

---

---

**Stationary training equipment —**

Part 10:

**Exercise bicycles with a fixed wheel  
or without freewheel — Additional  
specific safety requirements and test  
methods**

*Équipement d'entraînement fixe —*

*Partie 10: Bicyclettes d'exercice avec une roue fixe ou sans roue  
libre — Exigences spécifiques de sécurité et méthodes d'essai  
supplémentaires*

STANDARDSISO.COM : Click to view the full PDF of ISO 20957-10:2017



STANDARDSISO.COM : Click to view the full PDF of ISO 20957-10:2017



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

# Contents

	Page
<b>Foreword</b> .....	<b>iv</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 Classification</b> .....	<b>2</b>
<b>5 Safety requirements</b> .....	<b>3</b>
5.1 External construction.....	3
5.1.1 Transmission elements, rotating parts, squeeze and shear points.....	3
5.1.2 Temperature of accessible surfaces.....	4
5.2 Intrinsic loading.....	4
5.2.1 Seat pillar.....	4
5.2.2 Handlebar.....	4
5.2.3 Pedal.....	4
5.3 Seat pillar adjustment.....	4
5.3.1 General.....	4
5.3.2 Insertion depth.....	5
5.4 Handlebar.....	5
5.4.1 Handlebar stem adjustment.....	5
5.4.2 Insertion depth.....	5
5.5 Pedals.....	5
5.6 Stability.....	5
5.7 Locking system.....	5
5.8 Emergency braking system.....	6
5.8.1 Effectiveness.....	6
5.8.2 Actuator integrity.....	6
5.8.3 Visibility.....	6
5.9 Endurance for the pedal crank assembly.....	6
5.10 Foot clearance.....	6
5.11 Power display.....	6
5.12 Additional instructions for use.....	7
5.13 Additional marking.....	7
<b>6 Test methods</b> .....	<b>8</b>
6.1 General.....	8
6.1.1 Dimensional check.....	8
6.1.2 Visual examination.....	8
6.1.3 Performance test.....	8
6.2 Testing of transmission elements, rotating parts, squeeze and shear points.....	8
6.3 Testing of temperature of accessible surfaces.....	8
6.4 Testing of intrinsic loading.....	8
6.5 Testing of handlebars.....	8
6.6 Testing of stability.....	8
6.7 Testing of the emergency braking system.....	9
6.7.1 Testing of effectiveness.....	9
6.7.2 Testing of actuator integrity.....	9
6.8 Testing of the pedal crank assembly.....	9
6.9 Testing of the power display.....	10
6.10 Testing of locking system.....	11
<b>7 Test report</b> .....	<b>11</b>
<b>Bibliography</b> .....	<b>12</b>

## 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](http://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](http://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](http://www.iso.org/iso/foreword.html).

ISO 20957-10 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 136, *Sports, playground and other recreational facilities and equipment*, in collaboration with ISO Technical Committee TC 83, *Sports and other recreational facilities and equipment*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 20957-10:2007), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the Scope has been simplified;
- the formulation has been aligned with ISO 20957-1;
- [Clause 5](#) has been specified and restructured;
- [Clause 6](#) has been specified and restructured;
- the Normative references have been updated.

A list of all parts in the ISO 20957 series can be found on the ISO website.

# Stationary training equipment —

## Part 10:

# Exercise bicycles with a fixed wheel or without freewheel — Additional specific safety requirements and test methods

## 1 Scope

This document specifies safety requirements for exercise bicycles with a fixed wheel or without freewheel that have an inertia of  $>0,6 \text{ kg}\cdot\text{m}^2$ . The requirements are in addition to the general safety requirements of ISO 20957-1, with which this document is intended to be read in conjunction.

Any attachment provided with the exercise bicycle with a fixed wheel or without freewheel for the performance of additional exercises is subject to the requirements of ISO 20957-1.

