UL 60335-2-67

STANDARD FOR SAFETY

Household and Similar Electrical Appliances - Safety - Part 2-67: Particular requirements for floor treatment machines, for commercial use

ANSI/UL 60335-2-67-2017

SCC FOREWORD

National Standard of Canada

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UL Standard for Safety for Household and Similar Electrical Appliances – Safety – Part 2-67: Particular requirements for floor treatment machines, for commercial use, UL 60335-2-67

First Edition, Dated December 22, 2017

Summary of Topics

UL 60335-2-67 is an adoption of IEC 60335-2-67, Safety Standard for of Household and Similar Electrical Appliances, Part 2-67: Particular requirements for floor treatment machines, for commercial use (Edition 4, Issued by the IEC March 2003). Please note that the national difference document incorporates all of the U.S. national differences for UL 60335-2-67.

The new requirements are substantially in accordance with Proposal(s) on this subject dated April 21, 2017 and September 1, 2017.

No Text on This Page

CSA Group
CAN/CSA-C22.2 No. 60335-2-67:17
First Edition
(IEC 60335-2-67:2012, MOD)

Underwriters Laboratories Inc.
UL 60335-2-67
First Edition

Household and Similar Appliances – Safety – Part 2-67: Particular requirements for floor treatment machines, for commercial use

December 22, 2017

This national standard is based on publication IEC 60335-2-67, Edition 4:2012.

ANSI/UL 60335-2-67-2017

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as "CSA Group") and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

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Canadian Standards Association

This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. The technical content of IEC and ISO publications is kept under constant review by IEC and ISO. To submit a proposal for change, please send the following information to inquires@csagroup.org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the First Edition. The most recent designation of ANSI/UL 60335-2-67 as an American National Standard (ANSI) occurred on December 22, 2017. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

To purchase UL Standards, visit UL's Standards Sales Site at http://www.shopulstandards.com/HowToOrder.aspx or call toll-free 1-888-853-3503.

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PREFACE

This is the harmonized CSA Group and UL standard for Household and Similar Appliances – Safety – Part 2-67: Particular requirements for floor treatment machines, for commercial use. It is the first edition of CAN/CSA-C22.2 No. 60335-2-67, and the first edition of UL 60335-2-67. This edition of CAN/CSA C22.2 No. 60335-2-67 replaces the previous edition published in 2001 as CAN/CSA-E60335-2-67 (adopted IEC 60335-2-67: 1997).

This harmonized standard is based on IEC Publication 60335-2-67: Edition 4, Household and similar electrical appliances – Safety – Part 2-67: Particular requirements for floor treatment machines, for commercial use, issued March 2012. IEC 60335-2-67 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group, and Underwriters Laboratories Inc. (UL). The efforts and support of the Technical Harmonization Committee, 335K are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Subcommittee on Electrical Motor and Battery-Operated Cleaning Appliances for Industrial and Commercial Use, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

This Standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

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.

CAN/CSA-C22.2 No. 60335-2-67, is to be used in conjunction with the first edition of CAN/CSA-C22.2 No. 60335-1:11. The requirements for floor treatment machines, for commercial use, are contained in this Part 2 Standard and CAN/CSA No. 60335-1:11. Requirements of this Part 2 Standard, where stated, amend the requirements of CAN/CSA-C22.2 No. 60335-1:11. Where a particular subclause of CAN/CSA-C22.2 No. 60335-1:11 is not mentioned in CAN/CSA-C22.2 No. 60335-2-67, the CAN/CSA-C22.2 No. 60335-1:11 subclause applies.

UL 60335-2-67 is to be used in conjunction with the fifth edition of UL 60335-1. Requirements of this Part 2 Standard, where stated, amend the requirements of UL 60335-1. Where a particular subclause of UL 60335-1 is not mentioned in UL 60335-2-67, the UL 60335-1 subclause applies.

Level of Harmonization

This standard adopts the IEC text with national differences.

This standard is published as an equivalent standard for CSA Group and UL.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

All national differences from the IEC text are included in the CSA Group and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for differences from IEC

Differences from the IEC are being added in order to address regulatory and safety situations present in the US and Canada.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

IEC Copyright

For CSA Group, the text, figures, and tables of International Electrotechnical Commission Publication 60335-2-67, Household and similar electrical appliances – Safety – Part 2-67: Particular requirements for floor treatment machines, for commercial use, copyright 2012, are used in this standard with the consent of the International Electrotechnical Commission. The IEC Foreword and Introduction are not a part of the requirements of this standard but are included for information purposes only.

NATIONAL DIFFERENCES

GENERAL

In the CSA Group and UL publications of this standard, National Differences from the text of International Electrotechnical Commission (IEC) Publication 60335-2-67, Household and similar electrical appliances – Safety – Part 2-67: Particular requirements for floor treatment machines, for commercial use, copyright 2012 are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – Part 2-67: Particular requirements for floor treatment machines, for commercial use

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

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6) All users should ensure that they have the latest edition of this publication.

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60335-2-67 has been prepared by subcommittee 61J: Electrical motor-operated cleaning appliances for commercial use, of IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition cancels and replaces the third edition published in 2002 and its Amendment 1 (2005). It constitutes a technical revision.

The principal changes in this edition as compared with the third edition of IEC 60335-2-67 are as follows (minor changes are not listed):

– the title has been changed for better distinction with regard to IEC 60335-2-72;

– the scope has been revised editorially to avoid misunderstandings;

– terms and definitions has been revised with regard to the requirements revised;

– the standard has been revised in general and updated regarding state-of-the-art, as far as necessary, in particular some changes have been made to Clauses 15, 22, and 25;

– a new Annex BB (LPG requirements) was added;

– a new Annex CC 'Emission of acoustical noise' was added;

– a new Annex DD 'Emission of vibration' was added.

The text of this standard is based on the following documents:

FDIS	Report on voting
61J/489/FDIS	61J/498/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) of that standard.

NOTE 1 When "Part 1" is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for floor treatment machines for commercial use.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type*;

– notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under ″http://webstore.iec.ch″ in the data related to the specific publication. At this date, the publication will be

• reconfirmed,

• withdrawn,

• replaced by a revised edition, or

• amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

101DV DE *Modify Note 1 and the paragraph following it in the Part 2 Foreword by replacing it with the following:*

Note 1 When ″Part 1″ is mentioned in this standard, it refers to CAN/CSA-C22.2 No. 60335-1-11/UL 60335-1 (5th Ed.)

This part 2 supplements or modifies the corresponding clauses in CAN/CSA-C22.2 No. 60335-1 Ed 1: 2011-10-31 / UL 60335-1 Ed. 5: 2011-10-31 (based on IEC 60335-1 Ed. 4.2:2006), so as to convert that publication into the CSA/UL standard: Particular requirements for floor treatment machines for commercial use.

102DV DE *Modify the paragraph following Note 3 in the Part 2 Foreword by replacing it with the following:*

Words in SMALL ROMAN CAPS in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and associated noun are also in SMALL ROMAN CAPS.

