

INTERNATIONAL  
STANDARD

**ISO**  
**8548-2**

First edition  
1993-07-01

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**Prosthetics and orthotics — Limb  
deficiencies —**

**Part 2:**

Method of describing lower limb amputation  
stumps

*Prothèses et orthèses — Malformations des membres —*

*Partie 2: Méthode de description des moignons d'amputation des  
membres inférieurs*



Reference number  
ISO 8548-2:1993(E)

## Foreword

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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.

International Standard ISO 8548-2 was prepared by Technical Committee ISO/TC 168, *Prosthetics and orthotics*.

ISO 8548 consists of the following parts, under the general title *Prosthetics and orthotics — Limb deficiencies*:

- *Part 1: Method of describing limb deficiencies present at birth*
- *Part 2: Method of describing lower limb amputation stumps*
- *Part 3: Method of describing upper limb amputation stumps*
- *Part 4: Causal conditions leading to amputation*
- *Part 5: Patient descriptors*

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International Organization for Standardization  
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

## Introduction

Many different systems have been developed to classify amputation stumps, but none has achieved universal acceptance. The reasons for this are many. The members of the clinic teams in different countries, working with different patients and different technical possibilities, develop their own systems to meet their individual needs. Hence there is a need for an international system to be developed in order to compare one publication with another, one patient against another. The different care groups who will appreciate and use a standardized system of describing stumps include surgeons of different disciplines, other doctors (especially those concerned with rehabilitation), physical and occupational therapists, and prosthetists. Such a system is also of value to epidemiologists and government health officials.

The system proposed has to meet the needs of the different members of the clinic team and to enable the description of the stump to be recorded in a way that can be easily incorporated in reports. This part of ISO 8548 deliberately aims at defining the minimum information to be described. It should be feasible for this information to be included in forms designed by the individual institution; the information should also be capable of ready adaptation for computer analysis.

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# Prosthetics and orthotics — Limb deficiencies —

## Part 2:

## Method of describing lower limb amputation stumps

### 1 Scope

This part of ISO 8548 establishes a method of describing lower limb amputation stumps and for recording the descriptive information.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8548. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8548 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8548-1:1989, *Prosthetics and orthotics — Limb deficiencies — Part 1: Method of describing limb deficiencies present at birth.*

ISO 8549-1:1989, *Prosthetics and orthotics — Vocabulary — Part 1: General terms for external limb prostheses and external orthoses.*

ISO 8549-2:1989, *Prosthetics and orthotics — Vocabulary — Part 2: Terms relating to external limb prostheses and wearers of these prostheses.*

### 3 Definitions

For the purposes of this part of ISO 8548, the definitions given in ISO 8548-1, ISO 8549-1 and ISO 8549-2 apply.

### 4 Measurement of lower limb amputation stumps

#### 4.1 Reference levels and reference planes

Identify the reference levels and planes relevant to the particular level of amputation as described in 4.1.1 and 4.1.2.

##### 4.1.1 Reference levels

**4.1.1.1 Crotch level** — the most proximal level at which a circumferential measurement, perpendicular to the centreline of the thigh, can be obtained.

**4.1.1.2 Medial joint line** — the level of the medial tibial plateau, unless there is a fixed deformity of the knee, in which case this level is the highest at which a circumferential measurement perpendicular to the centreline of the stump can be obtained.

**4.1.1.3 Stump end level** — the level of the stump end.

**4.1.1.4 Ground level** — the level on which the patient is standing barefoot.

**4.1.1.5 "Fall-away" level** — in trans-femoral and trans-tibial stumps only, the level on the medial side of the stump at which the slope of the stump shape changes as it curves in towards the end.

**4.1.1.6 Minimum circumferential level** — in knee and ankle disarticulation stumps only, the level of the minimum circumferential measurement.

**4.1.1.7 Femoral condylar level** — in knee disarticulation stumps only.

**4.1.1.8 Maximum distal circumferential level** — in ankle disarticulation stumps only, the level of the maximum distal circumferential measurement.

#### **4.1.2 Reference planes (used for partial foot amputations only)**

**4.1.2.1 Heel plane** — the plane at the posterior aspect of the heel parallel with the centreline of the leg.

**4.1.2.2 Anterior tibial plane** — the plane at the anterior aspect of the tibia at the ankle joint line parallel with the centreline of the leg.

**4.1.2.3 Stump end plane** — the plane at the stump end parallel with the centreline of the leg.

**4.1.2.4 Toe plane** — the plane at the tips of the toes of the contralateral leg parallel with the centreline of the leg.

#### **4.2 Measurements**

##### **4.2.1 Length measurements**

Measure and record the length measurements as specified in the appropriate table (see tables 1 to 7) for the particular level of amputation.

##### **4.2.2 Circumferential measurements**

Measure and record the circumferential measurements as specified in the appropriate table (see tables 1 to 7) for the particular level of amputation.

#### **4.3 Assessment of joint function**

##### **4.3.1 General**

The aspects of joint function which need to be recorded include abnormalities of range of joint movement, significant reduction of muscle power and any loss of joint stability.

##### **4.3.2 Measurement of abnormal range of joint movement**

Record any abnormalities of the range of joint movement using the method of measurement of joint motion as adopted by the American Academy of Orthopaedic Surgeons in 1964 in which all motions of the joint are measured from defined zero starting positions.

