
Vozila za zbiranje odpadkov in pripadajoči iztresalniki - Splošne in varnostne zahteve - 3. del: Vozila za zbiranje odpadkov z nakladanjem spredaj

Refuse collection vehicles and associated lifting devices - General requirements and safety requirements - Part 3: Front loaded refuse collection vehicles

Abfallsammelfahrzeuge und die dazugehörigen Schüttungen - Allgemeine Anforderungen und Sicherheitsanforderungen - Teil 3: Frontlader

Bennes a ordures ménageres et leurs leve-conteneurs associés - Exigences générales et exigences de sécurité - Partie 3 : Bennes a chargement frontal

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Refuse collection vehicles and their associated lifting devices - General requirements and safety requirements - Part 3: Front loaded refuse collection vehicles

Bennes de collecte des déchets et leurs lève-conteneurs
associés - Exigences générales et exigences de sécurité -
Partie 3: Bennes à chargement frontal

Abfallsammelfahrzeuge und die dazugehörigen
Schüttungen - Allgemeine Anforderungen und
Sicherheitsanforderungen - Teil 3: Frontlader

This European Standard was approved by CEN on 12 January 2008.

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Contents

Page

Foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	8
4 Modes and controls of front loaded RCV	12
5 List of significant hazards	14
6 Safety requirements	20
7 Verification	37
8 Information for use	41
Annex A (normative) Definition of working and functional spaces	46
Annex B (normative) Examples of data sheet	48
Annex C (informative) Types of systems for front loaded RCVs: lifting devices, compaction and discharge systems and types of waste containers	54
Annex D (normative) Warning signals	60
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC, amended by 98/79/EC	61
Annex ZB (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	62
Bibliography	63

Figures

Figure A.1 — Side view of a front loaded RCV	46
Figure A.2 — Top view of a front loaded RCV	47
Figure B.1 — Example of data sheet. Dimensions, volumes and centres of gravity	48
Figure B.2.1 — Example of data sheet - Axle load calculation	49
Figure B.2.2.1 — Lateral tipping edge at outer tire	50
Figure B.2.2.2 — Rear tipping edge at centre line of the most rear axle	50
Figure B.2.2 — Example of data sheet - Calculation of side and rear stability on fully tipped body / bodywork	51
Figure B.2.3.1 — Longitudinal stability	52
Figure B.2.3.2 — Lateral stability	52

Figure B.2.3. — Example of data sheet - Stability calculation in container lifting mode	53
Figure C.1 — Types of lifting devices for front loaded RCV	54
Figure C.2 — Types of compaction systems	55
Figure C.3 — Types of discharge systems	56
Figure C.4 — Recommended types of waste containers	57
Figure C.5 — Description of forks	58
Figure C.6 — Types of top doors	59
Figure D.1 — Warning signal for extending lifting devices.....	60
Tables	
Table 1 — List of significant hazards	14
Table 2 — Graphical symbols.....	26
Table 3 — Verification	37

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EN 1501-3:2008 (E)**Foreword**

This document (EN 1501-3:2008) has been prepared by Technical Committee CEN/TC 183 "Waste management", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2008, and conflicting national standards shall be withdrawn at the latest by September 2009.

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

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

For relationship with EC Directive(s), see informative Annexes ZA and ZB, which are an integral part of this document.

The minimum essential criteria are considered to be of primary importance in providing safe, serviceable, economical, and practical front loaded refuse collection vehicles.

This European Standard is one part of the series of coordinated standards EN 1501 about "Refuse collection vehicles and their associated lifting devices - General requirements and safety requirements" comprising the following parts:

- *Part 1: Rear-end loaded refuse collection vehicles, as amended by A1: Footboards (under revision)*
- *Part 2: Side loaded refuse collection vehicles*
- *Part 3: Front loaded refuse collection vehicles*
- *Part 4: Noise test code for refuse collection vehicles*
- *Part 5: Lifting devices for refuse collection vehicles (under preparation)*

This European Standard is the third one of a series of standards dealing with specification, design, safety and testing of refuse collection vehicles (RCVs) and their associated lifting devices.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This document is a type C standard as stated in EN ISO 12100-1.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

The series of standards should be read in conjunction with the documents developed by CEN/TC 183/WG 1 for mobile waste containers (according to the series of standards EN 840), for stationary waste containers (according to the series of standards EN 12574) and for selective collection containers emptied by the top (Type B of EN 13071) that are compatible with some of the lifting devices specified in this standard (see Figure C.4).

