



# SLOVENSKI STANDARD

## SIST HD 400.1 S1:1995

01-marec-1995

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### Motorna ročna orodja - 1. del: Splošne zahteve

Hand-held motor operated tools -- Part I: General specifications

Handgeführte Elektrowerkzeuge -- Teil I: Allgemeine Bestimmungen

Outils portatifs à main à moteur -- Partie I: Règles générales

Ta slovenski standard je istoveten z: **HD 400.1 S1:1980/A1:1991**

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#### **ICS:**

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400.1

HARMONIZATION DOCUMENT  
DOCUMENT D'HARMONISATION  
HARMONISIERUNGSDOKUMENT

HD  
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protection against electric shock - heating - leakage  
currents - endurance - abnormal operation - mechanical  
hazards - construction

English version

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HAND-HELD MOTOR OPERATED TOOLS - PART I: GENERAL SPECIFICATIONS

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OUTILS PORTATIFS A MAIN A MOTEUR - PARTIE I: REGLES GENERALES

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HANDGEFÜHRTE ELEKTROWERKZEUGE - TEIL I: ALLGEMEINE BESTIMMUNGEN

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C E N E L E C

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EUROPÄISCHES KOMITEE FÜR ELEKTROTECHNISCHE NORMUNG

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## I N D E X

## Foreword

## Endorsement Notice

1. Scope
2. Definitions
3. General requirement
4. General notes on tests
5. Rating
6. Classification
7. Marking
8. Protection against electric shock
9. Starting
10. Input and current
11. Heating
12. Leakage current
13. Radio interference suppression
14. Moisture resistance
15. Insulation resistance and electric strength
16. Endurance
17. Abnormal operation
18. Mechanical hazards
19. Mechanical strength
20. Construction
21. Components
22. Internal wiring
23. Supply connection and external flexible cables and cords
24. Terminals for external conductors
25. Provision for earthing
26. Screws and connections
27. Creepage distances, clearances and distances through insulation
28. Resistance to heat, fire and tracking
29. Resistance to rusting

## FIGURES

1. Standard test finger
2. Test pin
3. Diagrams for leakage current measurement
4. Spring-operated impact-test apparatus
5. Arrangement for impact test
6. Bending-test apparatus
7. Ball-pressure apparatus
8. Hot mandrel apparatus
9. Arrangement and dimensions of the electrodes for the tracking test

Appendix I Thermal cut-outs and overload releases

Appendix II Rules for routine testing

Addendum Temporary national deviations from HD 400.1

FOREWORD

This Harmonization Document has been prepared by the Secretariat of CENELEC Technical Committee 313 in accordance with the decisions taken by this committee during its meeting held in October 1977 in Baden/Wien.

This Harmonization Document is based on CEE Publication 20, Part I, second edition, 1976. The reasons for the common modifications to this publication are mentioned in the last column of the Endorsement Notice, in accordance with the CENELEC Internal Regulations.

Note 1. The contents of this Harmonization Document will be re-examined as soon as new amendments to CEE Publication 20, Part I, have been published.

Note 2. For components used in hand-held motor operated tools, reference is made to CENELEC Harmonization Documents or, in the absence of such documents, to other international standards. Only in so far as these standards are harmonized by CENELEC will the requirements for components be identical.

Note 3. Temporary national deviations from this Harmonization Document are mentioned in an Addendum to this document which does not form part of this Harmonization Document and has the status of a CENELEC report. It is published separately.

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This Harmonization Document is in several parts:

HD 400.1	Part I : General specifications
HD 400.2	Part II: Particular specifications Section A - G

in preparation

prHD 400.3	Part II Particular specifications Section H - N
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## ENDORSEMENT NOTICE

CEE Publication 20, Part I, second edition, 1976, applies, except for the following modifications, which have been jointly agreed upon:

CLAUSE	MODIFICATION	REASON
General	Wherever in CEE Publication 20 reference is made to another CEE specification, the HD refers primarily to a corresponding EN or CENELEC HD, should such exist. Where no European Standard or CENELEC HD exists for the scope in question, the relevant CEE Publication shall apply.	EN or CENELEC HD have priority over other publications
4	General notes on tests	
4.2	CENELEC specifies that radio interference levels shall be measured immediately after tests according to Clause 8 have been carried out. (CEE: after clause 12, Leakage current) The same deviation shall also apply with regard to a future IEC Publication. <a href="https://standards.iteh.ai/catalog/standards/sist/936dd502-8927-4afc-ac70-b1b1e1e1e1e1/sist-hd-400-1-s1-1995">https://standards.iteh.ai/catalog/standards/sist/936dd502-8927-4afc-ac70-b1b1e1e1e1e1/sist-hd-400-1-s1-1995</a>	CENELEC considers the test sequence to be suitable one.
11	Temperature rises	
Table of temperature rises	The 8th and 9th item in the table reads in CENELEC: <u>Ambient of switches with/without T-marking.</u> The same deviation shall also apply with regard to a future IEC Publication.	Said technical amendment should be incorporated into the relevant CEE publication too.
15	Insulation resistance and electrical strength	
15.3	Third paragraph of the explanatory note: The end of this paragraph reads as follows in the CENELEC Publication: "...the metal foil is so placed that no flashover occurs at <u>its</u> edges." (CEE:...at the edges of the insulation.) This deviation is a technical correction and should also be incorporated into a future IEC Publication.	Said technical amendment should be incorporated into both CEE and IEC Publications too.

- 5 -

CLAUSE	MODIFICATION	REASON
23  23.2	<p>Supply connection and external cables and cords</p> <p>CENELEC specifies the use of harmonized cable types HO5 RR-F and HO5 VV-F instead of the corresponding CEE types (2)53 or (13)53.</p> <p style="padding-left: 40px;">This deviation shall remain a special CENELEC feature, even when harmonization with the relevant IEC document be realised.</p> <p>CENELEC does not specify, as CEE does, the heaviest type of cable HO7 RN-F in the General Specifications (Part I), nor is this in relation to the mass of the tool.</p> <p>For CENELEC, the use of the heaviest type of cable is specified in relation to the nature of the tool and its foreseeable use in practice and the relevant requirements are therefore included in the corresponding sections of Part II, Particular Specifications.</p> <p style="padding-left: 40px;">A similar deviation is also under discussion for a future IEC publication.</p>	CENELEC HD has priority here.
23.3 and 23.4	<p>Whereas CEE specifies plugs according to CEE Publications 7 or 17, CENELEC authorises the use of plugs according to relevant national requirements.</p> <p style="padding-left: 40px;">This deviation should also be made in the case of future harmonization with IEC.</p> <p style="padding-left: 40px;">Said deviation will no longer be maintained should CENELEC issue harmonized specifications for plug and socket devices resulting from activities undertaken with a view to implementing a unified system.</p>	Pending the issue of CENELEC harmonized specifications for plug and socket devices this deviation from CEE remains necessary.

CLAUSE	MODIFICATION	REASON
24 24.3	<p>Terminals for external conductors</p> <p>The CENELEC document includes, as a new second paragraph of the explanatory notes, an amendment covering the possibility of providing supply terminals on switches or analogous components.</p> <p>A similar requirement should be incorporated into a future IEC publication too.</p>	<p>This technical amendment, designed to realize a uniform assessment of test criteria, should be accepted by both CEE and IEC too.</p>

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December 1979

## 1. SCOPE

1.1 THIS SPECIFICATION APPLIES TO HAND-HELD ELECTRIC MOTOR-OPERATED OR MAGNETICALLY DRIVEN TOOLS, INTENDED FOR INDOOR OR OUTDOOR USE.

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 specification. This specification applies to tools having any rated frequency.

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

Tools with an electric heating element incorporated are within the scope of this specification, but such tools should also comply with the relevant EN or CENELEC HD, if any, otherwise with CEE Publication 11, 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. Attention is drawn to the fact that in many countries additional requirements are specified by the national authorities responsible for the protection of Labour.

1.2 THIS SPECIFICATION IS CONCERNED PRIMARILY WITH SAFETY, BUT IT ALSO CONTAINS SOME REQUIREMENTS WITH REGARD TO RADIO AND TELEVISION INTERFERENCE SUPPRESSION UNDER NORMAL CONDITIONS OF USE.

## 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 SPECIFICATION.

1. HAND-HELD TOOL DENOTES 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.

Hand-held tools may be provided with a flexible shaft, the motor being fixed or portable. Hand-held tools may also have provision for mounting on a support.

2. RATED VOLTAGE DENOTES THE VOLTAGE (FOR THREE-PHASE SUPPLY, THE LINE VOLTAGE) ASSIGNED TO THE TOOL BY THE MAKER.

3. RATED VOLTAGE RANGE DENOTES THE VOLTAGE RANGE ASSIGNED TO THE TOOL BY THE MAKER, EXPRESSED BY ITS LOWER AND UPPER LIMITS.

