T Level Technical Qualification in Maintenance, Installation and Repair for Engineering and Manufacturing (8730-12)

8730-033 Employer-Set Project Exemplar – E Grade

Summer 2024

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Introduction

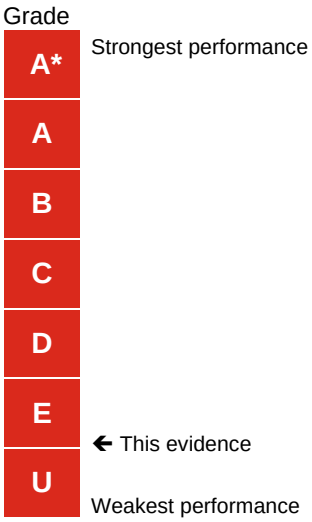
Summer 2024 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2024 assessment series to achieve an E grade for the 8730-033 Maintenance, Installation and Repair for Engineering and Manufacturing Employer-Set Project (ESP).

Providers and learners may wish to use it to benchmark the performance in formative assessment against this to help understand a potential grade that may be achieved if a learner was to attempt the next summative assessment series.

The Employer-Set Project is graded A* to E and Unclassified.

The exemplar evidence provided for the E grade displays the holistic standard required across the tasks to achieve the E grade boundary for the summer 2024 series. A slightly weaker performance would have resulted in an Unclassified (U) result being issued.



The Employer-Set Project brief and tasks can be downloaded from here.

Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments (grading-arrangements-for-vtqsand-technical-qualifications-within-t-levels-in-the-academic-year-2023-to-2024) whilst also recognising the standards required for these qualifications.

- The exemplar evidence presented, as a whole, was sufficient to achieve the E grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than an E grade).

Marking of this Employer-Set Project is by task and Assessment Objective, below is a summary of these along with the mark achieved by the evidence presented and the maximum mark available for each aspect.

Task	Assessment Objectives	Mark achieved	Max mark available
Task 1 Research	- AO1 Plan their approach to meeting the project brief - AO2a Apply core knowledge - AO3 Select relevant techniques and resources to meet the brief	3	9
	- AO2b Application of core skills	3	6
Task 2 Report	- AO1 Plan their approach to meeting the project brief - AO3 Select relevant techniques and resources to meet the brief	2	6
	- AO2a Apply core knowledge	2	6
	- AO2b Application of core skills	2	6
	- AO5a Realise a project outcome – was the right outcome achieved - AO5b Review how well the outcome meets the brief, how well the brief was met, the quality of the outcome in relation to the brief	1	6
Task 3 Plan	- AO1 Plan their approach to meeting the project brief - AO3 Select relevant techniques and resources to meet the brief	1	6
	- AO2a Apply core knowledge	1	6
	- AO2b Application of core skills	1	6
Task 4 Present	- AO1 Plan their approach to meeting the project brief - AO3 Select relevant techniques and resources to meet the brief	3	6
	- AO2a Apply core knowledge	1	6

	- AO2b Application of core skills	2	6
	- AO5a Realise a project outcome – was the right outcome achieved - AO5b Review how well the outcome meets the brief, how well the brief was met, the quality of the outcome in relation to the brief	2	6
Maths	- AO4a Use of Math skills	2	3
English	- AO4b Use of English skills	2	3
Digital skills	- AO4c Use of digital skills	2	3

What evidence was being assessed for the maths, English and digital skills:

Maths:

- Research Notes - calculations relating to costings (and consideration of estimations) (Task 1)
- Tolerances and dimensions on diagrams (Task 2)
- Calculations of estimated cost of replacement and maintenance (Task 2)
- Calculation of cost, timescales and critical path within the planning chart (Task 3)
- Any calculations within the supporting statement (Task 3)

English:

- Research Notes (Task 1)
- Report (Task 2)
- Supporting statement for the plan of work (Task 3)
- Presentation delivery (orally) and materials to support presentation (e.g. slides etc) (Task 4)

Digital:

- Types of sources used for Research (Task 1)
- Report and drawing (Task 2)
- Presentation of the planning chart (Task 3)
- Presentation materials (slides, handouts, notes etc) (Task 4)