103DV DE *Modification by adding the following text at the end of the Part 2 Foreword:*

The numbering system in this Standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1, 000 and 1, 01 means 1.01.

104DV D2 *Modification by adding the following text to Clause DV.2 of the Part 1 Foreword:*

Relevant requirements for components are listed in Annex 101.DVB.

INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance 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 considered to comply with the standard.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – Part 2-67: Particular requirements for floor treatment machines, for commercial use

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of powered floor treatment machines intended for commercial indoor or outdoor use for the following applications:

– scrubbing,

– wet or dry pick-up,

– polishing and dry buffing,

– application of wax, sealing products and powder based detergents,

– shampooing,

– stripping, grinding and scarifying

of floors with an artificial surface.

Their cleaning motion is more lateral or periodic than linear.

NOTE 101 By contrast, the cleaning motion of machines covered by IEC 60335-2-72 is more linear than lateral or periodic.

NOTE 102 This standard applies to machines for COMMERCIAL USE. The following list, although not comprehensive, gives an indication of locations that are included in the scope:

– public use areas such as hotels, schools, hospitals;

– industrial locations, for example factories and manufacturing shops;

– retail outlets, for example shops and supermarkets;

– business premises, for example offices and banks;

– all uses other than normal housekeeping purposes.

They are not equipped with a TRACTION DRIVE. The following power systems are covered:

– internal combustion engines,

– mains powered motors up to a RATED VOLTAGE of 250 V for single-phase appliances and 480 V for other appliances,

– battery-powered motors.

Battery powered machines may be equipped with a built-in battery charger.

This standard does not apply to

– vacuum cleaners and water-suction cleaning appliances for household use (IEC 60335-2-2);

– floor treatment appliances for household use according to IEC 60335-2-10;

– spray extraction machines for COMMERCIAL USE (IEC 60335-2-68);

– wet and dry vacuum cleaners, including power brush, for COMMERCIAL USE (IEC 60335-2-69);

– floor treatment machines with or without TRACTION DRIVE, for COMMERCIAL USE, according to IEC 60335-2-72;

– hand-held and transportable motor-operated electric TOOLS (IEC 60745 series, IEC 61029 series);

– machines designed for use in corrosive or explosive environments (dust, vapour or gas);

– machines designed for picking up hazardous dusts (as defined in IEC 60335-2-69), inflammable substances, or glowing particles;

– machines designed for use in vehicles or on board of ships or aircraft.

NOTE 103 Attention is drawn to the fact that in many countries, additional requirements on the safe use of the equipment covered can be specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

1DV DE *Modify Clause 1 of the Part 2 as follows:*

1DV.1 *In the paragraph following NOTE 102, replace the second sentence and the dashed list with the following:*

They include the following energy sources or power systems, or combinations of them:

- **mains up to a rated voltage of 250 V for single-phase appliances and 480 V for other appliances;**
- **internal combustion engines;**
- **batteries supplying 150 V or less;**
- **double layer (ultra) capacitors;**
- **fuel cells.**

Energy sources or power systems utilizing both BATTERY and mains are excluded.

1DV.2 ***Modify the first six dashed items under "This standard does not apply to" in the Part 2 as follows:***

– First dashed item: replace IEC 60335-2-2 with CAN/CSA C22.2 No. 243 / UL 1017

– Second dashed item: replace IEC 60335-2-10 with CAN/CSA E60335-2-10 / CSA C22.2 No. 243 / UL 1017

– Third dashed item: replace IEC 60335-2-68 with CAN/CSA E60335-2-68 /CSA C22.2 No. 10 /UL 561

– Fourth dashed item: replace IEC 60335-2-69 with CAN/CSA E60335-2-69 / CSA C22.2 No. 243 /UL 1017

– Fifth dashed item: replace IEC 60335-2-72 with CAN/CSA C22.2 No. 60335-2-72 / UL 60335-2-72

– Sixth dashed item: replace IEC 60745 with CAN/CSA C22.2 No. 60745 / UL 60745, and IEC 61029 with CAN/CSA E61029 / CAN/CSA C22.2 No. 62841 / UL 62841

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60312-1, *Vacuum cleaners for household use – Part 1: Dry vacuum cleaners – Methods for measuring the performance*

ISO 6344-2, *Coated abrasives – Grain size analysis – Part 2: Determination of grain size distribution of macrogrits P12 to P220*

2DV DE ***Modification to Clause 2 of the Part 2 to add the following normative references:***

ASTM D471, Standard Test Method for Rubber Property – Effect of Liquids

ASTM D664, Standard Test Method for Acid Number of Petroleum Products by Potentiometric Titration

ASTM D6751, Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels

SAE J30, Fuel and Oil Hoses

SAE J1681, Recommended Practice for Gasoline, Alcohol, and Diesel Fuel Surrogates for Material Testing

SAE J2044, Quick Connect Coupling Specification For Liquid Fuel and Vapor/Emissions Systems

SAE J2045, Fuel System Tubing Assemblies

SAE J2260, Nonmetallic Fuel System Tubing with One or More Layers

IEC 60216-6, Electrical insulating materials – Thermal endurance properties – Part 6: Determination of thermal endurance indices (TI and RTE) of an insulating material using the fixed time frame method

ISO 3405, Petroleum products – Determination of distillation characteristics at atmospheric pressure

CSA C22.2 No. 10, Electric Floor Surfacing and Cleaning Machines

CSA C22.2 No. 243, Vacuum cleaners, blower cleaners, and household floor finishing machines

CAN/CSA-C22.2 No. 60745 series of Standards, Hand-Held Motor-Operated Electric Tools – Safety

CAN/CSA-C22.2 No. 62841 series of Standards, Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety

CAN/CSA E730-2-2, Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Thermal Motor Protectors

CAN/CSA-E60335-2-10, Household and similar electrical appliances – Safety – Part 2-10: Particular requirements for floor treatment machines and wet scrubbing machines

CAN/CSA-E60335-2-68, Safety of Household and Similar Electrical Appliances – Part 2: Particular Requirements for Spray Extraction Appliances, for Industrial and Commercial Use

CAN/CSA-E60335-2-69, Safety of Household and Similar Electrical Appliances – Part 2: Particular Requirements for Wet and Dry Vacuum Cleaners, Including Power Brush, for Industrial and Commercial Use

CAN/CSA E61029 series of Standards, Safety of Transportable Motor-Operated Electric Tools

UL 561, Floor-Finishing Machines

UL 1017, Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines

UL 2003, Outline of Investigation for LP-Gas Cylinder Assemblies

UL 60335-2-72, Household and Similar Electrical Appliances – Safety – Part 2-72: Particular Requirements for Floor Treatment Machines With or Without Traction Drive, for Commercial Use

UL 60730-2-2, Automatic Electrical Controls for Household and Similar Use; Part 2 Particular Requirements for Thermal Motor Protectors

UL 60745–1, Hand-Held Motor-Operated Electric Tools – Safety – Part 1: General Requirements

UL 62841-1, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 1: General Requirements

IEC 60695-10-3, Fire hazard testing – Part 10-3: Abnormal heat – Mould stress relief distortion test

IEC 60695-11-20, Fire hazard testing – Part 11-20: Test flames – 500 W flame test method

SAE J1127, Low Voltage Battery Cable

SAE J1128, Low Voltage Primary Cable

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9
Replacement:
NORMAL OPERATION
conditions under which the machine is operated in normal use, as intended by the manufacturer

It denotes the load corresponding to the RATED POWER INPUT or the highest obtainable load of all particular loads of the various functions that can be operated at the same time according to the manufacturer's instructions.

