

# **Competence Profiles for Lift and Escalator Engineering Guidance Note for Applicants and Assessors**

## **Purpose**

This guidance note (GN) serves to provide general reference and facilitate applicants from lift and escalator engineering industry to prepare the Professional Assessment under the Mechanical Discipline (MHKIE(MCL)) via both formal training route or general experience route. The GN also serves the reference for Assessors considering and preparing recommendations of Professional Assessment interviews with applicants from lift and escalator engineering.

This GN is advisory in nature and is designed to facilitate the applicants to prepare the application. It should not be construed in anyway as to supersede the relevant requirements stipulated in HKIE website for MHKIE admission application.

## **Introduction**

Competence-based Professional Assessment has been implemented for application after 1 April 2019. In 2020/21, all received applications are assessed in accordance with competence-based requirements. HKIE provided seminars/training of general requirements about competence-based assessments.

According to Part 2 Section 1(a) and Part 4 Section 1(a) of Schedule 9 of the Lifts and Escalators Ordinance (Cap. 618), if an applicant is a registered professional engineer under the Engineers Registration Ordinance (Cap. 409) in any of the relevant disciplines including mechanical engineering and with at least 2 years' relevant working experience and necessary practical experience, he/she shall have satisfied the requirement for registration as registered lift engineer or registered escalator engineer under Cap. 618. The Engineers Registration Board ("ERB") accepts the qualification of the person if he/she is a member of the Hong Kong Institution of Engineers ("HKIE") and of a relevant discipline for registration as a registered professional engineer under Cap. 409.

## **Application and Professional Assessment Interview for MHKIE (MCL)**

### **Application**

Before preparing the application, applicant should go through details of relevant information in HKIE web site including Information on Membership Classes, Routes to Membership, Application Form requirements and confirm if their academic qualifications, professional experiences, CPD hours, etc. satisfy MHKIE(MCL) requirements

The applicant is suggested to submit the Report on Training and Experience as per the exemplar in **Appendix I**. The report is suggested arranging in following four broad areas to demonstrate his professional experiences fulfilling the 12 competences:-

- i. Applying Mechanical Engineering Knowledge (C1, C2, C11)
- ii. Developing Technical Solutions (C3, C4)
- iii. Managing Engineering Work (C5, C6, C7, C12)
- iv. Upkeeping Professional Acumen (C8, C9, C10)

### **Interview**

The Applicant should prepare about 15-minute presentation of his projects submitted and evidences to illustrate his professional experiences such as reports, plans, calculations, photographs, etc. as appropriate.

Suggested allocation of time for 15-minute presentation

- 2-minute Introduction of applicant's academic qualifications, training and professional/responsible experiences;
- 4-minute Project experiences for applying mechanical engineering knowledge;
- 4-minute Project experiences for developing technical solutions for complex engineering problems;
- 3-minute Management experiences for complex engineering works or activities;
- 2-minute Experiences for upkeeping professional acumen.

Presentation slide should be concise and precise. For example, each slide in a presentation should normally bound within 1-minute and should confine to present about 3 major points. Staying too long in one slide may indicate unclear explanation of elements. Photos, schematic or drawings should be clearly presented in a slide. Copying details from the report to the slide is inappropriate. Relevant part or sessions of reports, plans, calculations, photographs, etc. should be extracted in appropriate format which is easy for discussion in the meeting. Photos / drawings should be cropped / zoomed in appropriate scale to facilitate discussion.

### **Assessment of Competence for Applicant from Lift and Escalator Engineering**

DAP(MCL) with the endorsement from Qualification and Membership Board considered that with evidences to support the following experiences in lift and escalator engineering would satisfy the MHKIE competence requirements in MCL.

