

New TX Series Escalators Featuring Enhanced Performance and Design, and Solutions for Minimizing Infection Risk

The spread of COVID-19 and the resulting diversification in how people work have boosted demand for comfortable spaces with high added value in offices and other commercial property. In response, Hitachi has developed a new model for the Japanese market in its latest TX Series of escalators that feature enhanced functionality and aesthetics, including design modifications to the steps and handrails. Hitachi has also put together a suite of infection risk mitigation solutions for the TX Series and other escalators that address the rising demand for antimicrobial disinfection and for maintaining social distancing on escalators, adding new products such as a handrail sterilizer. Installation of a new TX Series escalator for promotional use at the Hitachi Building Solutions Laboratory showroom of Hitachi Building Systems was completed in April 2021. This article describes the features of the TX Series escalator and its infection risk mitigation solutions.

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1. Introduction

Prompted by the spread of COVID-19, demand is rising for the antimicrobial disinfection of escalators and for maintaining social distancing during their use. In response, Hitachi has developed a new model for the Japanese market in its latest TX Series of escalators that feature enhanced functionality and aesthetics. Hitachi has also put together a suite of infection risk mitigation solutions^{*1} for the TX Series and other escalators. This has included the addition of new products such as a handrail sterilizer that became available in September 2020 and works by continuously disinfecting the handrail during escalator operation.

The new TX Series model for the Japanese market shares the same base design as other models in the series that are

already available in overseas markets but features specification and design changes optimized for the Japanese market. As well as retaining the safety and security functions and energy efficiency that were features of the VX Series, the TX's predecessor in the Japanese market, the new model also features enhancements to its functionality and aesthetics that include changes to the handrail design and yellow highlighting on the escalator steps that encourage safe use by demarcating the boundary of where to stand.

Installation at the Hitachi Building Solutions Laboratory showroom of Hitachi Building Systems Co., Ltd. of a TX Series escalator with a handrail sterilizer was completed in April 2021 to provide a venue for customer demonstrations (see **Figure 1**).

^{*1} Efficacy against all infectious diseases not yet demonstrated.

Figure 1 — New TX Series Escalator Installed at Hitachi’s Building Solutions Laboratory

The left-hand escalator in the photograph on the left is an S600TX, with skirt mold lighting, a stainless-steel EP handrail on the left side, and a glass-panel EN handrail on the right. The right-hand escalator on the right is an S1000TX-L with glass-panel handrails and handrail lighting.



2. Features of New TX Series Escalators

This section describes the features of the new TX Series escalators. All of the product features described here are fitted on the demonstration escalator referred to above.

2.1

New Step Design with Rounded Demarcation

To encourage safe use, the newly designed step features rounded corners for the rectangular yellow demarcation line that indicates where to stand. This provides unconscious encouragement to users to place their feet within the safe region of the escalator step (see **Figure 2**).

