



SLOVENSKI STANDARD

SIST EN 381-1:1996

01-februar-1996

Varovalna obleka za uporabnike ročnih verižnih žag - 1. del: Oprema za preskušanje odpornosti proti urezu z verižno žago

Protective clothing for users of hand-held chainsaws - Part 1: Test rig for testing resistance to cutting by a chainsaw

Schutzkleidung für die Benutzer von handgeführten Kettensägen - Teil 1: Prüfstand zur Prüfung des Widerstandes gegen Kettensägen-Schnitte

Vêtements de protection pour utilisateurs de scies à chaîne tenues à la main - Partie 1: Banc d'essai pour les essais de résistance à la coupure par une scie à chaîne

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Ta slovenski standard je istoveten z: **EN 381-1:1993**

ICS:

13.340.10 Varovalna obleka Protective clothing

SIST EN 381-1:1996 en

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EUROPEAN STANDARD

EN 381-1:1993

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 1993

UDC 614.897.1:687.175:621.936.6:620.17

Descriptors: Personal protective equipment, work clothing, accident prevention, protective clothing, legs, chain saws, shock resistance, test benches, specifications

English version

**Protective clothing for users of hand held
chainsaws - Part 1: Test rig for testing resistance
to cutting by a chainsaw**

Vêtements de protection pour utilisateurs de
scies à chaîne tenues à la main - Partie 1:
Banc d'essai pour les essais de résistance à la
coupure par une scie à chaîne

Schutzkleidung für die Benutzer von
handgeführten Kettensägen - Teil 1: Prüfstand
zur Prüfung des Widerstandes gegen
Kettensägen-Schnitte

This European Standard was approved by CEN on 1993-02-20. 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

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Foreword

This European Standard was prepared by the Technical Committee CEN/TC 162 "Protective clothing including hand and arm protection and lifejackets", 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 August 1993, and conflicting national standards shall be withdrawn at the latest by August 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.

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0 Introduction

This European Standard forms part of a series concerned with personal protective equipment designed to protect against the risks arising from the use of hand-held chain saws.

No protective equipment can ensure 100% protection against cutting from a hand-held chain saw.

Nevertheless, experience has shown that it is possible to design protective equipment which offers a certain degree of protection. Different functional principles may be applied in order to give protection. These include

- chain slipping: on contact the chain does not cut the material;
- clogging: fibres are drawn with the chain into the drive sprocket and block chain movement;
- chain braking: fibres have a high resistance to cutting and absorb rotational energy, thereby reducing the chain speed.

Often more than one principle is applied.

1 Scope

This first part of this European Standard specifies the test rig to be used to assess the resistance of personal protective equipment to cutting by hand-held chain saws. This part also describes the calibration procedure.

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.

prEN 381-2		Protective clothing for users of hand-held chainsaws - Part 2: Test method for leg protection
prEN 381-3		Part 3: Test method for boots
prEN 381-4		Part 4: Test method for chainsaw protective gloves
prEN 381-5		Part 5: Requirements for leg protection
prEN 381-6		Part 6: Requirements for boots
prEN 381-7		Part 7: Requirements for chainsaw protective gloves
prEN 381-8		Part 8: Test method for chainsaw protective gaiters
prEN 381-9		Part 9: Requirements for chainsaw protective gaiters
ISO 4915	1991	Textiles - Stitch types - Classification and terminology
ISO 3386-1	1986	Polymeric materials, cellular flexible - Determination of stress-strain characteristics in compression - Part 1: Low-density materials

3 Definitions

For the purposes of this standard the following definitions apply.

3.1 Chain saw

Saw with teeth on an endless chain.

3.2 Resistance to cutting

A general term for the various ways in which a protective material can reject or decelerate the chain of a chain saw. It is measured by applying a moving saw chain with a certain chain speed and energy and studying whether the chain cuts through.

3.3 Cut-through

Cut-through is the term describing that a saw chain has penetrated through a sample, so that the cut is longer than 10 mm in the layer nearest to the body.

3.4 Chain stopping time

The chain stopping time is the period of time taken for the saw chain to decelerate from a specified speed to complete rest, when the saw unit is not under power.

3.5 Free-running stopping time

The free-running stopping time is the chain stopping time when the chain is not brought into contact with a test piece.

3.6 Threshold chain speed

The threshold chain speed is the maximum speed which a sample can withstand during testing without cut-through occurring.

3.7 Chain slipping

Chain slipping is a protective effect whereby the saw chain slides over the surface of the protective material without cutting in.