While producing this standard it was assumed that:

- only persons who have been appropriately trained will operate the front loaded RCV;
- the guidelines issued by the chassis manufacturer have been taken into account;
- components without specific requirements are designed in accordance with the usual engineering practice and calculation codes, including all failure modes, of sound mechanical and electrical construction and made of materials with adequate strength and of suitable quality;
- harmful materials, such as asbestos, are not used as part of the machine;
- components are kept in good repair and working order, so that the characteristics, within the specified limits as stated in the maintenance manual, remain despite wear;
- by design of the load bearing elements, a safe operation of the machine is assured for loading ranging from zero to 100 % of the rated capacities;
- the equipment has been designed for operation with an ambient temperature between $-25\text{ }^{\circ}\text{C}$ and $40\text{ }^{\circ}\text{C}$;
- specific uses and operating conditions of the machinery are taken into account by negotiation between the manufacturer and the user (for example: type of waste, extended temperature range, type of driving conditions).

The standard is designed for careful consideration by designers, manufacturers, suppliers and users of the front loaded RCV.

EN 1501-3:2008 (E)**1 Scope**

This standard applies to front loaded refuse collection vehicles, as defined in 3.2, and specifies their technical requirements.

This standard deals with all significant hazards, hazardous situations and events relevant to the front loaded RCV, when it is used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

This standard part 3 describes and gives the requirements of the front loaded RCV and the associated lifting device(s) and refers to part 4 of this series of standards for the noise test code.

Examples for standard types of front loaded refuse collection vehicles are given in Annex C.

This European Standard is not applicable to:

- operation in severe conditions (e.g. extreme environmental conditions such as: temperatures below $-25\text{ }^{\circ}\text{C}$ and above $40\text{ }^{\circ}\text{C}$, corrosive environment, tropical environment, lightning, wind velocity in excess of 75 km/h);
- operation subject to special rules (e.g. potentially explosive atmospheres, contaminating environments);
- transportation of passengers, lifting of persons;
- loading by crane;
- loading by satellite vehicle;
- containers other than defined in EN 840-1 to -4, EN 12574-1 to -3 and type B of EN 13071;
- handling of loads the nature of which could lead to dangerous situations such as hot wastes, acids and bases, radioactive materials, especially fragile loads, explosives.

This document is not applicable to machinery which is manufactured before the date of its publication by CEN.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 294, *Safety of machinery - Safety distance to prevent danger zones being reached by the upper limbs*

EN 349, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body*

EN 574, *Safety of machinery - Two-hand control devices - Functional aspects - Principles for design*

EN 811, *Safety of machinery - Safety distances to prevent danger zones being reached by the lower limbs*

EN 840-1, *Mobile waste containers - Part 1: Containers with 2 wheels with a capacity up to 400 l for comb lifting devices, dimensions and design*

EN 840-2, *Mobile waste containers - Part 2: Containers with 4 wheels with a capacity up to 1 300 l with flat lid(s), for trunnion and/or comb lifting devices - Dimensions and design*

EN 840-3, *Mobile waste containers - Part 3: Containers with 4 wheels with a capacity up to 1 300 l with dome lid(s), for trunnion and/or comb lifting devices - Dimensions and design*