**Table 1: Relevant Lift and Escalator Engineering Experiences to fulfill HKIE Competence Requirements**

<i>HKIE Competence Requirements</i>	<i>Relevant Lift and Escalator Engineering Experiences</i>
<b>Applying Mechanical Engineering Knowledge (C1, C2, C11)</b>	
<p><b>C1.</b> Comprehend and apply knowledge of accepted principles underpinning widely applied good practice for professional engineering;</p>	<ul style="list-style-type: none"> <li>- Apply professional knowledge and skills in mechanical engineering, such as solid mechanics to analyse structure integrity of lift and/or escalator system, material consideration of cable and structure, dynamic and kinematic of lift and/or escalator drive or control system of operation and safety device, to design, implement, operate and maintain or investigate incidents; and</li> <li>- Provide professional advice on mechanical and control equipment for lift and/or escalator systems.</li> </ul>
<p><b>C2.</b> Comprehend and apply knowledge of accepted principles underpinning good practice for professional engineering that is specific to Hong Kong; and</p>	<ul style="list-style-type: none"> <li>- Understand and familiar with statutory requirements of Lifts and Escalators Ordinance (Cap. 618), relevant local code of practice, regulations and related ordinances;</li> <li>- Apply professional knowledge and skills in mechanical engineering, in accordance with Cap. 618, to design, implement, operate and maintain, investigate incidents or provide professional advice on mechanical and control equipment for lift and/or escalator systems.</li> </ul>
<p><b>C11.</b> Maintain the currency of his or her professional engineering knowledge and skills.</p>	<ul style="list-style-type: none"> <li>- Organise and attend related CPD activities in accordance with HKIE CPD requirements.</li> </ul>
<b>Developing Technical Solutions (C3 and C4)</b>	
<p><b>C3.</b> Define, investigate and analyse complex engineering problems in accordance with good practice for professional engineering; and</p>	<ul style="list-style-type: none"> <li>- Plan and supervise the development, manufacture, construction, installation, operation, maintenance or repair of the lift and/or escalator systems;</li> <li>- Investigate infrequently encountered complex engineering problems without precedent reference of solutions and be responsible to resolve the problems with originality in analysis.</li> </ul>

<b><i>HKIE Competence Requirements</i></b>	<b><i>Relevant Lift and Escalator Engineering Experiences</i></b>
<p><b>C4.</b> Design or develop solutions to complex engineering problems in accordance with good practice for professional engineering.</p>	<ul style="list-style-type: none"> <li>- Design or develop solutions for new installations and/or modernisation of the lift and/or escalator systems including control system to meet the defined requirements and objectives.</li> </ul>
<p><b>Managing Engineering Work (C5, C6, C7 and C12)</b></p>	
<p><b>C5.</b> Be responsible for making decisions on part or all of one or more complex engineering activities;</p>	<ul style="list-style-type: none"> <li>- Be responsible for the management of new installation, modernisation and/or maintenance of the lift and/or escalator systems;</li> <li>- Manage the use of diverse resources including people, money, equipment, materials and technologies;</li> <li>- Participate the resolution of critical problems arising from interactions between wide-ranging technical, engineering and other issues.</li> </ul>
<p><b>C6.</b> Manage part or all of one or more complex engineering activities in accordance with good engineering management practice;</p>	<ul style="list-style-type: none"> <li>- Supervise the installation or modernisation of the lift and/or escalator systems and inspect the quality of the work and to deal with any problems that arise;</li> <li>- Carry out extraordinary and emergency maintenance work on lifts and/or escalators when a breakdown, fault or other mechanical or electrical issue occurs.</li> </ul>
<p><b>C7.</b> Identify, assess and manage engineering risk; and</p>	<ul style="list-style-type: none"> <li>- Conduct risk assessment and manage the risks associated with the installation, modernisation, repair, maintenance and overhaul of the lift and/or escalator systems.</li> </ul>
<p><b>C12.</b> Exercise sound professional engineering judgement.</p>	<ul style="list-style-type: none"> <li>- Be responsible for engineering activities requiring judgement in technical, manpower, financial, safety, environment aspects.</li> </ul>
<p><b>Upkeeping Professional Acumen (C8, C9 and C10)</b></p>	
<p><b>C8.</b> Conduct engineering activities to an ethical standard prescribed by the HKIE;</p>	<ul style="list-style-type: none"> <li>- Understand and familiar with HKIE ethical standard and show how to apply them in projects.</li> </ul>

