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Energy efficiency of industrial trucks — Test methods —

Part 3:
Container handling lift trucks

Efficacité énergétique des chariots de manutention — Méthodes d'essai —

Partie 3: Chariots élévateurs porte-conteneur

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 110, *Industrial trucks*, Subcommittee SC 5, *Sustainability*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This document is intended to be used in conjunction with ISO 23308-1.

A list of all parts in the ISO 23308 series can be found on the ISO website.

Introduction

The ISO 23308 series deals with the energy efficiency of industrial trucks including batteries and battery chargers.

ISO 23308-1 contains the procedures to determine the efficiency of trucks, traction batteries and battery chargers. The other parts provide a specific test cycle for different truck types.

NOTE   The test cycles are based on the VDI 2198 guideline. This guideline is widely accepted by industry and is used to measure the energy consumption of electric industrial trucks and internal combustion (IC) industrial trucks. The guideline has been in place since 1996 and it is used broadly. This approach allows the evaluation of the energy efficiency of trucks by comparison.

The content of this document is of relevance for the following stakeholder groups:

— machine manufacturers (small, medium and large enterprises);

— market surveillance authorities;

— machine users (small, medium and large enterprises);

— service providers, e.g. for consulting activities.

The stakeholder groups above have been given the opportunity to participate at the drafting process of this document. The machines concerned are indicated in the scope of this document.

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Energy efficiency of industrial trucks — Test methods —

Part 3:
Container handling lift trucks

1 Scope

This document specifies the method of energy consumption measurement for container handling lift trucks, as defined in ISO 5053-1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 668, *Series 1 freight containers — Classification, dimensions and ratings*

ISO 5053-1, *Industrial trucks — Terminology and classification — Part 1: Types of industrial trucks*

ISO 23308-1:2020, *Energy efficiency of Industrial trucks — Test methods — Part 1: General*

ISO 22915-9:2014, *Industrial trucks — Verification of stability — Part 9: Counterbalanced trucks with mast handling freight containers of 6 m (20 ft) length and longer*

ISO 22915-12:2015, *Industrial trucks — Verification of stability — Part 12: Industrial variable-reach trucks handling freight containers of 6 m (20 ft) length and longer*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5053-1 and ISO 23308-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Test conditions

4.1 General

The travelling position shall be in accordance with ISO 22915-9:2014, 4.2, and ISO 22915-12:2015, 4.2, such that the bottom of the container is no higher than 0,9 m above the seat index point (SIP) as defined in ISO 5353, and at a height ensuring that the operator has sufficient forward visibility.

For variable reach trucks in the travelling position the boom shall be fully retracted.

Additional requirements for test conditions are given in ISO 23308-1.

4.2 Laden container handler

A laden container handler shall be tested with a test load of 70 % of the rated load.

4.3 Empty container handler

An empty container handler shall be tested with an empty container according to ISO 668.

A container with a height of 8 ft 6 in (= 2 591 mm) and a length of 20 ft (= 6,1 m) shall be used in the test (weight of 20 ft container minimum 2 200 kg).

5 Measurement procedure

5.1 General

The appropriate requirements of ISO 23308-1:2020, Clause 5, apply together with 5.2 and 5.3 which describe specific information for container handling lift trucks.

5.2 Test set up

Measurement shall start with the truck loaded and fully supported, with twist locks engaged at the travelling position height, at position A.

It is permissible for variable reach container handling trucks to be tested using simultaneous lifting and extension of the boom.

Table 1 — Test specification for container handling lift trucks

	Variable reach container handler/ Counterbalance container handler	
	Empty container handler	Loaded container handler
Rated capacity, Q	$Q \leq 10$ t	$Q > 10$ t
Test duration (h)	1	1
Number of cycles (1/h)	30	20
Distance, l (m)	100	100
Lift at B and D (m)	4[a]	4[a]
[a] From travelling position and upwards.		

5.3 Operating sequence

The cycle shall be performed according to Figure 1 and Table 1.

The sequence of the cycle shall be carried out with the following actions:

— start at position A (travelling position);

— travel in forward direction to position "B" by turning through 90° and advance to position of container stack;

— return the backward tilt to the vertical position (only counterbalanced container handler);

— lift the load as specified in Table 1;

— lower to the travelling position height;

— tilt back to maximum (only counterbalanced container handler);

— drive backwards to position "C";

— travel in forward direction to position "D" by turning through 90° and advance to position of container stack;

— return the backward tilt to the vertical position (only counterbalanced container handler)

— lift the load as specified in Table 1;

— lower to the travelling position height;

— tilt back to maximum (only counterbalanced container handler);

— drive backwards to position "A";

— end of cycle.

The travel speed shall be so adapted to reach the specified number of cycles per hour. The load shall be lifted and lowered, without depositing the load.

Travelling is not permitted while lift/lowering, or reach/retracting operations.
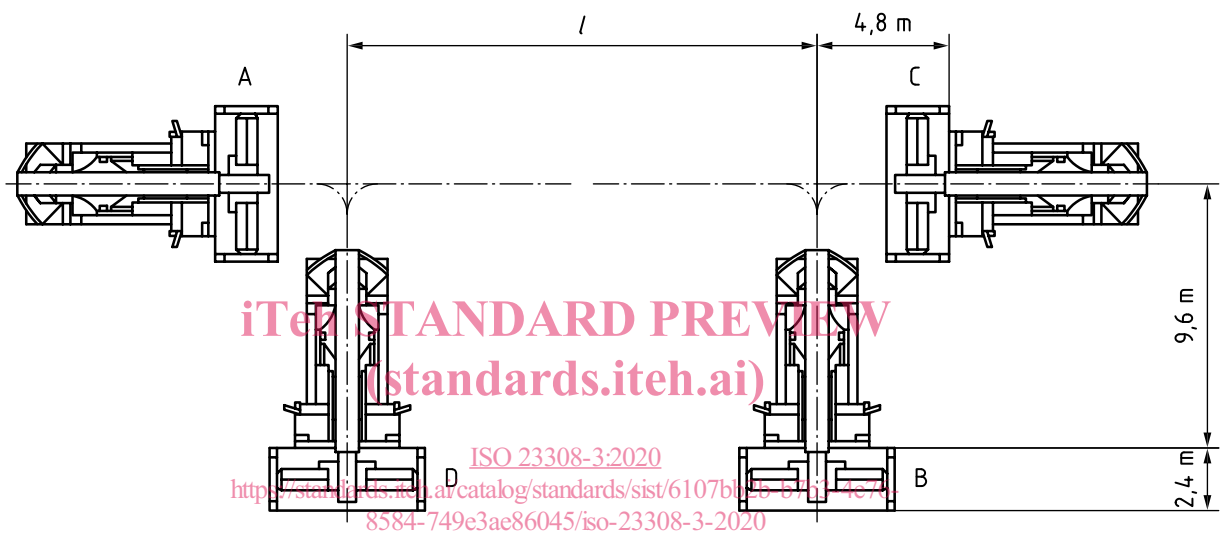
Key

A, B, C, D truck position

l distance

Figure 1 — Test layout energy consumption