## 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 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13732-1:2006, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces*

ISO 20957-1, *Stationary training equipment — Part 1: General safety requirements and test methods*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20957-1 and the following apply.

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

#### **flywheel**

rotating mass designed to create inertia

### 3.2

#### **freewheel**

mechanism which is designed to disengage the *flywheel* (3.1) from the pedal mechanism in one direction

### 3.3

#### **seat pillar**

connection between the frame and the seat provided to adjust the height of the seat

### 3.4

#### **seat tube**

part of the frame where the *seat pillar* (3.3) is inserted

**3.5**

**handlebar stem**

connection between the frame and the handlebar provided to adjust the height of the handlebar

**3.6**

**emergency brake**

mechanism designed to stop the movement of the pedals in case of emergency

**3.7**

**locking system**

mechanism designed to immobilize any rotating part of the training equipment

**3.8**

**housing**

cover used to encase potentially hazardous elements

**3.9**

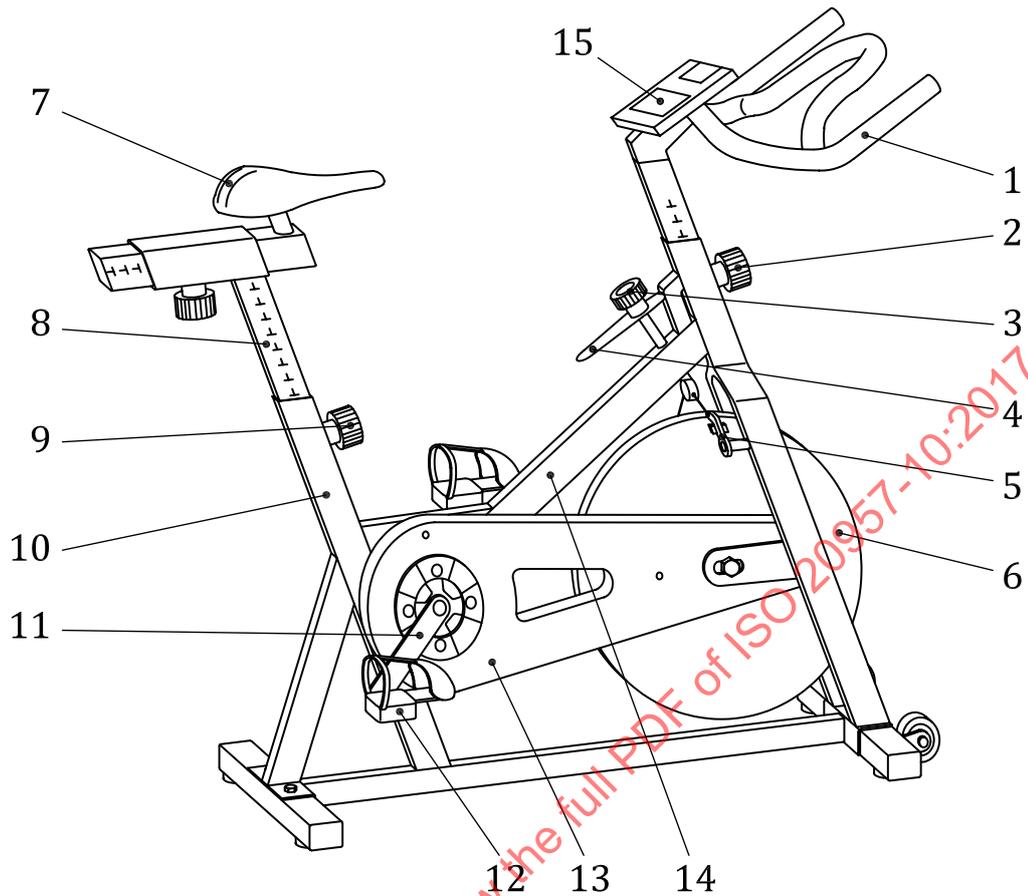
**transmission guard**

component used to prevent access to potentially hazardous transmission elements

**4 Classification**

The usage classes according to ISO 20957-1 apply. [Figure 1](#) shows an example of a training equipment with a fixed wheel or without freewheel.

