Dedicated to People Flow™

KONE TransitMaster™ 120

Environmental product declaration

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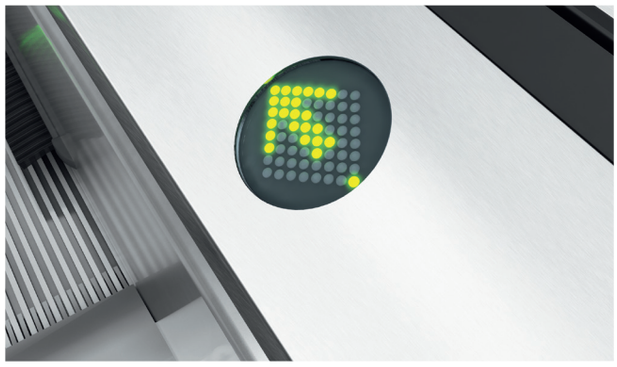
General information

This Environmental Product Declaration (EPD) provides you with information on the environmental performance of KONE products and services. The Environmental Product Declaration is made according to the ISO 14025 standard. In addition, the ISO 14001 Environmental Management System is implemented in several KONE units. For the latest information on KONE Elevators & Escalators responsibility including Environmental Management, see **www.kone.com**.

The results of the Environmental Product Declaration are valid for the KONE TransitMaster™ 120 escalator, the reference escalator in the infrastructure segment, mainly targetted at airports and light transit centers.

Product description	
Escalator type:	KONE TransitMaster™ 120 escalator
Segment:	Infrastructure
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%; 1.0-50%; 10h-25%; 2.5h - 0%
Equivalent step load:	25 kg
Manufacturer:	KONE Corporation



Environmental performance

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 of the KONE TransitMaster™ 120 escalator was applied in compliance with the requirements of the ISO 14040 and ISO 14044 standards.

Functional unit
The function of an escalator is to give people access to multi-storey buildings. The functional unit is a 1 km distance traveled by the escalator. The LCA results for the whole life cycle are also represented in this Environmental Product Declaration.

System boundaries
The Life Cycle Assessment covers the important environmental aspects for raw material production, component manufacturing, installation, use, maintenance and end-of-life treatment; in other words full chain assessment. Transportation is also included in the stages of the life cycle. The Life Cycle Assessment includes the consumption of raw materials and energy resources, as well as emissions and waste generation.

The Life Cycle Assessment is based on an estimated lifetime of 15 years for the reference escalator TransitMaster™ 120 operating 14 hours per day, 6 days per week and 52 weeks per year. The Chinese national energy mix has been used for calculating emissions during the life cycle.

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

The data used in the Life Cycle Assessment is collected from the manufacturer and suppliers as well as LCA databases. If no suitable data was available, an expert opinion or the best estimation was used.

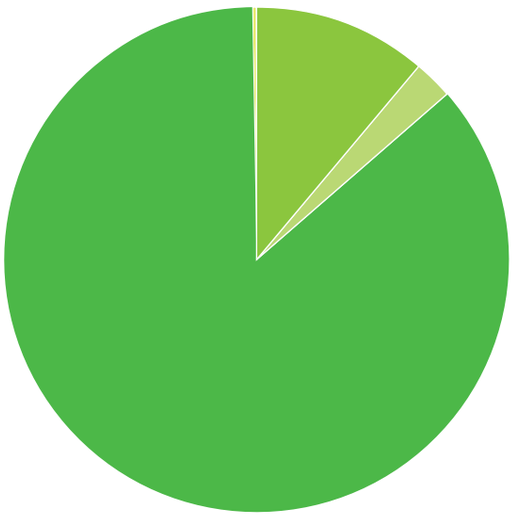
The most significant environmental impacts

About 91% of carbon dioxide (CO_2) emissions, 91% of nitrogen oxide (NOX) emissions and 86% of sulfur oxide (SOX) emissions are generated during the use stage. By comparison, during material production carbon dioxide emissions are 7%, and during component manufacturing 1% of the total carbon dioxide emissions. About 90% of the total primary energy is consumed during the use stage.

Total primary energy and emissions to air		
	Values are calculated per escalator, with a reference operation of 1 km	Values are calculated per escalator in the whole life cycle
Total primary energy	36.8 MJ	4,343,275 MJ
Emissions to air		
CO_2	2.36 kg	277,763 kg
NO_X	8.77E-03 kg	1,035 kg
SO_X	2.05E-02 kg	2,415 kg
Particulates	1.87E-03 kg	221 kg

The Impact Assessment phase of LCA evaluates the significance of potential environmental impacts throughout the life cycle of the product. The shares of the total environmental impacts of the life cycle stages have been calculated using the Eco-Indicator 99 (H,A) method and the factors of the CML-Impact Assessment method. The absolute values of the impact assessment are not highly relevant because the main purpose is to compare the relative differences between products or processes.

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



The stage of the life cycle	EI99 value-%
Material production	11.2
Component manufacturing	2.5
Delivery	0.0
Installation	0.02
Use	86.1
Maintenance	0.06
End-of-life treatment	0.2

The most significant environmental aspects of the escalator are fossil fuels (particularly hard coal and crude oil) and air emissions (particularly carbon dioxide, nitrogen oxides, sulfur oxides and particulates) according to the CML-Impact Assessment and Eco-Indicator 99 methods. The impact categories included are global warming, eutrophication, photochemical oxidation, and acidification.

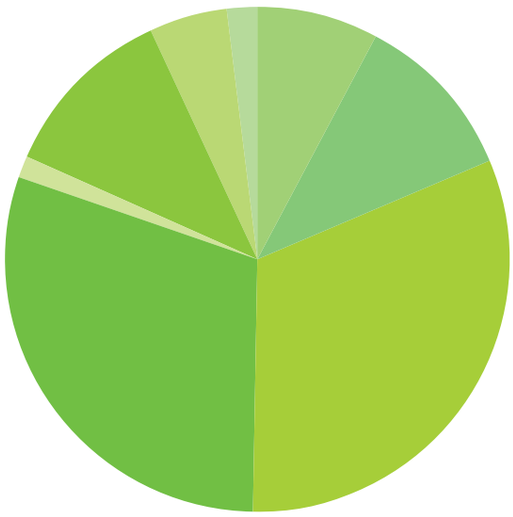
Emissions expressed in terms of environmental impact categories			
Category of impact	Equivalent unit	Values are calculated per escalator, with a reference operation of 1 km	Values are calculated per escalator in the whole life cycle
Global warming (GWP100)	kg CO_2 eq.	2.75	324,361
Eutrophication	kg PO4 eq.	1.16E-03	137
Photochemical oxidation	kg ethylene eq.	1.09E-03	129
Acidification	kg SO2 eq.	2.87E-02	3,389

* Values are calculated according to the factors of CML-Impact Assessment method.

The Life Cycle Assessment shows that most of the environmental impacts of an escalator's life cycle are caused by the electricity used for operating the escalator during the use stage.

Additional environmental information

Product material content
The KONE TransitMaster™ 120 escalator is mainly composed of steel, copper, and plastics.



Material	Weight (%)
Aluminum	7.8
Copper	10.9
Steel	31.9
Steel, zinc coated	30.0
Other metals	1.3
Plastics	11.4
Glass	5.1
Others	1.7

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.

8.7 kg of VOC emissions are released during the life cycle of the escalator. The main sources of VOCs are material production (87%), component manufacturing (3%) and the use stage (10%).

Recycling description

The end-of-life treatment of the escalator is multi-metal scrap recycling. The metals, which represent about 82% of the escalator material weight, are recyclable. When metals are recycled there is a clear reduction in environmental impacts, primarily because the recycling of metals lowers the demand for primary metals as raw materials. Plastics can be used for energy recovery or disposed of in landfills.

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

Sensitivity analyses

The electricity consumption of the escalator during the use stage (life cycle) with different operating modes affects the environmental results significantly: the stand-by mode decreases the total environmental impact by nearly 10% and the stopped mode by 17%.

Operational mode	Operational hours/year [h]*	Energy consumption/year [kWh]
Continuously running*	4,370	13,580 kWh
Stand-by speed without passenger load	4,370	12,070 kWh
Stopped without passenger load	3,750	10,880 kWh

***Continuously running:** 14 h/day operation, 6 days/week, 52 weeks/year
Stand-by speed without passengers: 12 h/day operation 0.5 m/s, 2 h/day operation 0.2 m/s, 6 days/week, 52 weeks/year
Stopped without passengers: 12 h/day operation, 2 h/day no operation, 6 days/week, 52 weeks/year

Glossary

Acidification potential
Chemical alteration 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)
Damage factors in the hierarchic perspective. Pollutants are allocated to impact categories and are 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.

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.

Exponential notation (E)
A way of writing numbers that accommodates values too large or small to be conveniently written in standard decimal notation, for example 7.21E-04 kg is equal to 0.000721 kg.

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 atmosphere's absorption of infrared radiation. Greenhouse gases are converted to CO_2 equivalents with GWP factors, using factors for a 100-year interval (GWP100).

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 the 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 the emission of 1 kg of ethylene.

Recycling rate
The percentage of metal 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.

This document has been developed in collaboration with VTT, Technical Research Centre of Finland. VTT is a contract research organization involved in many international assignments. With its more than 2700 employees, VTT provides a wide range of technology and applied research services for its clients, private companies, institutions and the public sector. VTT is striving to improve the well-being of society and to enhance the technical and economic performance of its clients.

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 TransitMaster™ 120 Escalator. Research report No VTT-R-02318-10. VTT. Espoo, Finland 2010.

KONE provides innovative and eco-efficient solutions for elevators, escalators and automatic building doors. We support our customers every step of the way; from design, manufacturing and installation to maintenance and modernization. KONE is a global leader in helping our customers manage the smooth flow of people and goods throughout their buildings.

Our commitment to customers is present in all KONE solutions. This makes us a reliable partner throughout the life-cycle of the building. We challenge the conventional wisdom of the industry. We are fast, flexible, and we have a well-deserved reputation as a technology leader, with such innovations as KONE MonoSpace®, KONE MaxiSpace™, and KONE InnoTrack™. You can experience these innovations in architectural landmarks such as the Trump Tower in Chicago, the 30 St Mary Axe building in London, the Schiphol Airport in Amsterdam and the Beijing National Grand Theatre in China.

KONE employs over 34,800 dedicated experts to serve you globally and locally in over 50 countries.

KONE Corporation
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