



SLOVENSKI STANDARD
SIST EN 50144-1:1999

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SIST HD 400.1 S1:1995

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Safety of hand-held electric motor operated tools -- Part 1: General requirements

Sicherheit handgeführter motorbetriebener Elektrowerkzeuge -- Teil 1: Allgemeine Anforderungen

Sécurité des outils électroportatifs à moteur -- Partie 1: Règles générales

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ICS:

25.140.20 Ò\^ dā } æ! |] àæ Electric tools

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EUROPEAN STANDARD
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March 1995

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Supersedes HD 400.1 S1:1980 + A1:1991

Descriptors: Hand-held motor-operated electric tools, safety requirements, protection against electric shocks, fire protection, protection against mechanical hazards

English version

Safety of hand-held electric motor operated tools Part 1: General requirements

Sécurité des outils électroportatifs à
moteur
Partie 1: Règles générales

Sicherheit von handgeführten
motorbetriebenen Elektrowerkzeugen
Teil 1: Allgemeine Anforderungen

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

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

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels



This European Standard has been prepared by Technical Committee CENELEC TC 61F, Hand-held and transportable electric motor operated tools.

It was submitted to the Unique Acceptance Procedure (UAP) in March 1993 and was approved by CENELEC as EN 50144-1 on 1994-07-05.

A draft for and amendment was submitted to the Unique Acceptance Procedure in April 1994 and was approved by CENELEC on 1994-10-04 for inclusion into the European Standard.

NOTE: Finland and Sweden have no obligation to implement this European Standard.

The following date was fixed:

- latest date of publication of an identical national standard (dop) 1995-10-01

This European Standard replaces HD 400.1 S1:1980 and its amendment A1:1991.

However HD 400.1 S1 remains valid until all Harmonization Documents which are used in conjunction with it have been withdrawn. No date of withdrawal of conflicting standards (dow) has therefore been fixed.

Other harmonized standards referred to in this European Standard are listed in annex F. The annex lists the valid edition of those documents at the time of issue of this EN. All references are however to be understood as references to the latest edition.

This standard is divided into two parts:

Part 1: General requirements, comprising clauses of a general character.

Part 2: Particular requirements, dealing with particular types of appliances. The clauses of these particular requirements supplement or modify the corresponding clauses in Part 1. Where the text of Part 2 indicates "addition" or "replacement", the relevant text of Part 1 is to be adapted accordingly. Where no change is necessary, the words "This clause of Part 1 is applicable" are used.

NOTE - In this standard the following print types are used:

- Requirements proper.
- Test specifications.
- Explanatory matter.

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1. SCOPE

1.1 This standard applies to hand-held electric motor operated or magnetically driven tools, intended for indoor or outdoor use.

NOTES

Hand-held electric motor-operated tools, hereinafter referred to as tools, which can be mounted on a support for use as fixed tools without any alteration of the tool itself, are within the scope of this standard.

Additional requirements for such support may be necessary.

This standard applies to tools having any rated frequency.

It also applies, as far as is reasonable, to tools not mentioned in Part 2, Particular Requirements, and to those designed on basically new principles.

This standard does not apply to tools for food processing or preparation.

This standard does not apply to battery-operated tools.

Tools with an electric heating element incorporated are within the scope of this standard, but such tools should also comply with the EN 60335-1, as far as it reasonably applies.

For tools intended to be used in locations where special conditions prevail, as in ships and vehicles, and in hazardous locations, for example, where explosions are liable to occur, special constructions may be required.

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2. DEFINITIONS

2.1 Where the terms voltage and current are used, they imply the r.m.s. values, unless otherwise specified.

2.2 The following definitions apply for the purpose of this standard.

1. Hand-held tool: an electric motor-operated or magnetically driven machine intended to do mechanical work and so designed that the motor and the machine form an assembly which can easily be brought to its place of operation and which is held by hand or suspended during operation.

NOTE - Hand-held tools may be provided with a flexible shaft, the motor being fixed or portable.