Task 1 Research

Assessment number (eg 1234-033)	8730-033
Assessment title	Employer-Set Project

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	1
Evidence title / description	**Evidence expected for marking:** Research notes List of sources/references **Evidence submitted for marking:** Research notes List of sources/references
Date submitted by candidate	DD/MM/YY

Task 1 – Research:

Factors that influence the price of the escalator:

- Angle of the escalator
- Width of the steps on the escalator
- Height of the escalator
- Length of the escalator
- Speed of the steps on the escalator
- Number of steps on the escalator
- Indoor/Outdoor installation of the escalator
- Multiple parallel/Crisscross escalators
- Location of the escalator

Example calculations:

If the angle is 35 degrees:

Indoor escalator length = escalator height (m) * 1.428 + 4.905m

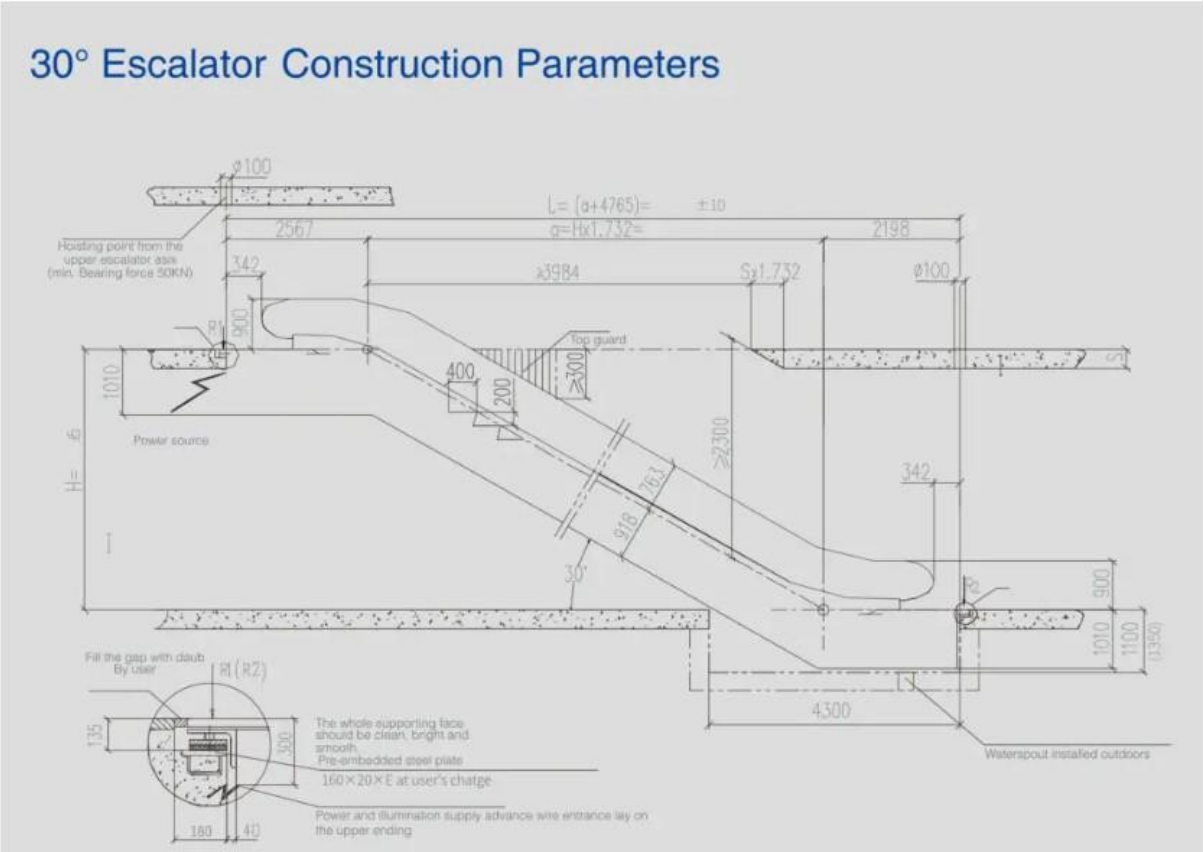
Outdoor escalator length = escalator height (m) * 1.428 + 5.105m

