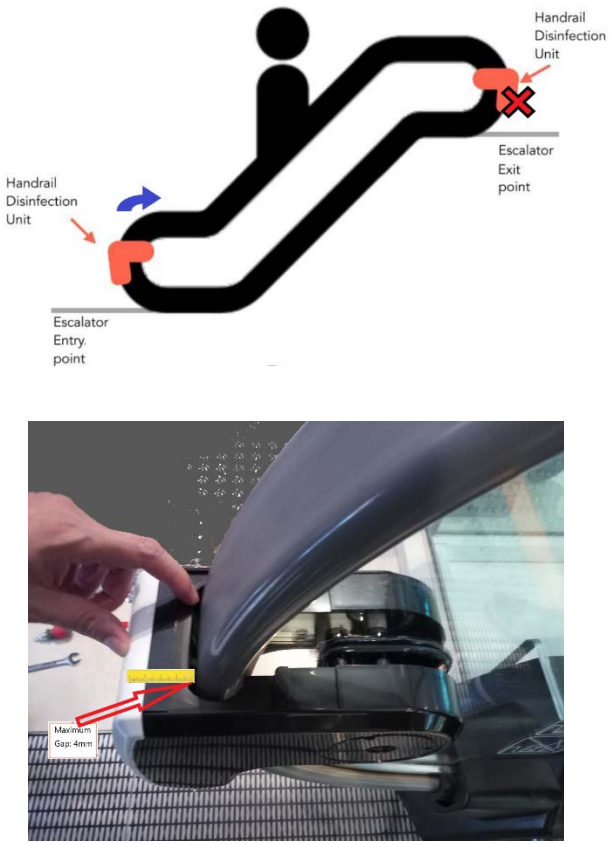
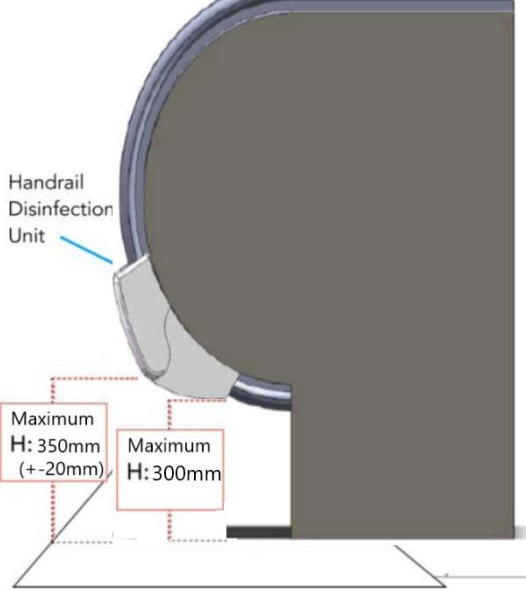


Major Risks associated with Escalator Handrail Cleaners

The following are major risks associated with escalator handrail cleaners. A sample risk assessment prepared by an external quality assurance agency is included in Appendix for easy reference.

Item	Risk and Mitigation	Illustration
1	<p>Risk: Pinching and trapping of passenger's fingers or clothing in the clearance between the handrail of an escalator and the sterilizer.</p> <p>Mitigation:</p> <ol style="list-style-type: none"> 1. The operation direction of the escalator shall be uni-directional by hardwiring such that the handrail accessible by passengers will always be moving <u>out</u> from the cleaner outlet. 2. The gap between the handrail of an escalator and the sterilizer shall be checked regularly to ensure it is within 4 mm to minimize the pinch hazard. 	
2	<p>Risk: Foreign matters being jammed into the sterilizer entry and outlet.</p> <p>Mitigation: The distance between the lowest edge of the sterilizer and the floor should be within 350 ± 20 mm. After installation, the lowest edge of the device, including protective profile (if any), shall be within 300 mm from the floor.</p>	