2. Rated voltage: the voltage (for three-phase supply, the voltage between phases) assigned to the tool by the manufacturer.

3. Rated voltage range: the voltage range assigned to the tool by the manufacturer expressed by its lower and upper limits.

4. Rated input: the input in watts, assigned to the tool by the manufacturer.

5. Rated current: the current at rated voltage or at the lower limit of the rated voltage range, assigned to the tool by the manufacturer.

NOTE - If no current is assigned to the tool, the rated current for the purpose of this standard is the current measured when the tool is operating under normal load, at rated voltage or at the lower limit of the rated voltage range.

6. Rated frequency: the frequency assigned to the tool by the manufacturer.

7. Rated frequency range: the frequency range assigned to the tool by the manufacturer, expressed by its lower and upper limits.

8. Rated no-load speed: no-load speed at rated voltage or at the upper limit of the rated voltage range, assigned to the tool by the manufacturer.

9. Non-detachable flexible cable or cord: flexible cable or cord which can only be removed from the tool with the aid of a tool.

10. Basic insulation: denotes the insulation applied to live parts to provide basic protection against electric shock.

NOTE - Basic insulation does not necessarily include insulation used exclusively for functional purposes.

11. Supplementary insulation (protective insulation): an independent insulation provided in addition to the basic insulation, in order to ensure protection against electric shock in the event of a failure of the basic insulation.

12. Double insulation: an insulation comprising both basic insulation and supplementary insulation.

13. Reinforced insulation: an improved basic insulation with such mechanical and electrical qualities that it provides the same degree of protection against electric shock as double insulation.

14. Class I tool: a tool having at least basic insulation throughout and provided with either an appliance inlet with earthing contact, or a non-detachable flexible cable or cord with earthing conductor.

NOTE - Class I tools may have parts with double insulation or reinforced insulation, or parts operating at safety extra-low voltage.

15. Class II tool: a tool with double insulation and/or reinforced insulation throughout and without provision for earthing.

Such a tool may be of one of the following types:

(i) A tool having a durable and substantially continuous enclosure of insulating material which envelops all metal parts, with the exception of small parts, such as nameplates, screws and rivets, which are isolated from live parts by insulation at least equivalent to reinforced insulation; such a tool is called an insulation-encased class II tool;

(ii) A tool having a substantially continuous metal enclosure, in which double insulation is used throughout, except for those parts where reinforced insulation is used, because the application of double insulation is manifestly impracticable; such a tool is called a metal-encased Class II tool;

(iii) A tool, which is a combination of types (i) and (ii).

NOTES

The enclosure of an insulation-encased Class II tool may form a part or the whole of the supplementary insulation or of the reinforced insulation.

If a tool with double insulation and/or reinforced insulation throughout has an earthing terminal or earthing contact, it is considered to be of Class I construction.

Class II tools may have parts operating at safety extra-low voltage.

16. Class III tool: a tool designed for operation at safety extra-low voltage, and which has no circuits, either internal or external, which operate at a voltage other than safety extra-low voltage.

17. Safety extra-low voltage: a nominal voltage not exceeding 42 V between conductors and between conductors and earth or, for three-phase supply, not exceeding 24 V between conductors and neutral, the no-load voltage not exceeding 50 V and 29 V respectively.

NOTES

When safety extra-low voltage is obtained from the supply mains, it must be through a safety isolating transformer or a convertor with separate windings.

The voltage limits specified are based on the assumption that the safety isolating transformer is operated at its rated supply voltage.

18. Normal load: the load to be applied to the tool so that the stress imposed corresponds to that occurring under normal conditions of use, any marking of short-time or intermittent operation being observed and heating elements, if any being operated as in normal use.

NOTE - The normal load is based on the rated voltage or on the upper limit of the rated voltage range.

19. Accessible part: any part which can be touched by the standard test finger shown in figure 1; for accessible metal parts, it includes any other metal part which is in electrical contact with such parts.