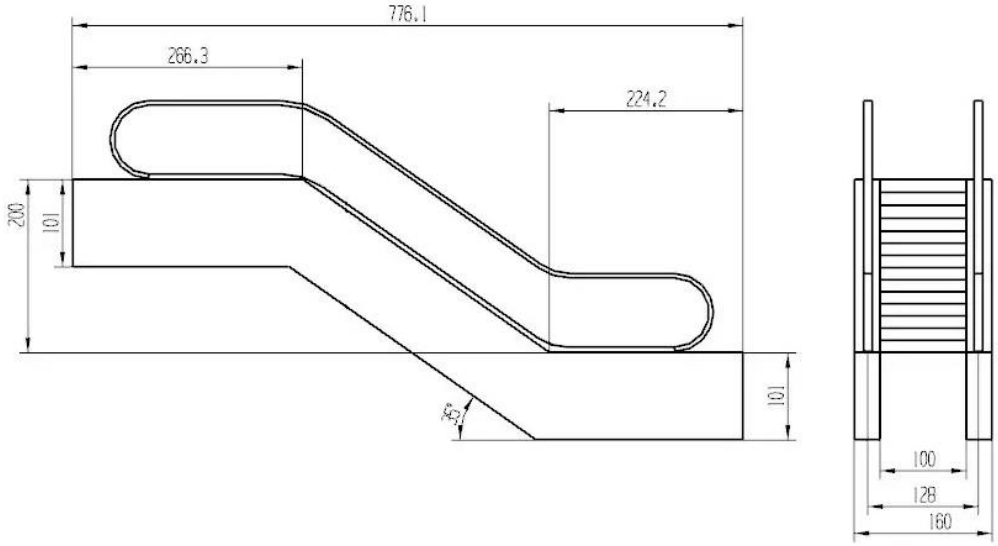
If the angle is 30 degrees:

Indoor escalator length = escalator height (m) * 1.732 + 4.765m

Outdoor escalator length = escalator height (m) * 1.732 + 4.965m

Example parameters:





Safety features on an escalator:

- Handrails
- Step sensors
- Skirt brushes
- Emergency stop buttons
- Safety comb plates
- Balustrades
- Skirting

- Speed sensors
- Overload protection
- Emergency lighting and alarms

Escalator installation:

1. Site assessment – Locate most convenient position for escalator use
2. Permits and regulations – obtain all required legalese and ensure everything meets production standard
3. Planning and design of the escalator – plan out and design the layout before installation
4. Preparation – prepare the construction site with proper support, power and other necessary utility
5. Delivery – parts must be delivered to the build site
6. Assembly – installation process must include the truss structure, handrails and safety features
7. Testing and inspection – ensure escalator functions safely and with no issues

Escalator maintenance:

- Regular inspection – schedule regular inspections by qualified technicians to check the escalator for any potential issues that have come up since installation
- Cleaning – regular cleaning of the components in the escalator to prevent debris buildup and maintain hygiene level for use
- Lubrication – properly lubricate all moving parts of the escalator regularly to ensure smooth and efficient operation
- Component replacement – replace older components of the escalator with new ones before the old part wears out and break down
- Emergency stop tests – test the emergency stop system to ensure it works in the case of an actual emergency
- Safety checks – verify that all the safety features of the escalator are still in use and function normally
- Training for staff – train building maintenance staff to recognise early signs of potential issues and how to respond to emergencies

Essential components:

- A structural truss
- Upper module step
- Handrail drive system
- The lower module
- Top landing platforms
- Bottom landing platforms
- Step chain
- The tracks
- Escalator steps
- The handrail

Estimate prices of components:

Handrail - £100 - £200

Escalator steps - £50 - £150

Skirt brushes - £30 - £50

Comb - £3 - £350

Handrail entry - £5 - £110

Motor - £1000 - £4500

Chain - £80 - £650

Skirt panels - £3 - £30

Rollers - £1 - £20

Balustrade – start price of £115 per metre

Deck barricade - £15 - £95

Handrail options:

- SBR (rubber) – the default material for escalator handrails, used on most escalators that are current in service
- NT (thermoplastic) – new high performance, long life, environmentally friendly material. Most likely a more expensive alternative than the default rubber

Tools required for handrail preparation and installation:

- Vulcanisation mould SBF 8
    - Core SBF 8
    - Control unit
    - Plug
    - Socket
    - Analog screw-in thermometer
    - Heating element
    - Thermocouple
    - Bracket top and bottom
    - Eye bolt
    - Hex nut
    - Bolt / 2 pin
- Narrow grooved hand roller
- Cyclopean scissors
- Regular cutting scissors
- Spew trimming knife
- Saddlers knife
- Hand roll 45mm even
- Whetstone
- Template for 60 degrees cut
- Flat nose pliers 160mm
- Rubber marker
- Pincers
- 8mm brush
- 3m tape measure
- Pull-on hook
- Stanley knife
- Vulcanisation gloves
- Grease paste

- Cut protection gloves
- Assembling core
- Sandpaper with 3M hookit fastening
- Grinding disc with 3M hookit fastening
- Mould stone green

Cleaning and sealing product for handrail:

- Cleaner 250
- Sealer 150
- Interim cleaner 540
- Cleaner 250 wipes
- Sealer 150 wipes
- Sponge
- Rag

References and where they were used:

What is an Escalator and How Much Does It Cost？ - Dazen (dazenelevator.com):

Factors that influence the price of the escalator

Example calculations

Example parameters

Safety features on an escalator

Escalator installation

Escalator maintenance

https://www.google.com/search?q=escalator+[mentioned escalator part]+price&[rest of URL]:

Estimate prices of components

How Much Is A Glass Balustrade Per Meter? | Origin Architectural:

Price of the balustrade in Estimate prices of components

CE Center - (bnpmedia.com):

Essential components

Escalator Products - A&A Electrical (aa-electrical.com):

Handrail options

Semperit_Handrail_Tool___Accessoires_Catalogue.pdf (semperitgroup.com):

Tools required for handrail preparation and installation

Cleaning and sealing product for handrail

Task 2 Report

Assessment number (eg 1234-033)	8730-033
Assessment title	Employer-Set Project

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

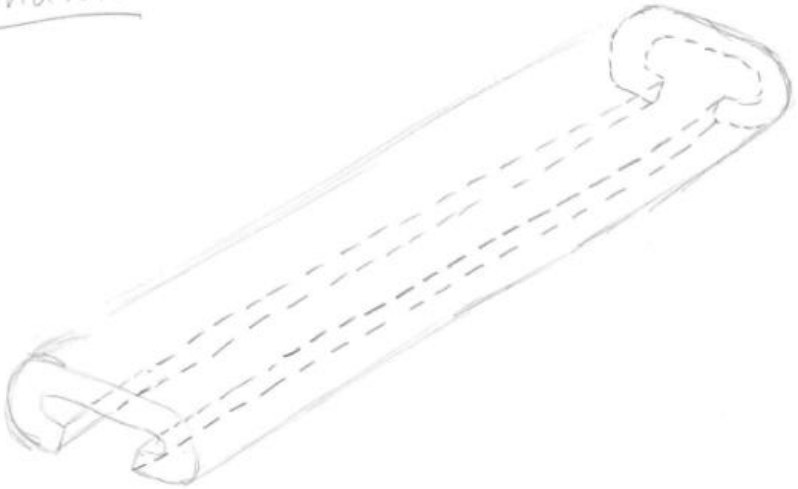
Task(s)	2
Evidence title / description	**Evidence expected for marking:** Written report (typically 2000 words) Engineering Drawing(s) (typically one side of A3) **Evidence submitted for marking:** Written report (typically 2000 words) Engineering Drawing(s) (typically one side of A3)
Date submitted by candidate	DD/MM/YY