Tanks of machines, if applicable, are filled before starting the operation to the highest level as indicated on the tank, or completely if no marking is provided.

Socket-outlets for accessories are loaded with a resistive load in accordance with the marking. Suction functions, if applicable, are switched on during operation.

The NORMAL OPERATION related to the operational functions is specified in 3.1.9.101 to 3.1.9.103.

3.1.9.101
Scrubbing, stripping, grinding and scarifying machines are operated with the appropriate brushes or pads on a surface of hydraulically pressed concrete paving slabs (see Annex AA).

An alternative is a smooth concrete area of a surface consistency comparable with hydraulically pressed concrete paving slabs.

3.1.9.102
Polishing and dry buffing machines are operated as follows.

PVC or comparable surfaces are considered to be suitable for establishing NORMAL OPERATION. The peak of input occurring during the drying process of the chemical applied to treat the surface is not taken as NORMAL OPERATION but is averaged by extending measurements over a period of at least 10 min.

3.1.9.103
Carpet shampooers are operated on a test surface consisting of a carpet, in accordance with IEC 60312-1, the carpet being fastened to the floor.

Prior to testing, the brush of the shampooing machine is conditioned by operating it for 15 min on a clean, dry concrete surface. After running on the concrete surface the brush is immersed in a shampoo solution for at least 30 min.

3.4.2DV D1 *Modification: Replace Clause 3.4.2DV of the Part 1 with the following:*

SAFETY EXTRA-LOW VOLTAGE – voltage not exceeding 42,4 V peak a.c. or d.c. between conductors and between conductors and earth

3.101
WATER-SUCTION CLEANING MACHINE
machine for applying and sucking up a water-based cleaning solution

3.102
MOTORIZED CLEANING HEAD
hand-held or hand-guided cleaning device connected to the machine, with an integrated electrical motor

Note 1 to entry: The permanently attached main cleaning head is not regarded as a MOTORIZED CLEANING HEAD.

3.103
TRACTION DRIVE
system used to propel the machine, e.g. by powered wheels

Traction by the effect of rotating brushes is not included

3.104
OPERATOR PRESENCE CONTROL
OPC
control device that automatically interrupts the power, e.g. to a drive or an engine, when the OPERATOR's actuating force is removed

Note 1 to entry: Such devices may be, for example, continuous action controls (″hold-to-run″ controls).

3.105
GUARD
part of the machine specifically designed to provide protection by means of a physical barrier, such as, for example, a casing, a shield, a cover, a screen, a door, an enclosure or a fence; other parts of the machine that fulfil a primarily operational function, such as, for example, the frame of the machine, may also fulfil a protective function but are not referred to as GUARDS

Note 1 to entry: Three main kinds of GUARDS can be distinguished: fixed GUARDS, interlocking moveable GUARDS and adjustable GUARDS. Interlocking movable GUARDS are required where frequent access is envisaged, while fixed GUARDS can be used where frequent access is not envisaged.

3.106
OPERATOR
person installing, operating, adjusting, maintaining, cleaning or moving the machine

3.107
TEST SOLUTION
solution which consists of 20 g of NaCl and 1 ml of a solution of 28 % by mass of dodecyl sodium sulphate in each 8 l of water

Note 1 to entry: The chemical designation of dodecyl sodium sulphate is $C_{12}H_{25}NaSO_4$.

3.108
COMMERCIAL USE
intended use of machines covered by this standard, i.e. not intended for normal housekeeping purposes by private persons but which may be a source of danger to the public

I.e. in particular that

– the machines may be used by cleaning contractors, cleaning staff, etc.;

– they are used in commercial or public premises (i.e. offices, shops, hotels, hospitals, schools, etc.) or in industrial (plants, etc.) and light industrial (workshops, etc.) environments.

Note 1 to entry: COMMERCIAL USE is also called professional use.

3.109DV D2 *Add the following definition and Table 3.109DV to Clause 3 of the Part 2:*

LOW-VOLTAGE LIMITED-ENERGY (LVLE) CIRCUIT – a circuit involving an a.c. voltage of not more than 30 V r.m.s. or 42,4 V peak, or a d.c. voltage of 60 V and supplied by any of the following:

– a combination of a BATTERY source or an isolated transformer secondary winding and one or more resistors, or a regulating network complying with a) – c):

a) The maximum load current shall be drawn under any condition of loading, including short circuit, using a resistor. The current shall be measured 60 s after the application of the load. The resistor shall be continuously readjusted during this 1 min. period to maintain maximum load current. The measured load current shall not exceed the value listed in Table 3.109DV.

b) With reference to the specified voltage limit, measurement shall be made with the unit connected to the intended supply voltage and with all loading circuits disconnected.

c) The performance shall not be affected by malfunction of a single component, excluding resistors. The network shall comply with the value in Table 3.109DV.

– a BATTERY with output current limited by overcurrent protection in accordance with Table 3.109DV.

NOTE: A LOW-VOLTAGE LIMITED-ENERGY CIRCUIT is also known as a LVLE CIRCUIT.

Table 3.109DV

Rating for secondary fuse or circuit protector

20 or less	5
More than 20 but not greater than 60	100/V[a]
[a] V is the maximum output voltage, regardless of the load, with the primary energized.	

3.110DV D2 ***Add the following definition to Clause 3 of the Part 2:***

BATTERY **– one or more electrical cells, electrically connected so that the combination furnishes current as a unit.**

There is one positive and one negative externally accessible connection, and there are no externally accessible inter-cell connections

NOTE: See IEV (IEC 60050) definition 482-02-17.

3.111DV D2 ***Add the following definition to Clause 3 of the Part 2:***

BATTERY ASSEMBLY **– a multi-cell BATTERY design that is ready for use, contains a common pressure vessel construction, a single vent line assembly, shared hardware and is furnished with a single connection cable that has an electrical connector at the end**

NOTE: See IEV (IEC 60050) definition 482-02-17.

4 General requirement

This clause of Part 1 is applicable except as follows.

Replacement of the first paragraph by the following text:

Machines shall be constructed so that they function safely so as to cause no danger to persons or surroundings during normal use, even in the event of carelessness, and during installation, adjusting, maintenance, cleaning, repairing or transportation.