##### **4.3.3 Assessment of joint power**

Record any reduction of muscle power likely to affect performance significantly.

NOTE 1 Muscle power can be measured objectively but requires expensive and bulky apparatus which is inapplicable here. The scales relating to measurements of power in poliomyelitis cases are equally inappropriate.

The subjective judgement as to whether there is significant reduction of power or not has to be based on an appreciation as to whether the power demonstrated would be sufficient to stabilize the proximal joint with the stump in a well-fitted socket in the prosthetic stance phase.

##### **4.3.4 Assessment of joint stability**

Record an assessment of the joint stability.

NOTE 2 It is recognized that stability of a joint is a function of the integrity of the osseous, ligamentous and neuro-muscular elements. In the context of this part of ISO 8548, the recording of the joint instability refers solely to bony and/or ligamentous impairments and their consequences.

#### **5 Method of describing lower limb amputation stump**

##### **5.1 General**

Describe the stump using the relevant descriptors listed in the appropriate tables (see tables 1 to 7), and by the use of the guidance given in annex A.

## 5.2 Trans-pelvic amputation

Use the descriptors shown in table 1.

## 5.3 Hip disarticulation

Use the descriptors shown in table 2.

NOTE 3 "Hip disarticulation" refers to amputation at the acetabulo-femoral joint or an amputation above the proximal reference level as described for the usual trans-femoral amputation.

## 5.4 Trans-femoral amputation (above-knee)

Use the descriptors shown in table 3.

NOTE 4 The upper reference level for length measurements is the crotch but, in the case of a flexion deformity, the upper reference level for length would be the highest level at which a circumferential measurement is possible at right angles to the centreline of the stump.

## 5.5 Knee disarticulation

Use the descriptors shown in table 4.

NOTE 5 The upper reference level for length measurements is the crotch but, in the case of a flexion deformity,

the upper reference level for length would be the highest level at which a circumferential measurement is possible at right angles to the centreline of the stump.

## 5.6 Trans-tibial amputation (below-knee)

Use the descriptors shown in table 5.

NOTE 6 The upper reference level for length measurements is the medial joint line but, in the case of a flexion deformity, the upper reference level for length would be the highest level at which a circumferential measurement is possible at right angles to the centreline of the stump.

## 5.7 Ankle (Syme's) disarticulation

Use the descriptors shown in table 6.

NOTE 7 The upper reference level for length measurements is the medial joint line but, in the case of a flexion deformity, the upper reference level for length would be the highest level at which a circumferential measurement is possible at right angles to the centreline of the stump.

## 5.8 Partial foot amputation

Use the descriptors shown in table 7.

**Table 1 — Descriptors for trans-pelvic amputations** (see 5.2 and annex A)

<b>Descriptor</b>	<b>Statements to be recorded</b>
<b>Measurements</b>	Not relevant
<b>Stump shape</b> Pelvic remnant	Absent/present If the contralateral limb is the site of an amputation, state the level
<b>Skin of the stump</b> Amputation scar  General	Healed/unhealed Mobile/adherent Skin barrier intact/skin barrier not intact Sensation normal/sensation impaired No additional scarring/additional scarring
<b>Circulation</b> Oedema	None/present/excessive
<b>Soft tissues of the stump</b> Amount Consistency	Adequate/inadequate/excessive Normal/flabby/indurated
<b>Significant pain</b> Spontaneous pain Tenderness Painful neuroma Phantom pain Pain after exercise	No/yes No/yes (generalized)/yes (localized) No/yes No/yes No/yes