20. Detachable part: a part which can be removed without the aid of a tool.

21. Rated operating time: the operating time assigned to the tool by the manufacturer.

22. Continuous operation: operation under normal load for an unlimited period.

23. Short-time operation: operation under normal load for a specified period, starting from cold, the intervals between successive periods of operation being sufficiently long to allow the tool to cool down to approximately room temperature.

24. Intermittent operation: operation in a series of specified identical cycles, each cycle being composed of a period of operation under normal load, followed by a rest period with the tool running idle or switched off.

25. Thermal cut-out: a device which, during abnormal operation, limits the temperature of a tool, or of parts of it, by automatically opening the circuit or by reducing the current, and which is so constructed that its setting cannot be altered by the user.

26. Non self-resetting thermal cut-out: a thermal cut-out which requires resetting by hand, or replacement of a part, in order to restore the current.

27. Creepage distance: the shortest path between two conductive parts, or between a conductive part and the bounding surface of the tool, measured along the surface of the insulating material.

NOTE - The bounding surface of the tool is the outer surface of the enclosure, considered as though metal foil were pressed into contact with accessible surfaces of insulating material.

28. Clearance: the shortest distance between two conductive parts, or between a conductive part and the bounding surface of the tool, measured through air.

29. "Aid of a tool", "Use of a tool": where such expressions occur, the word tool means a screwdriver, a coin or any other object which may be used to operate a screw or other fixing means.

30. The term body includes all accessible metal parts, shafts or handles, knobs, grips and the like and metal foil in contact with all accessible surfaces of insulating material; it does not include inaccessible metal parts.

31. Safety isolating transformer: transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to double insulation or reinforced insulation and which is designed to supply a tool or circuit of safety extra low voltage

3. GENERAL REQUIREMENTS

3.1 Tools shall be so designed and constructed that in normal use they function safely and cause no danger to persons or surroundings, even in the event of such careless use as may occur in normal service.

NOTES

The materials used for the construction of the tool should not introduce additional hazards during use or disposal of the tool.

The risks due to noise and vibration should be reduced to the lowest level practicable, taking into account the appropriate European standards.

In general, compliance is checked by carrying out all the relevant tests.

4. GENERAL CONDITIONS FOR THE TESTS

4.1 Tests according to this standard are type tests.

4.2 Unless otherwise specified, the tests are made on a single sample as supplied, which shall withstand all the relevant tests.

NOTES

If the tool is designed for different supply voltages, for both a.c. and d.c., for different speeds, etc., more than one sample may be required.

If the test of sub-clause 11.2 has to be made, three or possibly six additional samples are required.

If it is necessary to dismantle a Class II tool for the tests of clauses 12 and 15, one additional sample may be required.

The testing of components may necessitate the submission of additional samples of these components. When the submission of such samples is necessary, they should be submitted together with the tool.

4.3 Unless otherwise specified, the tests are carried out in the order of the clauses of this standard.

NOTE - Before testing is started, the tool is operated at rated voltage or at the lower limit of the rated voltage range, in order to verify that it is in working order.

4.4 Unless otherwise specified, the tests are carried out at an ambient temperature of $(20 \pm 5)^\circ\text{C}$, the tool being placed in the most unfavourable position which may occur in normal use.

4.5 Tools for a.c. only are tested with a.c., at rated frequency, if marked. Tools for d.c. only are tested with d.c.

Tools not marked with rated frequency are tested at 50 Hz.

Tools designed for more than one rated voltage, or for both a.c. and d.c., are tested at the most unfavourable voltage and nature of supply.

When it is specified that the supply voltage is equal to the rated voltage multiplied by a factor, the supply voltage for tools marked with a rated voltage range is equal to:

- the upper limit of the rated voltage range multiplied by this factor, if greater than 1;
- the lower limit of the rated voltage range multiplied by this factor, if smaller than 1.

When testing tools designed for d.c. only, the possible influence of polarity on the operation of the tool is taken into consideration.

Tools marked with a rated frequency range are tested at 50 Hz, if this frequency is within the range; otherwise, they are tested at the most unfavourable frequency within the range.