- EN 840-4, *Mobile waste containers - Part 4: Containers with 4 wheels with a capacity up to 1 700 l with flat lid(s), for wide trunnion or BG- and/or wide comb lifting devices - Dimensions and design*
- EN 842, *Safety of machinery - Visual danger signals - General requirements, design and testing*
- EN 894-1, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 1: General principles for human interactions with displays and control actuators*
- EN 894-2, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2: Displays*
- EN 894-3, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 3: Control actuators*
- EN 953, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards*
- EN 982, *Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics*
- EN 983, *Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics*
- EN 1032, *Mechanical vibration - Testing of mobile machinery in order to determine the vibration emission value*
- EN 1037, *Safety of machinery - Prevention of unexpected start-up*
- EN 1050:1996, *Safety of machinery - Principles for risk assessment*
- EN 1088:1995, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection*
- EN 1501-4, *Refuse collection vehicles and their associated lifting devices - General requirements and safety requirements - Part 4: Noise test code for refuse collection vehicles*
- EN 1837, *Safety of machinery - Integral lighting of machines*
- EN 12574-1, *Stationary waste containers - Part 1: Containers with a capacity up to 10 000 l with flat or dome lid(s), for trunnion, double trunnion or pocket lifting device - Dimensions and design*
- EN 12574-2, *Stationary waste containers - Part 2: Performance requirements and test methods*
- EN 12574-3, *Stationary waste containers - Part 3: Safety and health requirements*
- EN 13071, *Selective waste collection containers - Above-ground mechanically-lifted containers with capacities from 80 l to 5000 l for selective collection of waste*
- EN 13309, *Construction machinery - Electromagnetic compatibility of machines with internal electrical power supply*
- EN 13478, *Safety of machinery - Fire prevention and protection*
- EN 60204-1:2006, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005, modified)*
- EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*
- EN 61310-1, *Safety of machinery - Indication, marking and actuation - Part 1: Requirements for visual, auditory and tactile signals (IEC 61310-1:1995)*
- EN ISO 7731, *Ergonomics - Danger signals for public and work areas - Auditory danger signals (ISO 7731:2003)*

EN 1501-3:2008 (E)

EN ISO 11688-1, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12100-1:2003, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2 *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13732-1, *Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850, *Safety of machinery - Emergency stop - Principles for design (ISO 13850:2006)*

EN ISO 14122-2, *Safety of machinery - Permanent means of access to machinery - Part 2: Working platforms and walkways (ISO 14122-2:2001)*

IEC 60417, *Graphical symbols for use on equipment*

ISO 7000, *Graphical symbols for use on equipment - Index and synopsis*

3 Terms and definitions

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For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

3.1**refuse collection vehicle (RCV)**

vehicle intended to be used for the collection and transportation of refuse based on loading via waste containers or by hand

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NOTE It consists of a chassis with cab onto which the bodywork is mounted. The bodywork includes an integrated or interchangeable body. The bodywork also includes a lifting device and/or a compaction mechanism.

3.2**front loaded RCV**

RCV, as defined in 3.1, where refuse is loaded from the front via waste containers into the hopper/body

NOTE The trajectory of the waste container is over the top of the cab or the front axle, regardless where the waste container is picked up.

3.3**combination with other types of RCVs**

a combination of a front loaded RCV with a rear and/or side loaded RCV

3.4**cab**

enclosure mounted on the chassis in front of the bodywork where the operative drives and controls the front loaded RCV and other operative(s) can sit

3.5**body**

part of the bodywork in which the collected refuse is stored. It may be fixed, interchangeable or rotating

3.6**capacity of the front loaded RCV**

internal volume of the body and discharge door available for the refuse, measured in cubic metres rounded off to one decimal (V3 and V4 in Figure B.1)

3.7**discharge door**

part of the bodywork, hinged to the body, which has to be opened to discharge the refuse

3.8**hopper**

part of the bodywork into which the refuse is loaded via waste containers. If the front loaded RCV has no compaction mechanism, the body is the hopper

3.9**capacity of the hopper**

volume of non-compacted refuse the hopper contains, measured in cubic metres rounded off to one decimal. When a compaction mechanism leaves a volume it is included in the capacity of the hopper (V1 + V2 in Figure B.1)

3.10**closed system**

when the lowest edge of the hopper or of the body is 1 600 mm or more above the level on which the front-loaded RCV is standing, and any shear trap related to the packing mechanism is at least 850 mm away from this edge (see "n" and "m" in Figure B.1)

3.11**cab shield**

plate fitted to the front of the hopper for protection of the cab and the space between the cab and the bodywork from falling objects

3.12

compaction mechanism mechanism used to compact and transfer the refuse from the hopper into the body

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NOTE Several types are shown in Figure C.2.