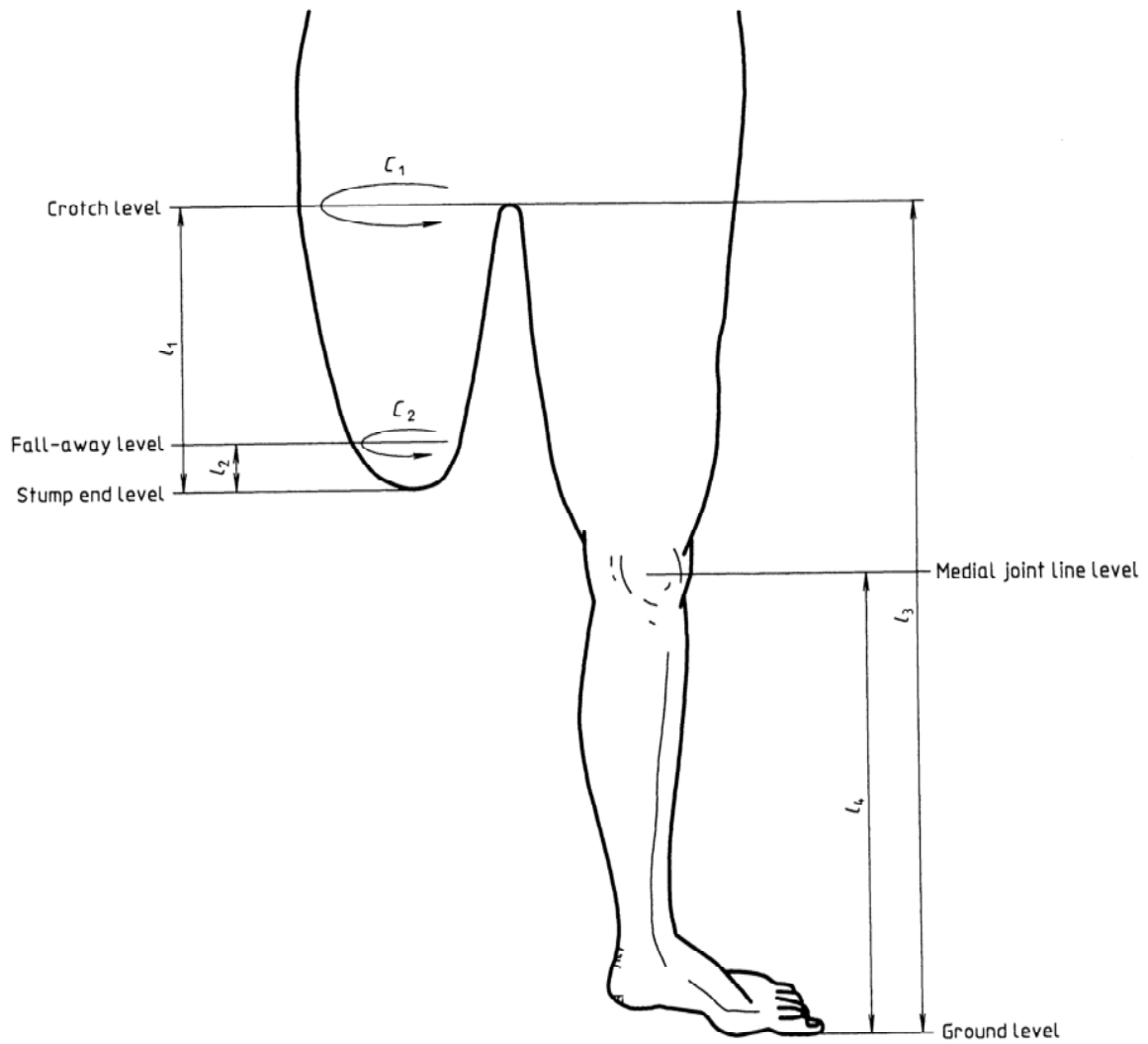


**Table 2 — Descriptors for hip disarticulations** (see 5.3 and annex A)

Descriptor	Statements to be recorded
<b>Measurements</b>	Not relevant
<b>Stump shape</b> Upper femoral remnant	Absent/present but not prominent/present and prominent If the contralateral limb is the site of an amputation, state the level
<b>Skin of the stump</b> Amputation scar  General	Healed/unhealed Mobile/adherent Skin barrier intact/skin barrier not intact Sensation normal/sensation impaired No additional scarring/additional scarring
<b>Circulation</b> Oedema	None/present/excessive
<b>Soft tissues of the stump</b> Amount Consistency	Adequate/inadequate/excessive Normal/flabby/indurated
<b>Significant pain</b> Spontaneous pain Tenderness Painful neuroma Phantom pain Pain after exercise	No/yes No/yes (generalized)/yes (localized) No/yes No/yes No/yes

**Table 3 — Descriptors for trans-femoral (above-knee) amputations (including supracondylar and transcondylar amputations) (see 5.4, figure 1 and annex A)**

