INTERNATIONAL STANDARD

ISO 20474-6

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Earth-moving machinery — Safety —

Part 6: Requirements for dumpers

Engins de terrassement — Sécurité —

Partie 6: Exigences applicables aux tombereaux

Reference number
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Foreword

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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 20474-6 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety, ergonomics and general requirements*.

ISO 20474 consists of the following parts, under the general title *Earth-moving machinery — Safety*:

— *Part 1: General requirements*

— *Part 2: Requirements for tractor-dozers*

— *Part 3: Requirements for loaders*

— *Part 4: Requirements for backhoe loaders*

— *Part 5: Requirements for hydraulic excavators*

— *Part 6: Requirements for dumpers*

— *Part 7: Requirements for scrapers*

— *Part 8: Requirements for graders*

— *Part 9: Requirements for pipelayers*

— *Part 10: Requirements for trenchers*

— *Part 11: Requirements for earth and landfill compactors*

— *Part 12: Requirements for cable excavators*

— *Part 13: Requirements for rollers*

— *Part 14: Information on national and regional provisions* [Technical Specification]

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 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.

Provisions that are applicable for Australia, the EU, Japan or the USA, and which are mandatory for compliance with specific governmental laws, directives or regulations in force in the particular country or region, are given in ISO/TS 20474-14.

NOTE Other countries or regions may also have regional requirements.

Earth-moving machinery — Safety —

Part 6: Requirements for dumpers

1 Scope

This part of ISO 20474 gives the safety requirements specific to wheeled and crawler dumpers as defined in ISO 6165, including compact dumpers and compact dumpers with standing operator. It is not applicable to road-truck-mounted dumpers. It is intended to be used in conjunction with ISO 20474-1, which specifies general safety requirements common to earth-moving machine families, and with ISO/TS 20474-14, which gives information on provisions that are mandatory in particular countries or regions. The specific requirements given in this part of ISO 20474 take precedence over the general requirements of ISO 20474-1.

This part of ISO 20474 deals with all significant hazards, hazardous situations and events relevant to the earth-moving machinery within its Scope when used as intended or under conditions of misuse reasonably foreseeable by the manufacturer (see also ISO/TS 20474-14). It specifies the appropriate technical measures for eliminating or reducing risks arising from significant hazards, hazardous situations or events during commissioning, operation and maintenance. It is not applicable to machines manufactured before the date of its publication.

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.

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 6016, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

ISO 6683, *Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests*

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-scrapers — Performance tests*

ISO 10570, *Earth-moving machinery — Articulated frame lock — Performance requirements*

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

ISO 20474-1:2008, *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 and ISO 7132, and the following, apply.

3.1
dumper
self-propelled crawler or wheeled machine, with an open body, which transports and dumps or spreads material

NOTE 1 See ISO 6165 and Figures A.1 and A.2.

NOTE 2 Except in the case of compact dumpers, loading is performed by other machines or equipment.

3.2
rigid frame dumper
dumper with a rigid frame and wheel or crawler steering

NOTE See ISO 6165 and Figure A.1 (and Figure A.3).

3.3
articulated frame dumper
dumper with an articulated frame for steering

NOTE See ISO 6165 and Figure A.2.

3.4
swing dumper
dumper having a 360° swing upper structure

NOTE 1 See ISO 6165.

NOTE 2 The upper structure is comprised of a rigid frame, open body and operator's station; the undercarriage consists of a track-type or wheeled unit.

3.5
compact dumper
articulated or rigid dumper having an operating mass in accordance with ISO 6016 of 4 500 kg or less

NOTE 1 See ISO 6165 and Figures A.4, A.5 and A.6.

NOTE 2 A compact dumper may have integral self-loading equipment.

3.6
self-loading equipment
integral mounted bucket-supporting structure and linkage permanently fitted to the dumper, enabling it to fill its own open body with material

NOTE See Figure A.6.

4 Safety requirements and/or protective measures

4.1 General

Dumpers shall comply with the safety requirements and/or 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

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.2.3 Body-down indicator

Dumpers — except for compact dumpers and crawler dumpers without an enclosed cab — shall have the following provisions:

— a device preventing travelling in a transmission ratio higher than second gear or with a speed greater than 10 km/h when the body is not completely lowered;

— an audible and/or visible warning device functioning when the body is not in a lowered position and the transmission is engaged.

4.2.4 Body support device

The device shall meet the requirements given in ISO 13333.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.2.5 Sticking load

Where there is a risk of losing stability while dumping due to the load (e.g. wet clay or 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

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

4.4 Articulated frame lock

Articulated frame lock devices shall be in accordance with ISO 10570.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.5 Roll-over protective structures (ROPS)

ISO 20474-1:2008, 4.3.3, shall apply, except in the case of compact dumpers with a seated operator, whose ROPS shall be in accordance with ISO 3471.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.6 Falling object protective structure (FOPS)

4.6.1 General

ISO 20474-1:2008, 4.3.4, shall apply with the additions/exceptions specified in 4.6.2 and 4.6.3.

