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Underwriters Laboratories Inc.
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Particular Requirements for Grinders, Polishers and Disk-Type Sanders

March 23, 1995

Approved
by
Standards Council
of Canada



Commitment for Amendments

This Standard is issued jointly by Canadian Standards Association and Underwriters Laboratories Incorporated. Amendments to this Standard will be made only after processing according to the Standards writing procedures by both Canadian Standards Association and Underwriters Laboratories Incorporated.

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Preface

This is the common CSA and UL Standard for portable electric grinders, polishers and disk-type sanders. It is the first edition of CSA Standard C22.2 No. 745-2-3 *Safety of portable electric tools Part 2: Particular requirements for grinders, polishers and disk-type sanders* and UL 745-2-3 *Safety of portable electric tools Part 2: Particular requirements for grinders, polishers and disk-type sanders*. It is written in SI (metric) units.

This Standard was prepared by Canadian Standards Association and Underwriters Laboratories Inc. This common CSA and UL Standard is based on IEC Publication 745-2-3 (1984) *Part 2: Particular requirements for grinders, polishers and disk-type sanders*. Where Canadian and US deviations have necessitated the deletion of IEC Publication 745-2-3 text, the IEC text has been retained but has been over-stricken to indicate it as nonmandatory. Text added to IEC Publication 745-2-3 as mandatory has been redlined (shaded) including, where feasible, Tables and Figures.

Where a particular clause of the general requirements Standard is not mentioned in this Standard, the clause applies as far as is reasonable. Where this edition states *addition, modification, or replacement*, the relevant requirement, test specification, or explanatory matter in the general requirements Standard should be adapted accordingly.

If the functions of a tool are covered by different particular Standards, the relevant particular requirements Standard is applied to each function separately, so far as is reasonable. If applicable, the influence of one function on the other is taken into account.

This Standard was reviewed by the CSA Subcommittee on Portable Electric Tools of the Technical Committee on Consumer and Commercial Products under the jurisdiction of the Standards Steering Committee on the Canadian Electrical Code, Part II, and was formally approved by these Committees.

This Standard was processed and reviewed in accordance with the method of development, revision and implementation of UL Standards for safety.

This Standard will be submitted to the Standards Council of Canada for publication as a National Standard of Canada and to the American National Standards Institute (ANSI) for publication as an American National Standard.

March 23, 1995

UL Effective Date

As of June 1, 2007, all products Listed or Recognized by UL must comply with the requirements in this Standard.

Between June 1, 2002 and June 1, 2007, new product submittals to UL must be evaluated under all requirements in this standard.

Between March 23, 1995 and June 1, 2002, new product submittals to UL may be evaluated under all requirements in this Standard or, if requested in writing, evaluated under presently effective requirements only. The presently effective requirements are contained in the seventh edition of UL 45.

CSA Effective Date

The effective date for CSA will be announced through a *CSA Certification Notice*.

Note: *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*

Foreword (CSA)

Certification organizations, as accredited by the Standards Council of Canada, have their own criteria procedures for certification services. The following paragraphs define CSA Certification policies.

The Canadian Standards Association provides certification services for manufacturers who, under license from CSA, wish to use the appropriate registered CSA Marks on certain products of their manufacture to indicate conformity with CSA Standards.

CSA Certification for a number of products is provided in the interest of maintaining agreed-upon standards of quality, performance, interchangeability and/or safety, as appropriate. Where applicable, certification may form the basis for acceptance by inspection authorities responsible for enforcement of regulations. Where feasible, programs will be developed for additional products for which certification is desired by producers, consumers or other interests.

In performing its functions in accordance with its objectives, CSA does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of the Association represent its professional judgement given with due consideration to the necessity limitations of practical operation and state of the art at the time the Standard is processed.

Products in substantial accord with this Standard but which exhibit a minor difference or a new feature may be deemed to meet the Standard providing the feature or difference is found acceptable utilizing appropriate CSA Certification Division Operating Procedures. Products which comply with this Standard shall not be certified if they are found to have additional features which are inconsistent with the intent of this Standard. Products shall not be certifiable if they are discovered to contravene applicable Federal laws or regulations.

Testing techniques, test procedures and instrumentation frequently must be prescribed by the CSA Certification Division in addition to the technical requirements contained in Standards of CSA. In addition to markings specified in the Standard the CSA Certification and Testing Division may require special cautions, markings and instructions that are not specified by the Standard.

Some tests required by CSA Standards may be inherently hazardous. The Association neither assumes nor accepts any responsibility for any injury or damage that may occur during or as the result of tests, wherever performed, whether performed in whole or in part by the manufacturer or the Association, and whether or not any equipment, facility or personnel for in connection with the test is furnished by the manufacturer or the Association.

Manufacturers should note that, in the event of the failure of the CSA Certification and Testing Division to resolve an issue arising from the interpretation of requirements, there is an appeal procedure: the complainant should submit the matter, in writing, to the Secretary of the Canadian Standards Association.