STANDARDSISO.COM : Click to view the full PDF of ISO 20957-10:2017

**Key**

1	handlebar	9	seat adjustment
2	handlebar adjustment	10	seat tube
3	resistance adjustment	11	pedal crank
4	emergency brake	12	pedal
5	resistance system (brake)	13	transmission guard
6	flywheel	14	frame
7	seat	15	display (if provided)
8	seat pillar		

**Figure 1** — Example of an exercise bicycle with a fixed wheel or without freewheel

## 5 Safety requirements

### 5.1 External construction

#### 5.1.1 Transmission elements, rotating parts, squeeze and shear points

Training equipment where the pedal cranks have a greater diameter than the housing shall have a distance between the pedal cranks and the stationary parts of the construction of  $\geq 10$  mm. This requirement does not apply if the housing has a greater diameter than the pedal crank.

Transmission elements shall be covered in accordance with ISO 12100. All other parts shall be tested with the test finger in accordance with ISO 20957-1. The test finger shall not become entrapped or come into contact with moving parts which do not have a smooth surface. The radius of the edge of the

flywheel shall be  $\geq 2,5$  mm. The edges of the pedals shall be free of burrs, rounded or protected in some other way.

Test in accordance with [6.1.1](#) and [6.2](#).

### 5.1.2 Temperature of accessible surfaces

Accessible surfaces of the training equipment shall not have a temperature  $>65$  °C.

Test in accordance with [6.3](#).

## 5.2 Intrinsic loading

### 5.2.1 Seat pillar

The seat pillar shall be tested in the most onerous position with a vertical load of 2,5 times the maximum user's body mass as specified in the user's manual or 2 500 N, whichever is greater.

Test in accordance with [6.4](#).

During the tests of the seat pillar, the training equipment shall not tip over. The clamped seat pillar shall not slip by more than 5 mm into the seat tube during the test. After the test, the training equipment shall not be broken and shall still function as intended by the manufacturer.

### 5.2.2 Handlebar

The handlebar shall be tested with a vertical load of 1,5 times the maximum user's body mass specified in the user's manual or 1 500 N, whichever is greater.

The same handlebar shall then be tested with a horizontal load. The load shall be 0,5 times the maximum body mass as specified in the user's manual or 500 N, whichever is greater, applied horizontally in a forward direction.

After the test, the training equipment shall not be broken and shall still function as intended by the manufacturer.

Test in accordance with [6.5](#).

### 5.2.3 Pedal

The pedals shall withstand a load of 2,5 times the maximum user's body mass as specified in the user's manual or 2 500 N, whichever is greater. Test in accordance with [6.8](#).

After the test, the training equipment shall not be broken and shall still function as intended by the manufacturer.

## 5.3 Seat pillar adjustment

### 5.3.1 General

The height and the horizontal position, if applicable, of the seat shall be adjustable without a tool for class S training equipment.

For class H training equipment, if a tool is required to adjust the seat height, it shall be provided by the manufacturer.

### 5.3.2 Insertion depth

The seat pillar shall have a permanent mark indicating the minimum insertion depth of at least 1,5 times the cross-section reference dimension (e.g. diameter or longest diagonal use of a rectangular tube) into the seat tube. The mark is not required if the minimum insertion depth is given by the design.

Test in accordance with [6.1.1](#) and [6.1.2](#).

If the clamping mechanism of the horizontal adjustment becomes loose, the seat shall remain attached and support the user.

Test in accordance with [6.1.3](#).

## 5.4 Handlebar

### 5.4.1 Handlebar stem adjustment

The handlebar stem shall be adjustable or different grip positions shall be possible.

If a tool is required to adjust the handlebar stem, it shall be provided by the manufacturer.