3.13**discharge system**

system to empty the body

NOTE Several types are shown in Figure C.3.

3.13.1**ejection plate system**

system to empty the body by moving the ejection plate to the rear, after opening the discharge door

3.13.2**discharge by tipping**

system to empty the body by tilting the body after opening the discharge door

3.13.3**rotation drum system**

system to empty the body by rotation of the drum after opening the discharge door

3.13.4**walking floor**

system to empty the body by moving floor segments after opening the discharge door

EN 1501-3:2008 (E)**3.13.5****interchangeable body**

when the whole body is demounted and then discharged independently

3.14**designated waste container**

range or types of receptacles for storing refuse prior to the collection by the front loaded RCV and which are compatible with the lifting device of the front loaded RCV

NOTE Some of these waste containers are standardized following EN 840-1, to -4 and EN 12574-1 to -3 (see: Operation manual). Main types of designated waste containers are described in Figure C.4.

3.15**lifting device**

mechanism located on the front of the bodywork which empties waste containers into the hopper and puts them back on the ground. This mechanism may also include an integrated receptacle for waste

NOTE Several types are shown in Figure C.1.

3.15.1**functional space of lifting device**

space covered by the movements of the lifting device (including the waste container) as specified by the manufacturer

NOTE See Figures A.1 and A.2.

3.15.2**lift arm(s)**

part of the lifting device which consists of a moveable structure and which transfers the waste container(s) from the ground to the hopper

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NOTE Main types are shown in Figure C.1. <http://www.iteh.ai/catalog/standards/sist/a784d822-3871-43e0-a2de-e762fa7c767d/sist-en-1501-3-2008>

3.15.3**extending arm**

moving part of the lifting device used to provide more horizontal reach in order to pick up the designated waste container(s)

3.15.4**holding systems****3.15.4.1****fork**

part of the lifting device attached to the lift arm or the extending arm consisting of a pair of fingers to hold the designated waste container(s) (see Figure C.5)

3.15.4.2**comb**

horizontal component with teeth on the upper part, to which the frontal receiver of the designated waste container is located

3.15.4.3**clamp**

mechanism which holds the designated waste container(s) by application of jaws. When these jaws overlap, it is called an overlapping clamp

3.15.4.4**trunnion holding system**

part of the lifting device attached to the lift arm or the extending arm consisting of a pair of arms with a locking mechanism to hold and pick up the designated waste container(s) fitted with trunnion

3.16**travelling position of the lifting device**

location of the lifting device and/or extending arm and/or fork within the designed dimensions of the front loaded RCV (according to road traffic regulations) for the purpose of travel movement of the RCV

3.17**waste container emptying cycle**

number of sequences to hold, pick-up, lift and tip the waste container and put it back on the ground

3.18**top door**

cover for the hopper

NOTE Several types are described in Figure C.6.

3.19**access door**

door at the side(s) of the bodywork for maintenance purpose

3.20**operative**

authorised and trained person to operate the RCV

3.21**mono-operative front loaded RCV**

when the whole sequence of movements of the waste container emptying cycle can be achieved only through the actuation of the controls located in the cab

3.22**visible space**

outdoor space visible to the operative from his working station

3.23**operating station**

location outside of the functional spaces, where the operative operates the machine during normal use. Inspection, cleaning and maintenance are excluded (see Figure A.2)

3.24**travel movement**

motorised movement over 6 km/h of the front loaded RCV when all equipments and components are set and fixed for travel mode

