laying of ropes • rope tension test ◆ Understand the installation requirements for compensation ropes between car and counterweight including: <ul style="list-style-type: none"> • termination of compensation chains • laying of compensation chains • termination of compensation ropes • laying of compensation ropes • compensation rope tension devices ◆ Understand the installation requirements for safety ropes of car and counterweight including: <ul style="list-style-type: none"> • termination of safety ropes • laying of safety ropes • safety ropes tension devices
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	<ul style="list-style-type: none"> ◆ Understand the headroom dimensions calculation for lifts and counterweight including: <ul style="list-style-type: none"> • top clearance of lift car • further guided distance of guid-rail for lift car • the free vertical distance between the level of the highest area on the car roof • the free vertical distance from the highest equipment at car top to the lowest part of well • bottom clearances in lift pit • further guided distance of guid-rail for counterweight • the free vertical distance from the lowest equipment at car top to the lowest part of well ◆ Understand check drawings of the devices including: <ul style="list-style-type: none"> • the devices in machine room • the devices in landings • the devices inside the lift shaft • the devices in lift pit • the devices of car and counterweight • tallations <p>6.2 Methods and procedures of check works for lifts</p> <ul style="list-style-type: none"> ◆ Formulate check procedures of the devices including: <ul style="list-style-type: none"> • the devices in machine room • the devices in landings • the devices inside the lift shaft • the devices in lift pit • the devices of car and counterweight ◆ Effectively use different kinds of tools, instruments and check drawings to implement and assign completed check works for different devices of lifts <p>6.3 Professionalism in completed installation check of lifts</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation check instructions and the code of practice for lift design and construction to implement and assign completed check works for different devices of lifts
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed check procedures for different devices of lift systematically and through effective communication; and</p> <p>(ii) Capable to implement completed check procedures for different devices of lift under general or complicated situations in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in implementing the installation of mechanical and electrical installations of lifts.</p>

1. Title	Perform commissioning work of escalator
2. Code	EMLEIT304A
3. Range	Arrange and implement escalator debugging at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Working principles and commissioning of the devices for escalator system</p> <ul style="list-style-type: none"> ◆ Understand inspection requirements of the devices for escalators before connection of main power supply, including: <ul style="list-style-type: none"> • devices in the driving station • the devices inside the truss • the devices outside the truss • devices in the reversing station ◆ Understand the testing and adjustment requirements of the devices for escalators when connection main power supply, including: <ul style="list-style-type: none"> • testing phase sequence of 3-phase power • hand mode operation adjustment • testing and adjustment of control voltages • testing and adjustment of lighting devices • testing and adjustment of stopping devices ◆ Understand adjustment requirements of the devices for escalators before turn on automatic operation, including: <ul style="list-style-type: none"> • adjustment of handrail driving devices • adjustment of key-type automatic startup devices • adjustment of photo-sensor automatic startup devices • adjustment of contact-mat automatic startup devices • final adjustment of working brakes and auxiliary brakes ◆ Understand the testing and adjustment requirements of the devices for escalators when turn on the automatic mode operation, including: <ul style="list-style-type: none"> • full load test • handrail deterioration test • tests on braking distance of working brakes and auxiliary brakes • tests on startup and shutdown operation of key-type automatic startup devices

	<ul style="list-style-type: none"> • tests on startup and shutdown operation of photo-sensor automatic startup devices • tests on startup and shutdown operation of contact-mat automatic startup devices • startup and full speed adjustment for AC star-delta (Y /Δ) driving mode • acceleration, full speed and deceleration adjustment for AC variable voltage variable frequency driving mode <p>6.2 Methods and procedures of commissioning escalators</p> <ul style="list-style-type: none"> ◆ Understand the commissioning requirements of driving modes for escalators including: <ul style="list-style-type: none"> • AC single speed driving mode • AC star-delta driving mode • AC variable voltage variable frequency driving mode ◆ Formulate commissioning procedures of the devices for different kinds driving mode escalators including: <ul style="list-style-type: none"> • the devices before connection main power supply • the devices after power supply is on • the devices before the automatic mode of operation is on • the devices after the automatic mode of operation is on ◆ Effectively use different kinds of tools, instruments and commissioning manuals to implement and assign completed commissioning works for different kinds of driving modes escalator including: <ul style="list-style-type: none"> • AC single speed driving mode • AC star-delta driving mode • AC variable voltage variable frequency driving mode <p>6.3 Professionalism in completed installation commissioning of escalators</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation commissioning instructions and the code of practice for escalator design and construction to implement and assign full adjustment and testing work for escalators of different kinds of driving modes
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed commissioning procedures for escalators of different kinds of driving mode systematically and through effective communication; and</p> <p>(ii) Capable to implement completed commissioning work for escalators of different kinds of driving mode under general or complicated situations in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing mechanical installations and electrical installations of escalators.</p>

1. Title	Perform periodic escalator safety inspection and testing
2. Code	EMLEIT305A
3. Range	Arrange and implement periodic escalator safety inspection and testing at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Working principles and testing and examination reports for the devices of escalators system</p> <ul style="list-style-type: none"> ◆ Understand working principles of the devices for escalator including: <ul style="list-style-type: none"> • devices in the driving station • devices inside the truss • devices outside the truss • devices in the reversing station ◆ Understand the requirements of testing and examination report, including: <ul style="list-style-type: none"> • driving motor with associated overload protective devices • safety equipment with particular regard to the brake and the stopping distance the escalator • control equipment and safety equipment • any sign of wear and tear for driving elements and insufficient tension of belts and chains • vision inspection and running inspection of steps • dimension and tolerances to ensure that dimensions specified are maintained despite wear • combplate for proper condition and adjustment • balustrade interior panelling, skirting and skirt panel deflector devices • handrails • preventive measures provided in safeguarding adjacent building obstacles from causing injuries to the users • at floor intersections and on criss-cross escalators • insulation resistance and electrical continuity • safety notices and signs

	<p>6.2 Methods and procedures for periodic escalator safety inspection and testing</p> <ul style="list-style-type: none"> ◆ Formulate periodic safety inspection and testing procedure lists for escalators of different kinds of driving mode including: <ul style="list-style-type: none"> • all kinds of driving station devices • all kinds of truss internal devices • all kinds of truss external devices • all kinds of reversing station devices ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • safety preparation works for shutdown • safety works for working • safety procedures for resume operation ◆ Effectively use different kinds of tools, instruments and testing and examination forms to implement and assign periodic safety inspection and testing work for escalators including: <ul style="list-style-type: none"> • static examination e.g. the comb plates and terminal guides adjusted properly; has the brake been examined and found to be in order; is an auxiliary brake provided • dynamic tests e.g. does the operation brake operate properly; is the stopping distance is normal; does the auxiliary brake operate properly; does the overspeed device operate properly • drive motor current tests e.g. voltage and rated power at time of test; overload protection test; do machine room /power socket have separate power supply • clearances such as clearance between steps; clearance between step and adjacent skirting, total clearance between step and both skirting, clearance between the upper surface of the step and the root of the comb teeth, distance between the floor and the lower point of the handrail into the newel • insulation resistance to earth such as power system and safety circuit • earthing such as all metalwork enclosing conductors and the maximum continuity resistance to earth • half hour run such as running unladen, 15 minutes in upward direction followed by 15 minutes in downward direction
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	<ul style="list-style-type: none"> • general inspection (escalator work) such as emergency stop switches, broken step chain device, broken drive chain/belt device, handrail inlet switch, non-reversal device, combplate switch, operation brake, step sagging device, skirt panel switch, phase protection device, overspeed device, broken handrail device and auxiliary brake • general inspection (other works) such as notices/pictographs for passengers, guards at adjacent building obstacles and criss-cross escalators, rigid guard adjacent to escalator handrail, notice on access door to machinery spaces, unrestricted landing areas and the clear height above step <p>6.3 Professionalism in full periodic escalator safety inspection and testing</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions, the code of practice for escalator design and construction and code of practice for escalator work to implement and assign periodic safety inspection and testing work for escalators
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed periodic safety inspection and testing procedures for escalators systematically and through effective communication; and</p> <p>(ii) Capable to implement escalator completed periodic safety inspection and testing of under general or complicated situations in compliance with the prescribed standards of the code of practice for escalator design and construction.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in implementing escalator debugging or commissioning.</p>

1. Title	Perform the check works of escalator
2. Code	EMLEIT306A
3. Range	Arrange and implement escalator commissioning at construction sites.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Installation and check drawings of the devices for escalator</p> <ul style="list-style-type: none"> ◆ Understand the installation requirements of devices in the driving station including: <ul style="list-style-type: none"> • control cabinet • overspeed governor • junction box • traction machines • auxiliary brakes ◆ Understand the installation requirements of devices inside the truss including: <ul style="list-style-type: none"> • main drive transition section guides such as step chain wheel stop thrust guides, step chain wheel guides, step wheel stop thrust guides and step wheel guides • truss mid-section guides such as step chain wheel guides and step wheel guides • tension frame transition section guides such as step chain wheel stop thrust guides, step chain wheel guides, step wheel stop guides and step wheel guides • handrail devices such as handrail guiding device, handrail driving device, handrail elongating compensation device, handrail inlet protection device and broken handrail device • all kinds of safety stopping devices such as skirt panels switch, step sagging switch and broken handrail switch

	<ul style="list-style-type: none"> ◆ Understand the installation requirements of devices outside the truss including: <ul style="list-style-type: none"> • glass-type and metal-type balustrade such as balustrade decking, interior profile, balustrade interior panelling and skirtingpanels safety guards such as the guards between handrail and obstacles and intersection guards between two adjacent criss-cross escalators • deflector devices such as rubber and brush bristles type deflector devices • all kinds of notices e.g. hold the handrails tightly, hold the children firmly, hold the dogs firmly in the arms, do not transport bulky objects, face forward and do not stand near the sides of the step ◆ Understand the installation requirements of devices inside the reversing station including: <ul style="list-style-type: none"> • inverter • junction box • stop devices • step chain tension device ◆ Understand testing requirements of the devices including: <ul style="list-style-type: none"> • safety stopping devices • slip of handrail speed • braking distance of working brake and auxiliary brake • start and stop operation of key-type startup devices • start and stop operation of photo-sensor for the automatic startup devices • start and stop operation of contact-mat for the automatic startup devices ◆ Understand check drawings of the devices including: <ul style="list-style-type: none"> • devices in the driving station • devices inside the truss • devices outside truss • devices in the return station
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	<p>6.2 Methods and procedures of check escalators</p> <ul style="list-style-type: none"> ◆ Formulate the procedures lists of check for the devices including: <ul style="list-style-type: none"> • devices in the driving station • devices inside the truss • devices outside truss • devices in the return station ◆ Effectively use different kinds of tools, instruments and check drawings to implement and assign completed check works for different devices of escalators <p>6.3 Professionalism in completed installation check works for escalators</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation check instructions and the code of practice for escalator design and construction to implement and assign completed check works for escalators
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed check procedures for different devices of escalators systematically and through effective communication; and (ii) Capable to implement completed check for different devices of escalators under general or complicated situations in compliance with the prescribed standards.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in installing mechanical installations and electrical installations of escalators.</p>

