
**Energy performance of lifts, escalators
and moving walks —**

**Part 1:
Energy measurement and verification**

*Performance énergétique des ascenseurs, escaliers mécaniques et
trottoirs roulants —*

Partie 1: Mesurage de l'énergie et vérification

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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
1.1 General	1
1.2 Lifts	1
1.3 Escalators and moving walks	1
2 Terms and definitions	1
3 Measurement and verification of lift, escalator and moving walk energy usage	3
3.1 General	3
3.2 Lift energy measurements or escalator and moving walk power measurements	4
3.3 Lift, escalator and moving walk energy verification check	4
3.4 Multiple lift, escalator and moving walk installations	5
4 Measurement procedures for a lift installation	5
4.1 Preliminaries	5
4.2 Procedures for the energy measurements	6
4.3 Procedures for the energy verification check	7
5 Measurement procedures for an escalator or moving walk installation	9
5.1 Preliminaries	9
5.2 Procedures for power measurement	9
5.3 Procedures for the power verification check	10
6 Reporting	10
6.1 General information	10
6.2 Lift reporting	11
6.3 Lift energy usage verification check	11
6.4 Escalator and moving walk energy reporting	12
6.5 Escalator and moving walk energy verification check reporting	12
Annex A (informative) Measuring instrument coupling points	13
Bibliography	15

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 25745-1 was prepared by Technical Committee ISO/TC 178, *Lifts, escalators and moving walks*.

ISO 25745 consists of the following parts, under the general title *Energy performance of lifts, escalators and moving walks*:

— *Part 1: Energy measurement and verification*

Additional parts, dealing with energy calculation and classification for lifts (elevators) and energy calculation and classification for escalators and moving walks, are planned.

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Introduction

This International Standard has been prepared in response to the rapidly increasing need to ensure and to support the efficient and effective use of energy. This International Standard provides:

- a) a consistent method of measuring actual energy usage of an installed lift, escalator and moving walk;
- b) a simple method to periodically verify that energy usage of an installed unit has not changed — this is in support of regulatory periodic energy verification requirements.

This International Standard is intended to be a reference for the following parties:

- building developers or owners determining and confirming the energy consumption of a building;
- building owners and service companies for performing regulatory periodic energy verification;
- the manufacturers, installers and maintenance providers of lifts, escalators and moving walks;
- consultants and architects involved in specification of lifts, escalators and moving walks.

The total energy consumption over the entire life cycle of lifts, escalators and moving walks consists of the energy to manufacture, install, operate, and the disposal of lifts, escalators and moving walks. However, for the purpose of this International Standard, only the power consumption of the lift, escalator or moving walk required for its operation is considered in the assessment of energy consumption and its verification.

This International Standard is suitable for national or regional jurisdictional energy performance purposes, such as European Directive 2010/31/EU.^[4]

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Energy performance of lifts, escalators and moving walks —

Part 1: Energy measurement and verification

1 Scope

1.1 General

This part of ISO 25745 specifies:

- a) methods of measuring actual energy consumption of lifts, escalators and moving walks on a single unit basis;
- b) methods of carrying out periodic energy verification checks on lifts, escalators and moving walks in operation.

This part of ISO 25745 only considers the energy performance during the operational portion of the life cycle of the lifts, escalators or moving walks.

1.2 Lifts

For lifts, this part of ISO 25745 does not cover energy aspects, such as:

- a) hoistway lighting;
- b) heating and cooling equipment in the lift car;
- c) machine room lighting;
- d) machine room heating, ventilation and air conditioning;
- e) non-lift, display systems, closed circuit television security cameras, etc.;
- f) non-lift, monitoring systems (building management systems, etc.);
- g) the effect of lift group dispatching on energy consumption;
- h) consumption through the power sockets.

1.3 Escalators and moving walks

For escalators and moving walks, this part of ISO 25745 covers energy aspects of the ancillary equipment, such as:

- a) lighting with the exception of comb plate lighting and step gap lighting and traffic light;
- b) cooling and heating;
- c) alarm devices and emergency battery supplies equipment, etc.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

ancillary current

current drawn by the ancillary circuit(s) through the ancillary switch(es)

- 2.2 ancillary energy**
energy used by the ancillary equipment
- 2.3 ancillary equipment**
equipment such as lighting, fans, heating, alarm devices and emergency battery supplies
- 2.4 ancillary power coupling point**
point where ancillary power measurements are taken, and which is located at the output side of the lift, escalator or moving walk ancillary power breaker

NOTE See Annex A.

- 2.5 autostart condition**
condition when an escalator or moving walk is stationary, powered up and ready to start when initiated by passenger detection
- 2.6 energy**
power consumed over time

- 2.7 energy meter**
instrument capable of measuring energy

- 2.8 idle condition**
condition when a lift is stationary at a floor following a run before the standby mode is entered

- 2.9 load condition**
condition in which an escalator or moving walk is running with one or more passengers

- 2.10 main power coupling point**
point where the main power measurements are taken, and which is located at the output side of the main switch/disconnect for the lift, escalator or moving walk

NOTE See Annex A.

