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

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Stationäre Trainingsgeräte - Teil 2: Kraft-Trainingsgeräte, zusätzliche besondere sicherheitstechnische Anforderungen und Prüfverfahren

Appareils d'entraînement fixes - Partie 2: Appareils d'entraînement de force, exigences techniques spécifiques de sécurité et méthodes d'essai supplémentaires

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EUROPEAN STANDARD

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training equipment, additional specific safety
requirements and test methods**

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techniques spécifiques de sécurité et méthodes
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Stationäre Trainingsgeräte - Teil 2:
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sicherheitstechnische Anforderungen und
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This European Standard was approved by CEN on 1996-04-19. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 136 "Sports, playground and other recreational equipment", of which the secretariat is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 1996, and conflicting national standards shall be withdrawn at the latest by November 1996.

This standard consists of the following parts:

- EN 957-1: General safety requirements and test methods
- EN 957-2: Strength training equipment, additional specific safety requirements and test methods
- EN 957-4: Strength training benches, additional specific safety requirements and test methods
- EN 957-5: Pedal crank training equipment, additional specific safety requirements and test methods
- prEN 957-6: Tread mills, additional specific safety requirements and test methods
- prEN 957-7: Rowing machines, additional specific safety requirements and test methods
- prEN 957-8: Stair climbers and steppers, additional specific safety requirements and test methods

This part of EN 957 is an amalgamation of EN 957-2 and EN 957-3.

This part of EN 957 should be read in conjunction with EN 957-1.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.



Introduction

This part of EN 957 concerns the safety of strength training equipment.

It amends and supplements EN 957-1. The requirements of this specific standard take priority over those in the general standard.

1 Scope

This part of EN 957 specifies additional safety requirements for strength training equipment in addition to the general safety requirements of EN 957-1.

This part of EN 957 is applicable to stationary training equipment type strength training equipment (type 2) (hereinafter referred to as training equipment) with the classes S and H.

Any attachment provided with the training equipment for the performance of additional exercises are subject to the requirements of EN 957-1.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 294 Safety of machinery – Safety distances to prevent danger zones being reached by the upper limbs

EN 957- 1:1996 Stationary training equipment – Part 1: General safety requirements and test methods

3 Definitions

For the purposes of this standard the definitions of EN 957-1 apply.

4 Classification

Clause 4 of EN 957-1:1996 applies.

5 Safety requirements

5.1 General

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

5.2 Loading

5.2.1 Intrinsic loading

Each piece of equipment loaded with the user's bodymass shall withstand a force F

for class H 2,5 times the bodymass (100 kg) without breakage,

for class S 2 times the bodymass (100 kg).

When tested according to 6.2, supports (e. g. load bearing surfaces) shall not be deformed by more than $f = 1/100$, cantilever supports (cantilever surfaces) by more than $f = 1/150$ and other dimensions by more than 1 %. The training equipment shall not break when a static load of four times the bodymass is applied.

5.2.2 Extrinsic loading

5.2.2.1 Class H

When tested according to 6.3 and loaded with the user's bodymass and/or reaction forces or moments of the user, each piece of equipment shall withstand without breakage a load F according to the following equation:

$$F(N) = [G_k + 1,5 G] \cdot 2,5 \cdot 9,81$$

where:

G is the maximum load in kilograms indicated by the manufacturer (see clause 10 of EN 957-1:1996);

G_k is the force in kilograms determined by the proportional bodymass (100 kg);

1,5 is the dynamic coefficient;

2,5 is the safety coefficient.

5.2.2.2 Class S

When tested according to 6.3 and loaded with the user's bodymass and/or reaction forces or moments of the user, each piece of equipment shall withstand a load F according to the following equation:

$$F(N) = [G_k + 1,5 G] \cdot 2 \cdot 9,81 \quad (1)$$

where:

G is the maximum load in kilograms indicated by the manufacturer (see clause 10 of EN 957-1:1996). The torques as specified in table 1 are to be taken as basis for the calculation of G , if greater than the manufacturer's stated maximum load;

G_k is the force in kilograms determined by the proportional bodymass (100 kg);

1,5 is the dynamic coefficient;

2 is the safety coefficient.

After the test, supports (load bearing surfaces) shall not be deformed by more than $f = 1/100$,

cantilever supports (cantilever surfaces) by not more than $f = 1/150$,

and other dimensions by not more than 1%.

If greater than manufacturer's maximum stated load, the equipment shall be capable of accepting a minimal torque load as specified in table 1, throughout the range of movement of each exercise for which the equipment is designed. The training equipment shall not break when a static load according to equation (1) with a safety coefficient of 4 is applied.

5.3 Endurance load

When tested according to 6.4, the training equipment shall be capable of normal function.

When the training equipment consists of two or more separate functional units, each shall withstand the endurance load test.

When more than one function is tested, which involve use of common components e. g.: ropes, pulleys and bearings, these can be replaced before each separate test.

5.4 Stacked weights

5.4.1 Access to squeeze and/or shear points

5.4.1.1 General

The uncontrolled access by third parties to squeeze and/or shear points of stacked weights shall be prevented.

Weights that can only be lifted as a whole block shall not come closer than 60 mm during movement to any part of the equipment or the ground.