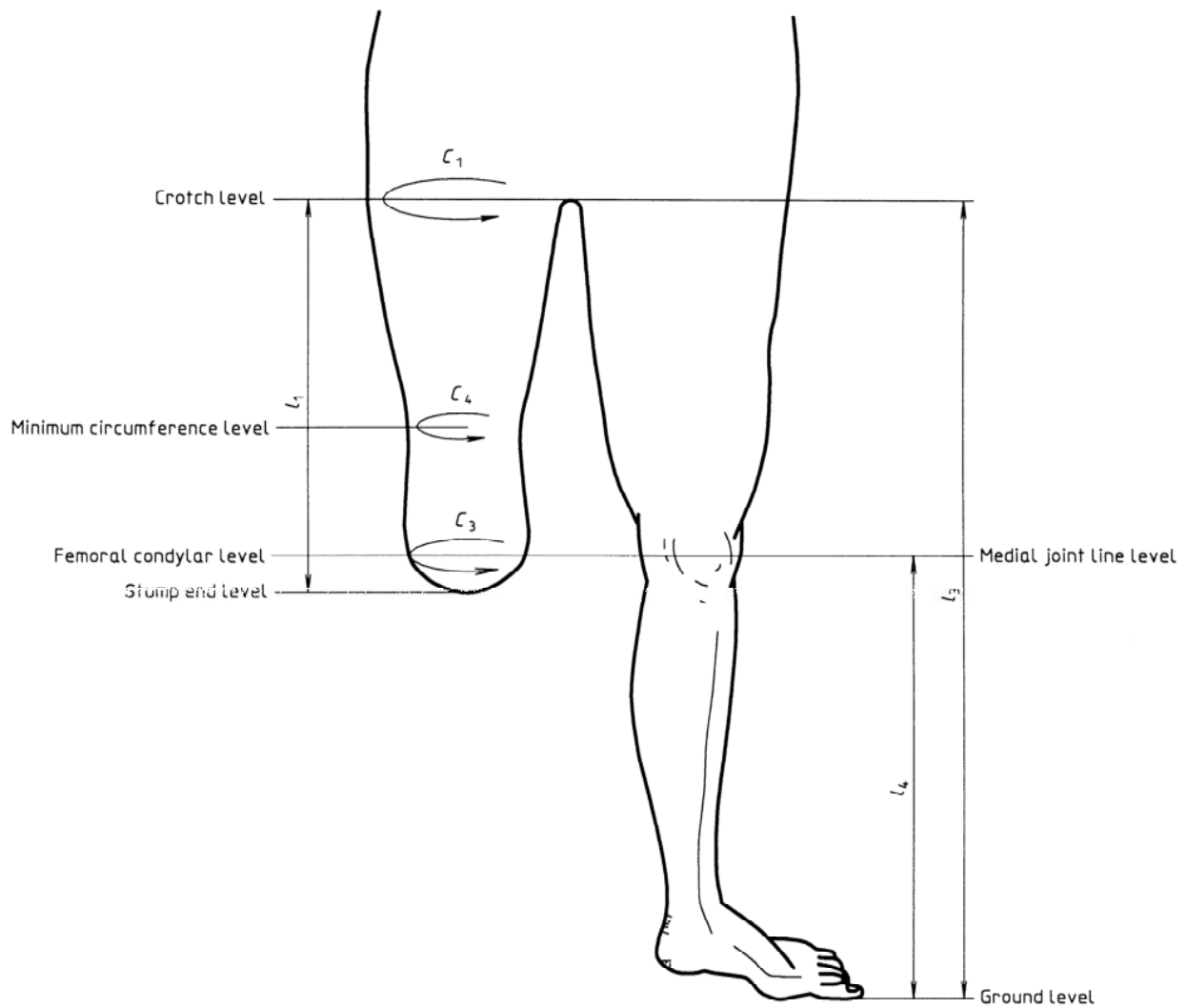
Descriptor	Statements to be recorded
<b>Measurements</b>	Record the following measurements: <sup>1)</sup> <ul style="list-style-type: none"> <li>— the length from the crotch to the stump end, <math>l_1</math></li> <li>— the length from the "fall-away" to the stump end, <math>l_2</math></li> <li>— the length of the contralateral limb from the crotch to the ground, <math>l_3</math></li> <li>— the length of the contralateral limb from the medial joint line to the ground, <math>l_4</math></li> <li>— the circumference at the crotch, <math>C_1</math></li> <li>— the circumference at the "fall-away", <math>C_2</math></li> </ul> If the contralateral limb is the site of an amputation, state the level
<b>Stump shape</b> General End of femur	Cylindrical/conical/bulbous Not prominent/prominent
<b>Skin of the stump</b> Amputation scar General	Healed/unhealed Mobile/adherent Skin barrier intact/skin barrier not intact Sensation normal/sensation impaired No additional scarring/additional scarring
<b>Circulation</b> Colour of skin Temperature (to the examining hand) Oedema	Normal/cyanotic/other discoloration Warm/cold None/present/excessive
<b>Soft tissues of the stump</b> Amount Consistency	Adequate/inadequate/excessive Normal/flabby/indurated
<b>Significant pain</b> Spontaneous pain Tenderness Painful neuroma Phantom pain Pain after exercise	No/yes No/yes (generalized)/yes (localized) No/yes No/yes No/yes
<b>Joint function</b> <b>Hip</b> Range of movements Muscle power Stability Pain	Normal/abnormal (Specify: flexion/extension or abduction/adduction) No significant reduction/significant reduction Normal/impaired No/yes
1) If the stump was measured with the patient in any position other than standing, state the patient's posture.	



**Figure 1 — Reference levels and measurements for trans-femoral amputations**

**Table 4 — Descriptors for knee disarticulations (not including transcondylar and supracondylar amputations) (see 5.5, figure 2 and annex A)**

Descriptor	Statements to be recorded
<b>Measurements</b>	Record the following measurements: <sup>1)</sup> <ul style="list-style-type: none"> <li>— the length from the crotch to the stump end, <math>l_1</math></li> <li>— the length of the contralateral limb from the crotch to the ground, <math>l_3</math></li> <li>— the length of the contralateral limb from the medial joint line to the ground, <math>l_4</math></li> <li>— the circumference at the crotch, <math>C_1</math></li> <li>— the minimum circumference of the stump, <math>C_4</math></li> <li>— the circumference of the femoral condyles, <math>C_3</math></li> </ul> If the contralateral limb is the site of an amputation, state the level
<b>Stump shape</b> General	Cylindrical/bulbous/conical
<b>Skin of the stump</b> Amputation scar General	Healed/unhealed Mobile/adherent Skin barrier intact/skin barrier not intact Sensation normal/sensation impaired No additional scarring/additional scarring
<b>Circulation</b> Colour of skin Temperature (to the examining hand) Oedema	Normal/cyanotic/other discoloration Warm/cold None/present/excessive
<b>Soft tissues of the stump</b> Amount Consistency	Adequate/inadequate/excessive Normal/flabby/indurated
<b>Significant pain</b> Spontaneous pain Tenderness Painful neuroma Phantom pain Pain after exercise	No/yes No/yes (generalized)/yes (localized) No/yes No/yes No/yes
<b>Joint function</b> <b>Hip</b> Range of movements Muscle power Stability Pain	Normal/abnormal (Specify: flexion/extension or abduction/adduction) No significant reduction/significant reduction Normal/impaired No/yes
1) If the stump was measured with the patient in any position other than standing, state the patient's posture.	