1. Title	Maintain lift traction machines
2. Code	EMLEOR301A
3. Range	Arrange and implement the maintenance of lift traction machines at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift traction machines</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of traction motor including: <ul style="list-style-type: none"> • 3-phase AC induction motor • 3-phase AC slip-ring induction motor • 3-phase AC permanent-magnet motor • shunt field DC motor • separative exciter DC motor ◆ Understand the structure and working principles of different traction machines including: <ul style="list-style-type: none"> • worm reduction gear traction machines • helical gear traction machines • gearless traction machines <p>6.2 Methods and procedures of maintaining lift traction machines</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of different kinds of traction machines and the works include inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of different kinds of motor and the works include: <ul style="list-style-type: none"> • motor commutator • carbon brush of commutator • motor bearing ◆ Know the repair and maintenance of different kinds of gearboxes and the works include: <ul style="list-style-type: none"> • gearbox bearing • gearbox worm shaft • gearbox worm gear • traction sheave ◆ Know the arrangement and implementation of instructions for lift traction maintenances ◆ Enable to effectively operate the maintenance instruments and tools

	<p>6.3 Professionalism in handling lift traction machines</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s maintenance instructions to arrange and implement the maintenance of traction machines ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform the maintenance of traction machines
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of all kinds of traction machines; (ii) Capable to systematically and effectively complete the repair and maintenance of different kinds of lift traction machine; (iii) Capable to arrange and implement the maintenance instructions for lift traction machines;and (iv) Capable to follow manufacturer’s maintenance instructions to arrange and implement the maintenance of traction machines.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift traction machines.</p>

1. Title	Maintain lift control cabinets
2. Code	EMLEOR302A
3. Range	Arrange and implement the maintenance of lift control cabinets at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift control cabinets</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of control cabinet including: <ul style="list-style-type: none"> • single-speed AC drive (AC 1) control cabinet • two-speed AC drive (AC 2) control cabinet • variable voltage AC drive (ACVV) control cabinet • variable voltage variable frequency AC drive (ACVVVF) control cabinet • MG set variable voltage DC drive (Ward-Leonard D.C Drive) control cabinet • Thyristor variable voltage DC drive (Thyristor-Leonard D.C. Drive) control cabinet ◆ Understand the structure and working principles of different control cabinets components including transformers, rectifiers, protective devices, resistors, reactors, capacitors, converters, inverters, electronic circuit boards, contactors and relays <p>6.2 Methods and procedures of maintaining lift control cabinets</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of different control cabinets and the works include the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of different control cabinets components and the works include conditions, functions, fault records and set values of the components ◆ Know the arrangement and implementation of maintenance instructions for lift control cabinets ◆ Enable to effectively operate the maintenance instruments and tools <p>6.3 Professionalism in handling lift control cabinets</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement the maintenance of control cabinets ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform the maintenance of control cabinets

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of different kinds of control cabinet; (ii) Capable to systematically and effectively complete the repair and maintenance of different kinds of control cabinet; (iii) Capable to arrange and implement the maintenance instructions for lift control cabinets; and (iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of control cabinets.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift control cabinets.</p>

1. Title	Maintain overspeed governors and safety gears of lifts
2. Code	EMLEOR303A
3. Range	Arrange and implement the maintenance works of lift overspeed governor and safety gear at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift overspeed governor and safety gear</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of overspeed governor including: <ul style="list-style-type: none"> • one-way horizontal centrifugal governor • two-way horizontal centrifugal governor • one-way vertical flyball overspeed governor ◆ Understand the structure and working principles of different kinds of safety gear including: <ul style="list-style-type: none"> • rope gripper • one-way instantaneous type safety gear • one-way instantaneous type safety gear with buffer effect • one-way progressive type safety gear • two-way progressive type safety gear <p>6.2 Methods and procedures of maintaining overspeed governors and safety gears</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance different overspeed governors and safety gears and the works include the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance different overspeed governors including: <ul style="list-style-type: none"> • moving parts of overspeed governor • governor bearing • governor electrical switch • safety rope ◆ Know the repair and maintenance different safety gears including: <ul style="list-style-type: none"> • moving part of safety gear • action bar of safety gear ◆ Know the arrangement and implementation of maintenance instructions for lift overspeed governor and safety gear ◆ Enable to effectively operate the maintenance instruments and tools

	<p>6.3 Professionalism in handling overspeed governors and safety gears</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s maintenance instructions to arrange and implement the maintenance of overspeed governors and safety gears ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform overspeed governor and safety gear maintenance
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of different kinds of overspeed governor and safety gear; (ii) Capable to systematically and effectively complete the repair and maintenance of different kinds of overspeed governor and safety gear; (iii) Capable to arrange and implement the maintenance instructions for lift overspeed governors and safety gears; and (iv) Capable to follow manufacturer’s maintenance instructions to arrange and implement the maintenance of overspeed governors and safety gears.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift overspeed governor and safety gear installations.</p>

1. Title	Maintain lift brakes
2. Code	EMLEOR304A
3. Range	Arrange and implement the maintenance of lift brakes at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift brakes</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of brake (electromechanical) including: <ul style="list-style-type: none"> • magnetic brake drum • magnetic disc brake • hydraulic brake drum • hydraulic disc brake <p>6.2 Methods and procedures of maintaining lift brakes</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of different brakes and works include the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of different brakes including: <ul style="list-style-type: none"> • brake wheel/plate • brake lining • mechanical brake components • electromagnetic coil • hydraulic device of the brake ◆ Know the arrangement and implementation of maintenance instructions for lift brakes ◆ Enable effectively operate the maintenance instruments and tools <p>6.3 Professionalism in handling the maintenance works of brakes</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement brake maintenance ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform brake maintenance

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to master the construction and key points of repair and maintenance of different kinds of brake;(ii) Capable to systematically and effectively complete the repair and maintenance of different kinds of brake;(iii) Capable to arrange and implement the maintenance instructions for lift brakes; and(iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of brakes.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift brakes.

1. Title	Maintain lift landing devices
2. Code	EMLEOR305A
3. Range	Arrange and implement the maintenance of lift landing devices at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift landing doors</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of landing door including: <ul style="list-style-type: none"> • 2-speed side opening horizontally sliding door (2S-L / 2S-R) • 3-speed side opening horizontally sliding door (3S-L / 3S-R) • 4-panel centre opening horizontally sliding door (2CO) • 6-panel centre opening horizontally sliding door (3CO) • 2-panel upward opening vertically sliding door (2U) • 2-panel centre opening vertically sliding door (CO) <p>6.2 Methods and procedures of maintaining lift landing devices</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of different landing devices and the works include the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of different landing door devices including: <ul style="list-style-type: none"> • door header frame • door panel • linkage mechanism • locking/unlocking device • self-closing device ◆ Arrange and implement maintenance instructions for lift landing devices ◆ Enable to effectively operate the maintenance instruments and tools <p>6.3 Professionalism in maintaining lift landing devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement the maintenance of landing devices ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform the maintenance of landing devices

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of different kinds of landing device; (ii) Capable to systematically and effectively complete the repair and maintenance of different kinds of landing device; (iii) Capable to arrange and implement the maintenance instructions for lift landing devices; and (iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of landing devices.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift landing devices.</p>

1. Title	Maintain lift car and counterweight
2. Code	EMLEOR306A
3. Range	Arrange and implement the maintenance of lift cars and counterweights at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure of lift car and counterweight</p> <ul style="list-style-type: none"> ◆ Understand the structure of different lift cars including: <ul style="list-style-type: none"> • single wrap and roping ratio 1:1 and 2:1 lift cars • double wrap and roping ratio 1:1 and 2:1 lift cars ◆ Understand the structure of different counterweights including: <ul style="list-style-type: none"> • single wrap and roping ratio 1:1 and 2:1 counterweights • double wrap and roping ratio 1:1 and 2:1 counterweights <p>6.2 Methods and procedures of maintaining cars and counterweights</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of cars and counterweights and the works include the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of cars including: <ul style="list-style-type: none"> • car ventilation device • car lighting and alarm device • car door device • car top device • car safety device • display and push button equipment • car guide-rail ◆ Know the repair and maintenance of counterweights including: <ul style="list-style-type: none"> • counterweight block fixing device • counterweight guide-rail ◆ Arrange and implement maintenance instructions for lift cars and counterweights ◆ Enable to effectively operate the maintenance instruments and tools <p>6.3 Professionalism in maintaining lift cars and counterweights</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement car and counterweight maintenance ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform car and counterweight maintenance

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of different kinds of car and counterweight; (ii) Capable to systematically and effectively complete the repair and maintenance of different kinds of lift car and counterweight; (iii) Capable to arrange and implement the maintenance instructions for lift car and counterweight; and (iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of car and counterweight.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift cars and counterweights.</p>

1. Title	Maintain lift buffers
2. Code	EMLEOR307A
3. Range	Arrange and implement the maintenance works of lift buffers at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift buffers</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of buffer including: <ul style="list-style-type: none"> • energy accumulation buffers • one-plunger type energy dissipation buffers • multi-plunger type energy dissipation buffers <p>6.2 Methods and procedures of maintaining buffers</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of different kinds of buffer and the works include the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of buffers including <ul style="list-style-type: none"> • welding part of buffer • fixed part of buffer • piston part ◆ Arrange and implement maintenance instructions for lift buffers ◆ Effectively use repairing and testing instruments and tools <p>6.3 Professionalism in maintaining buffers</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement buffer maintenance ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform buffer maintenance
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to master the construction and key points of repair and maintenance of different kinds of buffer;</p> <p>(ii) Capable to systematically and effectively complete the repair and maintenance of different kinds of lift buffer;</p> <p>(iii) Capable to arrange and implement the maintenance instructions for lift buffers; and</p> <p>(iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of buffers.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift buffers.