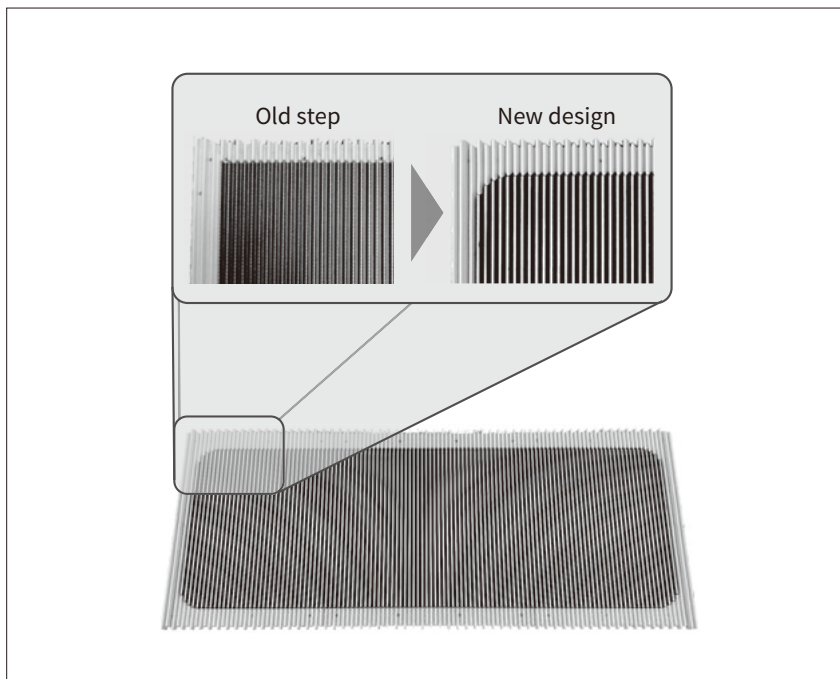


Figure 2 — New Rounded Demarcation Step Design

By rounding the corners of the rectangular yellow demarcation line, the design provides unconscious encouragement to users to place their feet within the safe region of the escalator step.

2.2

Minimalist Handrail Design

The escalator has a minimalist handrail design with little in the way of decoration. This design accentuates the handrail, with minimalism achieved by having semicircular terminal sections (the section of handrail around the escalator entry) and a simple shape for the plastic around the handrail inlet. The same cross-sectional profile is also used for the paneling on both the stainless-steel EP type and the L and EN types, which are made of glass.

(1) Frameless handrail: EN type (TX-EN)

This is a simple handrail with glass panels. Design changes mean that it is also available on outdoor models, something that was not possible with the previous VX Series.

(2) Frameless handrail lighting: L type (TX-L)

The illuminated glass-panel handrail available on the previous VX Series required a stainless-steel frame around the handrail, with a design that made the frame visible below the handrail. On the TX-L, in contrast, miniaturization of the lighting has eliminated the need for this frame and made it possible to offer illuminated glass-panel handrails with the same simplicity of design as the TX-EN. Moreover, use of light-emitting diode (LED) tape lighting has allowed this lighting to be lengthened so that it now provides seamless illumination that follows the handrail all the way to the inlet.

This combination of a frameless handrail and longer slim-line lighting provides a new style of handrail lighting never seen before (see **Figure 3**).

(3) Handrail with stainless-steel panels: EP type (TX-EP)

Changes to the aesthetic design mean that the same cross-sectional profile used for the glass-panel handrail is now available in stainless steel, combining stylishness with a sense of solidity.

2.3

Extensive Functions for Safety and Security and for Energy Efficiency

The functions on the previous VX Series for energy efficiency and for improving safety and helping users feel confident about using the escalator have also been carried over to the new model.

(1) Eco mode

This mode determines the rider load from the load on the inverter and reduces speed imperceptibly when there is only a small number of riders. Use of eco mode reduces energy consumption by approximately 6%².

² Benefits assessed for S1000 model (without lighting) with a 5-m floor height operating for 13 hours a day. Similarly, the assumed operating time for each energy-saving mode is based on operational data recorded for a VX Series escalator in 2010 and set at 10 hours for eco mode, 6 hours for slowdown when not in use, and 6 hours for the automatic restart system.

(2) Slowdown when not in use (optional extra)

This slows to 10 m/min when there are no riders and then gradually increases speed back up to 30 m/min when a sensor detects someone getting on the escalator. As continuing to operate at a slow speed indicates the direction of travel to users, this provides significant energy savings without compromising utility. Use of this mode reduces energy consumption by approximately 16%².

(3) Automatic restart system (optional extra)

By halting when there are no riders and automatically restarting when a sensor detects someone getting on the escalator, this reduces the amount of time the escalator runs without any riders during off-peak periods. Use of this mode reduces energy consumption by approximately 24%².

(4) Soft stop function

In the event of an emergency stop triggered by a safety mechanism, etc., this function minimizes the risk of users stumbling or falling over by decelerating the escalator gradually rather than coming to an abrupt halt.

(5) Audible guidance

The escalator issues audible guidance to advise riders when it is about to start, stop, or change speed, it also broadcasts alerts during sensor-controlled operation. Similarly, as an infection risk mitigation measure, the escalator can also play an announcement advising riders to maintain an appropriate distance from one another when the load exceeds a predetermined amount.