Appendix: Risk Assessment Template for Escalator Handrail Cleaner

Item	Description of Potential Risk	Recommended Remedial Measures
1	Risk of pinching and trapping of passenger's fingers or clothing in the clearance between handrail belt of escalator and the sterilizer.	<p>Average diameter from the age of 3 to 10, calculated from the girth measurement, was 16mm for the thumb, 15mm both the index and middle fingers, 14 and 13mm for the ring and little fingers, respectively. The gap between handrail of escalator and the sterilizer shall be installed and checked regularly to ensure not exceeding 4 mm in avoiding accident.</p> <p>Inform related personnel that the operation direction of the escalator is in an uni-directional operation mode by hardwiring such that the handrail moving out at the cleaner outlet. Remove the sterilizer if the running direction of the escalator need to be changed for any reason.</p>
2	To protect against risk of foreign matters being jammed into the sterilizer entry and outlet.	<p>The distance between the lowest edge of sterilizer and ground should not more than 350mm with 20mm acceptable tolerance.</p> <p>A protective profile shall be designed and installed so as to sufficiently cover the roller and other parts of the sterilizer. To prevent the parts from being reachable by the foreign matters, the cover installed shall be not exceeding 300mm measured from its lowest edge to the ground and also its distance between the outlet of escalator should be at least approx. 100mm for ease of checking of the outlet of escalator.</p>
3	Risk of trapping between sterilizer and the balustrade of the escalator.	Provide proper training to related personnel to seal all trapping gap according to the installation guide.
4	The safety concern and performance of the ultraviolet light.	The gap and cover have to be checked periodically to ensure it is not exceeding 4mm and intact. The performance shall be tested and approved by an accredited laboratory. The light output of an LED for a constant current varies as a function of its junction temperature, the disinfecting performance and efficiency may be varied by temperature.
5	Risk of collision by passenger or foreign matter.	Reflective or luminous tapes to be provided in conspicuous position to enhance passengers' attention.
6	Hinderance to escalator emergency stop switch.	Emergency stop switch should not be blocked by the sterilizer. Install the sterilizer properly according to the guideline provided by the manufacturer.
7	Possible breakage of the sterilizer and sharp edge.	No damage was found refer to result of test report of impact test (EN60950-1:2006/A2:2013) by laboratory. Regular inspection, especially before daily switch on the escalator, is required to ensure intactness of sterilizer enclosure.

Item	Description of Potential Risk	Recommended Remedial Measures
8	Risk of damage of balustrade during installation.	Installation guide and training should be provided to related personnel before carrying out the work.
9	Collapse of sterilizer due to poor installation work or maintenance work.	Manual vibration and shock test should be conducted after 30 minutes of applying the adhesive tape and/or sealant. To provide training and installation & maintenance manual for related personnel.
10	The concern of stability of mounting bracket when roller and gear is struck with great force.	The surface for applying adhesive tape should be cleaned thoroughly (dust, dirt, grease). Sufficient drying time is suggested to be waited according to the requirement provided by manufacturer for the smoothness and material before putting on bolts and screws. Periodical check on the surface of glass is recommended.
11	The strength of the bond between tape and the application surface may decrease after a certain period.	Regular check of the bonding performance of the tape in each maintenance. Manual vibration and shock test should be conducted. Replacement of the tape is required if the bracket may not adhere well on the application surface.
12	The safety concern of accident that happened during the operation.	The sterilizer should be able to detach during the escalator is in motion to minimize the potential risk for passengers. Such issue suggests to be recorded and analysed.
13	The installation of the sterilizer may, in certain extent, be incompatible with the design of the escalator.	It shall be checked whether the escalator such as the inclination of handrail and other spatial requirement fits the mechanical design of the sterilizer. Reference shall be made to the CoP of the Design and Construction of Lifts and Escalators and EN115-1 etc. It is suggested to evaluate the stability and performance for various speed of escalator.
14	Any debris or objects stuck in the rolling unit may cause the abnormal and affect the performance of sterilizer.	Such issue shall be paid attention in the regular check. In the case that the adjustment of protection bar is needed, it shall be taken out before cutting to prevent the cut debris falling into the unit.

Remarks:

By referring to EMSD circular No. 6/2019, an information leaflet about Major Risks Associated with Escalator Handrail Cleaners as above has been readily prepared through the joint efforts by “SGS” and “LECA” aiming to provide a general reference to anyone who are interested in this topic.

Last but not least, we would like to express special thanks to “EMSD” for his valuable comments throughout the preparation of this leaflet.