4. RATED INPUT DENOTES THE INPUT AT RATED VOLTAGE, ASSIGNED TO THE TOOL BY THE MAKER.

5. RATED CURRENT DENOTES THE CURRENT AT RATED VOLTAGE OR AT THE LOWER LIMIT OF THE RATED VOLTAGE RANGE, ASSIGNED TO THE TOOL BY THE MAKER.

If no current is assigned to the tool, the rated current for the purpose of this specification 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 DENOTES THE FREQUENCY ASSIGNED TO THE TOOL BY THE MAKER.

7. RATED FREQUENCY RANGE DENOTES THE FREQUENCY RANGE ASSIGNED TO THE TOOL BY THE MAKER, EXPRESSED BY ITS LOWER AND UPPER LIMITS.

8. RATED NO-LOAD SPEED DENOTES THE NO-LOAD SPEED AT RATED VOLTAGE OR AT THE UPPER LIMIT OF THE RATED VOLTAGE RANGE, ASSIGNED TO THE TOOL BY THE MAKER.

9. NON-DETACHABLE FLEXIBLE CABLE OR CORD DENOTES A FLEXIBLE CABLE OR CORD WHICH CAN ONLY BE REMOVED FROM THE TOOL WITH THE AID OF A TOOL.

December 1979

Where the expressions "with the aid of a tool", "without the aid of a tool" and "requires the use of a tool" occur in the text, the word "tool" means a screwdriver, a coin or any other object which may be used to operate a screw or similar fixing means.

10. FUNCTIONAL INSULATION DENOTES THE INSULATION NECESSARY FOR THE PROPER FUNCTIONING OF THE TOOL AND FOR BASIC PROTECTION AGAINST ELECTRIC SHOCK.

11. SUPPLEMENTARY INSULATION (PROTECTIVE INSULATION) DENOTES AN INDEPENDENT INSULATION PROVIDED IN ADDITION TO THE FUNCTIONAL INSULATION, IN ORDER TO ENSURE PROTECTION AGAINST ELECTRIC SHOCK IN THE EVENT OF A FAILURE OF THE FUNCTIONAL INSULATION.

12. DOUBLE INSULATION DENOTES INSULATION COMPRISING BOTH FUNCTIONAL INSULATION AND SUPPLEMENTARY INSULATION.

13. REINFORCED INSULATION DENOTES AN IMPROVED FUNCTIONAL 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 DENOTES A TOOL HAVING AT LEAST FUNCTIONAL INSULATION THROUGHOUT AND PROVIDED WITH EITHER AN APPLIANCE INLET WITH EARTHING CONTACT, OR A NON-DETACHABLE FLEXIBLE CABLE OR CORD WITH EARTHING CONDUCTOR.

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

In normal use, Class I tools intended to be used with a non-detachable flexible cable or cord are provided with a plug with earthing contact.

15. CLASS II TOOL DENOTES 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 ENVELOPES 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).

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 DENOTES 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.

Tools intended to be operated at safety extra-low voltage and having internal circuits which operate at a voltage other than safety extra-low voltage, are not included in the classification and are subject to additional requirements; these requirements are under consideration.

17. SAFETY EXTRA-LOW VOLTAGE DENOTES A NOMINAL VOLTAGE NOT EXCEEDING 42 V BETWEEN CONDUCTORS AND BETWEEN CONDUCTORS AND EARTH, THE NO-LOAD VOLTAGE NOT EXCEEDING 50 V.

When safety extra-low voltage is obtained from the supply mains, it shall be supplied 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.

December 1979

18. NORMAL LOAD DENOTES 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.

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

19. ACCESSIBLE PART DENOTES 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 DENOTES A PART WHICH CAN BE REMOVED WITHOUT THE AID OF A TOOL.

21. RATED OPERATING TIME DENOTES THE OPERATING TIME ASSIGNED TO THE TOOL BY THE MAKER.

22. CONTINUOUS OPERATION DENOTES OPERATION UNDER NORMAL LOAD FOR AN UNLIMITED PERIOD.

23. SHORT-TIME OPERATION DENOTES 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 DENOTES 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 DENOTES 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 DENOTES A THERMAL CUT-OUT WHICH REQUIRES RESETTING BY HAND OR REPLACEMENT OF A PART, IN ORDER TO RESTORE THE CURRENT.