Task 2 – Report

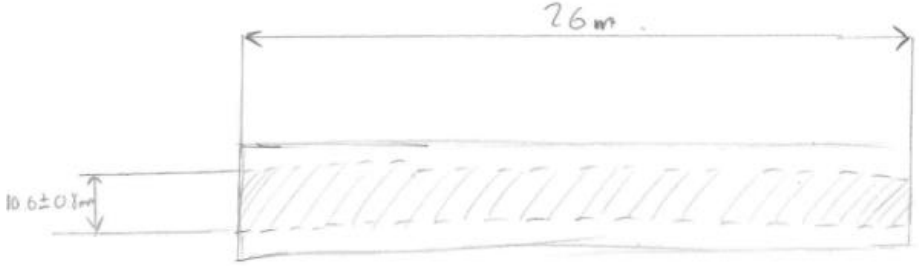
I have chosen to do this report on an escalator handrail as that is what was tasked to me by the employee. The handrail must be installed around the edge of the balustrade and capable of movement in synchronisation with the steps of the escalator. Moving parts must be well lubricated in order for smooth and efficient rotation of the handrail and the handrail itself must be sanitised for public use. A power supply must be used to power the moving parts, make sure the supply is correctly earthed and will not cause any shortage issues. There will be weekly checks on the rollers to relubricate any stiff parts and replace any old ones. A routine check must be exacted by a trained member of staff to inspect any component of the handrail system to ensure any faults in the system are identified before they become a serious problem, and measures can be taken to avoid these problems from surfacing. The handrail must fit tightly onto the balustrade so that it may not be peeled off unless by a trained member of staff with the correct equipment to do so, the handrail must also be able to fit into the handrail entrance and exit beneath the balustrade so it may complete its rotational sequence from one end of the escalator back to the other end. In order to install the handrail, the previous one must be cut by a trained member of staff with the right equipment may feed it out of the system and replace it with a new one. Once the old handrail has been taken out, the new one may be installed by reattaching the handrail to the balustrade and feeding it back into the handrail system, finally, melding the two ends together so it may endlessly rotate in synchronisation with the steps of the escalator. A monthly oil check will be carried out by a trained member of staff to replenish the oil if it is still in working condition or replace the oil if it is old. The same must be done with grease on all of the moving parts, grease checks should be done weekly however as the handrail will be in operation 24/7 and this will wear down the moving parts significantly if they are not lubricated regularly. If any one of the moving parts are shown to be worn down during any of these checks, a replacement is to be made promptly by the correct member of staff with the correct training. The drive systems must maintain the same treatment as the rollers as if they are stiff or at risk of breaking due to wear and tear or any other type of fault, the drive systems must be replaced or relubricated with grease or oil for a smooth and efficient run life. A weekly check must be done on the locking features to ensure that none of the locks that hold the systems in place have become loose or completely undone, in the case that a fault is found, the lock must be fastened securely or replaced with a functional lock and securely

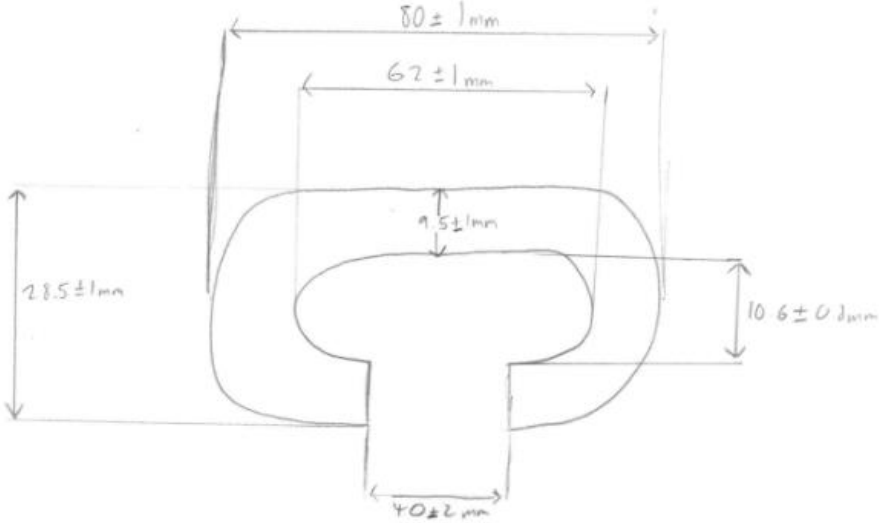
fastened again. Regular checks on the mechanical connections must be done to ensure they have been torqued properly and will not cause problems for the system, if during a check any of the connections have been found to be at fault the proper procedures must take into effect to properly torque the connection and ensure a safe system. Checks must be run on the electrical connections as well as the mechanical ones as if a fault is found in the electrical connections, it can result in potential casualties or injuries via electric shock depending on the voltage, it may also cause the system to be less efficient and lose its synchronisation with the steps due to a power deficit. A trained member of staff, namely an electrician, must fix these faults as soon as possible if they are found. The electrician must also check if the system is correctly earthed to prevent the system running too much voltage and blowing a fuse. The power supply must also be checked for wear, each individual component of the power supply must be checked for faults and the power supply must be turned off during any sort of electrical related check. If any component of the power supply or the power supply as a whole has had any sort of wear identified, it must be replaced with a newer, functional part.