**Figure 2 — Reference levels and measurements for knee disarticulations**

**Table 5 — Descriptors for trans-tibial (below-knee) amputations** (see 5.6, figure 3 and annex A)

Descriptor	Statements to be recorded
<b>Measurements</b>	Record the following measurements: <sup>1)</sup> <ul style="list-style-type: none"> <li>— the length from the crotch to the medial joint line, <math>l_5</math></li> <li>— the length from the medial joint line to the stump end, <math>l_6</math></li> <li>— the length from the "fall-away" point to the stump end, <math>l_2</math></li> <li>— the length of the contralateral limb from the crotch to the ground, <math>l_3</math></li> <li>— the length of the contralateral limb from the medial joint line to the ground, <math>l_4</math></li> <li>— the circumference at the level of the medial joint line, <math>C_5</math></li> <li>— the circumference at the "fall-away", <math>C_2</math></li> </ul> If the contralateral limb is the site of an amputation, state the level
<b>Stump shape</b> General End of tibia End of fibula	Cylindrical/conical/bulbous Not prominent/prominent Not prominent/prominent
<b>Skin of the stump</b> Amputation scar General	Healed/unhealed Mobile/adherent Skin barrier intact/skin barrier not intact Sensation normal/sensation impaired No additional scarring/additional scarring
<b>Circulation</b> Colour of skin Temperature (to the examining hand) Oedema	Normal/cyanotic/other discoloration Warm/cold None/present/excessive
<b>Soft tissues of the stump</b> Amount Consistency	Adequate/inadequate/excessive Normal/flabby/indurated
<b>Significant pain</b> Spontaneous pain Tenderness Painful neuroma Phantom pain Pain after exercise	No/yes No/yes (generalized)/yes (localized) No/yes No/yes No/yes
<b>Joint function</b> <b>Hip</b> Range of movements Muscle power Stability <b>Knee</b> Range of movements Muscle power Stability Pain in proximal joints	Normal/abnormal (Specify: flexion/extension or abduction/adduction) No significant reduction/significant reduction Normal/impaired Normal/abnormal (Specify: flexion/extension) No significant reduction/significant reduction Normal/impaired No/yes
1) If the stump was measured with the patient in any position other than standing, state the patient's posture.	

