
**Refuse collection vehicles — Safety
of manual and rear-loaded refuse
collection vehicles**

*Véhicules de collecte de déchets — Sécurité des véhicules de collecte
de déchets à chargement manuel et arrière*

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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 297, *Waste collection and transportation management*.

[ISO/TS 24159:2022](http://www.iso.org/iso/foreword.html)

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.

Introduction

Manual and rear-loaded refuse collection vehicles (RCVs) are used for waste collection when waste is loaded into vehicles manually, without lifting devices.

Manual and rear-loaded RCVs present specific risks to humans. Accidents have been reported during the operation of manual and rear-loaded RCVs, such as operators' bodies getting caught in vehicle parts while handling waste or maintaining the vehicle. Thus, there is a need for information on safety methods specifically for manual and rear-loaded RCVs. While there are International Standards on safety of machinery which provide safety requirements, there are alternative methods for when such International Standards do not fit with the situation and/or conditions of the operation of manual and rear-loaded RCVs.

This document provides support, advice and guidance to owners, waste-service providers, vehicle manufacturers, suppliers, maintenance providers, consultants, authorities and others related to manual and rear-loaded RCVs to improve the safety of waste-collection operators.

NOTE National or regional standards can specify more detailed requirements for specific markets.

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Refuse collection vehicles — Safety of manual and rear-loaded refuse collection vehicles

1 Scope

This document provides general requirements, recommendations and examples of safety methods to ensure the safety of operation of manual and rear-loaded refuse collection vehicles (RCVs).

This document applies to manual and rear-loaded RCVs with rotating plate loading systems, compression plate loading systems and rotating drum loading systems, and covers methods for ensuring safety with regard to the loading systems and discharge systems.

This document applies to the design and manufacture of manual and rear-loaded RCVs to ensure that they can be operated, adjusted and maintained such that they function properly.

This document is not applicable to the handling of loads the nature of which can lead to dangerous situations (e.g. hot refuse, acids and bases, radioactive materials, contaminated refuse, especially fragile loads, explosives).

2 Normative references

ISO 24161,¹⁾ *Waste collection and transportation management — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 24161 and the following apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

bodywork

assembly of all components fitted to the chassis of a refuse collection vehicle, which includes the *body* (3.4) itself

Note 1 to entry: The bodywork can be fixed or interchangeable. The bodywork also includes either a loading system or a footboard(s) or any combination of the two.

[SOURCE: EN 1501-1:2021, 3.4, modified — Note 1 to entry revised.]

3.2

cab

enclosure mounted on the chassis in front of the *bodywork* (3.1) where the operator drives and controls the refuse collection vehicle and where other potential operator(s) can sit

[SOURCE: EN 1501-1:2021, 3.3]

1) Under preparation. Stage at the time of publication: ISO/DIS 24161:2021.

**3.3
manual and rear-loaded refuse collection vehicle**

refuse collection vehicle into which waste is manually loaded into the *load opening* (3.6) on the rear and mechanically transferred into the *body* (3.4)

**3.4
body**

part of the *bodywork* (3.1) that retains the loaded waste

Note 1 to entry: It may be fixed or interchangeable or rotate as part of the loading system.

Note 2 to entry: To discharge the collected waste, the body is either tilted or rotated or an *ejection plate system* (3.19) is used.

Note 3 to entry: See [Figures A.1](#) to [A.3](#).

[SOURCE: EN 1501-1:2021, 3.5, modified — Definition revised.]

**3.5
tailgate**

structure connected to the rear of the *body* (3.4) that is equipped with a *load opening* (3.6) for loading waste and holds back waste retained inside the body

Note 1 to entry: See [Figures A.1](#) to [A.3](#).

**3.6
load opening**

opening for loading waste into the *tailgate* (3.5)

**3.7
hopper**

compartment where waste is loaded manually or mechanically into the *body* (3.4)

Note 1 to entry: See [Figures A.1](#) and [A.2](#).

Note 2 to entry: The hopper can be a separate compartment or part of the *bodywork* (3.1) or *tailgate* (3.5).

**3.8
capacity of the hopper**

volume of non-compacted waste the *hopper* (3.7) contains, measured in cubic meters rounded off to one decimal place

Note 1 to entry: If compression does affect the capacity of the hopper, the capacity of the hopper is measured when the sliding plate is in its fully retracted position.

[SOURCE: EN 1501-1:2021, 3.10, modified — definition revised, Note 1 to entry added.]

