SLOVENSKI STANDARD

SIST EN 364:1996

prva izdaja
februar 1996

Osebna varovalna oprema za zaščito pred padci z višine - Preskusne metode

Personal protective equipment against falls from a height - Test methods

ICS 13.340.60

Referenčna številka
SIST EN 364:1996(en)

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 364:1992

December 1992

UDC 614.895.1:62-783.4:620.17:614.8

Descriptors: Personal protective equipment, accident prevention, protection against fall, tests, inspection

English version

Personal protective equipment against falls from a height - Test methods

Equipement de protection individuelle contre les chutes de hauteur - Méthodes d'essai

Persönliche Schutzausrüstung gegen Absturz - Prüfverfahren

This European Standard was approved by CEN on 1992-11-30. 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.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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

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

Contents list

Foreword

This European Standard was prepared by the Technical Committee CEN/TC 160 "Protection against falls from a height including working belts", of which the secretariat is held by DIN.

This European Standard has been prepared under a mandate given to CEN by the Commission of the European Communities and the European Free Trade Association, and supports essential requirements of the EC Directive(s).

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of an identical text or by endorsement, at the latest by June 1993, and conflicting national standards shall be withdrawn at the latest by June 1993.

The Standard was approved and in accordance with the CEN/CENELEC Internal Regulations, 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, United Kingdom.

1 Scope

This standard specifies test methods for materials, components and systems associated with equipment for protection against falls, as follows:

a) static testing apparatus and static test methods

b) dynamic testing apparatus, including a torso dummy

c) test methods for dynamic performance and dynamic strength testing of components and systems

d) corrosion testing of metal components

e) test apparatus and test methods for conditioning tests and endurance tests

The standard also makes recommendations for the scheduling of tests.

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 354	Personal protective equipment against falls from a height - Lanyards
EN 361	Personal protective equipment against falls from a height - Full body harnesses
prEN 892-1	Mountaineering equipment - Ropes - Safety requirements, testing, marking
EN 10 002-1	Metallic materials - Tensile test - Method of test (at ambient temperature)
EN 10 002-2	Verification of the force measuring system of tensile testing machines
EN 45 001	General criteria for the operation of testing laboratories
ISO 9227:1990	Corrosion tests in artificial atmospheres - Salt spray tests

3 Definitions

For the purpose of this standard the following definitions apply.

3.1 Force measuring apparatus

Apparatus for measuring force including force transducer and analogue or digital display, or chart recorder.

3.2 Specified static test force

That stated in the requirements of the specification for the particular component or system submitted for test.

4 Requirements for test apparatus

4.1 Static testing machines

4.1.1 Force measurement requirements

Force measuring apparatus for static testing of components and systems shall conform to EN 10 002-2.

The calibration of measuring apparatus should be traceable to an approved physical properties laboratory or approved calibration service in accordance with the accuracy required for the test (consult EN 45001).

4.1.2 Requirements for rate of stressing

4.1.2.1 Metallic materials

The rate of stressing shall conform to EN 10 002-1.

4.1.2.2 Textile materials

The crosshead velocity for components in the length range 1,0 m to 2,0 m shall be within the range of 50 mm to 150 mm per minute.

Components shorter than 1,0 m shall be tested with a proportionately lower crosshead velocity.

Components longer than 2,0 m may be tested with a proportionately higher crosshead velocity.

4.2 Torso dummy

The torso dummy for static and dynamic testing of relevant components and systems shall conform to the dimensions and requirements described at figure 1. The mass of 100kg should have a tolerance of ± 1kg. The centre of gravity should be (200 ± 25) mm above the perineum. The suspension eyes should have an inside diameter of 40 mm and maximum cross-section diameter of 15 mm. The surface of the dummy should be smooth and, if of timber construction, should be shellacked or varnished.

4.3 Test cylinder

The test cylinder required for static testing of work positioning belts and work positioning restraint belts shall have a diameter of 350 mm with tolerance of ± 10 mm. It should be a rigid structure having a hard and smooth surface.

4.4 Dynamic testing apparatus

4.4.1 Structure

The rigid anchorage structure shall be so constructed that its natural frequency (of vibration) in the vertical axis at the anchorage point is not less than 100 Hz and so that the application of a force of 20 kN on the anchorage point does not cause a deflection greater than 1,0 mm.

The rigid anchorage point shall be a ring of (20 ± 1) mm bore and (15 ± 1) mm diameter cross section, or a rod of same diameter cross-section.