27. CREEPAGE DISTANCE DENOTES 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.

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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 DENOTES THE SHORTEST DISTANCE BETWEEN TWO CONDUCTIVE PARTS, OR BETWEEN A CONDUCTIVE PART AND THE BOUNDING SURFACE OF THE TOOL, MEASURED THROUGH AIR.

### 3. GENERAL REQUIREMENT

3.1 TOOLS SHALL BE SO DESIGNED AND CONSTRUCTED THAT IN NORMAL USE THEY FUNCTION RELIABLY AND CAUSE NO DANGER TO PERSONS OR SURROUNDINGS, EVEN IN THE EVENT OF SUCH CARELESS USE AS MAY OCCUR IN NORMAL SERVICE.

COMPONENTS NECESSARY TO GIVE AN ADEQUATE DEGREE OF RADIO AND TELEVISION INTERFERENCE SUPPRESSION, SHALL NOT ENTAIL CONDITIONS THAT MIGHT IMPAIR COMPLIANCE WITH THIS SPECIFICATION.

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

## 4. GENERAL NOTES ON TESTS

4.1 Tests according to this specification are type tests.  
For guidance of manufacturers, rules for routine testing are given in Appendix II.

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

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 Part I, General Specification.

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.

Where, according to Clause 13, the interference levels need be measured, these measurements are, however, made immediately after the tests according to Clause 8.

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.

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 or CENELEC HD, if any, otherwise to CEE Publication 11.

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, are 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.

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.

December 1979

4.8 Electronic speed control devices are set for the highest speed.

The introduction of tests to be made at other settings is under consideration.

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

4.10 When the conditions of normal load are specified in Part II, Particular Specifications, the tool is 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 II, Particular Specifications, the tool is loaded according to the manufacturer's instructions; in the absence of such instructions, the tool is operated continuously at a load such that rated input is attained.

Tools for which alternative accessories are available, are 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 sections of Part II, Particular Specifications, the tests are made in accordance with that section.

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

4.11 If a torque load is to be applied, the method of loading is chosen so as to avoid additional stresses, such as those caused by side thrust. Additional loads necessary for the correct operation of the tool are, 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, are tested together with this transformer.

4.13 If Class I tools have parts with double insulation or reinforced insulation, such parts are also checked for compliance with the appropriate requirements specified for Class II tools. Similarly, if Class II or Class III tools have parts operating at safety extra-low voltage, such parts are also checked for compliance with the appropriate requirements specified for Class III tools.

## 5. RATING

5.1 THE MAXIMUM RATED VOLTAGE IS:

250 V FOR D.C. TOOLS,  
440 V FOR OTHER TOOLS.

FOR CLASS III TOOLS, THE PREFERRED VALUES OF THE RATED VOLTAGE ARE 24 AND 42 V.

Compliance is checked by inspection of the marking.

The requirements of this specification 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,  
SPASH-PROOF TOOLS,  
WATERTIGHT TOOLS;

3. ACCORDING TO DEGREE OF RADIO AND TELEVISION INTERFERENCE SUPPRESSION:  
TOOLS OF CLASS A,  
TOOLS OF CLASS B.

## 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 1), 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,  
 MAKER'S NAME OR TRADE MARK,  
 MAKER'S MODEL OR TYPE REFERENCE,  
 RATED OPERATING TIME, OR RATED OPERATING TIME AND RATED  
 RESTING TIME, IN HOURS, MINUTES OR SECONDS, IF APPLICABLE,  
 SYMBOL FOR CLASS II CONSTRUCTION, FOR CLASS II TOOLS ONLY,  
 SYMBOL FOR DEGREE OF PROTECTION AGAINST MOISTURE, IF  
 APPLICABLE,  
 RATED NO-LOAD SPEED IN REVOLUTIONS PER MINUTE, IF EXCEEDING  
 10 000.

Tools for star-delta connection must be clearly marked  
 with the two rated voltages (e.g. 220  $\Delta$  /380 V).  
 For tools with heating elements incorporated, the rated  
 input is considered to be equal to the total maximum rated  
 input of the motor and of the heating elements that can be  
 in operation simultaneously.  
 Additional markings are allowed, provided they do not  
 give rise to misunderstanding.  
 If the motor of a tool is marked separately, the marking  
 of the tool and that of the motor must be such that there  
 can be no doubt with regard to the rating and maker of  
 the tool itself.

7.2 FOR TOOLS WITH HEATING ELEMENTS INCORPORATED, THE COMPLETE  
 MARKING FOR HEATING ELEMENTS REQUIRED IN THE CORRESPONDING EN OR  
 CENELEC HD, OTHERWISE IN CEE PUBLICATION 1) SHALL, IN ADDITION, BE  
 GIVEN ON THE MARKING PLATE OF THE TOOL.

