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Stationary training equipment — Part 2: Strength training equipment, additional specific safety requirements and test methods

Équipement d'entraînement fixe —

*Partie 2: Équipement d'entraînement de force, exigences spécifiques
de sécurité et méthodes d'essai supplémentaires*

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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.

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).

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 83, Sports and other recreational facilities and equipment, Subcommittee, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 136, Sports, playground 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 20957-2:2005), which has been technically revised.

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

- the formulation has been aligned with ISO 20957-1;
- [Clause 3](#) has been updated;
- [Clause 5](#) has been specified and restructured;
- [Clause 6](#) has been specified and restructured;
- additional requirements for externally loaded equipment have been added to [Clauses 5](#) and [6](#).

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Stationary training equipment —

Part 2:

Strength training equipment, additional specific safety requirements and test methods

1 Scope

This document specifies additional safety requirements for stationary strength training equipment.

This document is intended to be read in conjunction with the general safety requirements of ISO 20957-1.

This document is applicable to stationary training equipment type strength training equipment with stacked weight resistance or other means of resistance, such as elastic cords, hydraulic, pneumatic, electrical, magnetic, springs and externally loaded weights (type 2) (hereinafter referred to as training equipment) with the classes H, S and I according to ISO 20957-1.

NOTE Free-weight barbell racks are subject to the requirements of ISO 20957-4 and 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 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 <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

selectorized equipment

strength training equipment where the resistance means is a load that is an integral part of the device that can be varied by the user without adding or removing components to and from the equipment

Note 1 to entry: An example of equipment where this component is relevant is shown in [Figure 1](#).

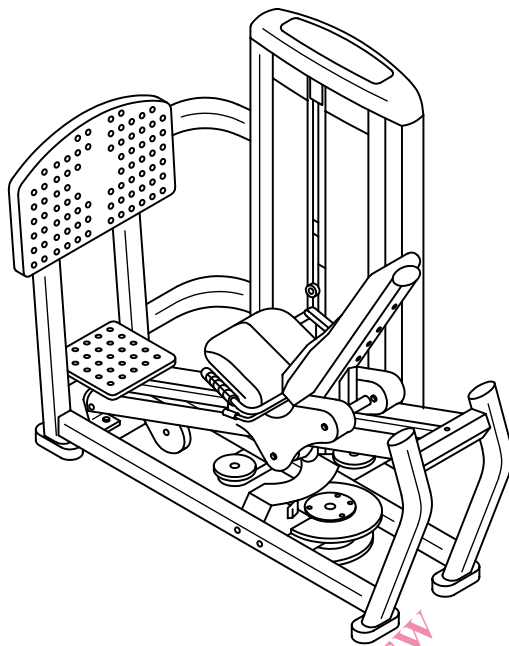


Figure 1 — Example of selectorized guided type equipment

3.2 externally loaded equipment

strength training equipment where the main resistance means is a load that is not an integral part of the device which can be varied by the user by adding or removing components to and from the equipment

Note 1 to entry: Components to be added or removed are, for example, weight discs or bands.

3.3 drop stop

permanent or adjustable constructive element creating a pre-set minimum stop position that provides the user with clearance to avoid entrapment without any further action of the user

3.4 catch mechanism

rest or holder for a barbell or for a carriage on *guided equipment* (3.9), which needs to be engaged by the user, from which the user can begin the exercise motion or end at the completion of the exercise

3.5 work arm

component of strength training equipment that allows the user to activate resistance means for a specific exercise

Note 1 to entry: An example of equipment where this component is relevant is shown in [Figure 2 a\)](#).

3.6 training resistance

force or torque exerted by the user to perform the exercise

3.7 weight post

structure protruding from the frame of *externally loaded equipment* (3.2) for the purpose of holding weight either for a resistance means or for storage.

Note 1 to entry: An example of equipment where this component is relevant is shown in [Figure 2 a\)](#) and [2 b\)](#).