The height of the rigid anchorage point shall be such as to ensure that no part of the component or system under test, or of the torso dummy or rigid steel mass, shall strike the floor during the test.

4.4.2 Force measurement apparatus

The force measuring apparatus shall be capable of measuring forces from 1,2 kN to 20 kN with an accuracy of ± 2 %, a frequency bandwidth of 1000 Hz, and include a low pass filter which has a passband ripple not greater than + 0,5 dB - 1,0 dB and a - 3 dB frequency bandwidth of 60 Hz. Roll off should be not less than - 12 dB per octave.

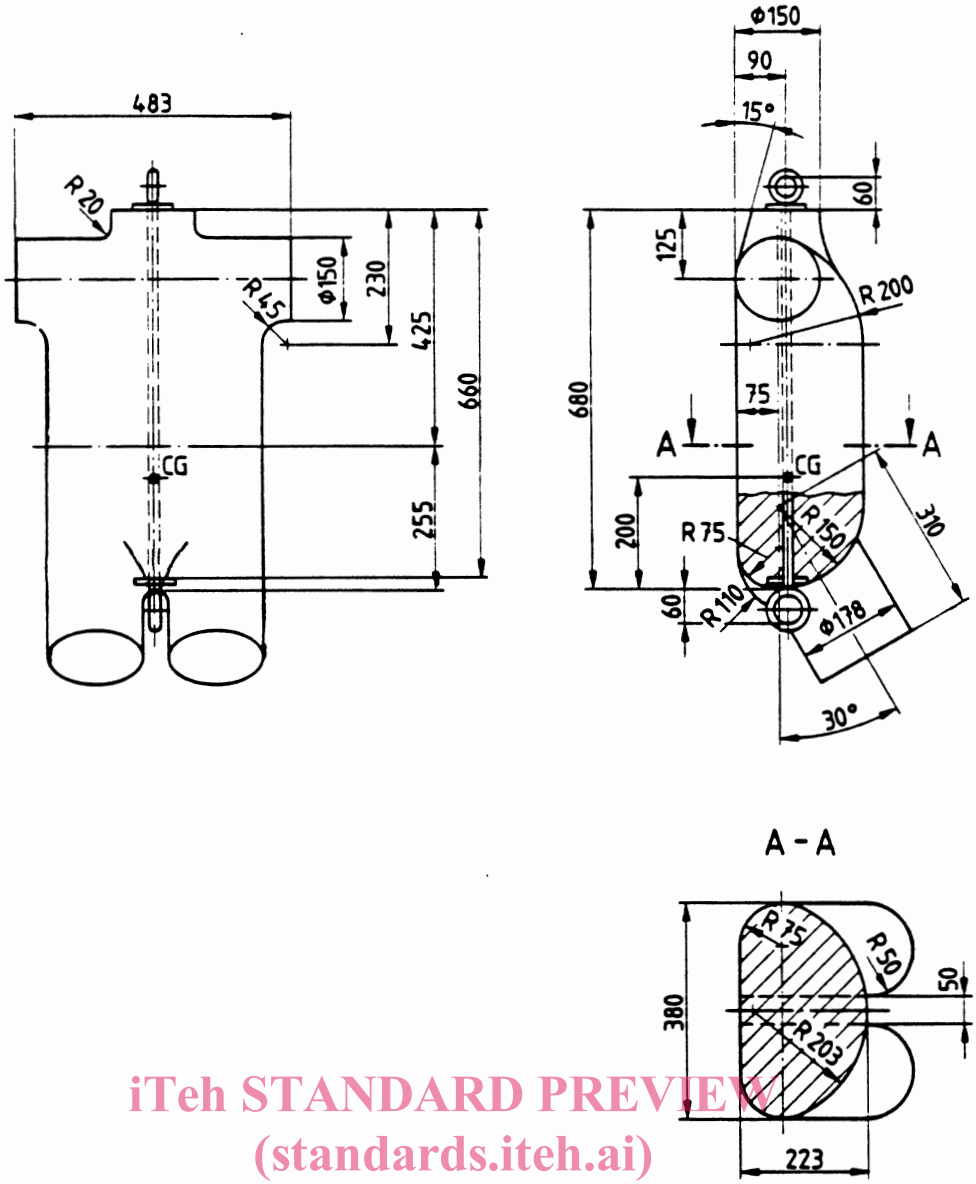
If an intermediate amplifier is used it shall be linear and calibrated to within ± 0,1 % over the operating range.