4DV DE ***Modification to the third paragraph of Clause 4 of the Part 2 as follows:***

Replace "cause no danger to person or surroundings" with "reduce the risk of fire, electric shock, and/or injury to persons"

Addition:

For the purpose of this standard, the term 'appliance' as used in Part 1 is to be read as 'machine'.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.101 *The* TEST SOLUTION *is to be stored in a cool atmosphere and used within seven days after its preparation.*

5.14DV D2 *Modification to 5.14 of the Part 1 by adding NOTE 2DV as follows:*

NOTE 2DV Attention is drawn to the second paragraph of 5.14, as this requires the evaluation of Class II constructions within Class I appliances.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Replacement*

Machines shall be one of the following classes with respect to the protection against electric shock:

– CLASS I,

– CLASS II or

– CLASS III.

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

Mains supplied machines for indoor use and intended for dry cleaning only, shall be at least IPX0. Other machines shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Replacement of the 4th dashed item as follows:*

– business name and address of the manufacturer and, if applicable, his authorized representative; any address shall be sufficient to ensure postal contact;

Addition:

Machines shall be marked in addition with the following:

– serial number, if any;

– designation of the machine and series or type, allowing the technical identification of the product. This may be achieved by a combination of letters and/or numbers;

NOTE 101 Designation of machine, series or type includes the model or type reference as required in Part 1.

– year of construction, i.e. the year in which the manufacturing process is completed.

NOTE 102 The year of construction can be part of the serial number.

Machines shall be marked with the mass of the most usual configuration in kg.

Machines intended to be used indoors and powered by internal combustion engines shall be marked with the symbol according to Figure 106. It is acceptable to show this symbol in monochrome colour.

7.1DV D2 *Modification of Clause 7.1 of the Part 2 by adding the following dashed item to the list:*

– if a manufacturer produces or assembles floor-finishing machines at more than one factory, each finished product shall have a distinctive marking, which may be in code, by means of which it can be identified as the product of a particular factory.

7.1.101 MOTORIZED CLEANING HEADS shall be marked with

– RATED VOLTAGE or RATED VOLTAGE RANGE in volts;

– RATED POWER INPUT in watts;

– name, trade mark or identification mark of the manufacturer or responsible vendor;

– model or type reference;

– mass of the most usual configuration in kg.

MOTORIZED CLEANING HEADS for water-suction cleaning appliances, except those of CLASS III CONSTRUCTION having a WORKING VOLTAGE up to 24 V shall be marked with symbol IEC 60417-5935 (2002-10).

NOTE This symbol is an information sign and, except for the colours, the rules of ISO 3864-1 apply.

Compliance is checked by inspection.

7.1.102 Socket-outlets for accessories shall be marked with the maximum load in watts on the socket-outlet or nearby.

Compliance is checked by inspection.

7.1.102DV D2 *Modify the text in Clause 7.1 of the Part 1: Replace the first sentence with the following:*

Socket-outlets for accessories shall be marked with the maximum load in watts or current in amps on the socket-outlet or nearby.

7.1.103DV D2 *Add Clause 7.1.103DV to Clause 7.1 of the Part 2:*

BATTERIES and BATTERY ASSEMBLIES shall be legibly and permanently marked with the following:

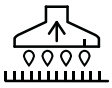
a) The manufacturer's name, trade name, or trademark. The manufacturer's identification may be in a traceable code when the BATTERY is identified by the brand or trademark owned by a private labeler.

b) Catalog designation or equivalent identification.

c) BATTERY nominal voltage, rated ampere-hour capacity and the hour rating at which this capacity is determined.

d) Additionally, BATTERY ASSEMBLIES shall be marked with identification letters – "Type E," "Type EE," or "Type EO." Individual batteries do not require type marking.

7.6 *Addition:*



[symbol IEC 60417-5935 (2002-10)] motorized cleaning head for water-suction cleaning

7.12 *Replacement of the 4th paragraph by the following text.*

This machine is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge.

Addition:

The front cover of the instructions shall include the substance of the following warning:

CAUTION Read the instructions before using the machine.

This wording may be replaced by symbols ISO 7000-0434 (2004-01) and either ISO 7000-1641 (2004-01) or ISO 7000-0790 (2004-01).

The instructions shall contain at least the following:

– the business name and full address of the manufacturer and, if applicable, his authorized representative;

– designation of series or type of the machine as marked on the machine itself, except for the serial number;

NOTE 101 The designation of series or type can be abstracted, as long as the identification of the product must be ensured.

– the general description of the machine;

– the intended use of the machine and the auxiliary equipment as covered by the scope of this standard;

NOTE 102 Examples of auxiliary equipment are spray units, suction units, and lights.

– the meaning of the symbols used on the machine and in the instructions;

– drawings, diagrams, descriptions and explanations necessary for the safe use, maintenance and repair of the machine and for checking its correct functioning;

– technical data including the markings on the machine;

– information regarding putting into service, safe operation, handling, transportation, and storage of the machine taking into account its weight;

– instructions to enable adjustment and maintenance to be carried out safely, including the protective measures that should be taken during these operations;

– the conditions in which the machine meets the requirement of stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns;

– the procedure to be followed to prevent unsafe situations in the event of accident (e.g. contact with or spillage of detergents, battery acid, fuel or oil) or equipment breakdown;

– the substance of the following:

This machine is intended for commercial use, for example in hotels, schools, hospitals, factories, shops, offices and rental businesses.

The instructions shall indicate the type and frequency of inspections and maintenance required for safe operation, including preventive maintenance measures. They shall, if applicable, give the specifications of the spare parts if they affect the health and safety of the OPERATOR.

In addition, the instructions shall give the following information, if applicable:

– for battery powered machines, instructions regarding the precautions to be taken for safe charging;

– precautions to be taken when changing brushes or other attachments;

– information on the detergents or other liquids that may be used including the choice and use of personal protective equipment (PPE);

– essential characteristics of auxiliary equipment which may be fitted to the machine;

– information regarding safe disposal of batteries;

– the intended use of the brushes specified for the machine;

– if split rims are used for pneumatic tyres, instructions shall be given for the safe change of tyres.

7.12.101 The instructions shall include warnings concerning ways in which the machine shall not be used, which in the experience of the manufacturer are likely to occur. At least, it shall include the substance of the following warnings, if applicable.

– WARNING Operators shall be adequately instructed on the use of these machines.

– WARNING Only use the brushes provided with the appliance or those specified in the instructions. The use of other brushes may impair safety.

– WARNING This machine is for dry use only.

– WARNING Do not inhale exhaust gas fumes. Only use indoors when adequate ventilation is provided, and when a second person has been instructed to look after you.

– CAUTION This machine is for indoor use only.

– CAUTION This machine shall be stored indoors only.