If this Standard is to be used in obtaining CSA Certification please remember, when making application for certification, to request all current Amendments, Bulletins, Notices and Technical Information Letters that may be applicable and for which there may be a nominal charge. For such information or for further information concerning details about CSA Certification please address your inquiry to the Applications and Records Section, Canadian Standards Association, 178 Rexdale Boulevard, Rexdale (Toronto), Ontario M9W 1R3.

Foreword (UL)

- A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.
- B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.
- C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.
- D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.
- E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of or reliance upon this Standard.
- F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

1. Scope

This clause of Part 1 is applicable except as follows:

1.1 Replacement:

This standard applies to electric grinders, polishers and disk-type sanders.

~~This standard does not apply to random orbit polishers. These are covered in Part 2-4.~~

2. Definitions

This clause of Part 1 is applicable except as follows:

2.2.23 First paragraph

Replacement:

Normal load denotes the load obtained when the tool is operated continuously for 30 min, the torque applied to the spindle being:

$1.5 D^{1.5} L \cdot 10^{-5}$ Nm for peripheral grinders and peripheral polishers with a wheel diameter not exceeding 55 mm,

$2.5 D^{1.5} L \cdot 10^{-5}$ Nm for other peripheral grinders and peripheral polishers,

$1.3 D^3 \cdot 10^{-7}$ Nm for facial grinders, facial polishers and disk-type sanders,

$1.5 D^{1.5} \cdot 10^{-4}$ Nm for valve seat grinders

where: D is the diameter, in millimeters, of the grinding wheel or disk, and

L is the thickness, in millimeters, of the grinding or polishing wheel indicated on the name plate.

Additional definitions:

2.2.101 Disk-type sander denotes an abrading tool in which the abrasive material is fixed to the facial surface of a rotating disk.

~~2.2.102 The term peripheral grinder refers to surface or cutoff grinders.~~

3. General requirement

This clause of Part 1 is applicable.

4. General notes on tests

This clause of Part 1 is applicable.

5. Rating

This clause of Part 1 is applicable.

6. Classification

This clause of Part 1 is applicable.

7. Marking

This clause of Part 1 is applicable except as follows:

7.1 Addition:

Grinders, polishers and disk-type sanders shall be marked with:

- rated no-load speed in revolutions per minute;
- indication of direction of rotation;
- rated diameter of the grinding disk or polishing wheel;
- rated grinding disk or polishing wheel thickness only for peripheral grinders and peripheral polishers.

WARNING — To reduce the risk of injury, always use proper guards when grinding and wear eye protection. Use only accessories rated at least _____ rpm.

The accessory speed marking shall be equal to or greater than the no-load speed marked on the tools' nameplate.

Grinders with 50.8 mm or less rated wheel size do not require the warning about the use of the guard.

This warning applies only to grinders. If the cautionary wording is included as part of the cautionary marking required in Part 1 sub-clause 7.1, the words "Warning — To reduce the risk of injury, ..." need not be repeated.

Tools other than grinders designed for operation at more than one speed shall be marked with the rated no-load speed settings in such a way that it is clear which speed corresponds with each of the settings.

7.11 Addition:

The direction of rotation of the wheel or disk shall be indicated by an arrow, raised or sunk, or by any other means no less visible and indelible.

Additional sub-clauses:

7.101 — Tools shall be accompanied by an instruction sheet giving in substance the following warning:

"Always wear eye protection."

In addition, the instruction for grinders shall include in substance the following:

"Do not use wheels having a maximum permissible speed below _____ n."

7.102 — Grinders, polishers and disk-type sanders with water supply, other than those of Class III, shall be accompanied by an instruction sheet stating that the tool must be supplied through an isolating transformer and indicating the type or the technical characteristics of the transformer.

8. Protection against electric shock

This clause of Part 1 is applicable.

9. Starting

This clause of Part 1 is applicable.

10. Input and current

This clause of Part 1 is applicable.

11. Heating

This clause of Part 1 is applicable except as follows:

11.2 Modification:

The tool is operated for a period equal to the rated operating time or, in the absence of the relevant marking, for 30 min, the torque applied to the spindle being equal to that specified for normal load or to that corresponding with the load necessary to attain, rated input, whichever is the higher, measured at the rated voltage or at the upper limit of the rated voltage range.

12. Leakage current

This clause of Part 1 is applicable.

13. Radio and television interference suppression

This clause of Part 1 is applicable.

14. Moisture resistance

This clause of Part 1 is applicable.

15. Insulation resistance and electric strength

This clause of Part 1 is applicable.

16. Endurance

This clause of Part 1 is applicable.

17. Abnormal operation

This clause of Part 1 is applicable.

18. Mechanical hazards

This clause of Part 1 is applicable except as follows:

Additional sub-clauses:

18.101 ~~Tools~~ Grinders having a rated grinding wheel diameter exceeding ~~550~~ 6 mm shall be provided with a non-detachable guard having sufficient mechanical strength to contain any parts of the wheel that may be thrown out in the event of breakage. The opening in the guard shall not be larger than necessary for the correct working of the tool.