Handrail



20.5±1mm
20.5±1mm


26mm
10.6±0.1mm


80±1mm
62±1mm
9.5±1mm
28.5±1mm
10.6±0.1mm
40±2mm

Task 3 Plan

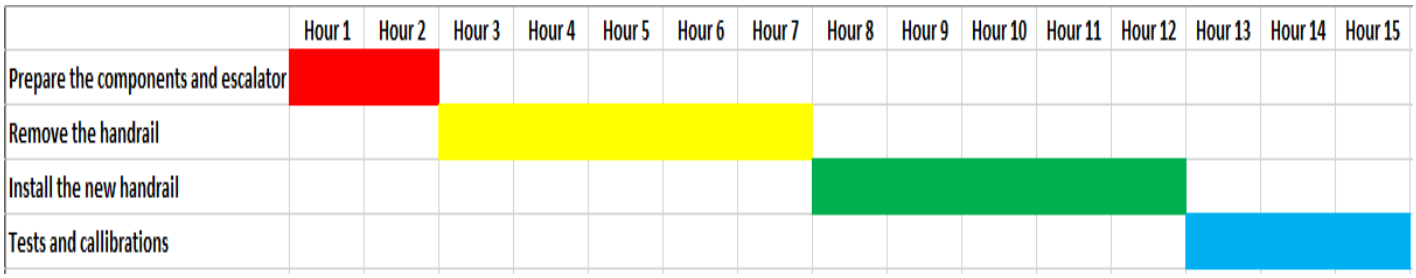
Assessment number (eg 1234-033)	8730-033
Assessment title	Employer-Set Project

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3
Evidence title / description	**Evidence expected for marking:** Planning chart (typically one side of A3) Support statement (typically 1000 words) **Evidence submitted for marking:** Planning chart (typically one side of A3) Support statement (typically 1000 words)
Date submitted by candidate	DD/MM/YY

Task 3 – Plan



Prepare the components and escalator:

- Purchase all equipment, components and PPE required to replace handrail of the escalator
- Ensure power to the escalator is turned off
- Loosen handrail tension

Remove the handrail:

- Decouple the handrail from the balustrade
- Cut the handrail with a hacksaw
- Decouple the handrail from the driver wheel at the lower end of the escalator
- Remove the handrail by pulling the handrail from the lower end of the escalator

Install the new handrail:

- Inspect new handrail for any defects before installation
- Couple the new handrail at the top end of the escalator
- Carefully roll down to the lower end of the escalator while making sure not to damage the rubber
- Loop around the driver wheel
- Push the handrail till both ends meet
- Fix the two ends together
- Retighten handrail tension

Tests and calibrations:

- Turn power back on
- Run multiple tests and calibrations on the new handrail to ensure it runs smoothly and in tandem with the steps of the escalator

    - **Note:** The proper member of staff must run tests, namely a technician or electrician
- Ensure all rollers are working correctly, stuck rollers will be indicated by making a squeaking noise as the handrail moves over them

Additionally, make sure the handrail meets proper hygiene standard both before and after replacement

Task 3 – Supporting Statement

A team of at least 3 engineers should be capable of replacing the handrail of an escalator. Having an electrician at hand if the safest option when interfering with the power system or any other electrical system involved as they would have the proper training required to safely handle any electrical system and not cause any issues in the system or for other people such as injuries or deaths. A technician will be able to run all the required tests and calibrations after the replacement has been completed with the help of the electrician too make sure the escalator and the handrail are both still in working order and there are no faults in the procedure. A maintenance engineer will be able to perform the removal of the old handrail and replacement of the new one as it is the safest option for preventing mistakes in the installation of the handrail or damage to the material.