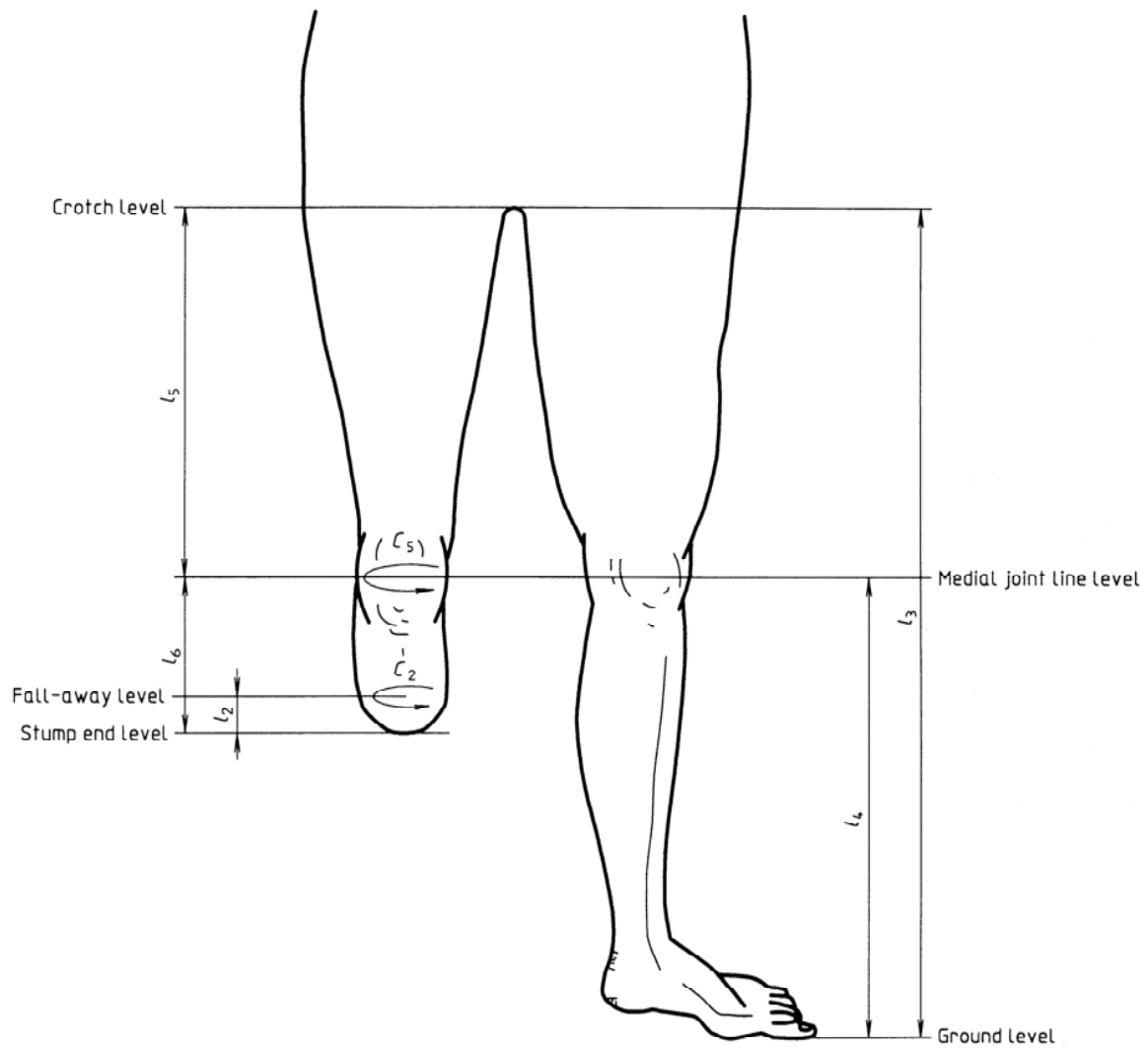
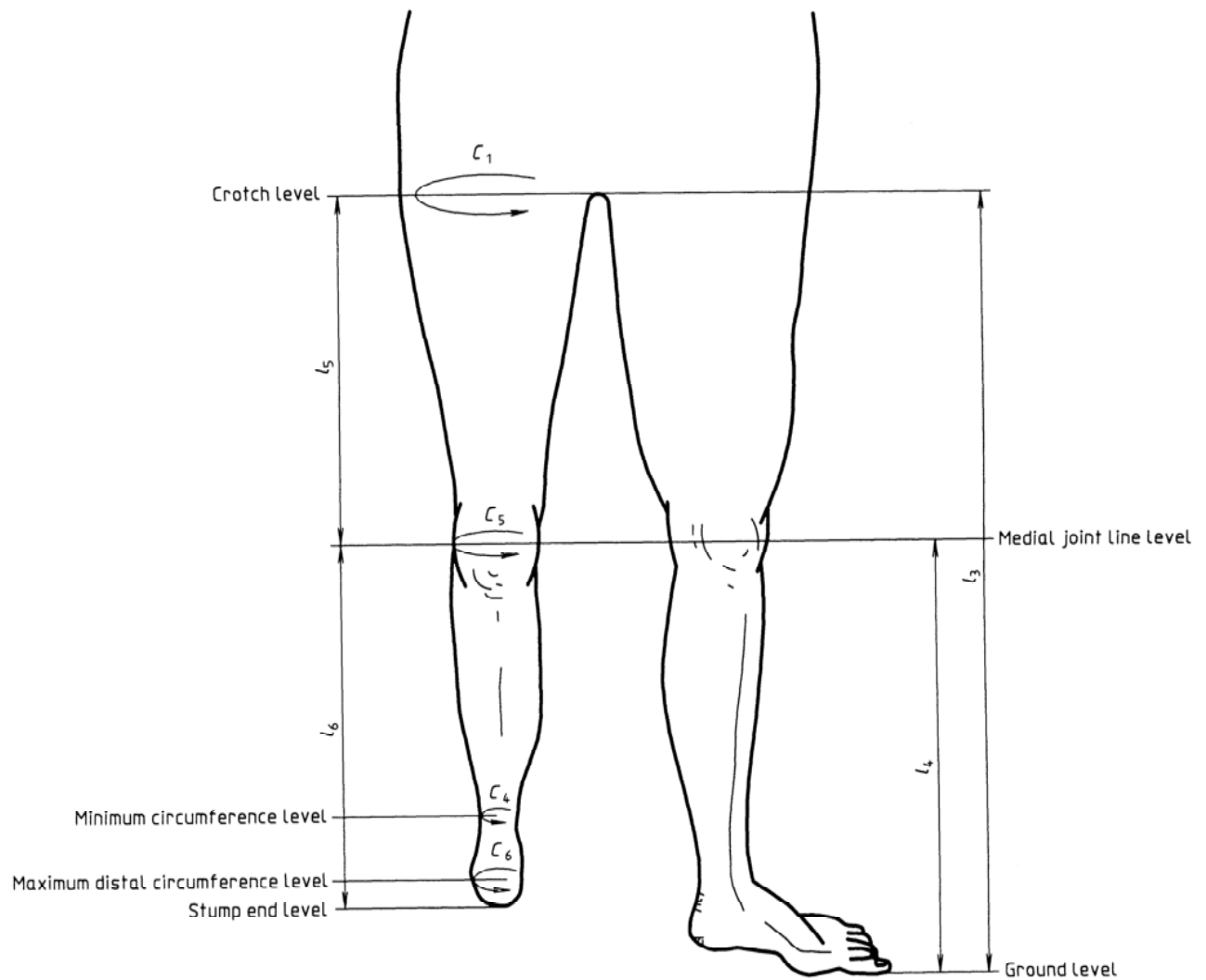