18.102 The no-load speed of the spindle fitted with a wheel or disk shall, at rated voltage or at the upper limit of the rated voltage range, not exceed 110% of the rated no-load speed.

Compliance with the requirements of Sub-clauses 18.101 and 18.102 is checked by inspection and by measuring the speed of the spindle after the tool has been operating for 15 min with no load.

18.103 Grinders shall have only one rated no-load speed.

Compliance is checked by inspection.

This requirement does not apply if it is not readily possible to fit abrasive wheels having a diameter exceeding ~~550~~ 6 mm.

19. Mechanical strength

This clause of Part 1 is applicable.

20. Construction

This clause of Part 1 is applicable except as follows:

Additional sub-clauses:

~~20.101 — Grinders with water supply shall be so constructed that their electrical insulation cannot be affected by water which might condense on cold surfaces, or which might leak from containers, hoses, couplings and the like.~~

~~Compliance is checked by inspection.~~

~~20.102 Flanges and guards shall comply with the applicable standards in Appendix E.~~

21. Internal wiring

This clause of Part 1 is applicable.

22. Components

This clause of Part 1 is applicable.

23. Supply connection and external flexible cables and cords

This clause of Part 1 is applicable ~~except as follows:~~

23.3 — Modification:

~~For units having a rated diameter exceeding 155 mm (angle grinders) or have a rated diameter exceeding 130 mm (straight grinders) and for units with water supply, the lightest cable which can be used is:~~

~~—ordinary polychloroprene or equivalent synthetic rubber sheathed flexible cable (code designation 245 IEC 66).~~

24. Terminals for external conductors

This clause of Part 1 is applicable.

25. Provision for earthing

This clause of Part 1 is applicable.

26. Screws and connections

This clause of Part 1 if applicable.

27. Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.

28. Resistance to heat, fire and tracking

This clause of Part 1 is applicable.

29. Resistance to rusting

This clause of Part 1 is applicable.

30. Tests by Manufacturer

This clause of Part 1 is applicable.

31. Instructions

This clause of Part 1 is applicable, except as follows:

Additional Specific Safety Rules:

31.3.101 Always use proper guard with grinding wheel. A guard protects operator from broken wheel fragments.

Applicable only to grinders.

31.3.102: Accessories must be rated or labeled the speed recommended on the tool warning label. Wheels and other accessories turning over rated speeds can fly apart and cause injury.

31.2.103: Hold tool by insulated gripping surfaces when performing an operation where the cutting tool may contact hidden wiring or its own cord. Contact with a live wire will make exposed metal parts of the tool live and shock the operator.

Appendix A – Thermal cut-outs and overload releases

This appendix of Part 1 is applicable.

Appendix B – Electronic circuits

This appendix of Part 1 is applicable.

Appendix C – Construction of safety isolating transformers

This appendix of Part 1 is applicable.

Appendix D – Measurement of creepage distances and clearances

This appendix of Part 1 is applicable.

Appendix E – Reference standards

This appendix of Part 1 is applicable.

Appendix F – Attachments and accessories

This appendix of Part 1 is applicable.

Appendix G – Sequence of tests

This appendix of Part 1 is applicable.

Appendix H -- Translations

Notice: In Canada there are two official languages; therefore it is necessary to have CAUTION, WARNING, and DANGER markings in both English and French on those products to be sold or used in Canada. Following is a list of acceptable French translations of the markings specified in this Standard.

This appendix of Part 1 is applicable except as follows:

H1: Translations**H1.1: Markings****7: Marquage**

AVERTISSEMENT: Afin de réduire les risques de blessure, utilisez toujours un outil muni d'un protecteur adéquat et portez des lunettes ou une visière. N'utilisez que des accessoires prévus pour au moins 7000 rpm.

Following is a list of acceptable French translations of the instructions specified in this Standard.

H1.2: Instructions**31: Instructions**

L'article correspondant du chapitre 1 s'applique, sauf pour ce qui suit:

Règles de sécurité particulières supplémentaires

31.3.101: Utilisez toujours un protecteur de meule approprié. Le protecteur arrête les éclats en cas de bris de la meule.

Applicable aux meuleuses rotatives.

31.3.102: Les accessoires doivent être prévus pour au moins la vitesse recommandée sur l'étiquette de mise en garde de l'outil. Les meules et autres accessoires s'ils tournent au-delà de la vitesse normale, risquent d'éclater et de provoquer des blessures.

31.3.103: Tenez l'outil par ses surfaces de prise isolées pendant toute opération de l'outil de coupe pour éviter tout contact avec un câblage dissimulé ou avec son propre cordon. En cas de contact avec un conducteur sous tension, les pièces métalliques à découvert de l'outil transmettraient un choc électrique à l'utilisateur.