### 5.4.2 Insertion depth

The handlebar stem shall have a permanent mark indicating the minimum insertion depth of at least 1,5 times the cross-section reference dimension (e.g. diameter or longest diagonal use of a rectangular tube) into the frame. The mark is not required if the minimum insertion depth is given by the design.

Test in accordance with [6.1.1](#) and [6.1.2](#).

If the clamping mechanism of the horizontal adjustment becomes loose, the handlebar shall remain attached and support the user.

Test in accordance with [6.1.3](#).

## 5.5 Pedals

The pedals shall include retention means which retain the foot in a position preventing unintended movement.

Test in accordance with [6.1.2](#) and [6.1.3](#).

## 5.6 Stability

The training equipment shall not tip over.

Test in accordance with [6.6](#).

## 5.7 Locking system

Exercise bicycles without freewheel for home use (class H) shall be equipped with a locking system.

The locking system shall be able to hold  $\geq 100$  Nm torque applied to the crankshaft. The crank shall not rotate  $>45^\circ$  when loaded.

NOTE The locking system is provided to help prevent uncontrolled use or movement of any rotating parts of high inertia of the training equipment by persons, especially children.

Test in accordance with [6.10](#).

## 5.8 Emergency braking system

### 5.8.1 Effectiveness

Exercise bicycles without freewheel shall be equipped with an emergency brake. This brake shall be capable of bringing the training equipment to a stop (in both directions) within one complete revolution of the crank and can be activated with a downward applied force (push) of  $\leq 100$  N or an upward applied force (pull) of  $\leq 50$  N.

Test in accordance with [6.7.1](#).

### 5.8.2 Actuator integrity

For friction-based mechanical brake systems, the actuator shall withstand a load of  $(300 \pm 5)$  N in the direction of movement of the actuator. For other types of brake systems (e.g. magnetic), the actuator shall withstand a load of five times the measured value required to trigger the brake system in the direction of movement of the actuator.

Test in accordance with [6.7.2](#).

After the test, the actuator shall not be broken and shall still function as intended by the manufacturer.

### 5.8.3 Visibility

The actuator shall be easily accessible and visible from the user's position.

The actuator of the emergency brake shall be coloured RED. If there is a background, the background shall be coloured YELLOW.

Test in accordance with [6.1.2](#).

## 5.9 Endurance for the pedal crank assembly

The pedal crank assembly shall withstand a dynamic load of 75 % of the maximum user's body mass as specified in the user's manual or  $(750 \pm 10)$  N, whichever is greater, for

- a) 1 000 000 cycles at a frequency of  $\leq 25$  Hz for class S, and
- b) 120 000 cycles at a frequency of  $\leq 25$  Hz for class H.

Test in accordance with [6.8](#).

### 5.10 Foot clearance

The vertical distance between any rigid component of the pedal and the floor or the pedal and any frame member shall be  $\geq 60$  mm.

Test in accordance with [6.1.1](#) and [6.1.2](#).

### 5.11 Power display

Exercise bikes without freewheel and with a watt display shall not be called ergometer.

Test in accordance with [6.1.2](#).

For values  $\geq 50$  W, the accuracy of the power display shall be within the tolerance of  $\pm 10$  % and for values of  $< 50$  W, the accuracy of the power display shall be within the tolerance of  $\pm 5$  W.

Test in accordance with [6.9](#).

A constant power mode is not allowed.

Test in accordance with [6.1.2](#).

For class S: If the heart rate is displayed, a warning placed in a conspicuous position on the display console shall be given: "WARNING! Heart rate monitoring systems may be inaccurate. Over-exercise may result in serious injury or death. If you feel faint, stop exercising immediately."

Test in accordance with [6.1.2](#).

A heart rate controlled mode is not allowed.

Test in accordance with [6.1.2](#).

Marking as class A, class B or class C training equipment is prohibited.

Test in accordance with [6.1.2](#).