<b><i>HKIE Competence Requirements</i></b>	<b><i>Relevant Lift and Escalator Engineering Experiences</i></b>
<p><b>C9.</b> Recognise the reasonably foreseeable social, cultural, health, safety, sustainability and environmental effects of professional engineering activities generally;</p>	<p>- Respond to emergency breakdowns and ensure health and safety regulations are met and produce risk assessment reports and legal and insurance documents.</p>
<p><b>C10.</b> Communicate clearly with other engineers and others that he or she is likely to deal with in the course of his or her professional engineering activities.</p>	<p>- Demonstrate the effective communication skills with workers, engineers, stakeholders and public related to design, implementation, operation and maintenance, incidents investigation and providing professional advice on mechanical and control equipment for lift and/or escalator systems.</p>

## Appendix I

## Report Template on Training and Experience

<b>Periods of Training and Experience</b>			
i. Chronological order, giving inclusive dates in months and years ii. As details of duties can be found in application form, they may not be repeated in this report.			
<b>Training</b>			
<b>From</b>	<b>To</b>	<b>Company</b>	<b>Position</b>
1/2015	12/2016	ABC Lift and Escalator Company	Graduate Trainee
		Projects	
		Assisted registered engineers to manage technical officers for maintenance of XX lifts and escalators and to install and modernise YY lifts and escalators.	
<b>Sub Total : (Months/Years)</b>		2 years	
<b>Professional Experience</b>			
<b>From</b>	<b>To</b>	<b>Company</b>	<b>Position</b>
1/2017	12/2017	ABC Lift and Escalator Company	Assistant Engineer
1/2018	12/2020	ABC Lift and Escalator Company	Engineer
		<b>Projects/Duties</b>	
		Manage new installation, modernisation and major repair of XX lifts and YY escalators for Building A, Building B and Building C projects with total contract sum of ZZZM HKD.	
		Manage technical staff to provide maintenance and routine repairing services for XX lift and escalators to comply with Cap 618 Lifts and Escalators Ordinance requirements	
		Supervise sales, design and technical team with XX staff; Develop technical knowhow and sales strategy for technical staff with ZZZM HKD turnover;	
<b>Sub Total : (Months/Years)</b>		4 years	
<b>Total : (Months/Years)</b>		6 years	

<b>Professional Experiences</b>	
<ul style="list-style-type: none"> <li>i. state your precise positions have occupied in each case and describe clearly the degree of your <i>responsibility</i> assigned; use the first person (I, me, my) to show your personal contribution;</li> <li>ii. indicate the <i>size and cost</i> of the works; keep in about 3 – 4 projects or works demonstrating all competences;</li> <li>iii. elaborate on any particular <i>problems</i> encountered and how you arrived at viable solutions with consideration of <i>options or alternatives</i>;</li> <li>iv. provide evidence to demonstrate the competences (At most four relevant competences should be quoted at a time);</li> <li>v. provide evidence or examples of recent work to support their claim of attaining professional status, such as reports, plans, calculations, photographs, etc. as appropriate.</li> </ul>	
<b>Applying Mechanical Engineering Knowledge</b>	<b>Competence</b>
<p><b>Project Title:</b> Project A Lift Modernisation</p> <p><b>Position:</b> Engineer in charge to design and implement the lift modernisation project</p> <p><b>Project Brief:</b> to design, implement and supervise technical staff for X lift modernisation with ZZZM HKD contract sum; to develop a new approach to modernise the aged escalators without replacing the existing truss.</p> <p><b>Professional Experiences:</b> For lift modernisation, replacement of existing truss would be a major concern for clients and constraints of our implementation work. To resolve this engineering problem, I applied professional <i>knowledge and skills in mechanical engineering including solid mechanics, materials, design and manufacturing, dynamics</i> to lead my technical team considering alternatives and developing a new approach in order to retain the existing truss and modernise all other components inside the escalator in order to comply with the <i>local statutory requirements in Cap 618 Lifts and Escalators Ordinance</i>.</p> <p>I joined and attended seminars, factory visits, group discussions organised by the HKIE, the International Association of Elevator (IAEE), the Building Services Operation and Maintenance Executives Society (BSOMES), etc. to upkeep my technical knowledge of lift and escalator technologies, project management skills, etc. Through the direct discussion with experts in different fields, I obtained the up-to-date technical knowledge of lift and escalator industry.</p>	<p>C1, C2</p> <p>C11</p>