Figure 3 — Reference levels and measurements for trans-tibial amputations

**Table 6 — Descriptors for ankle (Syme's) disarticulations** (see 5.7, figure 4 and annex A)

Descriptor	Statements to be recorded
<b>Measurements</b>	Record the following measurements: <sup>1)</sup> <ul style="list-style-type: none"> <li>— the length from the crotch to the medial joint line, <math>l_5</math></li> <li>— the length from the medial joint line to the stump end, <math>l_6</math></li> <li>— the length of the contralateral limb from the crotch to the ground, <math>l_3</math></li> <li>— the length of the contralateral limb from the medial joint line to the ground, <math>l_4</math></li> <li>— the circumference at the medial joint line, <math>C_5</math></li> <li>— the minimum circumference of the stump, <math>C_4</math></li> <li>— the maximum distal circumference of the stump, <math>C_6</math></li> </ul> If the contralateral limb is the site of an amputation, state the level
<b>Stump shape</b> General Bone	Cylindrical/bulbous Not prominent/prominent
<b>Skin of the stump</b> Amputation scar General	Healed/unhealed Mobile/adherent Skin barrier intact/skin barrier not intact Sensation normal/sensation impaired No additional scarring/additional scarring
<b>Circulation</b> Colour of skin Temperature (to the examining hand) Oedema	Normal/cyanotic/other discoloration Warm/cold None/present/excessive
<b>Soft tissues of the stump</b> Amount Consistency	Adequate/inadequate/excessive Normal/flabby/indurated
<b>Significant pain</b> Spontaneous pain Tenderness Painful neuroma Phantom pain Pain after exercise	No/yes No/yes (generalized)/yes (localized) No/yes No/yes No/yes
<b>Joint function</b> <b>Hip</b> Range of movements Muscle power Stability <b>Knee</b> Range of movements Muscle power Stability Pain in proximal joints	Normal/abnormal (Specify: flexion/extension or abduction/adduction) No significant reduction/significant reduction Normal/impaired Normal/abnormal (Specify: flexion/extension) No significant reduction/significant reduction Normal/impaired No/yes
1) If the stump was measured with the patient in any position other than standing, state the patient's posture.	





**Figure 4 — Reference levels and measurements for ankle disarticulations**

Table 7 — Descriptors for partial foot amputations (see figure 5)

Descriptor	Statements to be recorded
<b>Measurements</b>	Record the following measurements: <ul style="list-style-type: none"> <li>— the length from the heel plane to the stump end plane, <math>l_8</math></li> <li>— the length from the anterior tibial plane to the stump end plane, <math>l_7</math></li> <li>— the length of the contralateral foot from the heel plane to the toe plane, <math>l_9</math></li> </ul> Record any significant length discrepancy between the segments of the affected and contralateral limbs
<b>Stump shape</b> Bones	Not prominent/prominent
<b>Skin of the stump</b> Amputation scar General	Healed/unhealed Mobile/adherent Skin barrier intact/skin barrier not intact Sensation normal/sensation impaired No additional scarring/additional scarring
<b>Circulation</b> Colour of skin Temperature (to the examining hand) Oedema	Normal/cyanotic/other discoloration Warm/cold None/present/excessive
<b>Soft tissues of the stump</b> Amount Consistency	Adequate/inadequate/excessive Normal/flabby/indurated
<b>Significant pain</b> Spontaneous pain Tenderness Painful neuroma Phantom pain Pain after exercise	No/yes No/yes (generalized)/yes (localized) No/yes No/yes No/yes
<b>Joint function</b> <b>Hip</b> Range of movements Muscle power Stability <b>Knee</b> Range of movements Muscle power Stability <b>Ankle</b> Range of movements Muscle power Stability Pain in proximal joints	Normal/abnormal (Specify: flexion/extension or abduction/adduction) No significant reduction/significant reduction Normal/impaired  Normal/abnormal (Specify: flexion/extension) No significant reduction/significant reduction Normal/impaired  Normal/abnormal (Specify: flexion/extension) No significant reduction/significant reduction Normal/impaired  No/yes
<b>Foot remnant</b> General Plantigrade Other deformities	Otherwise normal/abnormal (specify) No/yes Not significant/significant (specify)