Where the recorder is of the peak hold type it shall track and hold to an accuracy of ± 1 % over the operating range. Where the recorder is of the force/time history type it should be dynamically or electronically calibrated to within ± 2 % over the operating range.

The apparatus shall have as common mode rejection ratio of not less than 60 dB at power frequencies.

For the purposes of this specification, where the force measurement apparatus, amplifier and recorder are in series, an overall error band of ± 2,5 % is accepted.

Dimensions in millimetres



Minimum blen radius R50
unless stated otherwise

Mass 100 kg
Material Hardware or plastics
(Minimum shore hardness 90)

Figure 1: Torso dummy

4.5 Rigid steel masses

The rigid steel mass, either (100 ± 1) kg or (150 ± 1) kg, as appropriate, shall be rigidly connected to an eyebolt which provides secure connection.

The 100 kg mass shall have a nominal diameter of 200 mm. The eyebolt shall be central at one end, but an offset additional eyebolt position is also permissible (see figure 2) to accomodate horizontal dimensional constraints of relevant testing procedures and equipment.

The 150kg mass shall have a nominal diameter of 200 m. The eyebolt shall be central at one end, but an offset additional eyebolt position is also permissible.

Dimensions in millimetres

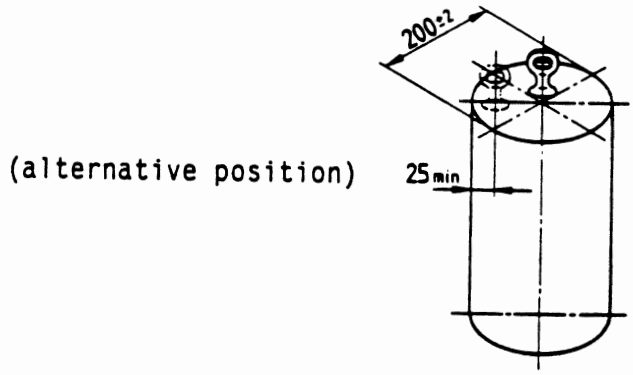


Figure 2: Rigid steel mass

4.6 Quick release device

The quick release device shall be compatible with the eyebolts of the 4.2 torso dummy and 4.5 rigid steel masses. It shall ensure release of torso dummy or rigid steel mass with no initial velocity.

4.7 Corrosion test apparatus

The apparatus for testing the corrosion resistance of metals shall be capable of the NSS (neutral salt spray) test procedure described in ISO 9227:1990.

4.8 Apparatus for conditioning tests

4.8.1 Heat

The chamber shall be capable of control at (50 ± 2) °C at a relative humidity of (85 ± 5) %

4.8.2 Cold

The refrigerated chamber shall be capable of control at (-30 ± 2) °C.

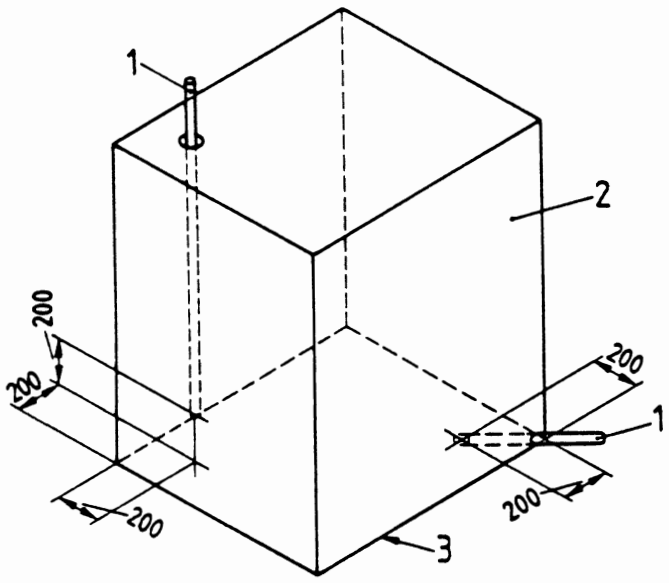
4.8.3 Wet

The water spray apparatus shall be capable of delivering at the rate of approximately 70 l/h. The water temperature should be in the range 10 °C to 30 °C.

4.8.4 Dust

The chamber should be a box of 1m cube internally, see figure 3, with provision for agitating dust with blasts of air from a 6 bar supply. The box shall be provided with a vent and air filter. The chamber shall have provision for a cord to be passed vertically through the top of the box for operation of the mechanism under test.