7.3 TOOLS FOR SHORT-TIME OPERATION OR INTERMITTENT OPERATION SHALL  
 BE MARKED WITH RATED OPERATING TIME OR RATED OPERATING TIME AND  
 RATED RESTING TIME RESPECTIVELY, UNLESS THE OPERATING TIME IS  
 EITHER LIMITED BY THE CONSTRUCTION OR CORRESPONDS TO THE DESCRIP-  
 TION OF NORMAL LOAD GIVEN IN PART II, PARTICULAR SPECIFICATIONS.  
 THE MARKING OF SHORT-TIME OPERATION OR INTERMITTENT OPERATION SHALL  
 CORRESPOND TO NORMAL USE EN/sist-hd-400-1-sl-1995  
 THE MARKING OF INTERMITTENT OPERATION SHALL BE SUCH THAT THE RATED  
 OPERATING TIME PRECEDES THE RATED RESTING TIME, THE MARKINGS BEING  
 SEPARATED BY AN OBLIQUE STROKE.

7.4 IF THE TOOL CAN BE ADJUSTED TO SUIT DIFFERENT RATED VOLTAGES OR  
 DIFFERENT RATED INPUTS, THE VOLTAGE OR INPUT TO WHICH THE TOOL IS  
 ADJUSTED SHALL BE EASILY AND CLEARLY DISCERNIBLE.  
 THIS REQUIREMENT DOES NOT APPLY TO TOOLS FOR STAR-DELTA CONNECTION.

For tools where frequent changes in voltage setting are  
 not required, this requirement is considered to be met if  
 the rated voltage or the rated input to which the tool is  
 adjusted, can be determined from a wiring diagram fixed to  
 the tool; the wiring diagram may be on the inside of a  
 cover which has to be removed to connect the supply con-  
 ductors. This diagram may be on a card which is riveted  
 to the cover, or on a paper or similar label secured to  
 the cover by an adhesive, but it must not be on a label  
 loosely attached to the tool.

7.5 FOR TOOLS MARKED WITH MORE THAN ONE RATED VOLTAGE OR RATED  
 VOLTAGE RANGE, THE RATED INPUT FOR EACH OF THESE VOLTAGES OR RANGES  
 SHALL BE MARKED, IF GREATER THAN 25 W.  
 THE UPPER AND LOWER LIMITS OF THE RATED INPUT SHALL BE MARKED ON THE  
 TOOL SO THAT THE RELATION BETWEEN INPUT AND VOLTAGE APPEARS DISTINCT-  
 LY, UNLESS THE DIFFERENCE BETWEEN THE LIMITS OF A RATED VOLTAGE  
 RANGE DOES NOT EXCEED 10% OF THE MEAN VALUE OF THE RANGE, IN WHICH  
 CASE THE MARKING FOR RATED INPUT MAY BE RELATED TO THE MEAN VALUE  
 OF THIS RANGE.

1) PROVISIONALLY, THE FREQUENCY MAY BE EXPRESSED IN CYCLES PER  
 SECOND.

7.6 WHEN SYMBOLS ARE USED, THEY SHALL BE AS FOLLOWS:

VOLTS . . . . .	V,
AMPERES . . . . .	A,
HERTZ OR CYCLES PER SECOND . . . . .	Hz OR c/s,
WATTS . . . . .	W,
KILOWATTS . . . . .	kW,
HOURS . . . . .	h,
MINUTES . . . . .	min,
SECONDS . . . . .	s,
REVOLUTIONS OR RECIPROCATIONS PER MINUTE . . . . .	./min,
ALTERNATING CURRENT . . . . .	~
THREE-PHASE ALTERNATING CURRENT . . . . .	3 ~
THREE-PHASE ALTERNATING CURRENT WITH NEUTRAL . . . . .	3N ~
DIRECT CURRENT . . . . .	—
CLASS II CONSTRUCTION . . . . .	□
SPLASH-PROOF CONSTRUCTION . . . . .	△ (ONE DROP IN A TRIANGLE),
WATERTIGHT CONSTRUCTION . . . . .	“ (TWO DROPS).

ADDITIONAL SYMBOLS MAY BE USED IF THEY ARE RECOGNIZED INTERNATIONALLY.

THE SYMBOL FOR NATURE OF SUPPLY SHALL BE PLACED NEXT TO THE MARKING FOR RATED VOLTAGE.  
 THE DIMENSIONS OF THE SYMBOL FOR CLASS II CONSTRUCTION SHALL BE SUCH THAT THE LENGTH OF THE SIDES OF THE OUTER SQUARE IS ABOUT TWICE THE LENGTH OF THE SIDES OF THE INNER SQUARE. THE LENGTH OF THE SIDES OF THE OUTER SQUARE SHALL NOT BE LESS THAN 5 mm, UNLESS THE LARGEST DIMENSION OF THE TOOL DOES NOT EXCEED 15 cm, IN WHICH CASE THE DIMENSIONS OF THE SYMBOL MAY BE REDUCED, BUT THE LENGTH OF THE SIDES OF THE OUTER SQUARE SHALL NOT BE LESS THAN 3 mm.  
 THE SYMBOL FOR CLASS II CONSTRUCTION SHALL BE SO PLACED THAT IT WILL BE OBVIOUS THAT IT IS A PART OF THE TECHNICAL INFORMATION AND IS UNLIKELY TO BE CONFUSED WITH THE MAKER'S NAME OR TRADE MARK.

7.7 TERMINALS INTENDED EXCLUSIVELY FOR THE NEUTRAL CONDUCTOR SHALL BE INDICATED BY THE LETTER N.  
 EARTHING TERMINALS SHALL BE INDICATED BY THE SYMBOL ⊕.  
 THESE INDICATIONS SHALL NOT BE PLACED ON SCREWS, REMOVABLE WASHERS OR OTHER PARTS WHICH MIGHT BE REMOVED WHEN CONDUCTORS ARE BEING CONNECTED.

7.8 TOOLS TO BE CONNECTED TO MORE THAN TWO SUPPLY CONDUCTORS SHALL BE PROVIDED WITH A WIRING DIAGRAM, UNLESS THE CORRECT MODE OF CONNECTION IS OBVIOUS.

The earthing conductor is not a supply conductor.  
 For tools for star-delta connection, the wiring diagram must show how the windings are to be connected.  
 The wiring diagram may be that referred to in sub-clause 7.4.

7.9 A PUSH-BUTTON SHALL BE COLOURED RED ONLY IF IT SERVES TO OPEN THE CIRCUIT, TO BE CONTROLLED AND HAS NO OTHER FUNCTION.

This requirement does not apply to push-buttons used for locking the mains switch.

7.10 FOR TOOLS WHICH MIGHT CAUSE DANGER WHEN STARTED UNEXPECTEDLY, THE "OFF" POSITION OF THE MAINS SWITCH SHALL BE INDICATED, UNLESS THIS POSITION IS OBVIOUS; THE INDICATION, IF REQUIRED, SHALL BE THE FIGURE O.  
 THE FIGURE O SHALL NOT BE USED FOR ANY OTHER INDICATION.  
 THE POSITION OF THE MOVING CONTACTS OF THE MAINS SWITCH SHALL CORRESPOND TO THE INDICATIONS FOR THE DIFFERENT POSITIONS OF ITS OPERATING MEANS.

7.11 REGULATING DEVICES AND THE LIKE, INTENDED TO BE ADJUSTED DURING OPERATION OF THE TOOL, SHALL BE PROVIDED WITH AN INDICATION FOR THE DIRECTION OF ADJUSTMENT TO INCREASE OR TO DECREASE THE VALUE OF THE CHARACTERISTIC BEING ADJUSTED.  
 THIS REQUIREMENT DOES NOT APPLY TO REGULATING DEVICES PROVIDED WITH RECIPROCATING ADJUSTING MEANS, IF ITS "FULLY-ON" POSITION IS OPPOSITE TO ITS "OFF" POSITION.  
 IF FIGURES ARE USED FOR INDICATING THE DIFFERENT POSITIONS, THE "OFF" POSITION SHALL BE INDICATED BY THE FIGURE 0 AND THE POSITION FOR A GREATER OUTPUT, INPUT, SPEED, ETC., SHALL BE INDICATED BY A HIGHER FIGURE.

An indication of + and - is considered to be sufficient.  
 The indications for the different positions of the operating means of a control device need not be placed on the device itself.

7.12 TOOLS PROVIDED WITH ELECTRONIC REGULATING DEVICES SHALL EITHER HAVE A SPECIAL MARKING OR BE ACCOMPANIED BY AN INSTRUCTION SHEET GIVING THE NECESSARY INSTRUCTIONS FOR THE USE OF THE TOOL.