– A warning that the machine shall be disconnected from its power source during cleaning or maintenance and when replacing parts or converting the machine to another function:

- for mains operated machines, by removing the plug from the socket-outlet;

- for battery-powered machines, by safely disconnecting at least the non-frame connected pole of the battery or by an equivalent method (disconnecting device);

• for internal combustion engine powered machines with a battery starter, by disconnecting the battery.

Instructions for mains operated machines shall also include the substance of the following:

– WARNING Do not allow the supply cord to come into contact with the rotating brushes or pads.

Instructions for machines having a current-carrying hose for dry suction, operating at other than SAFETY EXTRA-LOW VOLTAGE, shall also include the substance of the following:

– WARNING This hose contains electrical connections: do not use it to collect water and do not immerse in water for cleaning.

Instructions for internal combustion engine powered machines using LPG shall also include the substance of the following:

– WARNING Machines shall be parked safely.

– The machine shall be inspected by a qualified person regularly, in particular regarding the LPG container and their connections, as required for safe operation by regional or national regulations.

7.12.102 Information on noise

NOTE The instructions can provide information on airborne noise emission as indicated in CC.2.7.

7.12.103 Information on vibration

NOTE The instructions can provide information on vibration emission as indicated in Clause DD.2.

7.12.104DV DR *Add Clauses 7.12.104DV.1 and 7.12.104DV.2 to Clause 7.12 of the Part 2:*

7.12.104DV.1 The instructions for Class I, cord-connected products shall include the text or the equivalent in (a) plus the information in (b) or (c), as appropriate. The instructions for Class II mains supplied machines shall include the text or the equivalent in (d)

a) For all Class I appliances:

This floor-finishing machine shall be grounded while in use to protect the operator from electric shock. The machine is provided with a three-contact grounding-type attachment plug to fit the proper grounding type receptacle.

b) For a Class I, cord-connected appliance rated less than 15 A and intended for use on a nominal 120-V supply circuit, the instructions shall include the statements in either item 1 or 2:

1) This appliance is for use on a nominal 120-V circuit, and has a grounded plug that looks like the plug illustrated in sketch A in Figure 107DV. A temporary adaptor that looks like the adaptor illustrated in sketches B and C may be used to connect this plug to a 2-pole receptacle as shown in sketch B if a properly grounded outlet is not available. The temporary adaptor should be used only until a properly grounded outlet (sketch A) can be installed by a qualified electrician. The green colored

rigid ear, lug, or the like extending from the adaptor must be connected to a permanent ground such as a properly grounded outlet. Whenever the adaptor is used, it must be held in place by a metal screw.

Exception: In Canada, the use of a temporary adaptor is not permitted by the Canadian Electrical Code, Part I, CSA C22.1.

2) This appliance is for use on a nominal 120-V circuit and has a grounding attachment plug that looks like the plug illustrated in sketch A in Figure 107DV. Make sure that the appliance is connected to an outlet having the same configuration as the plug. No adaptor should be used with this appliance.

c) For Class I machines rated 150 – 250 volts:

No adapter is available for this plug.

d) For all Class II appliances:

In a double-insulated product, two systems of insulation are provided instead of grounding. No grounding means is provided on a double-insulated machine, nor should a means for grounding be added to the machine. Servicing a double-insulated machine requires extreme care and knowledge of the system, and should be performed only by qualified service personnel. Replacement parts for a double-insulated machine must be identical to the parts they replace. Always replace a damaged cord. A double-insulated product is marked with the words ″DOUBLE INSULATION″ or ⧈ ″DOUBLE INSULATED.″ The symbol: (square within a square) may also be marked on the machine.

Exception No. 1: Machines intended for rental use may be provided with legible and permanent safety instruction markings instead of an instruction manual. The markings shall include all of the applicable safety instructions required in 7.12 and its subclauses. The marking's letter height shall be not less than 3/32 inch (2.4 mm) and any caution or warning signal word shall be more prominent than any other required marking on the unit.

Exception No. 2: Machines intended for rental use, and provided with a specialty connector or assembly for connection of the power supply cord to the machine, may be provided with the markings described in Exception No. 1 in the form of a cord tag; see 7.14DV. The statement, "Do Not Remove This Tag", or equivalent wording, shall be included on the cord tag.

7.12.104DV.2 A Class II appliance provided with a two-blade, polarized attachment plug shall be provided with the following instructions or the equivalent: To reduce the risk of electric shock, this appliance has a polarized plug (one blade is wider than the other). This plug will fit in a polarized outlet only one way. If the plug does not fit fully in the outlet, reverse the plug. If it still does not fit, contact a qualified electrician to install the proper outlet. Do not change the plug in any way.

7.13 *Addition:*

The words "Original instructions" shall appear on the language version(s) verified by the manufacturer.

7.14 *Addition:*

The height of symbol IEC 60417-5935 (2002-10) shall be at least 15 mm.

Compliance is checked by measurement.

7.14DV D2 *Modification of 7.14 of the Part 1 to add the following:*

7.14DV Tags

7.14DV.1 A cord tag used for cautionary markings and a tag other than a cord tag that is used for cautionary or warning markings shall comply with the requirements:

a) In Clauses 7.14DV.2 – 7.14DV.5; and

b) For permanence and legibility in UL 969 / CSA C22.2 No. 0.15.

7.14DV.2 Three as-received samples and six samples of the tag that have been subjected to the conditioning specified in Clause 7.14DV.4, three for each condition, are to be subjected to the test described in Clause 7.14DV.5. After testing, the samples shall comply with the following requirements:

a) The tag shall not tear for more than 1,6 mm at any point;

b) The tag shall not separate from its point of attachment;

c) The tag shall not slip or move along the length of a cord or a tubular-type mounting surface more than 15 mm;

d) There shall be no permanent shrinkage, deformation, cracking, or any other condition that will render the marking on the tag illegible; and

e) Overlamination shall remain in place and not be torn or otherwise damaged. The printing shall remain legible.

7.14DV.3 Each sample shall consist of a length of cord or tubular-type mounting surface, or if the surface is flat, a section of the surface having dimensions larger than the tag. The tag shall be affixed to the cord or surface in the intended manner. If tags are applied by an adhesive, tests shall be conducted no sooner than 24 h after application of the tag.

7.14DV.4 The conditioning required by Clause 7.14DV.2 shall consist of the following:

a) The samples shall be conditioned for 24 h in an air-circulating oven maintained at a uniform temperature of 87,0 ±1,0 C. Following removal from the oven, the samples shall remain at a temperature of 23,0 ±2,0 C and a relative humidity of 50 ±5 percent for 30 min before testing.

b) The samples shall be conditioned for 72 h in a humidity of 85 ±5 percent at 32,0 ±2,0 C. The samples shall be tested within 1 min after the conditioning.

7.14DV.5 A cord or tubular-type mounting surface shall be held rigidly in a vertical orientation. A flat mounting surface shall be held rigidly in a vertical plane. A force of 22,3 N shall be applied to the uppermost corner of the tag farthest from the point of attachment, within 7 mm of the vertical edge of the tag. The force shall be applied vertically downward and maintained for 1 min. In determining compliance with Clause 7.14DV.2(d), manipulation such as straightening of the tag by hand is permitted.

7.14DV.6 The cord tag shall:

a) Be permanently affixed to the power-supply cord; and

b) Be located not more than 150 mm from the attachment plug.

7.16DV D2 *Modification of Clause 7.16 of the Part 1 by deleting the NOTE:*

This NOTE does not apply.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1 *Addition:*

Water and water-borne cleaning agents are considered conductive.

8.1.4DV D2 *Modification by adding a bulleted item to Clause 8.1.4 of the Part 1:*

• the part is supplied by a battery, and the voltage does not exceed 60 V d.c.

9 Starting of motor-operated appliances

This clause of Part 1 is replaced by the following.

It shall only be possible to start the machine by intended actuation of a control device provided for the purpose. The same requirement applies when restarting the machine after a stoppage, whatever the cause. This requirement only applies to components where the unexpected starting might cause a hazard. It does not apply to components such as suction units, pumps, etc.

Compliance is checked by inspection and test.

9DV.2 DR *Modification by replacing the text of Clause 9DV.2 in the Part 1 with the following:*

The use of time delay fuses is acceptable for stationary or portable appliances marked as indicated in Clause 7.17DV of the Part 1.

9DV.5 DR *Modification of Clause 9 of the Part 1 to add the following:*

Subclauses 9DV.1 – 9DV.4 apply to all mains-powered products.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.3DV D2 *Modification by replacing the paragraph following NOTE 3 of Clause 11.3 of the Part 1 with the following:*

Temperature measurements of windings by either thermocouple or resistance method are acceptable.

11.4 Not applicable.

11.6 Not applicable.

11.7 *Addition:*

Machines are operated until steady conditions are established.

Table 3DV D2 *Modification of Table 3 of the Part 1 by adding NOTE 5DV:*

NOTE 5DV A temperature is considered constant when readings taken during any continuous 1 h period of the test indicate an increase of no more than 3 K, or until the batteries have been discharged, whichever comes first.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.1DV.1 D2 *Delete Clause 13.1DV.1 of the Part 1:*

The requirements of Clause 13.1DV.1 do not apply.

13.1DV.2 D2 *Modification by adding the following to Clause 13.1 of the Part 1:*

Additionally, printed wiring assemblies and other electronic circuit components that would be damaged by application of the test potential, or that short-circuit the test potential, shall be removed, disconnected, or otherwise rendered inoperative before the dielectric voltage-withstand tests are made. Testing a representative subassembly instead of an entire unit is permitted. Individually shunting the semiconductor devices in the unit before the test is made to avoid destroying them in the case of a malfunction elsewhere in the secondary circuits is permitted.

13.2 *Addition:*

For CLASS I APPLIANCES where several motors operate at the same time, the leakage current shall not exceed 3,5 mA.

13.2DV D2 *Modification: Delete the first paragraph of 13.2 of the Part 2.*

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.2 *Addition:*

Wet cleaning machines, except shampooing machines, are operated for 10 min with to and from movements over a distance of 1 m at 15 cycles per minute on a floor of paving slabs with a smooth surface that are fastened to the bottom of a tray. At the beginning of the test, the tray is filled with the TEST SOLUTION *to a level of approximately 5 mm above the surface of the floor.*

15.2 *Replacement:*

Machines having a liquid container shall be so constructed that

– spillage of liquid due to NORMAL OPERATION,

– filling including overfilling, and

– overturning of HAND-HELD APPLIANCES and unstable machines

does not affect their electrical insulation.

Compliance is checked by the following tests:

The machine is placed on a support inclined at an angle of 10 ° to the horizontal, the liquid container being filled to half the level indicated in the instructions. A machine is considered to be unstable if it overturns when a force of 180 N is applied to the top of the machine in the most unfavourable horizontal direction.

Machines having a liquid container and provided with an appliance inlet are fitted with an appropriate connector and flexible cable or cord; machines having a liquid container and TYPE X ATTACHMENT *are fitted with the lightest cross-sectional area specified in Table 11 of the Part 1. Other machines are tested as delivered.*

The liquid container of the machine is completely filled with a saline solution of water containing approximately 1 % NaCl and a further quantity, equal to 15 % of the capacity of the container or 0,25 l, whichever is the greater, is poured in steadily over a period of 1 min.

HAND-HELD APPLIANCES and machines that are unstable are then, with the container completely filled and with the cover or lid in place, overturned from the most unfavourable of the normal positions of use, and are left in that position for 5 min unless the machine returns automatically to its normal position of use.

MOTORIZED CLEANING HEADS of WATER-SUCTION CLEANING MACHINES are placed in a tray, the base of which is level with the surface supporting the machine. The tray is filled with the TEST SOLUTION to a level of 5 mm above its base, this level being maintained throughout the test. The machine including the MOTORIZED CLEANING HEAD is operated until its liquid container is completely full and afterwards for a further 5 min.

After each of these tests, the machine shall withstand the electric strength test of 16.3.

There shall be no trace of liquid on insulation that reduces the CLEARANCES or CREEPAGE DISTANCES below the values specified in Clause 29.

15.3 *Modification:*

The relative humidity shall be (93 ± 6) %.

15.101 MOTORIZED CLEANING HEADS of WATER-SUCTION CLEANING MACHINES shall be resistant to liquids that may come into contact with them during normal use.

The following test is not applicable to MOTORIZED CLEANING HEADS of CLASS III CONSTRUCTION having a WORKING VOLTAGE up to 24 V.

Compliance is checked by the following four tests.

The MOTORIZED CLEANING HEAD is subjected to an impact test as described in IEC 60068-2-75, the value of the impact being 2 J. The MOTORIZED CLEANING HEAD is rigidly supported and three blows are applied to every point of the enclosure that is likely to be weak.

It is then subjected to the free fall test procedure 1 of IEC 60068-2-31. It is dropped 4 000 times from a height of 100 mm onto a steel plate having a thickness of not less than 15 mm. It is dropped

– 1 000 times on its right side;

– 1 000 times on its left side;

– 1 000 times on its front face;

– 1 000 times on its cleaning surface.

The MOTORIZED CLEANING HEAD is then subjected to the test described in 14.2.4 of IEC 60529, using the TEST SOLUTION.

The MOTORIZED CLEANING HEAD is to be operated in a flat-bottomed vessel filled with a saline solution of water containing approximately 1 % NaCl so that a depth of 3,0 mm of water is maintained. The vessel is to be a size such that the MOTORIZED CLEANING HEAD moves about freely; and is to be operated:

– without connection to the floor treatment machine for 15 min, if applicable; and

– connected to the floor treatment machine until the machine has picked up as much water as its capacity holds or for 5 min, whichever occurs sooner.

The MOTORIZED CLEANING HEAD shall then withstand the electric strength test of 16.3, the voltage being applied between the LIVE PARTS and the TEST SOLUTION. There shall be no trace of saline solution on insulation that reduces the CLEARANCES or CREEPAGE DISTANCES below the values specified in Clause 29.