1. Title	Maintain lift suspension ropes and compensation ropes
2. Code	EMLEOR308A
3. Range	Arrange and implement the maintenance of lift suspension ropes and compensation ropes at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types and structure of lift suspension ropes and compensation ropes</p> <ul style="list-style-type: none"> ◆ Understand different kinds of suspension rope and different kinds of compensation rope including: <ul style="list-style-type: none"> • ordinary lay suspension ropes • ordinary lay compensation ropes • regular lay suspension ropes • regular lay compensation ropes ◆ Understand the structure of different kinds of suspension rope and compensation rope including : <ul style="list-style-type: none"> • fiber core • steel strand • steel wire ◆ Understand the headroom calculation for different cars and counterweights Understand the types of rope terminal devices <p>6.2 Methods and procedures of maintaining suspension ropes and compensation ropes</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of suspension ropes and compensation ropes, including the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of suspension ropes and compensation ropes including: <ul style="list-style-type: none"> • rope tension • rope termination devices • rope diameter • rope wear ◆ Arrange and implement maintenance instructions for lift suspension ropes and compensation ropes ◆ Effectively use repairing and testing instruments and tools <p>6.3 Professionalism in maintaining lift suspension ropes and compensation ropes</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement the maintenance of suspension ropes and compensation ropes ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform the maintenance of suspension ropes and compensation ropes

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of suspension ropes and compensation ropes; (ii) Capable to systematically and effectively complete the repair and maintenance of lift suspension ropes and compensation ropes; (iii) Capable to arrange and implement the maintenance instructions for lift suspension ropes and compensation ropes; and (iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of suspension ropes and compensation ropes.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift suspension ropes and compensation ropes.</p>

1. Title	Maintain lift well equipment
2. Code	EMLEOR309A
3. Range	Arrange and implement the maintenance of lift well equipment at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift well equipment</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of well equipment including: <ul style="list-style-type: none"> • different kinds of travelling cable • different kinds of lift car levelling device • different kinds of lift car and counterweight guiding device • different kinds of lift car terminating floor limited switch device <p>6.2 Methods and procedures of maintaining well equipment</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of well equipment, including the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of well equipment including: <ul style="list-style-type: none"> • different kinds of travelling cable • different kinds of lift car levelling device • different kinds of lift car and counterweight guiding device • different kinds of lift car terminating floor limited switch device ◆ Arrange and implement maintenance instructions for lift well equipment ◆ Effectively use repairing and testing instruments and tools <p>6.3 Professionalism in maintaining lift well equipment</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement well equipment maintenance ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform well equipment maintenance
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively complete lift well equipment repair and maintenance;</p> <p>(ii) Capable to arrange and implement maintenance instructions for lift well equipment;</p> <p>(iii) Capable to use repairing and testing instruments and tools effectively;and</p> <p>(iv) Capable to follow manufacturer's maintenance instructions to arrange and implement well equipment maintenance.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general lift well equipment.

1. Title	Maintain the hydraulic power units of hydraulic lifts
2. Code	EMLEOR310A
3. Range	Arrange and implement the maintenance of the hydraulic power units of hydraulic lifts at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of the hydraulic power units of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of 3-phase AC motor including: <ul style="list-style-type: none"> • AC star-delta controlled motor • AC variable voltage variable frequency controlled motor ◆ Understand the structure and working principles of different kinds of hydraulic oil pump including: <ul style="list-style-type: none"> • screw-type hydraulic oil pump • gear-type hydraulic oil pump • vane-type hydraulic oil pump ◆ Understand the structure and working principles of different kinds of oil valve controller including: <ul style="list-style-type: none"> • single-stage variable speed oil valve controller • 2-stage variable speed oil valve controller • stage-less variable speed oil valve controller <p>6.2 Maintenance methods and procedures for the hydraulic power units of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance procedures for different kinds of hydraulic power unit including: <ul style="list-style-type: none"> • inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of different kinds of hydraulic power unit including: <ul style="list-style-type: none"> • 3-phase AC motors such as bearing, belt pulley and coupling • hydraulic oil pumps such as bearing, belt pulley, coupling, oil seal and packing seal • oil valve controllers such as manual hydraulic pump, hydraulic pressure gauge, oil seal and packing seal • hydraulic oil cooling devices such as oil cooling pump, cooling oil tank and cooling fan ◆ Arrange and implement maintenance instructions for the hydraulic power units of hydraulic lifts ◆ Effectively use repairing and testing instruments and tools

	<p>6.3 Professionalism in handling the hydraulic power units of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Follow manufacturer’s maintenance instructions to arrange and implement the maintenance of hydraulic power units ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform the maintenance of hydraulic power units
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of the hydraulic power units of hydraulic lifts; (ii) Capable to systematically and effectively complete the repair and maintenance of the hydraulic power units of hydraulic lifts; (iii) Capable to arrange and implement the maintenance instructions for the hydraulic power units of hydraulic lifts; and (iv) Capable to follow manufacturer’s maintenance instructions to arrange and implement the maintenance of the hydraulic power units of hydraulic lifts.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining the hydraulic power units of general hydraulic lifts.</p>

1. Title	Maintain hydraulic lift jacks
2. Code	EMLEOR311A
3. Range	Arrange and implement the maintenance of the hydraulic jacks of hydraulic lifts at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of the hydraulic jacks of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of hydraulic jack including: <ul style="list-style-type: none"> • single-acting hydraulic jack • swing-type hydraulic jack <p>6.2 Maintenance methods and procedures for the hydraulic jacks of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance procedures for different kinds of hydraulic jack including: <ul style="list-style-type: none"> • inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of different kinds of hydraulic jack including: <ul style="list-style-type: none"> • single-acting hydraulic jack piston • single-acting hydraulic jack piston guiding device • single-acting hydraulic jack piston oil seal and packing seal • swing-type hydraulic jack piston • swing-type hydraulic jack piston guiding device • swing-type hydraulic jack piston oil seal and packing seal ◆ Arrange and implement maintenance instructions for the hydraulic jacks of hydraulic lifts ◆ Effectively use repairing and testing instruments and tools <p>6.3 Professionalism in handling the hydraulic jacks of hydraulic lifts</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement hydraulic jack maintenance ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform hydraulic jack maintenance

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of the hydraulic jacks of hydraulic lifts; (ii) Capable to systematically and effectively complete the repair and maintenance of the hydraulic jacks of hydraulic lifts; (iii) Capable to arrange and implement the maintenance instructions for the hydraulic jacks of hydraulic lifts; and (iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of the hydraulic jacks of hydraulic lifts.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining the hydraulic jacks of general hydraulic lifts.</p>

1. Title	Overhaul lift traction machines
2. Code	EMLEOR312A
3. Range	Arrange and implement overhauls of lift traction machines at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift traction machines</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of traction motor including: <ul style="list-style-type: none"> • 3-phase AC induction motor • 3-phase AC slip-ring induction motor • 3-phase AC permanent-magnet motor • shunt DC motor • separate exciter DC motor ◆ Understand the structure and working principles of different kinds of traction machine including: <ul style="list-style-type: none"> • worm reduction gear traction machine • helical gear traction machine • gearless traction machine <p>6.2 overhaul methods and procedures for traction machines</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different kinds of traction machine, including: <ul style="list-style-type: none"> • selecting different kinds of suitable lifting gear • formulating work procedure lists for different kinds of lift car • formulating lifting procedure lists for different kinds of traction machine • Effectively use different lifting gears to implement and assign full lifting work for different kinds of lift car including <ul style="list-style-type: none"> • safety preparation works for shutdown • safety lifting the cars of single wrap with roping 1:1 and 2:1 • safety lifting the cars of double wrap with roping 1:1 and 2:1 • safe works of resumption operation ◆ Effectively use different lifting gears to implement and assign completed lifting work for traction machines ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for traction machines

	<p>6.3 Professionalism in full disassembly and assembly of traction machines</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions and the code of practice for lift work safety to implement and assign completed disassembly and assembly work for traction machines ◆ Apply manufacturer’s repair instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing work for traction machines including: <ul style="list-style-type: none"> • 3-phase AC and DC worm reduction gear traction machine • 3-phase AC helical gear traction machine • 3-phase AC and DC gearless traction machine
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed inspection, disassembly, assembly and adjustment procedures for different kinds of lift traction machine systematically and through effective communication; and (ii) Capable to implement completed inspection, disassembly, assembly and adjustment of different kinds of lift traction machine under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift traction machines.</p>

1. Title	Overhaul lift control cabinet
2. Code	EMLEOR313A
3. Range	Arrange and implement overhauls of lift control cabinets at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift control cabinets</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of control cabinet including: <ul style="list-style-type: none"> • single speed AC drive (AC 1) control cabinet • double speed AC drive (AC 2) control cabinet • variable voltage AC drive (ACVV) control cabinet • variable voltage variable frequency AC drive (ACVVVF) control cabinet • MG set variable voltage DC drive (Ward-Leonard D.C Drive) control cabinet • thyristor variable voltage DC drive (thyristor-Leonard D.C. Drive) control cabinet ◆ Understand the structure and working principles of different control cabinet components including: <ul style="list-style-type: none"> • transformers, rectifiers, protection devices, resistors, reactors, capacitors, converters s, inverters, electronic circuit boards, contactors and relays <p>6.2 Overhaul methods and procedures for control cabinets</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different kinds of control cabinet including: <ul style="list-style-type: none"> • selecting different suitable lifting gears • formulating work procedure lists for different control cabinets ◆ Effectively use different lifting gears to implement and assign completed lifting work for control cabinets including: <ul style="list-style-type: none"> • safety preparation works for shutdown • safety lifting control cabinets • safe works for resumption operation ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for control cabinet components

	<p>6.3 Professionalism in full disassembly and assembly of control cabinets</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions to implement and assign completed disassembly and assembly work for different kinds of control cabinet component ◆ Apply manufacturer’s repair instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing work for different control cabinet components including: <ul style="list-style-type: none"> • transformers, rectifiers, protection devices, resistors, inductors, capacitors, converters s, inverters, electronic circuit boards, contactors and relays for control cabinets
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed disassembly, assembly and adjustment procedures for different kinds of lift control cabinet systematically and through effective communication; and (ii) Capable to implement completed disassembly, assembly and adjustment of different kinds of lift control cabinet under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift control cabinets.</p>