- 2.11 no load condition**
condition when an escalator or moving walk is running at nominal speed without passengers

2.12 Nominal speed

- 2.12.1 nominal speed**
<escalator> speed in the direction of the moving steps or pallets when operating the equipment in the no load condition (i.e. without persons), stated by the manufacturer as that for which the escalator has been designed

- 2.12.2 nominal speed**
<moving walk> speed in the direction of the belt when operating the equipment in the no load condition (i.e. without persons), stated by the manufacturer as that for which the moving walk has been designed

2.13**reference cycle**

<lift> cycle during which the empty car is run from the bottom terminal landing, to the top terminal landing, and then back to the bottom terminal landing including two complete door cycles

2.14**running current**

current drawn by the lift, when it has achieved rated speed in either the up or down direction

2.15**slow speed condition**

condition when an escalator or moving walk is running at slow speed without passengers

2.16 Standby condition

NOTE 1 For units with power back-up systems, the lift, escalator or moving walk should be connected and operating on main power with back up power outputs disabled while the measurements are taken.

NOTE 2 Care should be taken to ensure that the application of the standby condition does not compromise the safety of the installation.

2.16.1**standby condition**

<lift> condition when a lift is stationary at a floor and may have reduced the power consumption to a lower level set for that particular lift

2.16.2**standby condition**

<escalator or moving walk> condition when the escalator or moving walk is stationary and powered on and can be started by authorized personnel

NOTE There may be other electrical loads not associated with the escalator or moving walk, which should not be included.

2.17**standby current**

current drawn by the lift, when in standby condition

2.18**terminal landings cycling test**

test for lifts when the car is continuously cycled between the bottom terminal landing and the top terminal landing, with the door operations enabled and no load in the car

2.19**verification**

procedure to identify any significant changes in energy characteristics during the life of the lift, escalator or moving walk

3 Measurement and verification of lift, escalator and moving walk energy usage**3.1 General**

This part of ISO 25745 specifies:

- a) an accurate method of energy measurement in order to confirm manufacturers' declarations of energy usage;
- b) quick and simple procedure for measurements to identify any significant changes in energy usage during the life of the installation.

Measurements and verifications may be performed after commissioning, in-service and after modernization if required.

The measurements shall be:

- practical in the field;
- repeatable;
- able to utilize commonly available measuring equipment;
- performed by a trained, competent person.

Tables 1 and 2 summarize measurements to be made and the instrumentation required.

Table 1 — Lift measurement and verification of energy usage

Type of measurement	Measurements to be made	Instrumentation
Energy measurement (see 3.2 and 4.2)	Main energy — running Main energy — idle and standby Ancillary energy — running Ancillary energy — idle and standby	Energy meter (see 4.1)
Energy verification check (see 3.3.2 and 4.3)	Main current — running Main current — idle and standby Ancillary current — running Ancillary current — idle and standby	Current probe (see 4.1)

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Table 2 — Escalator and moving walk measurement and verification of energy usage

Type of measurement	Measurements to be made	Instrumentation
Power measurement (see 3.2 and 5.2)	Power in standby condition Power in autostart condition Power in slow speed condition Power in no load condition Ancillary power	Power meter (see 5.1)
Energy verification check (see 3.3.3 and 5.3)	Power in no load condition	Power meter (see 5.1)

NOTE No reference cycle is used for escalators and moving walks. Therefore a power measurement and power verification check is applied.

3.2 Lift energy measurements or escalator and moving walk power measurements

This measurement may be run on request after commissioning and at any point during the equipment life cycle as needed. The specification for the measurement system is indicated in 4.1 for lifts and 5.1 for escalators and moving walks.

3.3 Lift, escalator and moving walk energy verification check

3.3.1 General

This check is to verify that power usage of a unit has not significantly changed over the life of the installation by a quick, simple procedure.

3.3.2 Lift

Only the current is measured, as this is the most likely element of energy consumption to change with equipment ageing. Initially a current or a current profile is established after equipment commissioning and after modernization. Thereafter checks may be performed at any time during the operating life of equipment, to determine whether the energy consumption of the equipment has changed. The specification for the measurement system is indicated in 4.1.

Usually aging affects the energy consumption when the lift is running. Therefore unless modifications have been made it should only be necessary to measure the main current running.

3.3.3 Escalator and moving walk

Initially power in the no load condition is measured. Thereafter, periodic checks of power in the no load condition may be performed at any time during the operating life of equipment, to determine whether the energy consumption of the equipment has changed. The specification for the measurement system is indicated in 5.1.

3.4 Multiple lift, escalator and moving walk installations

In the case of multiple lift, escalator and moving walk installations, each unit is tested as a standalone piece of equipment.

NOTE It is important to note that a group of lifts can be more energy efficient than single units operating alone.

4 Measurement procedures for a lift installation

4.1 Preliminaries

4.1.1 Instrumentation

The measuring instrumentation shall comply with the following:

- a) an ammeter and voltmeter capable of measuring root mean square values;
- b) an energy meter capable of measuring energy with unbalanced loads.

The energy meters can be those defined in IEC 62053^[2] or a power and energy analyser as defined in IEC 61000-4-30^[1] or any other equivalent instrument. It is important to ensure that the instruments selected are compatible with the technology of the installation, in particular for regenerative drives or where non sinusoidal wave-shapes may be present and supply systems where no neutral is provided.

4.1.2 Accuracy

The measured value shall have accuracy of at least than ± 10 %.

4.1.3 Test set up

The set up conditions shall be as follows.

- a) The instrument model numbers utilized for the test procedures shall be recorded.
- b) The tests shall be conducted without changing any lift parameters. The lift unit parameters (ID, location, etc.) shall be recorded for identification purposes.
- c) Public usage or entry to the lift shall be prevented and the terminal landing entrances shall be barricaded.
- d) The lift shall be run in a cycling mode until a normal operating temperature of the lift machine is achieved.
- e) It shall be ensured that there is no load in the car.