3.8**work arm actuated equipment**

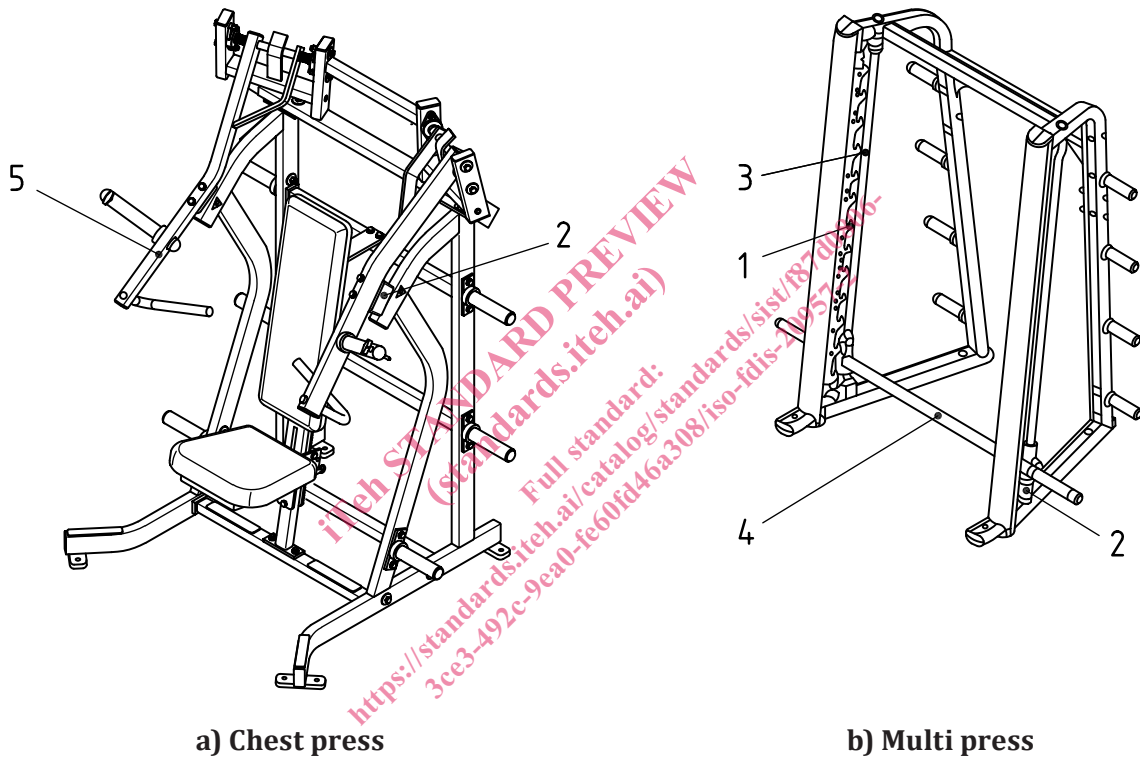
equipment where the external load is attached directly or indirectly to a movement mechanism that is displaced intentionally by the user

Note 1 to entry: An example is shown in [Figure 2 a\)](#).

3.9**guided equipment**

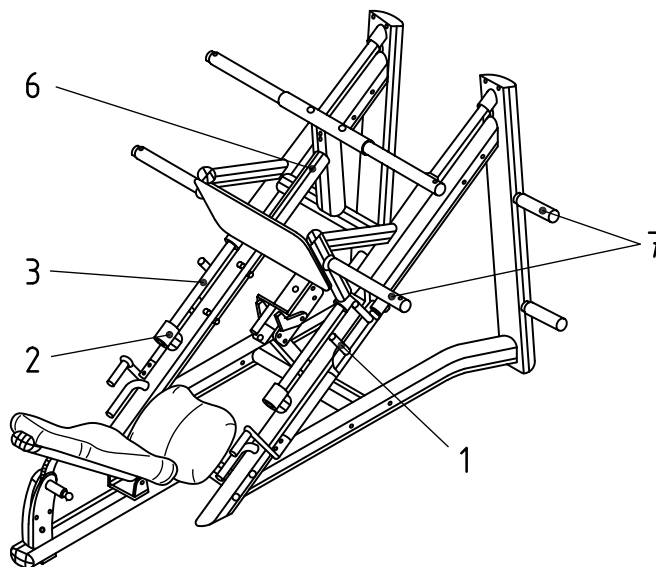
equipment where the external load is placed on a *weight post* ([3.7](#)) affixed to a carriage that is moving on a guided path

Note 1 to entry: Examples are shown in [Figure 2 b\)](#) and [2 c\)](#). Commonly used names for this equipment are "Smith press", "Smith Machine" and "multi-press".



a) Chest press

b) Multi press



c) Leg press

Key

- | | | | |
|---|----------------------|---|-------------|
| 1 | catch mechanism | 5 | work arm |
| 2 | adjustable drop stop | 6 | carriage |
| 3 | guide | 7 | weight post |
| 4 | barbell | | |

Figure 2 — Examples for different types of externally loaded guided strength training equipment

3.10
stacked weights

stacked guided weights used as a selectable training load

3.11
user-defined motion equipment

equipment where the workout motion is solely defined by the user

Note 1 to entry: Example is shown in Figure 3.