-----HKIE Competence Requirements-----	
<p>C1 - Comprehend and apply knowledge of accepted principles underpinning widely applied good practice for professional engineering</p> <ul style="list-style-type: none"> <li>- understand and grasp appropriate engineering knowledge and work from first principles to make reliable predictions of outcomes</li> <li>- seek advice, where necessary, to supplement own knowledge and experience</li> <li>- read understand, evaluate literature and put into practice new knowledge</li> </ul> <p>C2 - Comprehend and apply knowledge of accepted principles underpinning good practice for professional engineering that is specific to Hong Kong</p> <ul style="list-style-type: none"> <li>- demonstrate an awareness of legal requirements and regulatory issues in Hong Kong relevant to the RPE(MCL) under assessment</li> <li>- demonstrate an awareness of and apply appropriately the mechanical discipline specific engineering requirements in Hong Kong relevant to the mechanical discipline under assessment</li> </ul> <p>C11 - Maintain the currency of his or her professional engineering knowledge and skills</p> <ul style="list-style-type: none"> <li>- demonstrate a commitment to extending and developing knowledge and skills</li> <li>- participate in education, training, mentoring or other programmes contributing to his/her professional development</li> <li>- engage in collaborative activities with professional engineers</li> </ul>	
<b>Developing Technical Solutions</b>	<b>Competence</b>
<p><b>Project Title:</b> Project B Modernisation of X escalators and Y moving walkways; Project C Modernisation Z lifts for the Building C</p> <p><b>Position:</b> Engineer in charge to plan and supervise the investigation, design and implementation of the Project B and the Project C</p> <p><b>Project Brief:</b> The Project B was the escalator link in the district for serving over N residents with non standard rising angles of the escalators; The Project C is to modernise Z lifts for the Building B of XM HKD.</p>	



<p><b>Professional Experiences:</b></p>	<p>For Project B, I was responsible <i>to define, investigate, analyse and recommend</i> the approaches for the modernisation of X escalators and Y moving walkways with non standard rising angles of the escalators. As the <i>complex issues</i> in respect to non standard rising angles of the escalators comparing to the constant rising angle of escalator in typical building, with application of my mechanical engineering knowledge in mechanics of traction and braking system, I analysed the existing escalator systems and recommended a modernised design to replace X escalators and Y moving walkways.</p> <p>For Project C, I applied my fundamental <i>mechanical knowledge to develop</i> the rope system, traction, brake system, positive monitoring system, governor, safety gear, buffer stoke, overhead with manufacturer as well as control knowledge <i>to design</i> the double brakes monitoring system, unintended car movement protection device, ascending car overspeed protection device, advanced car door mechanical lock, door safety edge, intercom and CCTV system, automatic rescue device, obstruction switch to protect suspension ropes and other safety devices inside lift system.</p> <p>As the registered lift and escalator engineer, I had managed and was responsible for the inspection of lift and escalator since 2015. Meanwhile, with good lift and escalator engineering practice in accordance with requirements of Cap 618, I was also responsible for managing the inspection team for the lifts and escalators modernisation. Once the lift/escalator had been fully tested and validated in field, the test completion certificates would be issued in accordance with Cap 618.</p> <p>I emphasised the quality and reliability of the components and reviewed in regular meetings for improving the product development. Besides, I met with the manufacturer and vendor's engineers to feedback my findings from sites and to discuss with the supplier case by case in order to improve the quality, reduce installation costs, improve reliability and safety.</p> <p>-----HKIE Competence Requirements-----</p> <p>C3 - Define, investigate and analyse complex engineering problems in accordance with good practice for professional engineering</p>	<p>C3, C4</p>
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<ul style="list-style-type: none"> <li>- identify and understand the scope of the problem</li> <li>- look into details relevant information using quantitative and qualitative techniques</li> <li>- verify the correctness of results</li> <li>- conduct any necessary research and reaches substantiated conclusions</li> </ul> <p>C4 - Design or develop solutions to complex engineering problems in accordance with good practice for professional engineering</p> <ul style="list-style-type: none"> <li>- identify needs, requirements, constraints and performance criteria</li> <li>- formulate concepts and design possible solutions based on engineering principles</li> <li>- engage stakeholders in developing possible solutions</li> <li>- evaluate the pros and cons of the possible solutions and select a solution that best satisfies needs, requirements and criteria</li> <li>- plan and implement effective, efficient and practical systems or solutions</li> <li>- evaluate outcomes against original criteria and assumptions</li> </ul> <p>“Complex engineering problems” have some or all of the following characteristics:</p> <ul style="list-style-type: none"> <li>- involve wide-ranging or conflicting technical, engineering, and other issues</li> <li>- have no obvious solution and require originality in analysis</li> <li>- involve infrequently encountered issues</li> <li>- are problems beyond the scope of standards and codes of practice for professional engineering</li> <li>- involve diverse groups of stakeholders with widely varying needs</li> <li>- have significant consequences in a range of contexts</li> <li>- cannot be resolved without in-depth engineering knowledge</li> </ul>	
<p><b>Managing Engineering Work</b></p>	<p><b>Competence</b></p>
<p><b>Project Title:</b> Maintenance of X lifts and Y Escalators in Project D</p> <p><b>Position and Project Brief:</b> Project engineer to manage and supervise the maintenance activities for X lifts and Y escalators to comply with Cap 618 Lifts and Escalators Ordinance.</p>	

