Dedicated to People Flow™

KONE TRAVELMASTER™ 110

Environmental product declaration

KONE Environmental Product Declarations, or EPDs, provide independently verified information about the environmental performance of our products. EPDs are based on Life Cycle Assessments (LCA) carried out in compliance with the ISO 14040 and ISO 14044 standards.

The EPD lists all the components and environmental impacts of a representative sampling of our products throughout their life cycles, including energy and material consumption, waste generation, and emissions.

This EPD is a self-declaration developed in compliance with the ISO 14025 standard for Product Self-Declarations. The Life Cycle Assessment on which this EPD is based was jointly conducted by KONE and VTT Technical Research Centre of Finland.

Product reviewed in this document	
Escalator type	KONE TravelMaster™ 110 (EJV) escalator
Segment	Commercial
Rise	4.5 m
Inclination	30°
Step width	1,000 mm
Speed	0.5 m/s
Running direction	50% upwards, 50% downwards
Operation	14 hours/day, 6 days/week, 52 weeks/year, 15 years
Maximum capacity	6,000 persons/hour (according to EN 115-1 for 0.5 m/s)
Weight of passenger	75 kg (average value)
Maximum step load	100 kg (related to maximum capacity)
Usage load profile	0h–100%; 0.5h–75%; 1h–50%; 10h–25%; 2.5h–0%
Equivalent step load	25 kg
Manufacturer	KONE Corporation

Life Cycle Assessment

Life Cycle Assessment (LCA) is a tool for assessing the environmental impacts associated with a product, process, or service throughout its life cycle. The LCA covers the most important environmental aspects related to raw material production, component manufacturing, installation, use, maintenance, and end-of-life treatment i.e. full-chain assessment. Transportation is included in all stages of the life cycle. The LCA includes the consumption of raw materials and energy resources as well as emissions and waste generation.

The LCA is based on an estimated lifetime of 15 years for the reference escalator, a TravelMaster™ 110 operating 14 hours per day, 6 days per week and 52 weeks per year.

Because The KONE TravelMaster™ 110 is largely used in the Asian market, the Chinese mix of energy has been used for calculating emissions during the product's life cycle.

The total recycling rate for metals is assumed to be 95%. Metals are recovered as scrap from manufacturing and end-of-life processes.

The data used in the LCA is collected from the manufacturer and the suppliers as well as LCA databases. If no suitable data was available, calculations were based on expert opinion or the best estimation.

Total environmental impacts during the escalator's life cycle

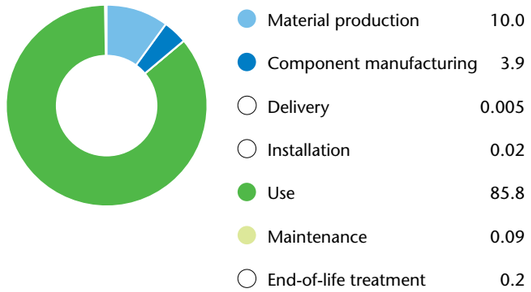
The impact assessment part of the LCA evaluates the significance of potential environmental impacts throughout the life cycle of the product. The Eco-indicator 99 (H, A)* method and the CML impact assessment method** have been used to calculate the share of the total environmental impacts of each life cycle stage.

The LCA shows that the biggest environmental impact during the escalator's life cycle is caused by electricity used for operating the escalator ***. Electricity consumption can be reduced significantly with different operating modes: the stand-by mode decreases the total environmental impact by 10% and the Stop & Go mode (escalator stops when not in use) by 18%.

The most significant environmental impacts of the escalator result from the fossil fuels used to generate the electricity that powers the equipment, in particular hard coal and crude oil. Air emissions that result from the use of these fossil fuels include carbon dioxide, nitrogen oxides, sulfur oxides and particulates. The impact categories included in the LCA are global warming, eutrophication, photochemical oxidation, and acidification.

About 89% of carbon dioxide (CO2) and nitrogen oxide (NOx) emissions as well as 94% of sulphur oxide (SOx) emissions are generated during the use stage of the life cycle.

The shares of the total environmental impacts of the life cycle stages using Eco-Indicator 99 method



** Eco-indicator 99 (H, A) (EI99) – A damage-oriented life cycle impact assessment method. Pollutants are allocated to impact categories and normalized by dividing the national total impact potentials. The environmental effects are then assigned to damage categories, which include the effects on human health, the quality of an ecosystem, and the fossil and mineral resources.*

*** CML Impact Assessment Method — A problem-oriented LCA method developed by the Institute of Environmental Sciences (CML) at Leiden University, the Netherlands. It allocates pollutants to impact categories.*

**** The installation location plays a significant role, when calculating the environmental impacts throughout the escalator's life cycle. Compared to the China case used as the reference, the total impact is approximately 54% smaller if the use location is in Europe, 46% smaller if in the U.S.A. and 20% smaller if in the Middle East. These variations are due to the different fuel mixes used in the different regions.*

Total primary energy and emissions to air

	Values per escalator, with reference operation 1 km distance	Values per escalator for the whole life cycle
Total primary energy	25.60 MJ	3,018,528 MJ
Emissions to air		
CO_2	1.62 kg	190,662 kg
NO^X	6.02E-03 kg	709 kg
SO^X	1.26E-02 kg	1,483 kg
Particulates	1.31E-03 kg	155 kg