1. Title	Overhaul lift overspeed governor and safety gear devices
2. Code	EMLEOR314A
3. Range	Arrange and implement overhauls of lift overspeed governors and safety gears at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift overspeed governors and safety gears</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of overspeed governor including: <ul style="list-style-type: none"> • one-way horizontal centrifugal governor • two-way horizontal centrifugal governor • one-way vertical flyball overspeed governor ◆ Understand the structure and working principles of different kinds of safety gear including: <ul style="list-style-type: none"> • rope gripper • one-way instantaneous type safety gear • one-way instantaneous type safety gear with buffer • one-way progressive type safety gear • two-way progressive type safety gear <p>6.2 Overhaul methods and procedures for overspeed governors and safety gears</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different kinds of overspeed governor and safety gears including: <ul style="list-style-type: none"> • selecting different suitable lifting gears • formulating work procedure lists for different overspeed governors and safety gears ◆ Effectively use different lifting gears to implement and assign the completed lifting work for compensation ropes including: <ul style="list-style-type: none"> • safety preparation works for shutdown • safety lifting of car compensation ropes • safety lifting of counterweight compensation ropes • safety resumption operation ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for overspeed governors and safety gears

	<p>6.3 Professionalism in completed disassembly and assembly of overspeed governors and safety gears</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions and the code of practice for lift work safety to implement and assign completed disassembly and assembly work for overspeed governors and safety gears ◆ Apply manufacturer’s repair instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing of overspeed governors and safety gears including <ul style="list-style-type: none"> • one-way horizontal centrifugal governor • two-way horizontal centrifugal governor • one-way vertical flyball overspeed governor • rope gripper • one-way instantaneous type safety gear • one-way progressive type safety gear • two-way progressive type safety gear
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed disassembly, assembly and adjustment procedures for different kinds of lift overspeed governor and safety gear systematically and through effective communication; and (ii) Capable to implement completed disassembly, assembly and adjustment of different kinds of lift overspeed governor and safety gear under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift overspeed governors and safety gears.</p>

1. Title	Overhaul lift brakes
2. Code	EMLEOR315A
3. Range	Arrange and implement lift brake overhauls at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift brakes</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of brake (electromechanical) including: <ul style="list-style-type: none"> • magnetic drum brake • magnetic disc brake • hydraulic drum brake • hydraulic disc brake <p>6.2 Overhaul methods and procedures for brakes</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different kinds of brake (electromechanical) including: <ul style="list-style-type: none"> • magnetic drum brake • magnetic disc brake • hydraulic drum brake • hydraulic disc brake ◆ Implement and assign completed shutdown and restart work for different brakes (electromechanical) including: <ul style="list-style-type: none"> • safety preparation works for shutdown • safety works for creption operation • safety works for resumption operation ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for different brakes (electromechanical) including: <ul style="list-style-type: none"> • magnetic drum brake • magnetic disc brake • hydraulic drum brake • hydraulic disc brake <p>6.3 Professionalism in completed disassembly and assembly of brakes</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's repair instructions to implement and assign completed disassembly, assembly and adjustment work for different brakes (electromechanical) ◆ Apply manufacturer's repair instructions and the code of practice for lift design and construction to implement and assign completed testing work for different brakes (electromechanical) including: <ul style="list-style-type: none"> • magnetic drum brake • magnetic disc brake • hydraulic drum brake • hydraulic disc brake

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to arrange and assign completed disassembly, assembly, adjustment and testing procedures for different kinds of lift brake systematically and through effective communication; and (ii) Capable to implement completed disassembly, assembly, adjustment and testing of different kinds of lift brake under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift brakes.

1. Title	Overhaul lift landing devices
2. Code	EMLEOR316A
3. Range	Arrange and implement overhaul of lift landing door devices at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift landing doors</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of landing doors including: 2-speed side opening horizontally sliding door (2S-L / 2S-R) <ul style="list-style-type: none"> • 3-speed side opening horizontally sliding door (3S-L / 3S-R) • 4-panel centre opening horizontally sliding door (2CO) • 6-panel centre opening horizontally sliding door (3CO) • 2-panel upward opening vertically sliding door (2U) • 2-panel centre opening vertically sliding door (CO) <p>6.2 Overhaul methods and procedures for landing doors</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different kinds of landing door including: <ul style="list-style-type: none"> • different kinds of horizontally sliding door • different kinds of vertical sliding door ◆ Implement and assign completed shutdown and restart work for different horizontal sliding doors and different vertically sliding doors including: <ul style="list-style-type: none"> • safety preparation works for shutdown • safety works of lift car creeping • safety works for resumption operation ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for different horizontal sliding doors and vertically sliding doors including: <ul style="list-style-type: none"> • locking device • landing door sill • horizontally sliding door suspension • horizontally sliding door tracks • vertically sliding door suspension device • vertically sliding door tracks • landing door panel and landing door frame

	<p>6.3 Professionalism in completed disassembly and assembly of landing doors</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions to implement and assign completed disassembly, assembly and adjustment work for different horizontally sliding doors and vertically sliding doors ◆ Apply the code of practice for lift design and construction to implement and assign completed testing work for different horizontally sliding doors and all kinds of vertically sliding doors including: <ul style="list-style-type: none"> • 2-speed side opening horizontally sliding door (2S-L / 2S-R) • 3-speed side opening horizontally sliding door (3S-L / 3S-R) • 4-panel centre opening horizontally sliding door (2CO) • 6-panel centre opening horizontally sliding door (3CO) • 2-panel upward opening vertically sliding door (2U) • 2-panel centre opening vertically sliding door (CO)
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed disassembly, assembly, adjustment and testing procedures for different kinds of lift landing door systematically and through effective communication; and (ii) Capable to implement completed disassembly, assembly, adjustment and testing of different kinds of lift landing door under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift landing devices.</p>

1. Title	Overhaul lift cars and counterweights
2. Code	EMLEOR317A
3. Range	Arrange and implement overhauls of lift cars and counterweights at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure of lift cars and counterweights</p> <ul style="list-style-type: none"> ◆ Understand the structure of different lift cars including: single wrap with roping ratio 1:1 and 2:1 <ul style="list-style-type: none"> • double wrap with roping ratio 1:1 and 2:1 ◆ Understand the structure of different counterweights including: <ul style="list-style-type: none"> • single wrap with roping ratio 1:1 and 2:1 • double wrap with roping ratio 1:1 and 2:1 <p>6.2 Overhaul methods and procedures for lift cars and counterweights</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different lift cars and counterweights including: <ul style="list-style-type: none"> • cars using different roping methods • counterweights using different roping methods ◆ Implement and assign full shutdown and restart work for different lift cars and counterweights including: <ul style="list-style-type: none"> • safety preparation works for temporarily adjustment the weights of counterweight • safety preparation works for shutdown • safety works for prevention creeping of lift car • safety works of resumption operation ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for different lift cars and counterweights including: <ul style="list-style-type: none"> • car roof panels • car wall panels • car platform • car door sill • car apron • car door hanger • car door guiding device • car door and car door frame • counterweight frame and counterweight block

	<p>6.3 Professionalism in completed disassembly and assembly of cars and counterweights</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions and the code of practice for lift work safety to implement and assign completed disassembly and assembly work for different lift cars and counterweights ◆ Apply the code of practice for lift design and construction to implement and assign completed testing work for different cars including: car ventilation <ul style="list-style-type: none"> • balance load setting for car and counterweight • traction • overload protective device • braking system • safety gear
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed disassembly, assembly and testing procedures for different lift cars and counterweights systematically and through effective communication; and</p> <p>(ii) Capable to implement completed disassembly, assembly and testing works for different lift cars and counterweights under general or complicated situations in compliance with the prescribed standards of repair.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift cars and counterweights.</p>

1. Title	Overhaul lift buffers
2. Code	EMLEOR318A
3. Range	Arrange and implement lift buffer overhauls at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift buffers</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different kinds of buffer including: <ul style="list-style-type: none"> • energy accumulation buffer • one-plunger energy dissipation buffer • multi- plunger energy dissipation buffer <p>6.2 Overhaul methods and procedures for buffers</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different kinds of buffer including: <ul style="list-style-type: none"> • energy accumulation buffer • one-plunger energy dissipation buffer • multi- plunger energy dissipation buffer ◆ Implement and assign completed shutdown and restart work for different buffers, including <ul style="list-style-type: none"> • safety preparation works for shutdown • safety works for resumption operation ◆ Effectively use different lifting gears to implement and assign completed lifting work for different buffers ◆ Effectively use different tools to implement and assign completed disassembly, rust removal and prevention and assembly work for different buffers <p>6.3 Professionalism in completed disassembly and assembly of buffers</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's repair instructions and the code of practice for lift work safety to implement and assign completed disassembly and assembly work for different buffers ◆ Apply manufacturer's repair instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing work for different buffers including: <ul style="list-style-type: none"> • energy accumulation buffer • one-plunger energy dissipation buffer • multi- plunger energy dissipation buffer

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to arrange and assign completed disassembly, rust removal and prevention, assembly and testing procedures for different lift buffers systematically and through effective communication; and (ii) Capable to implement completed disassembly, rust removal and prevention, assembly and testing works for different lift buffers under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift buffers.