4.6.2 FOPS level (other than compact dumpers)

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

4.6.3 Compact dumper

4.6.3.1 Compact dumper equipped with a cab

A compact dumper equipped with a cab shall be designed and built so that a FOPS can be fitted that is in accordance with ISO 3449:2005, level I.

4.6.3.2 Compact dumper with self-loading equipment

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

4.7 Operator's station

4.7.1 Cab

ISO 20474-1:2008, 4.3.2, shall apply with the exception that compact dumpers do not require a cab unless used in hazardous conditions detrimental to the operator's health.

4.7.2 Operator's seat

ISO 20474-1:2008, 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 in certain regions as an option, they shall also meet the above requirements.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.7.3 Compact dumpers with a standing operator position

4.7.3.1 General

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

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.7.3.2 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.

4.7.3.3 Operator's station

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.8 Steering system

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.8.1 General

ISO 20474-1:2008, 4.6.1, shall apply with the additions given in 4.8.2 and 4.8.3.

4.8.2 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.

4.8.3 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.

4.9 Seat belts

Dumpers shall have seat belts in accordance with ISO 6683.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

5 Verification of safety requirements and/or protective measures

ISO 20474-1:2008, Clause 5, shall apply.

6 Information for use

ISO 20474-1:2008, Clause 6, shall apply with the following additions to the operator's manual (6.2):

a) instructions for safe dumping;

b) instructions that, when tipping a load from a dumper, the centre of gravity will change continuously and the condition of the ground will determine 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 shall be placed on firm level ground, and that loading shall be avoided on soft and uneven ground;

d) instructions 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) instructions on the use of a retarder during downhill operations, such as the prescription that full use of the retarder shall be made before applying the service brakes.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

Annex A
(informative)

Illustrations

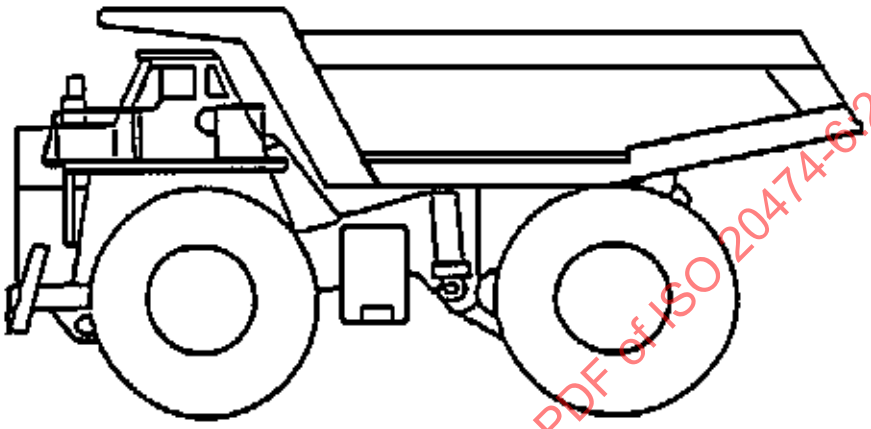

Figure A.1 — Rigid frame dumper

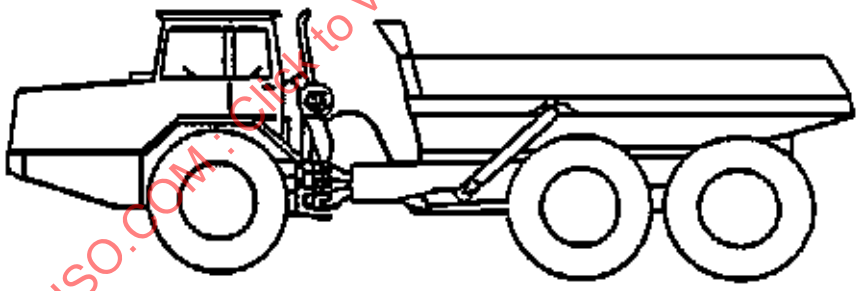

Figure A.2 — Articulated frame dumper

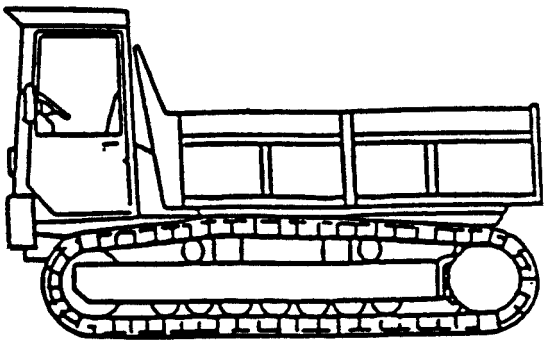

Figure A.3 — Crawler dumper