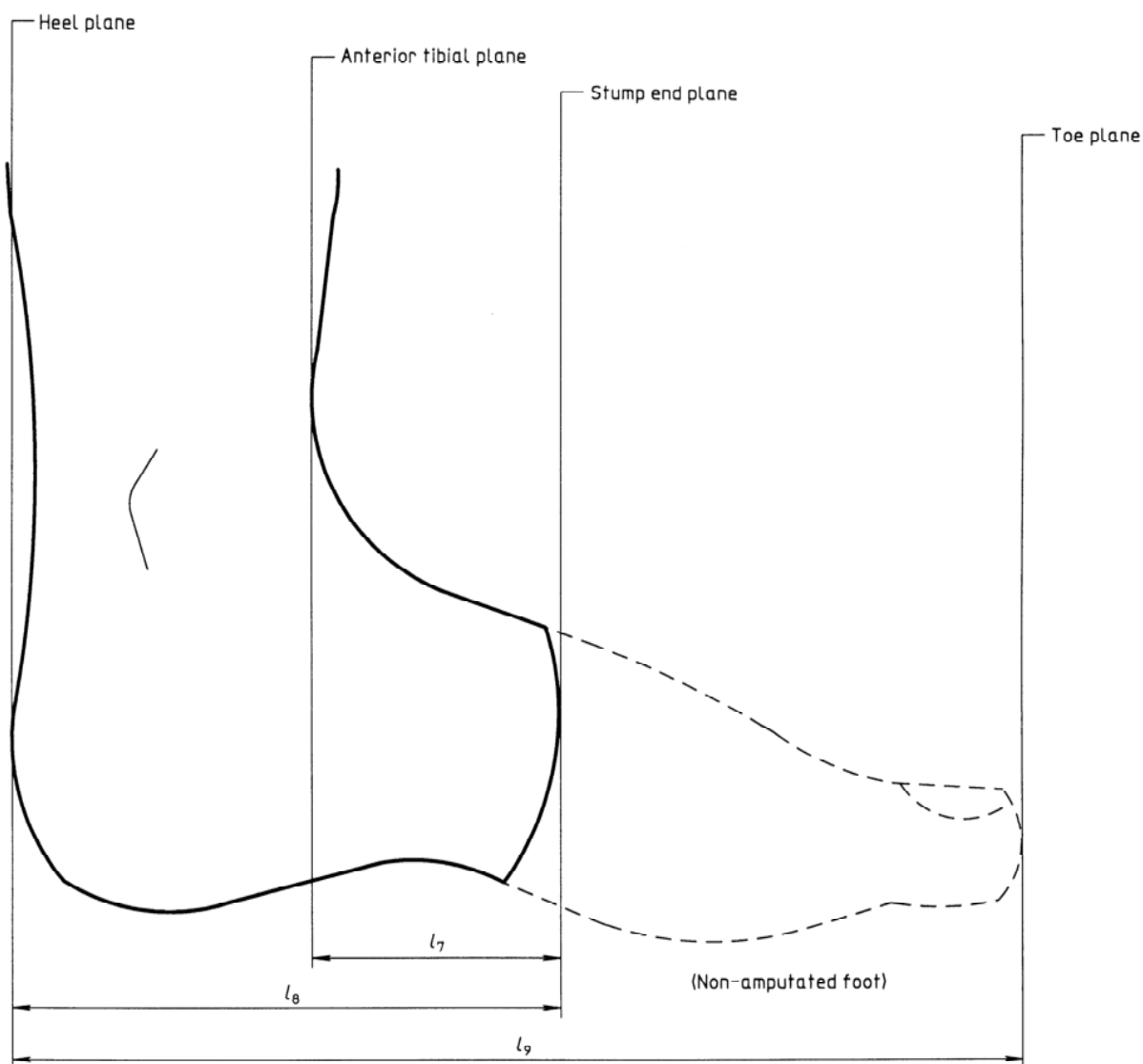


Figure 5 — Reference planes and measurements for partial foot amputations

## Annex A (informative)

### Explanatory notes for descriptors used in tables 1 to 7

#### A.1 General

The main elements in any description should include:

- a) stump measurements;
- b) stump shape;
- c) the condition of the skin of the stump;
- d) the condition of the circulation in the stump;
- e) the condition of the soft tissues of the stump;
- f) pain;
- g) proximal joint function, to include range of movement;
- h) relevant dimensions of the contralateral limb.

#### A.2 Measurements

The measurements chosen are non-invasive, require no special equipment, and can be made by any member of the clinic team. The number of measurements used is no more than is necessary to give an adequate description of the stump and its proportions.

#### A.3 Shape

Descriptions of the shape are restricted to conical, bulbous and cylindrical. Bulbous is self-evident and, provided the words "cylindrical" or "conical" are not interpreted too literally, they are equally descriptive. In addition it is important to record whether any bone is unduly prominent.

#### A.4 Skin

In describing the skin of the stump, one is concerned simply with the general situation. It is sufficient to note whether the skin barrier is intact or not, and whether the skin has normal sensation. There is no requirement to describe the operation incision in any detail but it should be recorded whether the scar is healed and mobile, or otherwise. The presence of additional scarring should be noted.

#### A.5 Circulation

Many factors concerning the circulation might well be recorded but it is enough to state:

- a) whether the skin is normal, cyanotic or otherwise discoloured;
- b) whether it is warm to the examining hand or not; and
- c) whether oedema is present.

Excessive oedema is seen to be that which would force the patient to take off the prosthesis during the day or such that one would hesitate to fit the patient with a prosthesis.

#### A.6 Soft tissues

The soft tissues of the stump are described only in terms of the amount and consistency.

#### A.7 Pain

Pain as an entity is always difficult to describe and is largely incapable of measurement. The presence or absence of significant spontaneous pain from whatever source, tenderness, painful neuroma, phantom pain and pain after exercise is to be distinguished from the common phantom sensations and is to be recorded.

#### A.8 Joint function

Proximal joint function in terms of range of movement, power and stability, and the presence of pain is to be noted. Abnormalities of movement (e.g. contractures) or excessive movement is also to be recorded.

#### A.9 Contralateral limb

In order that the description of the stump can be related to the patient as a whole, the contralateral limb needs some minimal dimensional description, e.g. the length from the crotch to the ground.

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**UDC 616-089.28:591.471.373**

**Descriptors:** medicine, prosthetic devices, lower limbs, defects, description.

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