1. Title	Overhaul lift suspension ropes and compensation ropes
2. Code	EMLEOR319A
3. Range	Arrange and implement overhauls of lift suspension ropes and compensation rope at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Types, structure and tensile strength of lift suspension ropes and compensation ropes and calculation of car and counterweight headroom</p> <ul style="list-style-type: none"> ◆ Understand different suspension ropes and compensation ropes including: <ul style="list-style-type: none"> • ordinary lay suspension ropes • ordinary lay compensation ropes • regular lay suspension ropes • regular lay compensation ropes ◆ Understand the different structures of suspension ropes and compensation ropes including: <ul style="list-style-type: none"> • fiber core • steel strand • steel wire ◆ Understand the tensile strength of suspension ropes and compensation ropes including: <ul style="list-style-type: none"> • single tensile • dual tensile ◆ Understand the headroom calculation for different cars and counterweight including: <ul style="list-style-type: none"> • reduction of overhead runby by positively monitoring slowdown devices • reduction of overhead runby by using anti-rebound devices <p>6.2 Overhaul methods and procedures for suspension ropes and compensation ropes</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different suspension ropes and compensation ropes including: <ul style="list-style-type: none"> • selecting appropriated tools set of lifting gears • formulating work procedure lists for lift cars • formulating work procedure lists for suspension ropes and compensation ropes

	<p>6.3 Professionalism in full disassembly and assembly of suspension ropes and compensation ropes</p> <ul style="list-style-type: none"> <li>◆ Effectively use different lifting gears to implement and assign completed lifting work for f lift cars including: <ul style="list-style-type: none"> <li>• safety preparation works of shutdown <li>• safety lifting the cars of single wrap and roping 1:1 & 2:1 <li>• safety lifting the cars of double wrap and roping 1:1 & 2:1 <li>• safety works for prevention creeping of cars <li>• safety works for resumption operation <li>◆ Effectively use different tools to implement and assign completed disassembly and assembly work for suspension ropes and compensation ropes including: <ul style="list-style-type: none"> <li>• termination sockets for the old ropes <li>• safety devices for prevention ropes slacking <li>• equalization of tension devices <li>• safety guards of prevention foreign falling object for suspension ropes <li>• safety guards of prevention foreign falling object for compensation ropes <li>◆ Apply manufacturer's repair instructions and the code of practice for lift work safety to implement and assign completed disassembly and assembly work for suspension ropes and compensation ropes <li>◆ Apply manufacturer's repair instructions and the code of practice for lift design and construction to implement and assign completed testing work for suspension ropes and compensation ropes including: <ul style="list-style-type: none"> <li>• termination sockets of ropes <li>• safety devices for prevention ropes slacking <li>• equalization of tension devices <li>• safety guards of prevention foreign falling object for suspension ropes <li>• safety guards of prevention foreign falling object for compensation ropes
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7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to arrange and assign completed disassembly, assembly and testing procedures for different kinds of lift suspension rope and compensation ropes systematically and through effective communication; and(ii) Capable to implement completed disassembly, assembly and testing works for different kinds of lift suspension rope and compensation ropes under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift suspension ropes.

1. Title	Overhaul lift well equipment
2. Code	EMLEOR320A
3. Range	Arrange and implement lift well equipment overhauls at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lift well equipment</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different well equipment including: <ul style="list-style-type: none"> • different travelling cables • different lift car levelling devices • different lift cars and counterweights guiding devices • different lift car terminating floor limited switch devices <p>6.2 Overhaul methods and procedures for well equipment</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different well equipment including: <ul style="list-style-type: none"> • different travelling cables • different lift car levelling devices • different lift cars and counterweights guiding devices • different lift car terminating floor limited switch devices ◆ Implement and assign full shutdown and restart work for equipment including: <ul style="list-style-type: none"> • safety preparation works for shutdown • safety works for resumption operation ◆ Effectively use different tools to implement and assign completed disassembly, rust removal and prevention and assembly work for different well equipment <p>6.3 Professionalism in completed disassembly and assembly of well equipment</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's repair instructions and the code of practice for lift work safety to implement and assign completed disassembly and assembly work for different well equipment ◆ Apply manufacturer's repair instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing for different well equipment including: <ul style="list-style-type: none"> • different travelling cables • different lift car levelling devices • different lift cars and counterweights guiding devices • different lift car terminating floor limited switch devices

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: (i) Capable to arrange and assign completed disassembly, rust removal and prevention, assembly and testing procedures for different lift well equipment systematically and through effective communication; and (ii) Capable to implement full disassembly, rust removal and prevention, assembly and testing for different lift well equipment under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general lift well equipment.

1. Title	Overhaul hydraulic lift power units
2. Code	EMLEOR321A
3. Range	Arrange and implement overhauls of hydraulic lift power units at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of hydraulic lift power units</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different 3-phase AC motors including: <ul style="list-style-type: none"> • AC star-delta controlled motor • AC variable voltage variable frequency controlled motor ◆ Understand the structure and working principles of different hydraulic oil pumps including: <ul style="list-style-type: none"> • gear-type hydraulic oil pump • vane-type hydraulic oil pump • screw-type hydraulic oil pump ◆ Understand the structure and working principles of different oil valve controllers including: <ul style="list-style-type: none"> • single-stage variable speed oil valve controller • 2-stage variable speed oil valve controller • stage-less variable speed oil valve controller <p>6.2 Overhaul methods and procedures for hydraulic power units</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different hydraulic power units including: <ul style="list-style-type: none"> • hydraulic oil pumps • oil valve controllers • hydraulic oil cooling devices • 3-phase AC motors ◆ Implement and assign full shutdown and restart work for different hydraulic power units including: <ul style="list-style-type: none"> • safety preparation works for shutdown • safety precaution works for prevention car (direct plunge) creeping • safety precaution works for prevention car (indirect plunge) creeping • safety works for resumption operation

	<p>6.3 Professionalism in completed disassembly and assembly of different hydraulic power units</p> <ul style="list-style-type: none"> ◆ Effectively use different lifting gears to implement and assign completed lifting work for hydraulic power units including: <ul style="list-style-type: none"> • different hydraulic oil pumps • different oil valve controllers • hydraulic oil cooling devices • different types of 3-phase AC motor ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for hydraulic power units including: <ul style="list-style-type: none"> • hydraulic oil pumps such as bearing, belt pulley, coupling, oil seal and packing seal • oil valve controllers such as manual hydraulic pump, hydraulic pressure gauge, oil seal and packing seal • hydraulic oil cooling devices such as oil cooling pump, cooling oil tank and cooling fan • 3-phase AC motors such as bearing, belt pulley and coupling ◆ Apply manufacturer’s repair instructions and the code of practice for lift work safety to implement and assign completed disassembly and assembly work for different hydraulic power units ◆ Apply manufacturer’s repair instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing work for different hydraulic power units including: <ul style="list-style-type: none"> • Cut off valve, one way valve, pressure relief valve, upstream valve, downstream valve, speed control shut off valve, excess flow valve, manual valve, manual hydraulic pump, hydraulic oil temperature indicating device
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed disassembly, assembly and testing procedures for different hydraulic power units of hydraulic lifts systematically and through effective communication; and</p> <p>(ii) Capable to implement completed disassembly, assembly and testing for different hydraulic power units of hydraulic lifts under general or complicated situations in compliance with the prescribed standards of repair.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining the hydraulic power units of hydraulic lifts.</p>

1. Title	Overhaul hydraulic lift jacks
2. Code	EMLEOR322A
3. Range	Arrange and implement overhauls of hydraulic lift jacks at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of hydraulic lift jacks</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different hydraulic jacks including: <ul style="list-style-type: none"> • single-plunger hydraulic jack • telescope-plunger hydraulic jack <p>6.2 Overhaul methods and procedures for hydraulic jacks</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different hydraulic jacks including: <ul style="list-style-type: none"> • single-plunger with direct plunge • single-plunger with indirect plunge • telescope-plunger with direct plunge • telescope-plunger with indirect plunge ◆ Implement and assign completed shutdown and restart work for different well equipment including: <ul style="list-style-type: none"> • safety preparation works for shutdown • safety lifting works of lift car for direct plunge • safety lifting works of lift car for indirect plunge • safety works for resumption operation • Effectively use different lifting gears to implement and assign completed lifting work for all kinds of hydraulic jacks ◆ Effectively use different tools to implement and assign completed disassembly, rust removal and prevention and assembly work for hydraulic jacks including: <ul style="list-style-type: none"> • single-plunger hydraulic jack piston • single-plunger hydraulic jack piston oil seal and packing seal • telescope-plunger hydraulic jack piston • telescope-plunger hydraulic jack piston oil seal and packing seal • different hydraulic jacks piston guiding devices • different hydraulic jacks construction remedies

	<p>6.3 Professionalism in completed disassembly and assembly of different hydraulic jacks</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions and the code of practice for lift work safety to implement and assign completed disassembly and assembly work for different hydraulic jacks ◆ Apply manufacturer’s repair instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing work for different hydraulic jacks including: <ul style="list-style-type: none"> • hydraulic jack flow controller • hydraulic jack exhaust device • hydraulic jack speed control shut off valve • hydraulic jack oil leak collection device • full load pressure detector for telescope-plunger hydraulic jack synchronized telescopic device
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed disassembly, rust removal and prevention, assembly and testing procedures for different hydraulic jacks of hydraulic lifts systematically and through effective communication; and (ii) Capable to implement completed disassembly, rust removal and prevention, assembly and testing for different hydraulic jacks of hydraulic lifts under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in maintaining hydraulic lift jacks.</p>

1. Title	Repair the faults of lifts
2. Code	EMLEOR323A
3. Range	Repair the faults of lifts at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of lifts</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of lifts including: <ul style="list-style-type: none"> • the devices in machine room • the devices inside lift shaft • the devices in lift pit • the devices in landings • the devices inside lift car • the control circuits <p>6.2 Methods and procedures of repairing lift faults</p> <ul style="list-style-type: none"> ◆ Know the principles of lift repair and maintenance and the works include the procedures of inspection, cleaning, oiling, commissioning and components replacement ◆ Know the techniques of faults location and remedy for lifts including: <ul style="list-style-type: none"> • faults occur at lift running • stubborn faults in lift operation • hidden faults in lift operation ◆ Effectively use repairing and testing instruments and tools <p>6.3 Professionalism in repairing lift faults</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's repair instructions to repair lift faults ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to repair lift faults
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively locate and eliminate lift faults and complete the repair work; and</p> <p>(ii) Capable to clearly explain the causes of component faults and the methods and key points of repairing them.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of lift maintenance.

1. Title	Perform lift rescue
2. Code	EMLEOR324A
3. Range	Implement lift rescue at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Working principles of lift emergency operation</p> <ul style="list-style-type: none"> ◆ Understand the working principles of different emergency operations including: <ul style="list-style-type: none"> • brakes • rescue tools <p>6.2 Methods and procedures for lift rescue</p> <ul style="list-style-type: none"> ◆ Know the requirements and principles of rescue tasks including: <ul style="list-style-type: none"> • Manual operation of lift • Communication with the passengers • Use of rescue tools ◆ Arrange and implement lift rescue works ◆ Effectively use repairing and testing instruments and rescue tools <p>6.3 Professionalism in lift rescue</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to arrange and implement rescue tasks ◆ Understand the requirements of safety guidelines and the code of practice for lifts in order to perform rescue tasks
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to systematically and effectively complete lift rescue; and</p> <p>(ii) Capable to clearly explain rescue methods and the main procedures.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge in lift maintenance.