Having proper PPE will also reduce the risk of the project, such as safety notices and bollards around the escalator to deter civilians getting on site and either causing themself harm or impeding the project. Goggles must be provided to all individuals working on the replacement of the handrail. Additionally, special cut resistant gloves made of a strong material will be provided to the maintenance material while working on the handrail and special insulated gloves will be provided to the electrician and technician while working on the electrical components and power supply to reduce the chance of getting electrocuted. If noise levels reach a certain decibel, then correct ear protection will also be provided to workers. Clean wipes will also be provided for the cleaning of the handrail before and after replacing the old one so it may meet proper hygiene standard and also so that the rollers are not dirty as that can cause problems in the system of the rotation of the handrail, namely soiling which can cause the rollers to become stuck.

Task 4 Present

Assessment number (eg 1234-033)	8730-033
Assessment title	Employer-Set Project

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	4
Evidence title / description	**Evidence expected for marking:** Presentation materials **Evidence submitted for marking:** Presentation materials
Date submitted by candidate	DD/MM/YY

Task 4 - Present

My findings

Justification for the handrail I have chosen

I have chosen the standard rubber handrail because it's the most common type of handrail and most information I came across was in regard to this default material. It was also the most cost effective in comparison to a special material

Planning of the activity

The planning of this activity mostly lay on how much information I could gather in Task 1 as it would serve as somewhat of a backbone for the rest of my tasks. For example, things such as the cost and material of certain components and brief instructions on how to install and maintain escalators.

Health and safety considerations

I have addressed multiple health and safety considerations in my findings. Things such as safety goggles and special gloves for specific jobs have been mentioned in addition to the use of portable barricades to deter nonworkers, disabling the power supply while working on the system, and only allowing workers with the correct training to do specific jobs.

Proposed costings

Following my findings of Task 1, a handrail costs anywhere between £100 and £200. However, if this instead means per metre, we can assume it will cost between £2600 and £5200 as the specification mentions the handrail will be 26 metres long.

Challenges presented by the brief and how these have been overcome

Finding relevant information for Task 1 was a challenge as a lot of valuable information was privatised but this challenge was overcome by simply taking whatever information helped and improvising it by using even more information from other places to create something more valuable and usable.

Any changes I would make if repeating this project

I would probably make changes to task 1 as well as this presentation if I repeat this project.

Finding useful information for task 1 was a task in of itself so if I were to repeat this project, I would try to search elsewhere for usable information.

Making presentations is not my strong suit so if I were to repeat this project, I would hopefully do a better job at making a presentation next time using the experience I gained from this first attempt

Employer-Set Project – Presentation Q & A Record (Task 4)

8730-12 T Level Technical Qualification in Maintenance, Installation and Repair for Engineering and Manufacturing

8730-033 Employer-Set Project (Summer 2024)

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234
Date	DD/MM/YY

Provider name	<provider name>
City & Guilds Provider No.	999999a

Record observation notes below to inform external marking. **Notes must be detailed, accurate and differentiating.**

Tutor questions to candidate	Candidate responses
What other materials would be used for handrail?	-Thermoplastic instead – only info was company info – more eco-friendly but more expensive -Moulded to fit balustrade and rotate.
How did you approach the maintenance schedule task?	-Looked at info from task 1 to understand how it was done. Used this to help with maintenance schedule.
What additional info could have supplied in brief to make task easier?	-In brief – some bullet points -Yes – takes some time to think about this. -Can't think about anything in particular.

Any other comments
The candidate’s presentation was brief but to the point.

Tutor signature	Date
X _____	DD/MM/YY

If completing electronically, double click next to the ‘X’ to add an electronic signature once the record is **finalised**.

Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

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