Dimensions in millimetres



1 Bore air tube Ø 6 mm
2 1000 mm³ (internal dimension) cube
3 Floor level

Figure 3: Dust conditioning chamber

4.9 Endurance test apparatus

The apparatus shall be capable, under gravitational acceleration of an appropriate mass, of repeated operation of sliding type and retractable type fall arresters.

5 Test Methods

Recomendations for the scheduling of tests are described at Annex A.

5.1 Full Body Harnesses

5.1.1 Dynamic performance test apparatus

The apparatus shall comply with 4.2 and 4.4.

5.1.2 Dynamic performance test procedure

5.1.2.1 Fit the torso dummy with the harness equipped with a lanyard made from prEN 892-1 approved single mountaineering rope of 11 mm diameter and without an energy absorber, so that the overall length of the lanyard from the harness tie-in point to the end of the knotted loop where it is attached to the test rig is 2 m.

5.1.2.2 Suspend the torso dummy by its upper attachment point and raise this to 2 m above the fixed anchorage point of the lanyard and maximum 300 m horizontally from the centre line. Hold it with the quick release device.

5.1.2.3 Release the torso dummy without initial velocity, the feet first free fall being about 4 m before the lanyard takes up the tension. Observe whether the harness releases the torso dummy. After the fall observe the orientation of the torso dammy and measure the angle between the longitudinal axis of the dorsal plane of the torso dummy and the vertical.

5.1.2.4 Using the same rope, though re-adjustment is permitted, within (15 ± 1) minutes repeat the test procedure with the torso dummy suspended from its lower attachment point to achieve a head first free fall of about 4 m.

5.1.2.5 Apply the above feet first and head first procedures to each attachment point designed to be used as part of a complete fall arrest system and marked as such (see EN 361).

5.1.2.6 For those attachment points which are not designed to be used as part of a complete fall arrest system, the above feet first and head first fall procedures shall be repeated but the free fall shall be about 2 m.

5.1.3 Static strength test apparatus

The apparatus shall comply with 4.1 and 4.2.

5.1.4 Static strength test procedure

5.1.4.1 Place the harness on the torso dummy.

5.1.4.2 Install the torso dummy and harness in the test apparatus and apply the specified static test force between the attachment element of the harness and the lower ring of the torso dummy. Maintain the force for a period of 3 minutes and observe whether the harness releases the torso dummy.

Repeat the procedure for each attachment element of the harness.

5.1.4.3 Repeat the procedure using the upper ring of the torso dummy and at the relevant specified static test force.

Note: Although this is a strength test, it also permits the study of behaviour and movement of the various components and some effects on the physical safety of the user.

5.2 Lanyards

5.2.1 Static strength test apparatus

The apparatus shall comply with 4.1.

5.2.2 Static strength test procedure

Install the lanyard in the test machine and submit it to the specified static test force between its two end points (supplied terminations). Maintain the force for a period of 3 minutes and observe that the lanyard does not fracture.

Note: If a textile lanyard is supplied for test with metallic connecters as terminations, the metallic connecters may be replaced by stronger connecters or may be clamped laterally by the jaws of the testing apparatus.

5.2.3 Dynamic strength test apparatus

The apparatus shall comply with 4.4.1, 4.5 and 4.6.

5.2.4 Dynamic strength test for lanyards incorporating length adjustment device

Attach a connector to the end point of the lanyard. Adjust the length adjustment device until the length between end points is (2,0 + 0,25) m or, if the overall length is less than 2,0 m, to the full length of the lanyard.

Attach the 100 kg mass to the adjustment device connector and attach the other end to the rigid structural anchorage point.

Raise the mass (4,0 ± 0,1) m or, if the lanyard is less than 2,0 m, as high as the length of lanyard permits and at a maximum of 300 m horizontally from the structural anchorage. Hold it by the quick release device.

Let the mass fall and observe that the mass is not released.

5.3 Energy absorbers

5.3.1 Static preloading test apparatus

The apparatus shall comply with 4.1.

Alternatively, the 4.4.1 apparatus can be employed with an auxiliary test mass of 204 kg.

5.3.2 Static preloading test procedure

Install the lanyard in the test machine and submit it to the specified static preloading test force between its two end points (supplied terminations). Maintain the force for a period of 3 minutes and observe whether permanent extension occurs.