1. Title	Maintain escalator driving devices
2. Code	EMLEOR325A
3. Range	Arrange and implement the maintenance of escalator driving devices at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator driving machines</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different drive motors including: <ul style="list-style-type: none"> • 3-phase AC induction motor • 3-phase AC permanent-magnet motor ◆ Understand the structure and working principles of different driving machines including: <ul style="list-style-type: none"> • helical gear driving machine • vertical worm reduction gear driving machine ◆ Understand the structure and working principles of different electromechanical brakes including: <ul style="list-style-type: none"> • magnetic drum brake • magnetic disc brake • auxiliary brake <p>6.2 Methods and procedures of maintaining driving devices</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of driving devices including the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of different driving machines including: <ul style="list-style-type: none"> • motor • gearbox • brake • transmission system ◆ Arrange and implement maintenance instructions for escalator driving devices ◆ Effectively use repairing and testing instruments and tools <p>6.3 Professionalism in maintaining escalator driving devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain the driving devices ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain the driving devices

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of the escalator driving devices; (ii) Capable to systematically and effectively complete the repair and maintenance of the escalator driving devices; (iii) Capable to arrange and implement the maintenance instructions for the escalator driving devices; and (iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of the escalator driving devices.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining driving devices of general escalators.</p>

1. Title	Maintain steps driving components of escalator
2. Code	EMLEOR326A
3. Range	Arrange and implement the maintenance works of steps driving components of escalators at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator steps driving devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different step chain driving wheels including: <ul style="list-style-type: none"> • long pitch step chain driving wheels • short pitch step chain driving wheels ◆ Understand the structure and working principles of different step chains including: <ul style="list-style-type: none"> • long pitch roller chains • short pitch roller chains ◆ Understand the structure and working principles of different step chain tension wheels including: <ul style="list-style-type: none"> • long pitch step chain tension wheels • short pitch step chain tension wheels <p>6.2 Methods and procedures of maintaining steps driving components</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of steps driving components including the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of different steps driving elements including: <ul style="list-style-type: none"> • driving wheels • driving chains • tension wheels of the driving chains • safety switch ◆ Arrange and implement maintenance instructions for step driving devices ◆ Effectively use repairing and testing instruments and tools <p>6.3 Professionalism in maintaining escalator steps driving components</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain the steps driving components ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain the steps driving components

7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of escalator steps driving components; (ii) Capable to systematically and effectively complete the repair and maintenance of escalator steps driving components; (iii) Capable to arrange and implement the maintenance instructions for escalator steps driving components; and (iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of escalator steps driving components.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining general escalator steps driving elements.</p>

1. Title	Maintain escalator handrail devices
2. Code	EMLEOR327A
3. Range	Arrange and implement the maintenance of escalator handrail devices at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Construction and principles of escalator handrail devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of all kinds of handrail devices including: <ul style="list-style-type: none"> • handrail • handrail guiding device • handrail driving device • handrail elongating compensation device • handrail inlet protection device • broken handrail device <p>6.2 Methods and procedures of maintaining handrail devices</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of different handrail devices including the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of handrail devices including: <ul style="list-style-type: none"> • handrail inlet protection device • broken handrail device • handrail guiding device • handrail driving device • allowable deviation of handrail slip ◆ Arrange and implement maintenance instructions for handrail devices ◆ Effectively use repairing and testing instruments and tools <p>6.3 Professionalism in maintaining escalator handrail devices</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain handrail devices ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain handrail devices

7. Assessment Criteria	The integrated outcome requirements of this unit of competency are: <ul style="list-style-type: none">(i) Capable to master the construction and key points of repair and maintenance of escalator handrail devices;(ii) Capable to systematically and effectively complete the repair and maintenance of escalator handrail devices;(iii) Capable to arrange and implement the maintenance instructions for escalator handrail devices; and(iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of escalator handrail devices.
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining handrail devices of general escalators.

1. Title	Maintain electrical components of escalators
2. Code	EMLEOR328A
3. Range	Arrange and implement the maintenance works of escalator's electrical components at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator's electrical components</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different control cabinets including: <ul style="list-style-type: none"> • single speed AC drive (AC I) control cabinet • AC star-delta driven (AC Y /Δ) control cabinet • variable volatage variable frequency AC drive (ACVVVF) control cabinet ◆ Understand the structure and working principles of different lighting devices including: <ul style="list-style-type: none"> • step lighting • lighting at the balustrade interior palnelling • lighting at the interior profile ◆ Understand the structure and working principles of different startup devices including: <ul style="list-style-type: none"> • manually-operated startup key • photo-seneor of automatically startup device • contact-mat automatically startup device ◆ Understand the structure and working principles of different emergency stop devices, including power supply phase sequence detector, motor overload detector, overspeed governor overspeed detector, broken driving chain device, handrail inlet protective device, emergency stop device, combplate safety device, step wheel and step chain wheel monitoring devices, skirting safety device and broken step chain device <p>6.2 Methods and procedures of maintaining electrical components</p> <ul style="list-style-type: none"> ◆ Know the repair and maintenance of electrical components including the procedures of inspection, cleaning, oiling and testing ◆ Know the repair and maintenance of all kinds of electrical components including: <ul style="list-style-type: none"> • control cabinet • lighting • startup device • stop device

	<ul style="list-style-type: none"> ◆ Arrange and implement maintenance instructions for escalator's electrical components ◆ Effectively use repairing and testing instruments and tools
	<p>6.3 Professionalism in maintaining escalator's electrical components</p> <ul style="list-style-type: none"> ◆ Follow manufacturer's maintenance instructions to maintain the electrical components ◆ Understand the requirements of safety guidelines and the code of practice for escalator in order to maintain the electrical components
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to master the construction and key points of repair and maintenance of escalator's electrical components; (ii) Capable to systematically and effectively complete the repair and maintenance of escalator's electrical components; (iii) Capable to arrange and implement the maintenance instructions for escalator's electrical components; and (iv) Capable to follow manufacturer's maintenance instructions to arrange and implement the maintenance of escalator's electrical components.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of maintaining electrical elements of general escalators.</p>

1. Title	Overhaul escalator driving devices
2. Code	EMLEOR329A
3. Range	Arrange and implement overhauls of escalator driving devices at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator driving machines</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different drive motors including: <ul style="list-style-type: none"> • 3-phase AC induction motor • 3-phase AC permanent-magnet motor ◆ Understand the structure and working principles of all kinds of driving machines including: <ul style="list-style-type: none"> • helical gear driving machine • vertical worm reduction gear driving machine ◆ Understand the structure and working principles of different electromechanical brakes including: <ul style="list-style-type: none"> • magnetic drum brake • magnetic disc brake • auxiliary brake <p>6.2 Overhaul methods and procedures for driving machines</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different driving machines including: <ul style="list-style-type: none"> • selection lists for different suitable lifting gears • work site safety equipment lists • work procedure lists for lifting different driving machines ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • safety preparation works for escalator shutdown • safety precaution works for surrounding • safety works for resumption operation ◆ Effectively use different lifting gears to implement and assign completed lifting work for different driving machines ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for different driving machines

	<p>6.3 Professionalism in completed disassembly and assembly of driving machines</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions and the code of practice for escalator work safety to implement and assign completed disassembly and assembly work for different driving machines ◆ Apply manufacturer’s repair instructions and the code of practice for escalator design and construction to implement and assign completed adjustment and testing work for different driving machines including: <ul style="list-style-type: none"> • 3-phase AC helical gear driving machine • 3-phase AC vertical worm reduction gear driving machine
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed inspection, disassembly, assembly and adjustment procedures for escalator driving devices systematically and through effective communication; and (ii) Capable to implement completed inspection, disassembly, assembly and adjustment of escalator driving devices under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling general escalator driving devices.</p>

1. Title	Overhaul escalator steps driving components
2. Code	EMLEOR330A
3. Range	Arrange and implement overhauls of escalator steps driving components at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator steps driving devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of all kinds of step chain driving wheels including: <ul style="list-style-type: none"> • long-pitch step chain driving wheels • short-pitch step chain driving wheels ◆ Understand the structure and working principles of different step chains including: <ul style="list-style-type: none"> • long-pitch step chain • short-pitch step chain ◆ Understand the structure and working principles of different step chain tension wheels including: <ul style="list-style-type: none"> • long-pitch step chain tension wheels • short-pitch step chain tension wheels <p>6.2 Overhaul methods and procedures for step driving devices</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for all kinds of step driving devices including: <ul style="list-style-type: none"> • selection lists for different suitable lifting gears • work site safety equipment lists • work procedure lists for different step chain driving wheels • work procedure lists for different step chains • work procedure lists for different step chain tension wheels ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • safety preparation works for escalator shutdown • safety precaution works for surrounding • safety works for resumption operation ◆ Effectively use different lifting gears to implement and assign completed lifting work for different step chain driving elements ◆ Effectively use all kinds of tools to implement and assign completed disassembly and assembly work for different step chain driving devices

	<p>6.3 Professionalism in completed disassembly and assembly of step chain driving devices</p> <ul style="list-style-type: none"> ◆ Apply manufacturer's repair instructions and the code of practice for escalator work safety to implement and assign completed disassembly and assembly work for different step chain driving devices ◆ Apply manufacturer's repair instructions and the code of practice for escalator design and construction to implement and assign completed adjustment and testing work for different step chain driving devices including: <ul style="list-style-type: none"> • long-pitch step chain driving devices • short-pitch step chain driving devices
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed inspection, disassembly, assembly and adjustment procedures for escalator step chain driving components systematically and through effective communication; and</p> <p>(ii) Capable to implement completed inspection, disassembly, assembly and adjustment of escalator step chain driving components under general or complicated situations in compliance with the prescribed standards of repair.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling step chain driving elements of general escalators.</p>