No specification as class A, class B or class C training equipment shall be given in the instructions for use.

Information about accuracy range with speed (rpm) and power (in W) shall be given in the instructions for use.

### 5.12 Additional instructions for use

In addition to the general instructions for use in ISO 20957-1, the manufacturer shall give instructions for the safe use with at least the following information:

- a) information on the risk caused by spinning pedals and/or exposed flywheel with the absence of a freewheel system;
- b) instructions of the method required to operate the emergency brake;
- c) instructions describing the method required to stop the rotation of the pedals and flywheel, and end the training;
- d) instructions describing the operation of the locking mechanism for class H;
- e) instructions to explain that class S training equipment shall always be used in a supervised environment;
- f) instructions describing the requirement to use the foot positioning system described in [5.5](#);
- g) for designs that do not ensure a minimum insertion depth of the handlebar and the seat, instructions to explain the importance of adjusting the handlebar and the seat to suit the user: "This adjustment shall not exceed the mark indicating the minimum insertion depth."

### 5.13 Additional marking

Home use (class H) training equipment without freewheel shall be marked with a warning label instructing the user to lock the training equipment when not in use: "WARNING — Lock the equipment when not in use."

Class S training equipment without freewheel shall be marked with a warning label instructing that the equipment shall be used in a supervised environment: "WARNING — Use the stationary training equipment in a supervised environment."

All labels shall be placed in a visible position.

## 6 Test methods

### 6.1 General

#### 6.1.1 Dimensional check

The measurement shall be done with appropriate measurement devices.

#### 6.1.2 Visual examination

The visual examination shall be done under proper lighting.

#### 6.1.3 Performance test

The tested mechanism shall be actuated as intended by the manufacturer.

### 6.2 Testing of transmission elements, rotating parts, squeeze and shear points

Apparatus: Test finger in accordance with ISO 20957-1.

Approach all moving parts from all sides with the test finger probe to determine whether the finger probe can become entrapped.

Determine whether the test finger probe is trapped.

### 6.3 Testing of temperature of accessible surfaces

The measuring procedure shall be according to ISO 13732-1:2006, 5.4.

Pedal the training equipment at  $(200 \pm 10)$  W with  $(60 \pm 1)$  min<sup>1</sup> for three periods of  $(20 \pm 1)$  min. After each period, rest for 5 min.

Within 2 min after the third period, measure the temperature of all exposed surfaces.

### 6.4 Testing of intrinsic loading

The test shall be carried out without the seat and in the most onerous position. Apply the static load as described in 5.2 for 5 min.

Determine the possibility of the training equipment tipping over and check against any breakage. Remove the load and determine the reference dimensions of the seat pillar.

### 6.5 Testing of handlebars

Apply a downward vertical static load on one side of the handlebar as described in 5.2.2 in the most onerous position. Then apply a horizontal static load on one side of the handlebar in the forward direction.

Use an 80 mm wide belt to apply the load.

### 6.6 Testing of stability

A test person with a body mass of  $(100 \pm 5)$  kg and a body height of  $(1\ 850 \pm 50)$  mm shall perform all of the exercises described in the user's manual on a  $(10_0^{+1})^\circ$  incline slope in the most onerous direction for each of the following positions while pedalling at  $(80 \pm 10)$  min<sup>-1</sup> for >30 s:

- a) sitting with hands on the handlebars;

- b) sitting upright with hands off the handlebars;
- c) standing with hands on the handlebars.

The test person shall be secured (e.g. by a harness for safety reasons) and he/she shall try not to counter-balance the  $(10_0^{+1})^\circ$  incline slope.

## 6.7 Testing of the emergency braking system

### 6.7.1 Testing of effectiveness

Pedal the exercise bicycle without freewheel at  $(100 \pm 10) \text{ min}^{-1}$  without resistance and activate the brake with the force in accordance with [5.8.1](#) and observe if the pedal crank comes to a stop within one revolution.