**3.9
rotating plate**

plate that rotates as it scrapes waste in the *tailgate* (3.5) upwards in preparation to be forced into the *body* (3.4) by the *push plate* (3.10)

Note 1 to entry: See [Figure A.1](#).

**3.10
push plate**

plate that forces waste scraped upwards by the *rotating plate* (3.9) into the *body* (3.4)

Note 1 to entry: See [Figure A.1](#).

3.11**press plate**

plate that scrapes waste in the *tailgate* (3.5) upwards after it is compressed to prepare it to be forced into the *body* (3.4)

Note 1 to entry: See [Figure A.2](#).

3.12**sliding plate**

plate that moves the *press plate* (3.11) downwards to compress the waste in the *hopper* (3.7) and forces the waste in the upper movement into the *body* (3.4)

Note 1 to entry: See [Figure A.2](#).

3.13**ejection plate**

plate that pushes waste retained in the *body* (3.4) out the rear of the body for discharge

Note 1 to entry: See [Figure A.2](#).

Note 2 to entry: An ejection plate can also be used to improve the compression ratio.

3.14**rotating plate loading system**

mechanism and action of a *rotating plate* (3.9) and *push plate* (3.10) forcing waste that is transferred from the *tailgate* (3.5) into the *body* (3.4)

Note 1 to entry: See [Figure A.1](#).

3.15**compression plate loading system**

mechanism and action of a *sliding plate* (3.12) and *press plate* (3.11) compressing waste that is transferred from the *tailgate* (3.5) into the *body* (3.4)

Note 1 to entry: See [Figure A.2](#).

3.16**rotating drum loading system**

mechanism and action of a drum rotating to transfer waste from the *tailgate* (3.5) into the *body* (3.4) with or without compaction

Note 1 to entry: See [Figure A.3](#).

3.17**discharge system**

mechanism and movement for emptying the *body* (3.4)

EXAMPLE *Ejection plate system* (3.19), *rotating drum discharge system* (3.20), *tipping system* (3.18).

[SOURCE: EN 1501-1:2021, 3.19, modified — Examples revised.]

3.18**tipping system**

mechanism and action to discharge waste from inside the *body* (3.4) to the rear by raising the *tailgate* (3.5) first and tipping the body afterwards

3.19**ejection plate system**

mechanism and action of emptying the *body* (3.4) by moving the *ejection plate* (3.13) to the rear after opening the *tailgate* (3.5) or the discharge door if needed

3.20

rotating drum discharge system

mechanism and action to discharge waste in the *bodywork* (3.1) by tipping the body and/or rotating drum after opening the *tailgate* (3.5) or the discharge door, if needed

3.21

safety device for preventing the tailgate from falling

safety device which prevents accidents in which the lifted or tilted *tailgate* (3.5) falls accidentally

EXAMPLE *Safety bar* (3.25).

3.22

emergency stop function

device for stopping loading system operations in emergencies

3.23

single-cycle mode

mode in which the operation of loading waste into the *body* (3.4) is stopped after each cycle of a *rotating plate loading system* (3.14) and *compression plate loading system* (3.15)

3.24

continuous operation mode

mode in loading systems that allows continuous operation of loading waste into the *body* (3.4)

3.25

safety bar

bar which acts as a safety device to prevent the lifted parts of a refuse collection vehicle from unintentional lowering

Note 1 to entry: See [Figure 3](#).

4 Structural and operational safety guidance and preventive measures

4.1 Loading system

4.1.1 Loading system controls

The rotating plate loading system and compression plate loading system shall operate either in single-cycle mode or with a choice between single-cycle mode and continuous operation mode. The rotating drum loading system shall operate in continuous operation mode. In both modes, activating the emergency stop function shall suspend operations.

Button switches or levers for loading operations shall be installed on the loading control panel on the rear of the manual and rear-loaded RCV. Button switches or levers for loading operations should be located in only one place on each vehicle and shall be structured such that they cannot launch operations when they are touched accidentally.

An emergency stop function shall be provided and the controls for this function shall be located in at least two locations close to the load opening, for example left, right or below. These should make it possible to suspend operations from the cab (optional).

EXAMPLE Button switches are recessed and cannot launch operations unless they are pushed down fully. The levers are placed further inside the shape of the body, so they cannot launch operations unless they are purposely moved.

4.1.2 Load opening height

The load opening should be at a height that facilitates the work of manually loading waste into the load opening.