<p><b>Professional Experiences:</b></p>	<p>I was <i>responsible for the management</i> of Z technical staff to maintain of the lift and escalator systems. I took care of and <i>made decisions</i> on budget plan of HKD ZZZ and maintenance plan for management approval of the required resources and potential technical and financial goals, difficulties and risk.</p>	<p>C5, C12</p>
	<p>To deliver the maintenance services, extraordinary and emergency maintenance work on lifts and escalators when a breakdown, fault or other mechanical or electrical issue occurs, I developed a clear project management schedule and plan to fix and agree with different teams and parties. I conducted risk assessment and managed the risks associated repair, maintenance and overhaul of the lift and escalator systems.</p>	<p>C6, C7, C12</p>
	<p>With the management support, I was responsible to organise technical staff to form the teams also involving suppliers, clients, certificate providers and related stakeholders to maintain the say X lifts and Y escalators. I chaired regular meetings with my team to monitor and provide advice if there were any difficulties, delays or unexpected services. I gave direction and led all the key members for supporting them to solve the problems and negotiated all technical, financial and commercial terms with the clients.</p>	
<p>-----HKIE Competence Requirements-----</p>		
<p>C5</p>	<ul style="list-style-type: none"> <li>- Be responsible for making decisions on part or all of one or more complex engineering activities             <ul style="list-style-type: none"> <li>- take full responsibility during the course and/or for the outcome of complex engineering activities undertaken</li> <li>- act appropriately and make decisions during the course and/or for the outcome of complex engineering activities undertaken</li> </ul> </li> </ul>	
<p>C6</p>	<ul style="list-style-type: none"> <li>- Manage part or all of one or more complex engineering activities in accordance with good engineering management practice             <ul style="list-style-type: none"> <li>- plan, schedule and organise projects to deliver specified outcomes</li> <li>- apply appropriate quality assurance techniques to manage engineering projects</li> <li>- manage resources, including personnel, finance and physical resources in engineering projects</li> <li>- manage conflicting demands and expectations</li> <li>- demonstrate awareness of financial considerations in managing engineering projects</li> </ul> </li> </ul>	