5.4.1.2 Class H

This can be achieved by either:

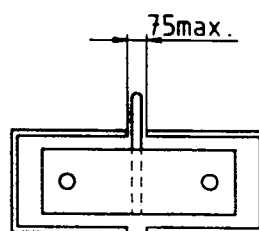
- a) surrounding by a casing in conformance with EN 294 with the exception of a maximum 75 mm wide gap for setting of the weights; or
- b) by locking the machine to prevent moving of the stacked weights when the equipment is not in use.

5.4.1.3 Class S

5.4.1.3.1 Encasing

Where stacked weights are behind the user they shall be encased on all sides except for a 75 mm wide gap to select weights and for weight pin to operate (see figure 1). Stacked weights that are encased shall fulfill the following requirements:

- a) up to 1800 mm the encasing shall be at least 60 mm higher than the upper edge of the block of weights in its highest position; or
- b) up to 1740 mm there shall be a horizontal distance between the encasing and the weights of at least 120 mm.



Dimensions in millimeters

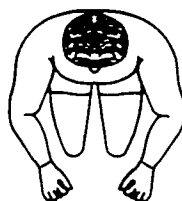
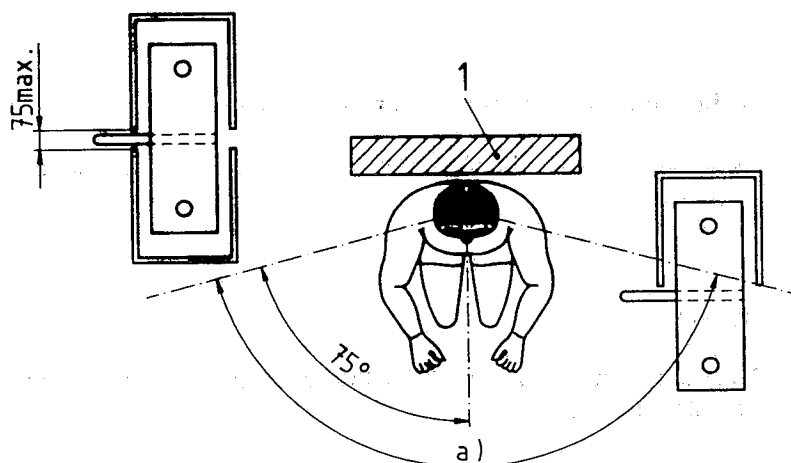


Figure 1: Weight stack behind the user

5.4.1.3.2 Reduced encasing

Where the stacked weights are at the side of the user they shall be encased on the 3 sides furthest from the user. On the side adjacent to the user they need not be encased provided they are within the field of vision at all times during the performance of the exercise (see figure 2).

Dimensions in millimeters



1 head support
a) field of vision

Figure 2: Weight stack alongside the user
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Where the stacked weights are at the side of the user and the side adjacent to the user does not need to be encased there shall be a horizontal clearance of at least 50 mm between the weight guard and the front edge of the weight and a diagonal clearance of 120 mm minimum between the weight guard and the front corner of the weight (see figure 3). A gap of 75 mm maximum is permitted on either side to allow for selection of the weight.

Dimensions in millimeters

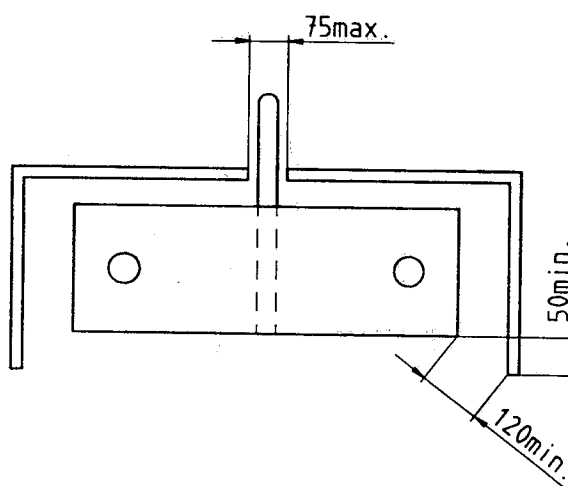


Figure 3: Clearance dimensions

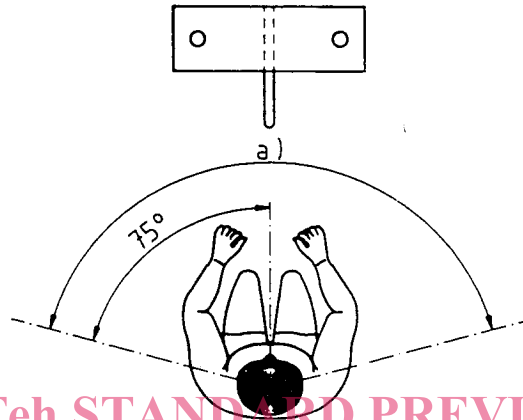
Where the user adopts a supine position for the performance of the exercise (e.g. bench press) the side adjacent to the user does not need to be encased provided the clearance is designed according to figure 3.

Multiweight stack machines do not require guarding on the three sides furthest from the user provided there is a framework on these sides which prevents uncontrolled access by third parties. On the side adjacent to the user the requirements apply as in 5.4.1.3.

5.4.1.3.3 No encasing

Where the stacked weights are always in front of the user and visible throughout the exercise without any important obstruction (see figure 4), weights need not be encased.

NOTE: Encasing is not necessary because the negative forces exceed the positive forces and thus the user can always interrupt the movement of the stacked weights if a third party unintentionally enters the area of the stacked weights.



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a) field of vision

Figure 4: Weight stack in front of the user