1. Title	Overhaul escalator handrail devices
2. Code	EMLEOR331A
3. Range	Arrange and implement overhauls of escalator handrail driving devices at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator handrail driving devices</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different handrail driving devices including: <ul style="list-style-type: none"> • handrail • handrail guiding device • handrail driving device • handrail elongating compensation device • handrail inlet protection device • broken handrail device <p>6.2 Overhaul methods and procedures for handrail driving devices</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different handrail driving devices including: <ul style="list-style-type: none"> • different handrails • different handrail guiding devices • different handrail driving devices • different handrail elongating compensation devices • different handrail inlet protection devices • different broken handrail devices ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • safety preparation works for escalator shutdown • safety precaution works for surrounding • safety works for resumption operation ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for different handrail driving devices

	<p>6.3 Professionalism in completed disassembly and assembly of handrail driving devices</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s repair instructions and the code of practice for escalator work safety to implement and assign completed disassembly and assembly work for different handrail driving devices ◆ Apply manufacturer’s repair instructions and the code of practice for escalator design and construction to implement and assign completed adjustment and testing work for different handrail driving devices including: <ul style="list-style-type: none"> • handrail inlet protection device • broken handrail device • allowable deviation of handrail slip • clearances between handrail outlet and guide or handrail bracket
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> (i) Capable to arrange and assign completed inspection, disassembly, assembly and adjustment procedures for escalator handrail driving devices systematically and through effective communication; and (ii) Capable to implement completed inspection, disassembly, assembly and adjustment of escalator handrail driving devices under general or complicated situations in compliance with the prescribed standards of repair.
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling handrail driving devices of general escalators.</p>

1. Title	Overhaul electrical components of escalators
2. Code	EMLEOR332A
3. Range	Arrange and implement overhauls of escalator's electrical elements at field locations.
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Structure and working principles of escalator's electrical components</p> <ul style="list-style-type: none"> ◆ Understand the structure and working principles of different control cabinets including: <ul style="list-style-type: none"> • single speed AC drive (AC 1) control cabinet • AC star-delta driven (AC Y /Δ) control cabinet • variable voltage variable frequency AC drive (ACVVVF) control cabinet ◆ Understand the structure and working principles of different lighting including: <ul style="list-style-type: none"> • step lighting • lighting at balustrade • lighting at interior profile ◆ Understand the structure and working principles of different startup devices including: <ul style="list-style-type: none"> • manually-operated startup key • photo-sensor automatically start-up device • contact-mat automatically startup device ◆ Understand the structure and working principles of all kinds of emergency stop devices including: <ul style="list-style-type: none"> • power supply phase sequence detector, motor overload detector, overspeed detector of overspeed governor, broken driving chain device, handrail inlet protective device, emergency stop devices, combplate safety devices, step wheel and step chain wheel monitor, skirting safety device and broken step chain device <p>6.2 Overhaul methods and procedures for electrical components</p> <ul style="list-style-type: none"> ◆ Formulate overhaul procedure lists for different electrical components including: <ul style="list-style-type: none"> • different control cabinets • different lightings • different startup devices • different emergency stop devices

	<p>6.3 Professionalism in completed disassembly and assembly of electrical components</p> <ul style="list-style-type: none"> ◆ Effectively use protective barriers or guards to implement and assign safety measures at work sites including: <ul style="list-style-type: none"> • safety preparation works for escalator shutdown • safety precaution works for surrounding • safety works for resumption operation ◆ Effectively use different tools to implement and assign completed disassembly and assembly work for different electrical components ◆ Apply manufacturer’s repair instructions to implement and assign completed disassembly and assembly work for different electrical components ◆ Apply manufacturer’s repair instructions and the code of practice for escalator design and construction to implement and assign completed adjustment and testing work for different electrical components including: <ul style="list-style-type: none"> • power supply phase sequence detector, motor overload detector, overspeed detector of overspeed governor, broken driving chain device, handrail inlet protection device, emergency stop devices, combplate safety devices, step wheel and step chain wheel monitor, skirting safety device and broken step chain device
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to arrange and assign completed disassembly, assembly and adjustment procedures for different escalator’s electrical components systematically and through effective communication; and</p> <p>(ii) Capable to implement completed disassembly, assembly and adjustment of different escalator’s electrical components under general or complicated situations in compliance with the prescribed standards of repair.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in overhauling handrail driving devices of general escalators.</p>

**Competencies for Practitioners of
the Lift and Escalator Engineering Branch
in the Electrical & Mechanical Services
Industry**

Competency Level 4

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. Credits	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	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. Credits	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. Credits	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of quality 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. Credits	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	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. Credits	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 the commissioning works of lift
2. Code	EMLEIT401A
3. Range	Arrange and implement the commissioning works of lift at construction sites.
4. Level	4
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Working principles and commissioning data for different lift devices</p> <ul style="list-style-type: none"> ◆ Understand the inspection procedures for different lift devices before connection of the 3-phase main power supply, including: <ul style="list-style-type: none"> • the devices in machine room • the devices inside lift car • the devices in landings • the devices inside lift shaft • the devices in lift pit ◆ Understand the testing and adjustment procedures for different lift devices after connection of the 3-phase main power supply, including: <ul style="list-style-type: none"> • testing of 3-phase power supply phase sequence • adjustment of manual mode of operation • adjustment of car door driving devices • testing and adjustment different control voltages • testing and adjustment different stopping devices • testing and adjustment different devices inside the lift shaft • testing and adjustment of car door locking devices • testing and adjustment of landing doors locking devices ◆ Understand the adjustment procedures for different lift devices before operation of automatically mode, including: <ul style="list-style-type: none"> • adjustment of levelling device • adjustment of floor selector device • final adjustment of working force for braking system • adjustment of car door driving device • adjustment of well terminal limit switch device • adjustment of well monitor deceleration switch device ◆ Understand the testing and adjustment procedures for different devices when operation of automatically mode, including: <ul style="list-style-type: none"> • full load test • weighting device test • leveling device test

	<ul style="list-style-type: none"> • re-leveling device test • well terminal limit switch device test • well monitor deceleration switch device test • adjustment the speed profiles in acceleration , full speed and deceleration at running profiles of short-run, mid-run and long-run respectively <p>6.2 Methods and procedures for lift works of testing and commissioning</p> <ul style="list-style-type: none"> ◆ Understand the commissioning procedures for different lift driving modes system including: <ul style="list-style-type: none"> • Variable voltage variable frequency AC drive • Thyristor-Leonard DC drive • Ward-Leonard DC drive ◆ Formulate the commissioning procedure lists for lifts of different driving modes including: <ul style="list-style-type: none"> • commissioing procedure lists for different lift devices before connection of 3-phase power supply • commissioing procedure lists for different lift devices after connection of 3-phase power supply • commissioing procedure lists for different lift devices before operation of automatically mode • commissioing procedure lists for different lift devices after operation of automatically mode ◆ Effectively use different tools, measuring instruments and different commissioning data to implement and assign completed commissioning work for lifts of all driving modes including: <ul style="list-style-type: none"> • Variable voltage variable frequency AC drive • Thyristor-Leonard DC drive • Ward-Leonard DC drive <p>6.3 Professionalism in handling the completed commissioning works of lifts</p> <ul style="list-style-type: none"> ◆ Apply manufacturer’s installation commissioning instructions and the code of practice for lift design and construction to implement and assign completed adjustment and testing work for lifts of general driving modes
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) apable to arrange and assign completed commissioning procedures for lifts of all driving modes systematically and through effective communication; and</p> <p>(ii) Capable to implement completed commissioning work for lifts of all driving modes under general or complicated situations in compliance with the prescribed standards.</p>
8. Remarks	<p>The credit value of this unit of competency is set on the presumption that the person already possesses knowledge and skills in implementing general lift debugging.</p>

**Competencies for Practitioners of
the Lift and Escalator Engineering Branch
in the Electrical & Mechanical Services
Industry**

Competency Level 5

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. Credits	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 requirement of this unit of competency is: (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. Credits	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. Credits	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. Credits	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. Credits	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. Credits	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 requirement of this unit of competency is:</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. Credits	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. Credits	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. Credits	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. Credits	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. Credits	3
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 ISO quality management standards ♦ Understand ISO 9000 Quality Management and Quality Assurance Standard Series, including the quality assurance system and management mechanism</p> <p>6.2 Implement ISO quality management standards ♦ Implement ISO 9000 Quality Management and Quality Assurance Standard Series, including:</p> <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	Analyze and assess performance of electrical system and equipment
2. Code	EMCUDE501A
3. Range	Master the theories of electromagnetic field, electromagnetic wave propagation, signal conversion and control circuit, electric motor, etc. with respect to electrical and mechanical engineering design; and apply the knowledge to analyze the performance of the electric motor operation, power transfer and control circuit system.
4. Level	5
5. Credits	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Performance and operating principles of electric motor</p> <ul style="list-style-type: none"> ◆ Understand the performance and operating principles of single-phase and three-phase induction motor, including the unbalanced operation, dynamic operation, temperature-rise simulation tests and conditioning monitoring <p>6.2 Analyze and assess performance of electrical system and equipment</p> <ul style="list-style-type: none"> ◆ Analyze the harmonic effect of using stepped wave or PWM Inverter for power transfer of the induction motor ◆ Analyze the open-loop control and close-loop control of the motor ◆ Use suitable non-carbon brush DC motor ◆ Apply communication switching technology and mathematical models to analyze and improve the control system <ul style="list-style-type: none"> • Apply analogue/digital converter and digital/analogue converter to optimize the control system • Apply mathematical model to analyze and improve the control system ◆ Analyze the electromagnetic wave propagation and its effect on surrounding signals <ul style="list-style-type: none"> • Apply the Maxwell equation and wave equation to calculate and analyze data propagated by waves and the effect on surrounding signals • Project the wave interference and use shields to protect from it
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to analyze and assess accurately and effectively the performance of an electro-electronic controlled three-phase variable voltage variable frequency heavy induction motor; and</p> <p>(ii) Capable to analyze accurately and effectively the interference of the current of the above-mentioned motor and its effect on surrounding signals, and advise on the improvement measures.</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	Use programmable logic controller (PLC) to upgrade control equipment
2. Code	EMCUDE502A
3. Range	For electrical and mechanical engineering design, use PLC human-machine interface software, groupware and PLC network system to write monitoring and management system programmes for electrical and mechanical equipment and production; and integrate PLC systems of different levels into a large PLC integrated production control, operation control, monitoring and management system.
4. Level	5
5. Credits	9
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Operating principles of PLC software system ♦ Understand the operating principles of PLC software system</p> <p>6.2 Use PLC to upgrade control equipment ♦ Use PLC human-machine interface software to set up the production control system</p> <ul style="list-style-type: none"> • Use PLC human-machine interface software, processor emulation software, programmable/testing software and communication software to write programmes and set up human-machine interface PLC electrical and mechanical equipment and production control system • Test and debug the PLC human-machine interface control system • Modify and rationalize the PLC human-machine interface control system <p>♦ Use PLC human-machine interface groupware to set up the monitoring, alarm and management system</p> <ul style="list-style-type: none"> • Use PLC human-machine interface groupware to set up label database and information list, and use the database to set up the alarm and management system • Use groupware to save group data record, and use the analytical function to analyze group data trend to achieve the alarm and management functions • Manage the safety of groupware data system <p>♦ Integrate PLC systems of different levels into a large PLC integrated monitoring and management system</p>

	<ul style="list-style-type: none"> • Use large PLC software and network software to integrate PLC systems of different levels into a large integrated production control, operation control, monitoring and management system • Use PLC software to help analyze data • Use information technology and network to transfer PLC data and information • Test and debug the large integrated PLC system
7. Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <p>(i) Capable to use PLC human-machine interface software to set up a safe, reliable, accurate, convenient and direct operation monitoring, alarm and management system for electrical and mechanical equipment; and</p> <p>(ii) Capable to integrate different levels individual PLC systems of the same production line of a plant into a large integrated monitoring, alarm and management system.</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	Analyze quality of electricity data and design suitable device to improve electricity quality
2. Code	EMCUDE504A
3. Range	For electrical and mechanical engineering design, understand crucial electricity quality data, such as power factor, weights of different harmonic waves and total harmonic distortion in order to design electricity quality improvement devices and circuits.
4. Level	5
5. Credits	6
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Electricity quality principles and operating principles of electricity quality improvement equipment</p> <ul style="list-style-type: none"> ◆ Understand factors affecting electricity quality and reasons why electricity quality is becoming more and more important ◆ Understand the operating principles of various electricity quality improvement equipment, such as star-delta transformer, isolating transformer, filter and active filter <p>6.2 Design electricity quality improvement device</p> <ul style="list-style-type: none"> ◆ Design suitable electricity quality improvement devices according to different electricity quality requirements ◆ Analyze data related to electricity quality, such as power factor and total harmonic distortion, etc.
7. Assessment Criteria	<p>The integrated outcome requirement of this unit of competency is:</p> <p>(i) Capable to analyze correctly various electricity quality data, design suitable improvement devices according to different electricity quality requirements and power supply arrangements, and analyze the pros and cons of different improvement devices.</p>
8. Remarks	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of power supply system.

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. Credits	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. Credits	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	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. Credits	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	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. Credits	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.

**Competencies for Practitioners of
the Lift and Escalator Engineering Branch
in the Electrical & Mechanical Services
Industry**

Competency Level 6

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. Credits	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 	

	<ul style="list-style-type: none"> ◆ 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 ▸ 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> <ul style="list-style-type: none"> (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 (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.
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 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. Credits	20
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Occupational safety and health policy and management system ♦ Understand the occupational safety and health policy and management system of the enterprise, such as:</p> <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 ♦ Formulate improvement plans for working procedures and mechanical protection and systems that do not comply with the safety and health management standards</p> <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. Credits	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. Credits	20
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Quality management goals ♦ Understand the concept of excellent quality management awards such as:</p> <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 ♦ Identify the deviations between quality management goals and the current quality management system</p> <p>♦ Identify the deviations between quality management goals and the performance of current quality management system</p> <p>♦ Formulate quality management strategy</p> <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. Credits	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 • 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	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of quality management.

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. Credits	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.

**Competencies for Practitioners of
the Lift and Escalator Engineering Branch
in the Electrical & Mechanical Services
Industry**

Competency Level 7

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. Credits	20
6. Competency	<p style="text-align: center;"><u>Performance Requirements</u></p> <p>6.1 Knowledge of social, electrical and mechanical industry's environment</p> <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 <p>6.2 Formulate overall operation development direction and strategy</p> <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 • Risk management strategy • Communication channels

	<ul style="list-style-type: none"> ◆ 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	The credit value of this unit of competency is set on the presumption that the person already possesses knowledge of engineering operation management.

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: <ul style="list-style-type: none"> – 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 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

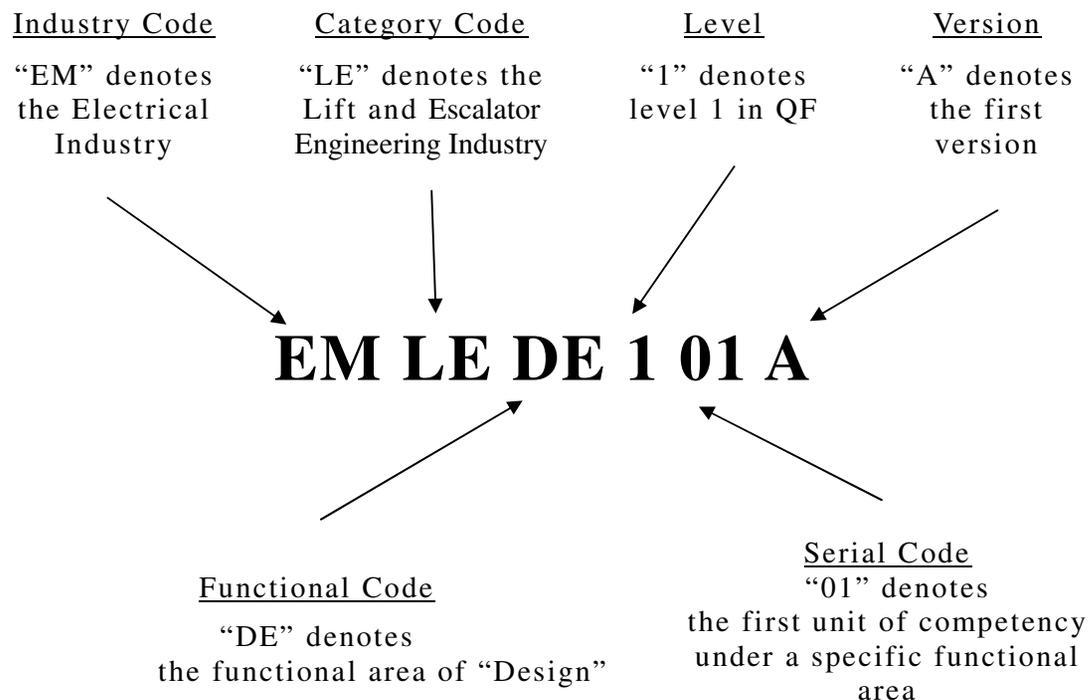
Level	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
7	<ul style="list-style-type: none"> – Demonstrate and work with a critical overview of a subject or discipline, including an evaluative understanding of principal theories and concepts, 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

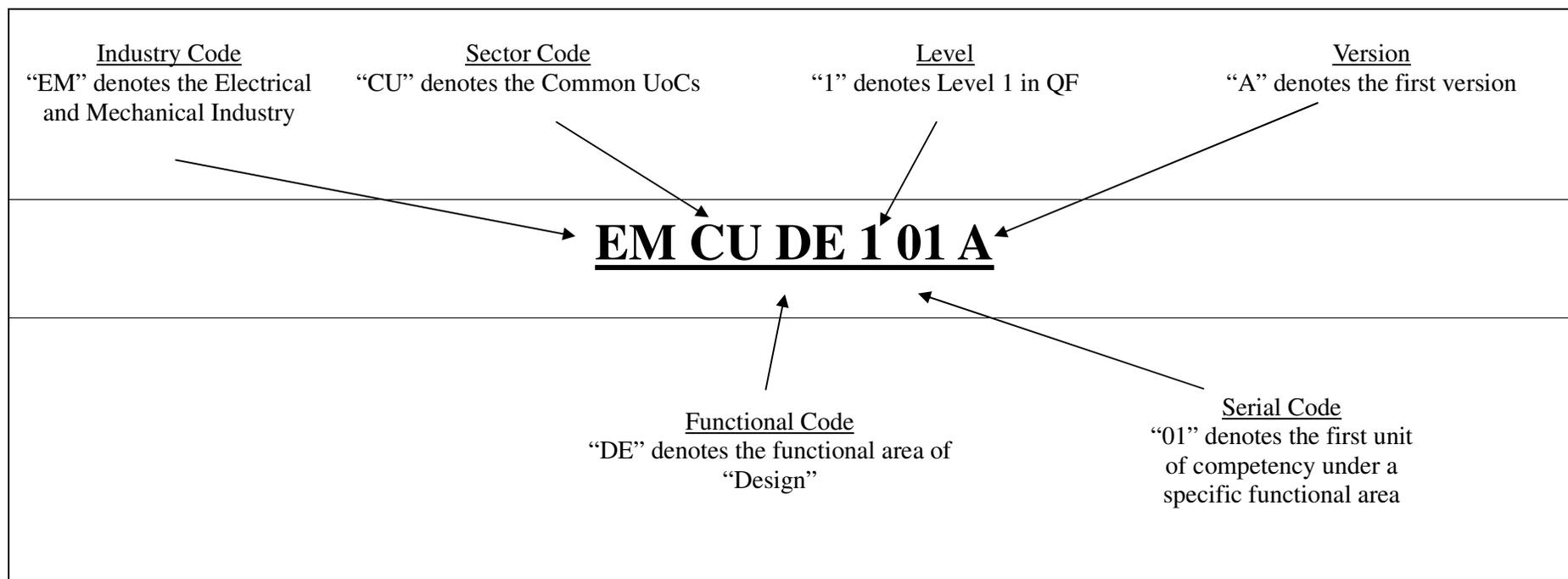
Coding Criteria

Coding Criteria

	Major Functional Areas	Code
(i)	Design	DE
(ii)	Installation	IN
(iii)	Inspection, Testing and Commissioning	IT
(iv)	Operation, Repair & Maintenance	OR
(v)	Project Management	PM
(vi)	Operation Management	OM
(vii)	Safety, Health and Environmental	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.

Common UoCs Coding Criteria (The Common UoCs are in the individual branch)

Use italic type, for example: *EMLEDE101A*