<p>C7 - Identify, assess and manage engineering risk</p> <ul style="list-style-type: none"> <li>- locate hazards, apportion frequency of occurrence and formulate risk profile in design and operations</li> <li>- develop corresponding management policies, procedures and protocols to manage</li> <li>- manage risks in work and operations according to the policies, procedures and protocols</li> </ul> <p>C12 - Exercise sound professional engineering judgement</p> <ul style="list-style-type: none"> <li>- demonstrate the ability to identify alternative options</li> <li>- demonstrate the ability to choose between options and justify decisions</li> <li>- be recognised by peers for his/her ability to exercise sound professional engineering judgement</li> </ul> <p>“Complex engineering activities” mean engineering activities or projects that have some or all of the following characteristics:</p> <ul style="list-style-type: none"> <li>- involve the use of diverse resources including people, money, equipment, materials and technologies</li> <li>- require resolution of critical problems arising from interactions between wide-ranging technical, engineering and other issues</li> <li>- have significant consequences in a range of contexts</li> <li>- involve the use of new materials, techniques, or processes or the use of existing materials, techniques, or processes in innovative ways</li> </ul>	
<p><b>Upkeeping Professional Acumen</b></p>	<p><b>Competence</b></p>
<p>I was familiar and complied with HKIE Rules of Conduct. I also maintained a high standard of integrity and conduct in my profession at all times. As a registered lift and escalator engineer, I complied with company internal guidance and statutory requirements of Cap 618. In performing tendering and procurement exercises, I would carefully avoid any conflict of interest situations. With my working experiences, I was confident to declare that I carried out all my duties with integrity, fairness to all and the highest ethics in profession at all times.</p> <p>I was of professional engineering knowledge in respect of operational safety and health for my projects. Adhering to the company safety requirements, I requested all my team members and sub-contractors to conduct risk assessments and implement mitigation measures timely. For Project A, I carefully vetted the assessment reports and consulted safety officers for all the potential project risks and hazards. I also supervised critical events and conducted site checks to ensure the works were completed in safe manner. During my site visit of inspection, I reminded workers to wear appropriate</p>	<p>C8</p> <p>C9</p>

<p>personal protection equipment and to do the works based on the safety instruction provided by suppliers, company and EMSD.</p> <p>While planning and implementing the lift modernisation in Project B and maintenance works in Project D, I designed and arranged the works to comply with the statutory requirements of environmental and pollution control ordinances. For example, I would minimise the quantity of replaced items in order to save our environment, to save the money of stakeholder, to shorten the time and the scale of the lift works which would serious affect the resident in the exist building. I as far as practicable retained and renewed the existing components including landing doors, guide rails, counter weight, car sling that could be used for another 20 years. Moreover, in terms of energy saving, I designed energy saving equipment like the VVVF control system and permanent magnet machine to replace the aged equipment which over 40% electricity could be saved after the modernisation. After the modernisation, the safety standard and performance of the lifts would be sharply improved and the new system could better serve the public and to contribute this sustainable development for Hong Kong.</p> <p>For lift modernisation and overhaul of Project A, I would have to liaise, communicate, provide briefing sessions with clients, residents, engineers from property management company, other stakeholders related to my recommended proposal, implementation programme, etc. In case of incident case in Project D, I would provide professional advice and prepare incident investigation reports on mechanical and control equipment for lift and escalator systems.</p>	<p>C10</p>
<p>-----HKIE Competence Requirements-----</p>	
<p>C8 - Conduct engineering activities to an ethical standard prescribed by the HKIE</p> <ul style="list-style-type: none"> <li>- demonstrate understanding of HKIE Rules of Conduct</li> <li>- behave in accordance with the HKIE Rules of Conduct in difficult circumstances (including demonstrating an awareness of limits of capability; acting with integrity and honesty and demonstrating self-management)</li> </ul> <p>C9 - Recognise the reasonably foreseeable social, cultural, health, safety, sustainability and environmental effects of professional engineering activities generally</p> <ul style="list-style-type: none"> <li>- consider and take into account of the impact and long-term effects of engineering activities on social, culture, health, safety, sustainability and the environment</li> <li>- project the outcome of professional engineering activities in the context of social, cultural, health, safety, sustainability and environmental aspects</li> </ul>	

C10	<ul style="list-style-type: none"><li>- Communicate clearly with other engineers and others that he or she is likely to deal with in the course of his or her professional engineering activities<ul style="list-style-type: none"><li>- use oral and written communication to convey clear message to his/her audience that meet their needs and expectations of his/her audience</li><li>- communicate using a range of media suitable to the audience and context</li><li>- treat people with respect</li><li>- develop empathy and uses active listening skills when communicating with others</li><li>- operate effectively as a team member</li></ul></li></ul>	
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