
Earth-moving machinery — Safety —
Part 6:
Requirements for dumpers

Engins de terrassement — Sécurité —

Partie 6: Exigences applicables aux tombereaux

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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html

This document was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety, ergonomics and general requirements*.

This second edition cancels and replaces the first edition (ISO 20474-6:2008), which has been technically revised with the following changes:

- normative references have been updated;
- references to national and regional provisions in the withdrawn ISO/TS 20474-14 have been deleted;
- new safety requirements and protective measures have been added, including requirements for the operator station.

It is intended to be used in conjunction with ISO 20474-1.

A list of all parts in the ISO 20474 series, published under the general title, *Earth-moving machinery — Safety*, can be found on the ISO website.

Introduction

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

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

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

ISO 20474 provides acceptable safety requirements for earth-moving machinery. This standard does not necessarily provide requirements to meet all national and regional regulatory provisions, e.g. Japan does not allow object handling with earth-moving machinery.

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Earth-moving machinery — Safety —

Part 6: Requirements for dumpers

1 Scope

This document gives the safety requirements specific to wheeled and crawler dumpers as defined in ISO 6165, including compact dumpers with seated or standing operator. It is not applicable to dumpers primarily designed for use on public roads. It is intended to be used in conjunction with ISO 20474-1, which specifies general safety requirements common to two or more earth-moving machine families. The specific requirements given in this document take precedence over the general requirements of ISO 20474-1.

This document deals with all significant hazards, hazardous situations and events relevant to the earth-moving machinery within its scope (see ISO 20474-1:2017, Annex A) when used as intended or under conditions of misuse reasonably foreseeable by the manufacturer. It specifies the appropriate technical measures for eliminating or reducing risks arising from relevant hazards, hazardous situations or events during commissioning, operation and maintenance.

This document is not applicable to machines manufactured before the date of its publication.

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 3164:2013, *Earth-moving machinery — Laboratory evaluations of protective structures — Specifications for deflection-limiting volume*

ISO 3449:2005, *Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements*

ISO 3471, *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements*

ISO 6165, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 7096:2000, *Earth-moving machinery — Laboratory evaluation of operator seat vibration*

ISO 7132, *Earth-moving machinery — Dumpers — Terminology and commercial specifications*

ISO 10268, *Earth-moving machinery — Retarders for dumpers and tractor-scrappers — Performance tests*

ISO 13333, *Earth-moving machinery — Dumper body support and operator's cab tilt support devices*

ISO 20474-1:2017, *Earth-moving machinery — Safety — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20474-1, ISO 7132, and the following apply.

ISO 20474-6:2017(E)

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

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

3.1

dumper

self-propelled or towed crawler or wheeled machine with an open body, which transports and dumps or spreads material, and where loading is performed by means external to the dumper

Note 1 to entry: A compact dumper can have integral self-loading equipment.

[SOURCE: ISO 6165:2012, 4.6]

3.2

rigid frame dumper

dumper (3.1) with a rigid frame and wheel or crawler steering

Note 1 to entry: See [Annex A](#) for an illustration.

[SOURCE: ISO 6165:2012, 4.6.1, modified — By adding Note 1.]

3.3

articulated frame dumper

dumper (3.1) with an articulated frame which accomplishes the steering of the machine

Note 1 to entry: See [Annex A](#) for an illustration.

[SOURCE: ISO 6165:2012, 4.6.2, modified — By adding Note 1.]

3.4

swing dumper

dumper (3.1) having a 360° swing upper structure, whose upper structure consists of a rigid frame, the open body and the operator station, and whose undercarriage consists of a track type or wheeled unit

[SOURCE: ISO 6165:2012, 4.6.3]

3.5

compact dumper

articulated frame dumper (3.3) or *rigid frame dumper* (3.2) having an operating mass of 4 500 kg or less

Note 1 to entry: A compact dumper can have integral self-loading equipment.

Note 2 to entry: See [Annex A](#) for an illustration.

3.6

self-loading equipment

integral mounted bucket-supporting structure and linkage permanently fitted to the *dumper* (3.1), enabling it to fill its own open body with material

4 Safety requirements and protective measures

4.1 General

Dumpers shall comply with the safety requirements and protective measures of ISO 20474-1, in as far as those are not modified by the specific requirements of this clause.