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.1DV.1 D2 *Delete Clause 16.1DV of the Part 1:*

The requirements of Clause 16.1DV do not apply.

16.1DV.2 D2 ***Modification by adding the following to 16.1 of the Part 1:***

Additionally, printed wiring assemblies and other electronic circuit components that would be damaged by application of the test potential, or that short-circuit the test potential shall be removed, disconnected, or otherwise rendered inoperative before the dielectric voltage-withstand tests are made. Testing a representative subassembly instead of an entire unit is permitted. Individually shunting the semiconductor devices in the unit before the test is made to avoid destroying them in the case of a malfunction elsewhere in the secondary circuits is permitted.

16.2DV D2 ***Delete Clause 16.2DV.1 of the Part 1:***

The requirements of Clause 16.2DV.1 do not apply.

16.3 *Addition:*

Current-carrying hoses, except for their electrical connections, are immersed for 1 h in a saline solution of a saline solution of water containing approximately 1 % NaCl, at a temperature of 20 °C ± 5 °C. While the hose is still immersed, a voltage of 2 000 V is applied for 5 min between each conductor and all the other conductors connected together. A voltage of 3 000 V is then applied for 1 min between all the conductors and the saline solution.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.2 *Addition:*

The machine is tested without liquid in the container.

NOTE 101 The term restricted heat dissipation of Part 1 means without liquid in the container.

19.7 *Addition:*

Brushes and fans are not regarded as parts liable to get blocked.

MOTORIZED CLEANING HEADS are tested with the rotating brush or similar device locked for 30 s.

19.9 Not applicable.

19.10 *Addition:*

For this test, the lowest possible load is obtained either by lifting the brushes from the floor or in case of machines fitted with a clutch drive that disengages the drive to the brushes, by disengaging the clutch. For machines that include suction equipment, the inlet shall be closed.

19.13 *Modification:*

In the second paragraph, add "and 22.103" after "20.2".

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Addition:*

MOTORIZED CLEANING HEADS are not subjected to this test.

20.2 *Addition:*

These requirements do not apply to rotating brushes and similar devices, or to moving parts exposed during the fitting of accessories that allow conversion from one application to another.

20.2DV D2 *Modification of Clause 20.2 of the Part 2 to add the following paragraph:*

If the instructions state that a part is to be removed when replacing a lamp or a drive belt, and a tool is required for its removal, the part is not considered to be a detachable part, provided that

– an instruction to disconnect the appliance from the supply before opening is marked on the cover or is visible during its removal; and

– after removal of the cover, access to live parts is prevented by at least basic insulation.

20.101 Machines shall be provided with an OPC.

Compliance is checked by inspection and functional test.

20.102 Shaft ends and similar rotating parts shall be protected if they protrude by more than a quarter of their diameter. Shafts up to 50 mm diameter do not need to be protected if they are rotating at less than 5 revolutions per second and their ends are rounded and smooth.

Compliance is checked by inspection and measurement, the machine having all pads, brushes etc. in place for NORMAL OPERATION.

The unintentional closing and lowering of doors, lids, covers etc., which could cause injury, shall be prevented.

Machines heavier than 20 kg (empty) shall be equipped with wheels or rollers for transport, which shall be located or protected so as to prevent injury to the feet of the OPERATOR.

Compliance is checked by inspection, by measurement and by functional test.

20.103 Fuel tank

If a fuel tank is within or contiguous to the engine compartment and excessively high temperatures may occur, the tank and/or filling arrangement shall be isolated from the electrical and exhaust systems by suitable protection, e.g. a separate enclosure or baffles.

The tank location and facilities for filling shall be such that spillage or leakage will not drain onto electrical or exhaust system parts.

Fuel spillage shall not be possible under NORMAL OPERATION.

Compliance is checked by inspection.

20.104 Internal combustion engine powered machines using liquefied petroleum gas

Internal combustion engine powered machines using liquefied petroleum gas (LPG) shall be constructed in accordance with the additional requirements specified in Annex BB. Requirements for the LPG container itself are not part of this standard.

Compliance is checked by inspection and measurement.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Replacement of the first paragraph by the following text:*

Machines and their components and fittings shall have adequate mechanical strength and be constructed to withstand such rough handling that may be expected in normal use, during transportation, assembly, dismantling, scrapping and any other action involving the machine.

Modification:

In the third paragraph, the impact value is increased to 1,0 J ± 0,04 J.

21.1DV DE *Modification of Clause 21.1 of the Part 2 by adding the following note:*

NOTE 1DV Clauses 21.1DV.1 and 21.1DV.2 of the Part 1 remain applicable.

21.101 Those parts of the machine that are subjected to impact in normal use are tested as follows.

If failure of the part subject to impact would cause a failure to comply with this specification, any spot of the machine that may be exposed during NORMAL OPERATION to impacts or blows shall be subjected to a single blow with an impact energy of 6,75 Nm. The impact stress on the free-standing machines shall be exerted by a steel sphere with a diameter of 50,8 mm and a mass of 0,535 kg dropped from a height of 1,3 m or hanging on a string acting as a pendulum, falling from a height of 1,3 m.

21.102 Current-carrying hoses shall be resistant to crushing.

Compliance is checked by the following test.

The hose is placed between two parallel steel plates each having a length of 100 mm, a width of 50 mm and the edges of the longer sides rounded with a radius of 1 mm. The axis of the hose is positioned at right angles to the longer sides of the plates. The plates are placed at a distance of approximately 350 mm from one end of the hose.

The steel plates are pressed together at a rate of 50 mm/min ± 5 mm/min until the applied force is 1,5 kN. The force is then released and the electric strength test of 16.3 is carried out between the conductors connected together and the saline solution.

21.103 Current-carrying hoses shall be resistant to abrasion.

Compliance is checked by the following test.

One end of the hose is attached to the connecting rod of the crank mechanism shown in Figure 102. The crank rotates at 30 revolutions per minute resulting in the end of the hose moving horizontally backwards and forwards over a distance of 300 mm.

The hose is supported by a rotating smooth roller over which a belt of abrasive cloth moves at a speed of 0,1 m/min. The abrasive is corundum grit size P100, as specified in ISO 6344-2.

A mass of 1 kg is suspended from the other end of the hose, which is guided to avoid rotation.

In the lowest position, the mass has a maximum distance of 600 mm from the centre of the roller.

The test is carried out for 100 revolutions of the crank.

After the test, BASIC INSULATION shall not be exposed and the electric strength test of 16.3 is carried out between the conductors connected together and the saline solution.

21.104 Current-carrying hoses shall be resistant to flexing.

Compliance is checked by the following test.