2.4

Skirt Mold Lighting

Developed as a proprietary Hitachi feature, LED lighting is embedded all along the skirt mold to help prevent shoes, trouser legs, or other items of clothing from coming into contact with the skirt guard. This lighting strip built into the skirt mold provides the escalator with a new style of lighting never used before. As this feature also provides foot lighting, it serves both a functional and aesthetic purpose (see **Figure 4**).

Figure 3 — Frameless Handrail Lighting: L Type (TX-L)

Slim-line lighting is built into the frameless handrail and the illumination range lengthened to provide a new style of handrail lighting never seen before.

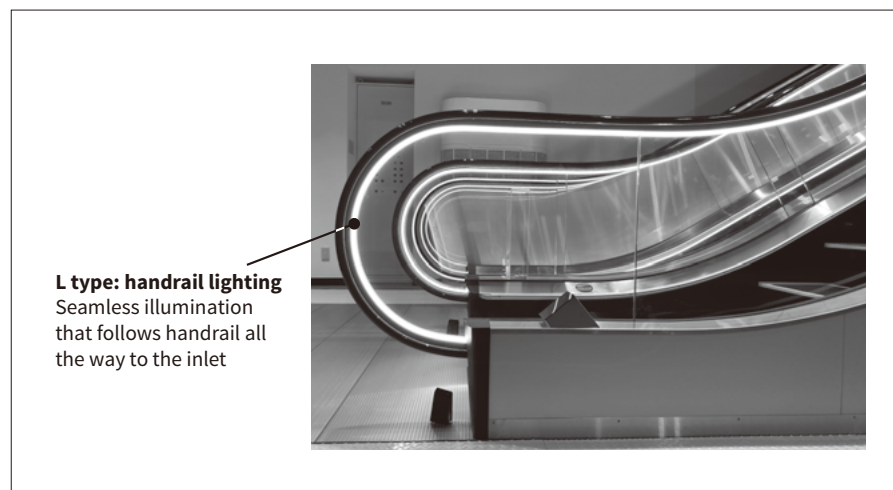




Figure 4 — Skirt Mold Lighting

Developed as a proprietary Hitachi feature, light-emitting diode (LED) lighting is embedded all along the skirt mold. This lighting strip built into the skirt mold provides the escalator with a new style of lighting never used before.

2.5

Automatic Diagnostics for Preventive Maintenance (Optional Extra)

When the escalator starts, it spends approximately three seconds performing an automatic slow-speed diagnostic check during which it collects operational information and assesses equipment condition^{*3}. The escalator also performs diagnostic checks during operation when there are no riders present, which is determined from the load on the inverter. The acquired information is used for preventive maintenance and to determine when best to perform servicing work by identifying any signs of potential faults or damage.

3. Infection Risk Mitigation Solutions for Escalators

This section describes a suite of infection risk mitigation solutions^{*1} made up of existing solutions that facilitate antimicrobial disinfection for escalators and the maintenance of social distancing during their use.

^{*3} Use of this service requires a maintenance contract with Hitachi Building Systems that covers remote maintenance.

3.1

Mitigation of Risks Associated with Handrail Contact

The act of holding onto the handrail, important for riding an escalator safely, is now something that is discouraged to prevent the spread of COVID-19. Accordingly, Hitachi has augmented its product range with solutions for keeping the handrail clean so that users can feel confident about holding it.

(1) Handrail sterilizer^{*4,*5} (combining antiviral and general disinfection, optional extra)

The handrail is continuously disinfected during escalator operation by exposing it to ultraviolet-C rays. Users are notified of this by playing an audio message at regular intervals and by means of a sticker affixed to the inner deck. As shown in **Figure 5**, the sterilizer unit is built into the escalator to keep it safe from damage by vandalism or similar (feature available on both TX and VX Series escalators). Note that this option is fitted on the demonstration escalator referred to above.

^{*4} The handrail solutions are mutually exclusive and only one can be adopted on each escalator.

^{*5} Please consult Hitachi regarding availability in the case of an escalator upgrade or retrofitting to an existing escalator.

