

---

---

**Earth-moving machinery — Physical  
dimensions of operators and minimum  
operator space envelope**

*Engins de terrassement — Dimensions des opérateurs et espace  
enveloppe minimal pour les opérateurs*

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 3411:2007](https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007)

<https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007>



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 3411:2007

<https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2007

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

**Contents**

Page

<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Physical dimensions of operators</b> .....	<b>2</b>
<b>5 Minimum operator space envelope</b> .....	<b>6</b>
<b>Bibliography</b> .....	<b>10</b>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 3411:2007](https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007)

<https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007>

## 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 3411 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety requirements and human factors*.

This fourth edition cancels and replaces the third edition (ISO 3411:1995), which has been technically revised.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 3411:2007](https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007)

<https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007>

## Introduction

The operator dimensions in this International Standard are derived from male and female data from the United States of America (CAESAR Data), Europe (ISO 15534-3:2000) and Asia (China, Japan, Korea and Thailand).

The dimensions of the male Asian data were found to be within the range of the 5<sup>th</sup> and 95<sup>th</sup> percentiles of the combined USA and European data. Thus, to represent the operator populations for the USA and Europe, the operator dimension data are based upon the data from those two regions. To account for the potential increase in female Asian operators, the small operator dimension values were maintained from ISO 3411:1995 and used instead of the larger dimensions from the USA and European data.

The dimensions given in this International Standard are either actual measurements obtained from the sources listed above or, when specific dimensions were not available, were derived by proportionally scaling the values from ISO 3411:1995, based on the trend of growth seen across the available measured dimensions.

The operator minimum normal interior space envelope for enclosures stated in this International Standard can be supplemented or modified by standards for specific earth-moving machinery.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 3411:2007](https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007)

<https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 3411:2007

<https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007>

# Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope

## 1 Scope

This International Standard provides the dimensions of operators of earth-moving machinery as defined in ISO 6165 and specifies the minimum normal operating space envelope within the operator enclosures.

It is not applicable to machines manufactured prior to 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 5353:1995, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

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

ISO 11112:1995, *Earth-moving machinery — Operator's seat — Dimensions and requirements*

<https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007>

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **small operator**

operator belonging to the worldwide earth-moving machinery operator population where approximately 5 % of operators are smaller than the dimension listed

### 3.2

#### **medium operator**

operator belonging to the worldwide earth-moving machinery operator population where approximately 50 % of operators are smaller than the dimension listed and the remaining worldwide earth-moving machinery operator population is larger than the dimension listed

### 3.3

#### **large operator**

operator belonging to the worldwide earth-moving machinery operator population where approximately 5 % of operators are larger than the dimension listed

### 3.4

#### **working posture**

posture an operator assumes while doing work

### 3.5

#### **erect posture**

standing or sitting upright without a backrest

#### 4 Physical dimensions of operators

The ranges of physical dimensions for standing and seated operators are shown in Figures 1 and 2. The ranges of derived body pivot dimensions are shown in Figure 3. The dimensions include a 25 mm allowance for the height of shoes or boots. The influence of other clothing is insignificant on these dimensions.

All dimensions are for an operator in an erect posture. A working posture is typically relaxed and the dimensions will be slightly less: stature (1A) and overhead reach (2A) will be reduced by about 15 mm, while sitting height (3A) and sitting eye height (3B) will be reduced by about 25 mm.

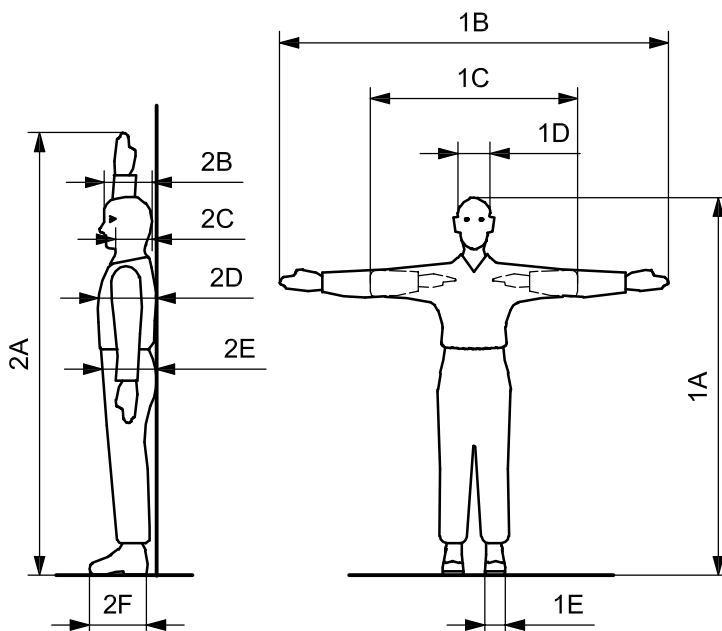
In some areas of the world, more than 5 % of the operators have leg lengths less than the values given for the small operators. To accommodate these areas, special adjustments may be provided.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 3411:2007](https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007)

<https://standards.iteh.ai/catalog/standards/sist/ee1cf9cd-039b-4a23-90e5-6c0ed9aa5cc0/iso-3411-2007>





Reference	Designation	Dimension mm		
		Small operator	Medium operator	Large operator
1A	Stature (with shoes) <sup>a</sup>	1 550	1 730	1 905
1B	Arm span <sup>c</sup>	1 585	1 765	1 942
1C	Arm span (elbows folded) <sup>c</sup>	850	958	1 060
1D	Head breadth <sup>b</sup>	140	151	163
1E	Foot breadth (with shoes) <sup>c</sup>	95	125	139
2A	Overhead reach (fingertip) <sup>c</sup>	1 900	2 118	2 325
2B	Head length	170	194	210
2C	Eye to back distance <sup>c</sup>	170	194	210
2D	Chest depth <sup>c</sup>	210	247	280
2E	Abdominal depth <sup>c</sup>	210	257	300
2F	Foot length (with shoes)	250	276	311

NOTE These columns represent the measured size range of the world population. Small is approximately the 5th percentile measurement, medium is approximately the 50th percentile measurement, and large is approximately the 95th percentile measurement. Small operator = 51,9 kg, medium operator = 74,4 kg, large operator = 114,1 kg.

<sup>a</sup> Add approximately 50 mm for protective helmet, if required.  
<sup>b</sup> Dimension for head breadth does not include the ears.  
<sup>c</sup> The dimensional values were derived through proportional scaling.

Figure 1 — Dimensions derived with operator in standing position