For button-type actuators, the force shall be applied in the centre of the actuator. For lever-type actuators, the force shall be applied at a distance of  $(25 \pm 1) \text{ mm}$  from the end of the lever.

### 6.7.2 Testing of actuator integrity

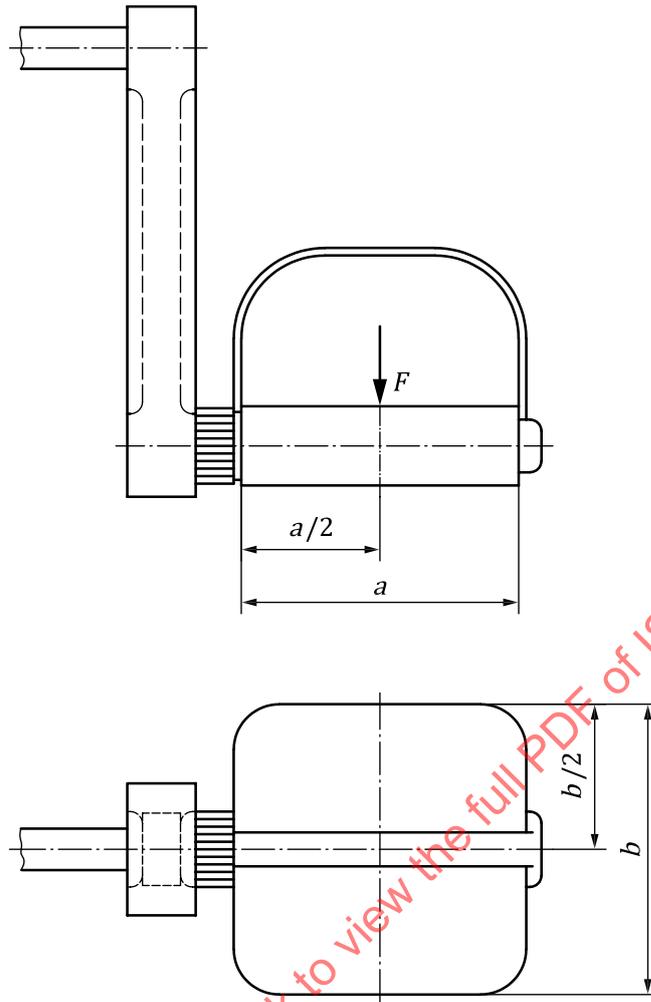
Apply a load in accordance with [5.8.2](#) for  $\geq 3$  min in the most onerous position.

## 6.8 Testing of the pedal crank assembly

For the endurance test, fix the exercise bicycle frame complete with pedal crank assembly to a test rig and apply the load in accordance with [5.9](#) onto one pedal in its lowest position. The load shall be placed as shown in [Figure 2](#).

During the test, ensure that the load on the pedal crank assembly falls to  $\leq 5 \%$  of the maximum load given in [5.9](#) before commencing application of the test loads on the pedal crank assembly again.

After the endurance test, apply the static load in accordance with [5.2.3](#) placed as shown in [Figure 2](#).



**Key**

- $a$  width of the pedal
- $b$  length of the pedal
- $F$  force

**Figure 2 — Testing of the pedal**

**6.9 Testing of the power display**

The test apparatus shall have an accuracy of  $\pm 1\%$ . The mechanical power can be measured directly at the crank.

Carry out the test as follows.

- a) Pedal the training equipment for 1 h at the maximum power (resistance) at a speed of  $(80 \pm 1) \text{ min}^{-1}$ .
- b) Cool down the training equipment to room temperature.
- c) Adjust the training equipment to  $(50 \pm 2,5) \text{ W}$  at  $(50 \pm 1) \text{ min}^{-1}$ .
- d) Compare the power of the test apparatus with the power read out on the display of the training equipment.
- e) Pedal for 15 min. After 15 min, measure the power and compare again to the reading on the display without stopping the training equipment.