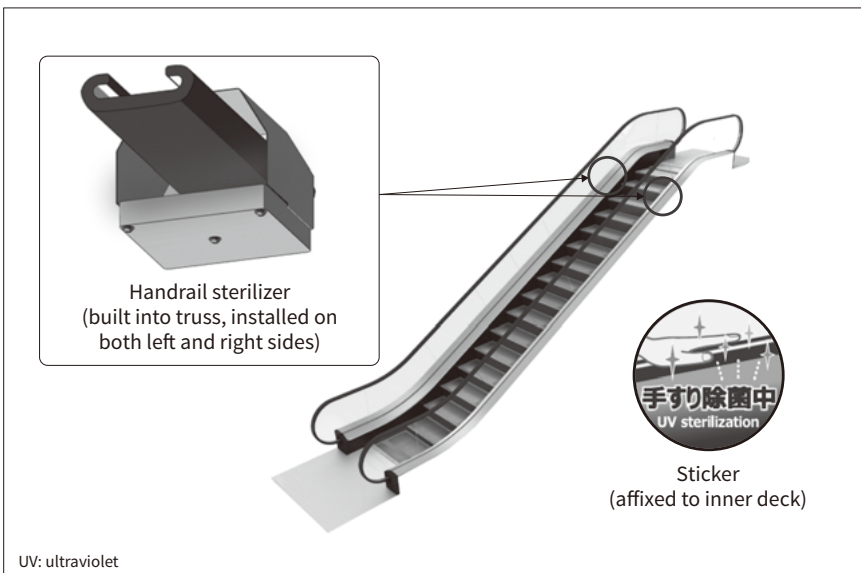


Figure 5 — Handrail Sterilizer

The sterilizer helps to reduce the risk of infection by disinfecting the handrail surface using LEDs that emit ultraviolet-C rays, which are effective against both bacteria and viruses.

(2) Handrail cleaner^{*4,*5,*6} (combining antiviral and general disinfection with cleaning, optional extra)

A cleaner fitted to the handrail inlet performs cleaning automatically at regular intervals. Containing 0.05% benzalkonium chloride, the cleaning fluid is effective against both viruses and bacteria (a feature available on VX Series escalators).

(3) Handrail coating^{*4,*5,*6} (combining disinfection and signage, optional extra)

Surface dirt and scratches are removed from the handrail surface and an antimicrobial coating is applied. As printing can be applied under this surface layer, the handrail can carry simple signage such as text or graphics (a feature available on both TX and VX Series escalators).

3. 2

Preventing Close Contact during Escalator Use

Hitachi provides a range of solutions that deliver audible or visual guidance to discourage the sort of crowding on escalators that happens at places such as railway stations during rush hour.

(1) Audible guidance^{*5}

This works by using the inverter load to determine the rider load and issues audible guidance reminding people to maintain social distancing if the load exceeds a predetermined amount (a feature available on both TX and VX Series escalators). Note that this option is fitted on the demonstration escalator referred to above.

(2) Step markings^{*5,*6} – Visual warning

Text or graphics are used on the escalator's steps or riser to encourage people to maintain an appropriate distance from one another. These take the form of a wrap. Customers are able to choose whatever design of text or graphics they want.

4. Conclusions

The TX Series of escalators offer extensive functionality and aesthetics, including for parts such as the steps and handrails. While sold as a business-to-business (B2B) product, once in service, elevators and escalators are also used by end users, making them in some sense a business-to-business-to-consumer (B2B2C) product. Accordingly, Hitachi aims to enhance its position in the marketplace by raising the level of awareness of Hitachi escalators and by earning a favorable opinion of them from end users as well as business customers, doing this by publicizing the excellent functionality and aesthetics of the TX Series through online and other channels as well as through showroom and other product demonstrations to the customers who actually purchase the equipment.

^{*6} This solution is a maintenance product and is only available for customers who have a maintenance contract with Hitachi Building Systems.

References

- 1) Hitachi News Release, "TX Series, New Escalator Model with High Functionality and Advanced Design, and Solutions for Reducing Infection Risk Involving Escalators" (Sep. 2020) in Japanese, <https://www.hitachi.co.jp/New/cnews/month/2020/09/0928a.html>
- 2) Hitachi Building Systems Leaflet, "Proposal for Reducing Hitachi Escalator Infection Risk," RE-597 (Sep. 2020) in Japanese.

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