NOTES

If the tool is designed for more than one rated voltage or rated voltage range, it may be necessary to make some of the tests more than once, in order to establish the most unfavourable voltage.

For tools designed for more than one rated voltage or rated voltage range, the rated voltage to be used for the tests is the most unfavourable voltage mentioned above.

4.6 Heating elements incorporated in the tool are connected to a separate supply, unless otherwise specified, and are tested according to the relevant EN 60335.

If, in normal use, the heating element cannot be operated unless the motor is running, the element is tested with the motor running. If the heating element can be operated without the motor running, the element is tested with or without the motor running, whichever is the more unfavourable.

4.7 Tools provided with a regulating device or a similar control, shall be tested with these controls adjusted to their most unfavourable setting within the range specified by the manufacturer for the particular application, if the setting can be altered by the user.

NOTES

If the adjusting means of the control is accessible without the aid of a tool, this sub-clause applies whether the setting can be altered by hand or with the aid of a tool; if the adjusting means is not accessible without the aid of a tool, this sub-clause applies only if the setting can be altered by hand.

Adequate sealing is regarded as preventing alteration of the setting by the user.

4.8 Electronic speed control devices shall be set for the highest speed.

4.9 Tools intended to be used with a non-detachable flexible cable or cord shall be tested with the flexible cable or cord connected to the tool.

4.10 When the conditions of normal load are specified in Part 2, the tool shall be loaded according to these conditions, irrespective of any marking of short-time operation or intermittent operation, unless it is evident from the design of the tool that these conditions will not occur in normal use.

When the conditions of normal load are not specified in Part 2, the tool shall be loaded according to the manufacturer's instructions; in the absence of such instructions, the tool shall be operated continuously at a load such that rated input is attained.

Tools for which alternative accessories are available shall be tested with that accessory within the manufacturer's specification which gives the most unfavourable results.

For accessories performing a function which is within the scope of one of the Parts 2, the tests are made in accordance with the relevant part.

For other accessories, the tests shall be made in accordance with the manufacturer's instructions; in absence of such instructions, the tool shall be operated continuously at a load such that rated input is attained.

4.11 If a torque is to be applied, the method of loading shall be chosen so as to avoid additional stresses, such as those caused by side thrust. Additional loads necessary for the correct operation of the tool shall be, however, taken into consideration.

4.12 Tools intended to be operated at safety extra-low voltage supplied by a transformer delivered together with the tool, shall be tested together with the transformer.

4.13 If Class I tools have parts with double insulation or reinforced insulation, such parts shall also be checked for compliance with the appropriate requirements specified for Class II tools.

Similarly, if Class I or Class II tools have parts operating at safety extra-low voltage, such parts shall also be checked for compliance with the appropriate requirements specified for Class III tools.

4.14 Tools with overload protection devices incorporated in the plug shall be tested without regard being paid to such protection device.

4.15 For tools incorporating electronic circuits see Annex B.

5. RATING

- 5.1 The maximum rated voltage is:
250 V for d.c. tools,
440 V for other tools.

Compliance is checked by inspection of the marking.

NOTE

The requirements of this standard are based on the assumption that in normal use the voltage between the supply lines and earth does not exceed 250 V.

6. CLASSIFICATION

6.1 Tools are classified:

1. According to protection against electric shock:
Class I tools,
Class II tools,
Class III tools;
2. According to degree of protection against moisture:
Ordinary tools,
Splash-proof tools,
Watertight tools.

7. MARKING

7.1 Tools shall be marked with:

- Rated voltage(s) or rated voltage range(s) in Volts,
- Symbol for nature of supply, if applicable,
- Rated frequency or rated frequency range in Hertz, unless the tool is designed for d.c. only, or for a.c. of any frequency not exceeding 60 Hz,
- Rated input in Watts or Kilowatts, if greater than 25 W,
- Rated current in Amperes, if greater than 10 A,
- Manufacturer's name or trade mark,
- Manufacturer's address or country of origin,
- Manufacturer's model or type reference and serial number (if any),