3.25**positioning movement**

motorised movement not exceeding 6 km/h of the front loaded RCV when one or more equipments of the RCV is out of the dimensions given in the data sheet according to Figure B.1

3.26**hold-to-run control**

control device by which the operating function is only carried out as long as the control is activated according to 3.26.3 of EN ISO 12100-1:2003. The operation stops automatically when the control is released

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EN 1501-3:2008 (E)**3.27****functional space**

volume covered by the movements of the designated waste container(s) when lifted by the lifting device as specified by the manufacturer (see Figures A.1 and A.2)

4 Modes and controls of front loaded RCV

NOTE Travel and positioning movements are not included.

4.1 Operating modes

Movements of the mechanically moved parts of the front loaded RCV:

4.1.1 Manual: the mechanism achieves each movement within the waste container emptying cycle or the compaction cycle by a specific, separate command.

4.1.2 Semi-automatic: the mechanism achieves each sequence of movements (two or more movements in one sequence) within the waste container emptying cycle or the compaction cycle by a specific command.

4.1.3 Automatic: the mechanism achieves all sequences of the waste container emptying cycle or the compaction cycle by one command without any other action.

4.2 Compaction operating modes and controls**4.2.1 General**

Each front loaded RCV may be fitted with one or more of the following compaction operating modes.

4.2.2 Automatic compaction

Automatic compaction mechanisms are activated by an impulse command, e.g. by a start control device or emptying a container into the hopper:

- continuous cycle is one that cycles by a start impulse and that continually cycles until stopped by an independent action;
- single cycle is one that cycles once with a start impulse or the emptying and then stops without any further operating action;
- multi cycle is one that cycles by a start impulse for a given number of times and then stops without any other action. The number of cycles is pre-determined.

For single and multi cycles the start impulse may be generated by means of the start command of the lifting device. It can also be stopped by activation of a stop control.

4.2.3 Semi-automatic compaction

The controlled cycle is activated by one single hold-to-run control, e.g. button or lever, from the start until all shear traps have been passed. Thereafter, the cycle will be completed as a single cycle as described in 4.2.2, even if the control is released.

4.2.4 Manual compaction

The compaction mechanism is commanded and controlled by the operative by means of a hold-to-run control, e.g. button or lever, for each sequence of movements.

4.2.5 Selection of mode/compaction

A selection of mode is when a compaction operating mode can be changed to or from any of the modes mentioned under 4.2.2 to 4.2.4.

4.3 Discharge system operating modes and controls

4.3.1 General

Each front loaded RCV may be designed for one or more of the following discharge operating mode(s), as described in 4.3.2 to 4.3.4.

4.3.2 Automatic discharge mode

The automatic discharge door opening and closing modes are not allowed.

4.3.3 Semi-automatic discharge mode

The semi-automatic mode of the discharge door achieving each sequence of the discharge cycle shall be activated by a hold-to-run control device except for the final closure. The final closure shall only be possible by the external control with a two-hand hold-to-run control device (see 6.3.1.3).

4.3.4 Manual discharge mode

The discharge door achieves each movement within the discharge cycle by a separate command of a hold-to-run control device. The final closure shall only be possible by the external two-hand hold-to-run control (see 6.3.1.3).

4.3.5 Selection of mode/discharge

A selection of mode is when a discharge operation mode can be changed to or from any of the modes mentioned under 4.3.3 and 4.3.4.

4.4 Lifting device operating modes and controls

4.4.1 General

The front loaded RCV may be designed for one or more of the following lifting device operating modes, as described in 4.4.2 to 4.4.4.

4.4.2 Automatic lifting mode

The lifting device achieves all sequences of the emptying cycle by one command.

4.4.3 Semi-automatic lifting mode

The lifting device achieves each sequence of movements (two or more movements in the sequence) of the emptying cycle by a command using a hold-to-run control device.

4.4.4 Manual lifting mode

The lifting device achieves each movement within the emptying cycle by a specific separate command of the hold-to-run control device.