3.8 Clogging

Clogging is an effect whereby fibres, yarns or other materials are drawn by the saw chain into the saw unit, thereby stopping the movement of the saw chain.

3.9 Chain braking

Chain braking is an effect whereby fibres or other materials of the personal protective equipment slow the speed of the saw chain sufficiently to prevent its advancement.

3.10 Cutting line

The cutting line is the tangent to the curve made by teeth of the saw chain at the point where it contacts a test specimen.

4 Principles

The test rig described in this part of this standard has been designed to apply a moving saw chain to personal protective equipment in such a way that both the speed of the chain and the amount of kinetic energy available for cutting are controllable.

This standardization is achieved by ensuring that the chain is not under power at the moment of test. Instead the chain is moving solely under the influence of its own momentum, together with that of a flywheel of known inertia to which it is coupled.

In order to conduct a test, the chain is first driven up to the required speed by means of any convenient motor. At the moment of test, the motor is then physically disconnected from the chain and flywheel. Simultaneously the chain is allowed to pivot down from a minimal height onto the test sample. The chain subsequently continues to move (and under normal circumstances, to cut into the sample) until all of its kinetic energy has been dissipated.

The result of the test is then reported as whether or not the sample shows a cut-through at the test speed.

5 Apparatus

5.1 Major components of test rig

The test rig consists of

- a power unit and a connecting device that transfers rotational energy to the saw unit;
- a saw unit with a defined moment of inertia including shaft, flywheel, sprocket, chain and bar;
- fixture for saw unit;
- test piece mounts for samples;
- instrumentation.

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The general arrangement of the test rig is shown in figure 1.

5.2 Power unit and connecting device

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The power unit shall be able to drive the saw chain at the required range of chain speed.

For calibration purposes the test rig shall be able to drive the chain with speeds of 19 m/s and 21 m/s. For testing purposes the test rig shall also be able to drive the chain with speeds as required in the relevant parts of the standard at the moment:

- part 2 Test rig for leg protection;
- part 3 Test method for boots;
- part 4 Test method for chain saw protective gloves;
- part 8 Test method for chain saw protective gaiters.

NOTE: For future development a higher speed possibility is recommended.

It shall be possible to disconnect the power unit from the saw unit.

5.3 Saw unit

5.3.1 Components

- Bar:** Sandvik symmetrical 11-tooth sprocket nosed, nominal groove width 1,50 mm, nominal length 330 mm (13")
- Chain drive sprocket:** Oregon 7-tooth rim sprocket.
- Flywheel:** Moment of inertia of rotating parts around output shaft, including shaft, flywheel and all retaining devices but excluding chain and sprocket: $0,47 \times 10^{-3} \text{ kgm}^2$, Tolerance $\pm 1\%$.
- Saw chain:** Oregon 8,25 mm (0,325") pitch, 21 LP, 56 chain links
- Chains are to be conditioned according to 7.5.1.
- Lubricating system:** A device shall make it possible to apply a continuous stream of oil to the guide bar and saw-chain. The rate of application shall be $(2 \pm 0,5) \text{ ml/min}$.
- Oil type:** White oil
Viscosity at 40°C : 155 mm²/s
Viscosity at 100°C : 15,5 mm²/s
Density at 15°C : 880 kg/m³

NOTE: Sandvik, Oregon, Fagerdala Industri, Excell, Hüls Troisdorf AG, Blount UK Ltd., Stihl and Eng Tex AB's articles mentioned in this standard are examples of suitable products available commercially. This information is given for the convenience of users of this standard and does not constitute an endorsement by CEN of these products.

5.3.2 Release system

A device shall make it possible to disconnect the power from the saw unit at the same moment as or momentarily before the saw unit is released and allowed to pivot downwards.

5.3.3 Instrumentation

A tachometer for the measurement of chain speed with an accuracy 0,1 m/s. It shall be possible to record the speed at the time of release.

Instrument for measuring chain stopping time, accuracy 0,1 s.

5.3.4 Additional specifications

The dimensions of the sprocket surroundings shall be as indicated in figure 2.

The chain tension shall be adjustable.

The free running stop time without chain shall exceed 25 s.

Lateral stiffness of guide bar, measured by the centre of the nose wheel shall be less than 10,0 mm at a lateral force of 50 N.

The machine is not fitted with a cover of the chain drive sprocket.

NOTE: This requirement does not preclude a guard to protect the operator. Such a guard shall not interfere with the testing.