4.2 Dump body

4.2.1 Control device

When the content of the body can be dumped manually, the control device shall be designed and placed so that opening and closing can be actuated safely, e.g. from the operator's position or from a side different from the tipping direction.

4.2.2 Body lowering

In case of loss of energy, lowering the body to the transport position (frame) shall be possible in a safe way without special tools, e.g. by manually operated valve.

4.2.3 Body-down indicator

All dumpers except for compact dumpers shall meet the following requirements:

- they shall be equipped with a device preventing speeds of greater than 10 km/h when the body is not completely lowered — the exception to this being articulated frame dumpers used in material spreading applications, for which speeds of up to 20 km/h are permitted;
- they shall be equipped with an audible or visible, or, preferably, an audible *and* visible warning device that functions when the body is not in a lowered position and the transmission is engaged.

4.2.4 Body support device

A mechanical body support device shall be provided to support the body in the lifted position during service, maintenance and other non-operational situations.

The device shall meet the requirements given in ISO 13333.

4.2.5 Sticking load

Where there is a risk of losing stability while dumping due to the load (e.g. wet clay, freezing material) sticking to the body, provision shall be made to assist the discharge of the load.

EXAMPLE Provision of an exhaust heating system for the dump body.

Compact dumpers are excluded from this requirement.

4.3 Retarder

All dumpers, except for compact dumpers and crawler dumpers, shall be equipped with a retarder system that is in accordance with ISO 10268.

4.4 Roll-over protective structures (ROPS)

ISO 20474-1:2017, 4.3.3.1, shall apply, with the following modification for compact dumpers:

- the test procedure of ISO 3471 shall be used, modified for lateral loading by ISO 3164:2013, 4.4.

4.5 Falling object protective structures (FOPS)

4.5.1 General

ISO 20474-1:2017, 4.3.4, shall apply with the additions and exceptions specified in [4.5.2](#) and [4.5.3](#) below.

4.5.2 FOPS level

Dumpers other than compact dumpers shall be fitted with FOPS according to ISO 3449:2005, level II.

4.5.3 Compact dumper

4.5.3.1 Compact dumper equipped with a cab

Compact dumpers equipped with a cab shall be fitted with a FOPS according to ISO 3449:2005, level I.

4.5.3.2 Compact dumper with self-loading equipment

If the load passes over the operator station, compact dumpers with self-loading equipment shall be fitted with a FOPS structure that is in accordance with ISO 3449:2005, level II.

4.6 Operator station

4.6.1 Cab

ISO 20474-1:2017, 4.3.2, shall apply, except that compact dumpers do not require a cab unless used in hazardous conditions detrimental to the operator's health.

ISO 20474-1:2017, 4.3.2.7, shall apply for rear window defrosting only if visibility through the rear window is required according to ISO 20474-1, 4.8.1.

4.6.2 Operator's seat

ISO 20474-1:2017, 4.4.1, shall apply, with the addition that the seat shall meet the requirements of the following input spectral class according to ISO 7096:2000:

- class EM1 for wheeled dumpers;
- class EM7 for compact dumpers.

If suspension seats are provided as an option, they shall also meet the above requirements.

4.6.3 Compact dumpers with a standing operator position

4.6.3.1 General

The travel speed of compact dumpers with a standing operator position shall not exceed 4 km/h.

4.6.3.2 Controls

Machine-propelling movements shall be controlled with hold-to-run controls.

A suitable device allowing the operator to hold and support himself during machine travel shall be provided. If a ride-on platform is fitted, the device shall not restrict or impede the operator's access to and from the platform.

Travel and directional controls shall be designed so as to allow the operator to have one hand free to support himself, reducing the risk of inadvertent contact with the controls.

4.6.3.3 Operator station

Provision shall be made to ensure that the operator, in the normal driving position, is contained within the overall plan dimensions of the machine.

If a ride-on platform is fitted for the operator, it shall be possible to fix it in a vertical position. A device shall be provided to prevent machine travel when the operator is not on the platform, or when the platform is in the vertical position.

The platform shall have a surface area of at least 1 400 cm² and shall be capable of containing a circle with a minimum diameter of 360 mm. The platform shall have a non-slip surface and a maximum height from the ground level of 250 mm.

The platform shall be designed to withstand a compressive force equal to 2,5 times the gross machinery mass, applied to its edge when travelling in the rearward direction. The platform shall not sustain any permanent deformation or change in position.