Emissions expressed in terms of environmental impact categories*

Category of impact	Equivalent unit	Values per escalator, with reference operation 1 km distance	Values per escalator in the whole life cycle
Global warming (GWP100)	kg CO_2 eq.	1.88	222,208
Eutrophication	kg PO_4 eq.	7.96E-04	94
Photochemical oxidation	kg ethylene eq.	6.83E-04	81
Acidification	kg SO_2 eq.	1.79E-02	2 ,111

** Note that the impacts have different equivalent units. Values are calculated according to the factors of CML impact assessment method.*

Operating mode	Operational hours/year [h]*	Energy consumption/ year [kWh]
Continuously running*	4,370	9,110 kWh
Stand-by speed with no passenger load**	4,370	7,720 kWh
Stop & Go with no passenger load***	3,560	7,870 kWh

** Continuously running: 14 h / day operation, 6 days / week, 52 weeks / year*

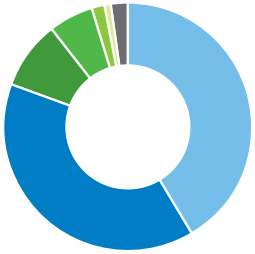
*** Stand-by speed with no passengers: 11.5 h / day operation 0.5 m/s, 2.5 h / day operation 0.2 m/s, 6 days / week, 52 weeks / year*

**** Stopped with no passengers: 11.5 h / day operation, 2.5 h / day no operation, 6 days / week, 52 weeks / year*

Product material content

The KONE TravelMaster™ 110 escalator is mainly composed of zinc coated and uncoated steel, and aluminum.

The product does not contain asbestos, paints containing lead or cadmium pigments, capacitors containing PCBs or PCTs, ozone layer-depleting chemicals such as CFCs, or chlorinated solvents. Mercury is not used in applications other than lighting. Cadmium stabilizers are not used in plastics.



Material	Weight (%)
Steel	41.5
Steel (zinc coated)	39.2
Aluminum	8.8
Raw glass	5.7
Other metals	1.7
Plastics	1.0
Others	2.0

Product recycling description

The end-of-life treatment of the escalator consists of multi-metal scrap recycling. The metals represent about 91% of the escalator material weight, and are recyclable. Recycling metals clearly reduces the environmental impacts, primarily because recycling lowers the demand for primary metals as raw materials.

Packaging includes wood (42%), plywood (49%), and plastics and other materials (9%). Wood and plywood can be recycled or used for energy recovery. Plastics can also be used for energy recovery, or disposed of in landfills.

Glossary

Acidification potential
Chemical alternation of the environment, resulting in hydrogen ions being produced more rapidly than they are dispersed or neutralized, occurs mainly through fallout of sulfur and nitrogen compounds from combustion processes. Acidification can be harmful to terrestrial and aquatic life.

CML-Impact Assessment Method
The CML methodology is based on midpoint modeling (problem oriented method). Pollutants are allocated to impact categories.
Eco-Indicator 99 (H,A) (EI99) –Impact Assessment Method
Damage factors in the hierarchism perspective. Pollutants are allocated to impact categories and are normalised by dividing the national total impact potentials. The environmental effects are then assigned to 'damage categories' which include the effects on human health, the quality of an ecosystem, and the fossil and mineral resources.

Eco-Indicator 99 (H,A) (EI99) –Impact Assessment Method
Damage factors in the hierarchism perspective. Pollutants are allocated to impact categories and are normalised by dividing the national total impact potentials. The environmental effects are then assigned to 'damage categories' which include the effects on human health, the quality of an ecosystem, and the fossil and mineral resources.

Eutrophication potential
Enrichment of bodies of water by nitrates and phosphates from organic material or the surface run-off, increases the growth of aquatic plants and can produce algal blooms that deoxygenate water and smother other aquatic life.

Functional unit
The quantified performance of a product system for use as a reference unit.

Global warming potential (GWP100)
The index used to translate the level of emissions of various gases into a common measurement to compare their contributions to the absorption by the atmosphere of infrared radiation. Greenhouse gases are converted to CO2 equivalents with GWP factors, using factors for a 100 year interval (GWP100).

Life Cycle Inventory (LCI)
Phase of life cycle assessment involving the compilation and quantification of inputs and outputs for a product system throughout its life cycle.

Life Cycle Impact Assessment (LCIA)
Phase of life cycle assessment aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts for a product system throughout the life cycle of the product.

Ozone depletion potential (ODP)
The index used to translate the level of emissions of various substances into a common measure to compare their contribution to the breakdown of the ozone layer. ODPs are calculated as the change that would result from the emission of 1 kg of a substance to that from emission of 1 kg of CFC-11 (a freon).

Photochemical oxidation
The index used to translate the level of emissions of various gases into a common measurement to compare their contributions to the change of ground-level ozone concentration. POCPs are calculated as the change that would result from the emission of 1kg of a gas to that from emission of 1 kg of ethylene.

Recycling rate
Metals recovered as scrap from manufacturing processes and scrap from end-of-life.

Volatile organic compounds (VOC)
A wide group of organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize into the atmosphere. VOCs cause various environmental impacts that depend on the specific set of compounds released. Mainly VOCs contribute to photochemical oxidation and respiratory organics.

References

ISO 14025: Environmental labels and declarations. Type III environmental declarations. Principles and procedures. 2006-12-18.

ISO 14040: Environmental management. Life cycle assessment. Principles and framework. 2006-12-18.

ISO 14044: Environmental management. Life cycle assessment. Requirements and guidelines. 2006-12-18.

Behm, Katri and Tonteri, Hannele. The Life Cycle Assessment of KONE TravelMaster™ 110 Escalator. Research report No VTT-R-02318-10. VTT. Espoo, Finland 2010.