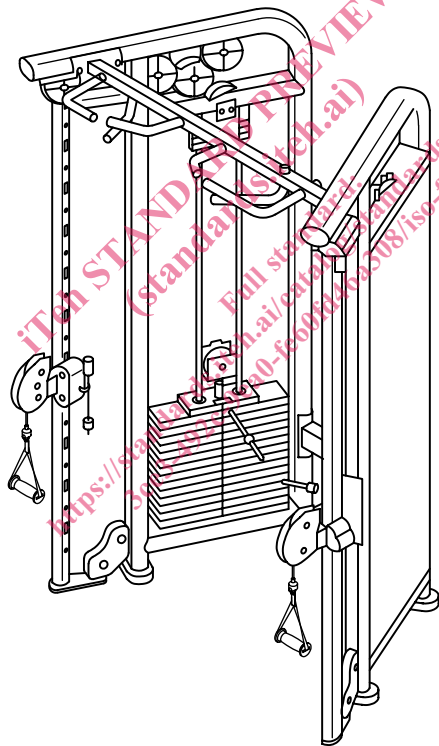


Figure 3 — Example of user-defined motion equipment

4 Classification

The classification given in ISO 20957-1 shall apply.

5 Safety requirements

5.1 General

Depending on the design of the training equipment, the following requirements shall apply as appropriate.

5.2 Stability

5.2.1 General

The equipment shall be stable in any direction and loading condition in training, folding and storage positions.

Test in accordance with the stability test in ISO 20957-1.

5.2.2 Externally loaded equipment

The equipment shall be stable when loaded as specified by the manufacturer either symmetrically or asymmetrically.

Test in accordance with [6.2.2](#).

5.2.3 User-defined motion equipment

The equipment shall be stable with maximum load selected as provided by the equipment and with its stacked weights at its highest point of the range of travel.

Test in accordance with [6.2.3](#).

5.3 Loading

5.3.1 Selectorized equipment and alternative resistance training equipment

For equipment classes H, S and I, the intrinsic loading and the extrinsic loading shall be in accordance with ISO 20957-1.

5.3.2 Externally loaded equipment

5.3.2.1 General

In addition to ISO 20957-1 the loading requirements given in [5.3.2.2](#) to [5.3.2.5](#) shall apply.

5.3.2.2 Weight posts intended for training

For classes S and I, the training weight posts shall withstand a static load of 6 times the maximum load, as specified by the manufacturer for the training weight post being evaluated.

For class H, the training weight posts shall withstand a static load of 4 times the maximum load, as specified by the manufacturer for the training weight post being evaluated.

Test in accordance with [6.3.1](#).

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

5.3.2.3 Weight posts intended for storage

For classes S and I, the storage weight posts shall withstand a single static load of 4 times the maximum load, as specified by the manufacturer for the storage weight post being evaluated.

For class H, the storage weight posts shall withstand a single static load of 2,5 times the maximum load as specified by the manufacturer for the storage weight post being evaluated.

Test in accordance with [6.3.2](#).

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

5.3.2.4 Extrinsic loading

The equipment shall withstand an extrinsic load F_{test} as calculated in accordance with [Formula \(1\)](#).

$$F_{\text{test}} = S(W_p + 1,5F_a) \quad (1)$$

where

- F_{test} is the total reactionary load to be applied during the test, in newton;
- S is the safety factor of 4 for classes S and I, and 2,5 for class H;
- W_p is the user's body weight portion of the load applied to the part of the equipment being evaluated, of either 100 kg or the maximum user mass as specified by the manufacturer, whichever is greater, in newton;
- 1,5 is the dynamic coefficient;
- F_a is the load applied to the part of the equipment being evaluated, derived from the maximum specified load while performing exercise, in newton.

Test in accordance with [6.3.3](#).

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

5.3.2.5 Catch mechanisms for guided equipment

For classes S and I, the catch mechanism shall withstand a single static load of 6 times the maximum load as specified by the manufacturer.

For class H, the catch mechanism shall withstand a single static load of 4 times the maximum load as specified by the manufacturer.

Test in accordance with [6.3.4](#).

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

5.4 Endurance

5.4.1 General

The equipment shall withstand the endurance requirements in accordance with ISO 20957-1 with a load of the maximum user's body mass as specified in the user's manual or 100 kg, whichever is greater, and the maximum training load, considering the following: