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**Earth-moving machinery — Safety —**  
**Part 10:**  
**Requirements for trenchers**

*Engins de terrassement — Sécurité —*

*Partie 10: Exigences applicables aux trancheuses*

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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.

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 20474-10 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 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.

Provisions that are applicable for Australia, 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.

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# Earth-moving machinery — Safety —

## Part 10: Requirements for trenchers

### 1 Scope

This part of ISO 20474 gives the safety requirements specific to trenchers as defined in ISO 6165. 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 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope*

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

ISO 6165:2006, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 6682, *Earth-moving machinery — Zones of comfort and reach for controls*

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

ISO 6393, *Earth-moving machinery — Determination of sound power level — Stationary test conditions*

ISO 6394, *Earth-moving machinery — Determination of emission sound pressure level at operator's position — Stationary test conditions*

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

ISO 12509, *Earth-moving machinery — Lighting, signalling and marking lights, and reflex-reflector devices*

ISO 13539:1998, *Earth-moving machinery — Trenchers — Definitions and commercial specifications*

ISO 17063, *Earth-moving machinery — Braking systems of pedestrian-controlled machines — Performance requirements and test procedures*

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 13539, and the following, apply:

**3.1  
trencher**  
self-propelled crawler or wheeled machine, having rear- and/or front-mounted equipment or attachment, primarily designed to produce a trench in a continuous operation, through motion of the machine

NOTE The attachment can be a digging chain, wheel, disk, plough blade or similar.

[ISO 6165:2006, definition 4.5]

**3.2  
restraint bar**  
structure generally above and parallel to the digging chain which provides a degree of protection from contact with the digging element

NOTE See Figures A.1 to A.4.

**3.3  
trench**  
narrow horizontal excavation for which, in general, the depth is greater than the width

### **4 Safety requirements and/or protective measures**

#### **4.1 General**

Trenchers 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 Restraint bar**

ISO 20474-1:2008, 4.14.3, shall apply, with the addition that a restraint bar shall be fitted and shall extend as far as practical over the length of the digging chain. A restraint bar or trench cleaner bar as shown in ISO 13539:1998, Figure 5, satisfies this requirement.

#### **4.3 Ride-on operated trenchers**

##### **4.3.1 Operator's station**

For the minimum operator space envelope, ISO 20474-1:2008, 4.3.1, shall apply, with the exception that, for trenchers having an operating mass in accordance with ISO 6016 of less than 2 000 kg, the minimum distance from the SIP (seat index point) to a window retracted above the operator head according to ISO 3411:2007 (920 mm) may be reduced to 650 mm at elbow height.

### 4.3.2 Roll-over protective structure (ROPS)

A roll-over protective structure (ROPS) shall be fitted. Force and energy equation shall be in accordance with ISO 3471.

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

### 4.3.3 Operator's seat

#### 4.3.3.1 General

ISO 20474-1:2008, 4.4.1.2, shall apply, with the following exceptions (4.3.3.2 and 4.3.3.3).

#### 4.3.3.2 Adjustment

##### 4.3.3.2.1 Seat with longitudinal position

For compact machines with an operating mass according to ISO 6016 of  $< 3\,500$  kg, the adjustment range shall comply with ISO 20474-1:2008, 4.4.1.3.

##### 4.3.3.2.2 Seat with transversal position

Fore and aft seat adjustment is not required.

##### 4.3.3.2.3 Vibration

ISO 20474-1:2008, 4.4.1.4, shall apply, with the addition that the seat shall be in accordance with ISO 7096:2000, input spectral class EM 6.

#### 4.3.3.3 Additional/separate operator's station

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

### 4.3.4 Operator's controls

#### 4.3.4.1 General

ISO 20474-1:2008, 4.5.1, shall apply, with the following additions (4.3.4.2 and 4.3.4.3).

#### 4.3.4.2 Engine stop

If a separate seat for special attachment is provided (e.g. backhoe equipment) and if the normal stopping device is not within the zone of reach according to ISO 6682 from that separate seat, an additional engine stopping device shall be fitted.

#### 4.3.4.3 Control deactivation

ISO 20474-1:2008, 4.5.3, shall apply, with the addition that the machine travel and attachment movement shall stop when the operator leaves the operator's station.

### 4.3.5 Stability

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

## 4.4 Pedestrian-controlled trenchers

### 4.4.1 Operator's station

ISO 20474-1:2008, 4.3.1.1, 4.3.1.2 and 4.3.1.6 are not applicable to pedestrian-controlled machines.

### 4.4.2 Controls

#### 4.4.2.1 General

ISO 20474-1:2008, 4.5, is applicable with the following additions (4.4.2.2 and 4.4.2.3).

#### 4.4.2.2 Control deactivation

Pedestrian-controlled trenchers shall be equipped with system(s) to stop machine travel and hazardous tool movement when the operator releases the operator's controls. Design of the controls shall take into account the hazards from inadvertent movement of the machine towards the operator.

#### 4.4.2.3 Speed limit

The forward speed of pedestrian-controlled machines shall not exceed 6 km/h by design. The speed of travel towards the operator's position shall not exceed 2,5 km/h by design.

### 4.4.3 Brake system

The brake system shall be in accordance with ISO 17063.

### 4.4.4 Lighting

ISO 20474-1:2008, 4.8.2, is not applicable to pedestrian-controlled trenchers. If provided with lighting, the machine's signalling and marking lights shall be in accordance with the appropriate clauses of ISO 12509.

### 4.4.5 Warning devices and safety signs

ISO 20474-1:2008, 4.9 a) is not applicable to pedestrian-controlled trenchers.

### 4.4.6 Retrieval, transportation, lifting and towing

ISO 20474-1:2008, 4.15, shall apply, with the exception of 4.15.2 and 4.15.5.

## 4.5 Noise

### 4.5.1 Sound power level

The sound power level of trenchers shall be measured in accordance with ISO 6393.

### 4.5.2 Sound pressure level at operator's station

The sound pressure level at the operator's station for trenchers shall be measured according to ISO 6394.

See also ISO 20474-1:2008, 4.13.2.2.

## 5 Verification of safety requirements and/or protective measures

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

## 6 Information for use

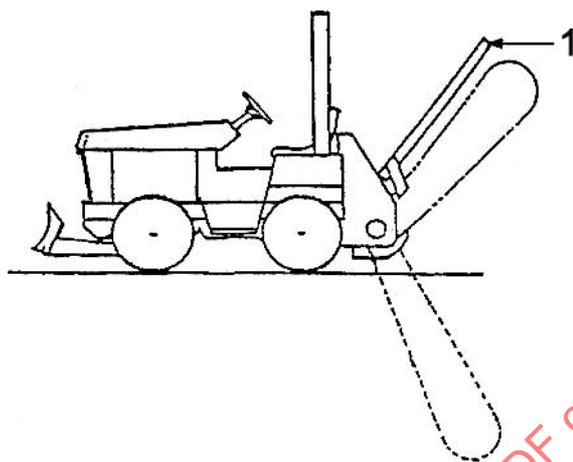
ISO 20474-1:2008, Clause 6, shall apply, with the following additions to the operator's manual (6.2):

- instructions for wearing hearing protection if an A-weighted sound pressure of 85 dB is exceeded;
- instructions regarding the deactivating device;
- safety rules for the use of restraint bar;
- instructions and safety precautions relating to the operation of pedestrian-controlled trenchers (e.g. automatic stop, speed limit, brake systems).

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**Annex A**  
(informative)

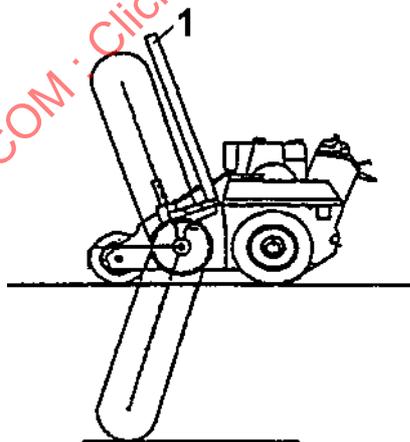
**Illustrations**



**Key**

1 restraint bar

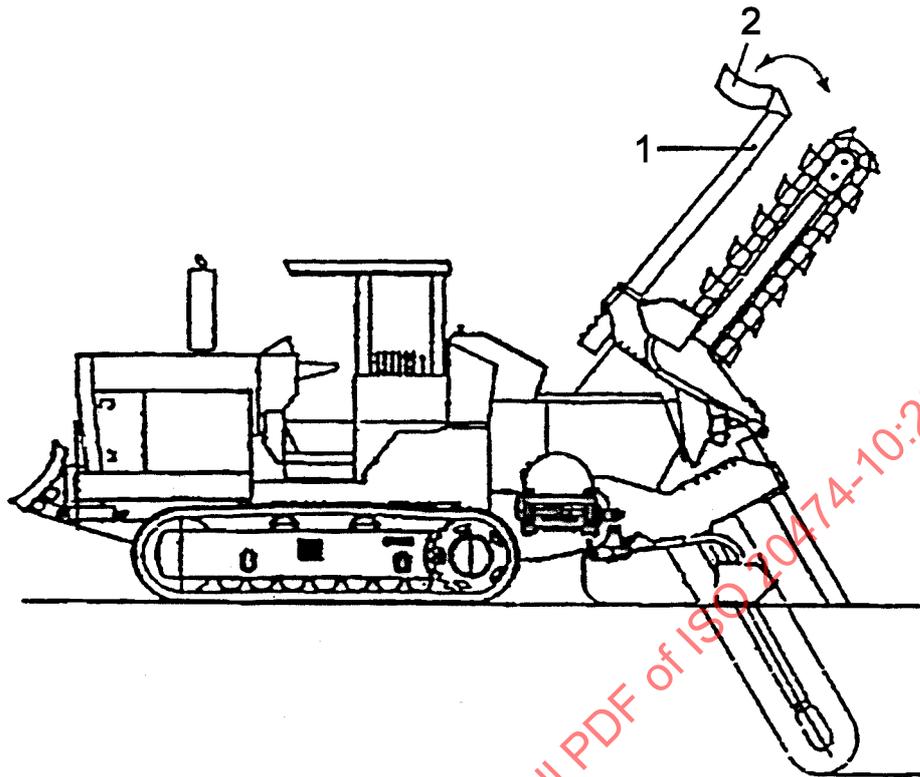
**Figure A.1 — Wheeled trencher — Ride-on**



**Key**

1 restraint bar

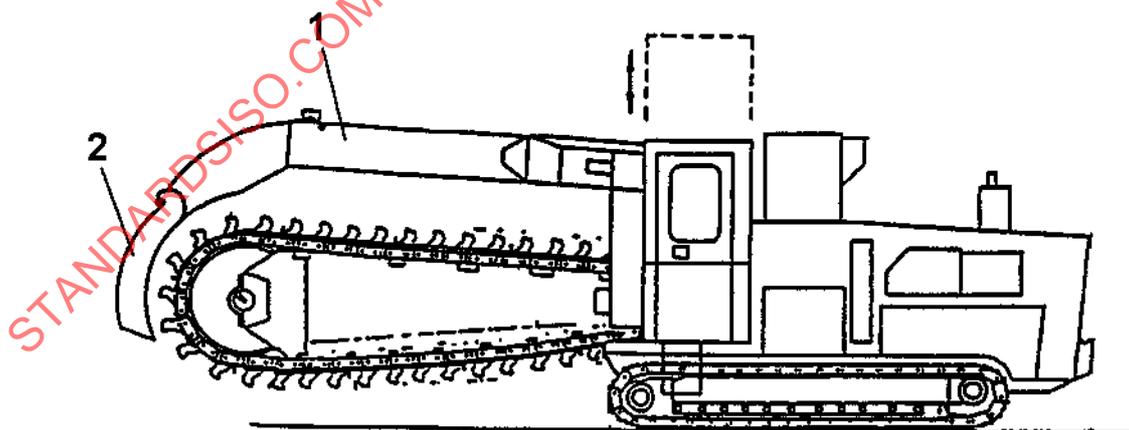
**Figure A.2 — Wheeled trencher — Pedestrian-controlled**



**Key**

- 1 restraint bar
- 2 trench cleaner

**Figure A.3 — Crawler trencher — Ride-on**



**Key**

- 1 restraint bar
- 2 trench cleaner

**Figure A.4 — Crawler trencher with elevating operator's station**