4.7 Steering system

4.7.1 General

ISO 20474-1:2017, 4.6.1, shall apply with the additions given in [4.7.2](#) and [4.7.3](#) below.

4.7.2 Steering controls for machines with swivelling seats

For dumpers equipped with a swivelling seat (180°), the steering system shall be such that the movement of the steering control corresponds to the intended direction in both seat positions.

4.7.3 Controls for steering and driving of machines with turnable upper structure

The movement of the control for the driving and the steering need not correspond to the intended direction of movement if the upper structure is not in a normal driving direction.

5 Information for use

ISO 20474-1:2017, 6.2, apply with the following additions:

- a) instructions for safe dumping;
- b) information to the effect that when tipping a load from a dumper, it needs to be taken into account that the centre of gravity changes continuously and the condition of the ground determines the stability of the machine (there are special hazards for wheeled dumpers working on soft ground and when the load, e.g. wet clay or freezing material, sticks to the body);
- c) instructions that, when loading compact dumpers fitted with self-loading equipment, for reasons of stability, the machine must be placed on firm level ground and loading avoided on soft and uneven ground;
- d) instruction in the procedure for obtaining the maximum braking performance (e.g. applying the longitudinal differential lock) in downhill operation under icy or slippery conditions;
- e) instruction on the use of a retarder during downhill operations, such as that full use of the retarder must be made before applying the service brakes.

Annex A
(informative)

Illustrations

See [Figures A.1](#) to [A.6](#).

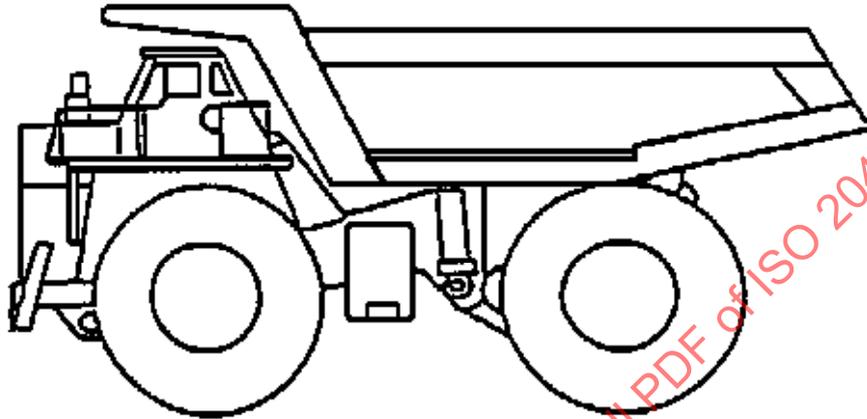


Figure A.1 — Rigid frame dumper

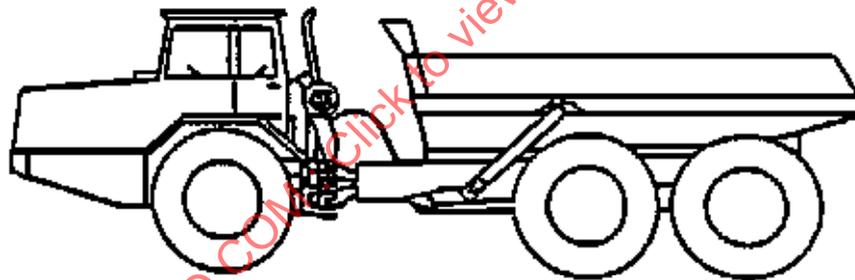


Figure A.2 — Articulated frame dumper

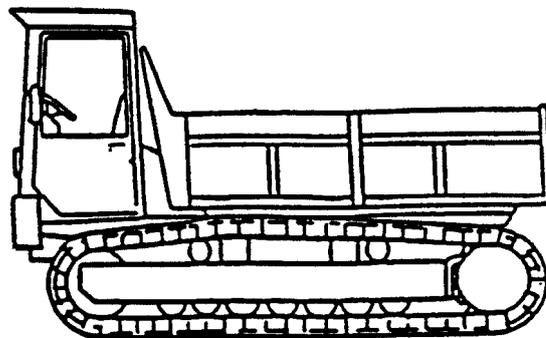


Figure A.3 — Crawler dumper