The end of the hose intended to be connected to the MOTORIZED CLEANING HEAD *is attached to the pivoting arm of the test equipment shown in Figure 103. The distance between the pivot axis of the arm and the point where the hose enters the rigid part is 300 mm ± 5 mm. The arm can be raised from the horizontal position by an angle of 40 ° ± 1 °. A mass of 5 kg is suspended from the other end of the hose or from a convenient point along the hose so that when the arm is in the horizontal position, the mass is supported and there is no tension on the hose.*

NOTE 1 It can be necessary to reposition the mass during the test.

The mass slides against an inclined plate so that the maximum deflection of the hose is 3°.

The arm is raised and lowered by means of a crank that rotates at a speed of (10 ± 1) r/min.

The test is carried out for 2 500 revolutions of the crank after which the fixed end of the hose is turned through 90° and the test continued for a further 2 500 revolutions. The test is repeated in each of the other two 90° positions.

After 10 000 revolutions, the hose shall withstand the electric strength test of 16.3.

If the hose ruptures before 10 000 revolutions are achieved, the flexing test is terminated. The hose shall still withstand the electric strength test of 16.3.

21.105 Current-carrying hoses shall be resistant to torsion.

Compliance is checked by the following test.

One end of the hose is held in a horizontal position with the remainder of the hose freely suspended. The free end is rotated in cycles, each cycle consisting of five turns in one direction and five turns in the opposite direction, at a rate of 10 turns per minute.

The test is carried out for 2 000 cycles.

After the test, the hose shall withstand the electric strength test of 16.3 and shall not be damaged to such an extent that compliance with this standard is impaired.

21.106 Current-carrying hoses shall be resistant to cold conditions.

Compliance is checked by the following test.

A 600 mm length of hose is bent as shown in Figure 104 and the ends are tied together over a length of 25 mm. The hose is then placed for 2 h in a cabinet having a temperature of –15 °C ± 2 °C. Immediately after the hose is removed from the cabinet, it is flexed three times, as shown in Figure 105, at a rate of one flexing per second.

The test is carried out three times.

There shall be no cracks or breaks in the hose and it shall withstand the electric strength test of 16.3. Any colour change of the hose is not considered as a failure.

22 Construction

This clause of Part 1 is applicable except as follows.

22.3DV D2 *Modification of Clause 22.3 of the Part 1 by adding the following paragraph:*

AFCIs and LCDIs shall be installed as an integral part of the attachment plug or located in the supply cord within 102 mm of the attachment plug.

22.6 *Addition:*

Machines shall be so constructed that neither water nor foam from detergents can penetrate into the motor or come in contact with LIVE PARTS.

22.6DV D2 *Modification to add the following to Clause 22.6 of the Part 1:*

22.6DV.1 *Leakage*

Leakage from a polymeric liquid reservoir is not considered likely to occur, if the reservoir is subjected Clause 22.6DV.2 and 22.6DV.3 without any cracking, breaking, shrinking, warping, or distortion that allows liquid to leak from the reservoir.

22.6DV.2 *Oven Conditioning test*

The reservoir shall be subjected to the test of Clauses 7.1 and 7.3 of IEC 60695-10-3, except that the oven shall be maintained at a temperature of 10 K higher than the maximum operating temperature of the reservoir measured at the hottest spot on the inside of the reservoir under normal operating conditions but not less than 70°C. The product shall not be operated during the test. After conditioning the reservoir shall be allowed to cool to room temperature and shall show no signs of shrinking, warping, or distortion that allows liquid to leak from the reservoir.

22.6DV.3 *Impact test*

If deterioration or breakage of a liquid reservoir provided as part of a machine would result in a risk of fire, electric shock, or injury to persons, the container shall be subjected to the impact test for polymeric reservoirs described in Clause 21.101 without distortion of the reservoir, including attached tubing, that results in one or both of the following conditions:

a) interference with the operation or user servicing of the product, or

b) openings that allow liquid to leak from the tank.

22.9DV D2 *Modification of Clause 22.9 of the Part 1 by adding the following:*

Wiring and cables routed beneath user-serviceable fluid confining components (e.g., fuel filters) shall be rated for continuous exposure to the fluid involved, unless protection is provided by sheathing, sleeving, conduit, or similar that is resistant to the fuel.

22.35 Addition:

These parts are subjected to the hammer test of Clause 21. If this insulation does not meet the requirement of 29.3 of the Part 1, these are subjected to the following impact test.

A sample of the covered part is conditioned at a temperature of 70 °C ± 2 °C for seven days (168 h). After conditioning, the sample is allowed to attain approximately room temperature.

Inspection shall show that the covering has not shrunk to such an extent that the required insulation is no longer given or that the covering has not peeled off, so that it may move longitudinally.

After this, the sample is maintained for 4 h at a temperature of –10 °C ± 2 °C.

While still at this temperature, the sample is then subjected to impact by means of the apparatus shown in Figure 101. The weight "A", having a mass of 0,3 kg, falls from a height of 350 mm on to the chisel "B" of hardened steel, the edge of which is placed on the sample.

One impact is applied to each place where the insulation is likely to be weak or damaged in NORMAL OPERATION*, the distance between the points of impact being at least 10 mm.*

After this test, it shall show that the insulation has not peeled off and an electric strength test as specified in 16.3 is made between metal parts and metal foil wrapped round the insulation in the required area.

22.101 Machines shall be constructed so as to prevent the penetration of objects from the floor, which may impair the safety of the machine.

LIVE PARTS of machines for wet use shall be at least 30 mm distance from the surface of the floor, measured in vertical direction through existing holes. This requirement does not apply to MOTORIZED CLEANING HEADS.

Compliance is checked by inspection and measurements.

22.102 CLASS I APPLIANCES and CLASS II APPLIANCES shall be equipped with a mains isolating switch that ensures ALL-POLE DISCONNECTION according to overvoltage category III conditions.

For built-in battery chargers, this ALL-POLE DISCONNECTION can be realised by pulling the plug.

Other switches may be of single pole construction.

The following circuits need not be disconnected by the supply disconnecting device:

– plug and socket-outlets;

– undervoltage protection circuits that are only provided for automatic tripping in the event of supply failure;

– phase rotating indicators;

– control circuits for interlocking.

It is recommended, however, that such circuits be provided with their own disconnecting device.

Compliance is checked by inspection.

22.103 Machines with batteries shall be designed in such a way that electrolyte leakage from the battery does not impair compliance with this standard; in particular there shall be no trace of electrolyte on insulation that reduces CLEARANCES or CREEPAGE DISTANCES below the values specified in Clause 29.

The battery housing shall be designed and constructed in such a way as to prevent the electrolyte being ejected on to the OPERATOR and to avoid the accumulation of vapours in places occupied by OPERATORS.

Compliance is checked by inspection and measurement.

22.104 When split rims are used with pneumatic tyres, the machine shall be provided with devices to prevent the user from separating the rims of the wheel before removing the wheel from the axle, e.g. by welded nuts or screws removable with the aid of a special TOOL only.

Compliance is checked by inspection.

22.105 Guards

Fixed GUARDS shall be secured by systems that can be opened or removed only with tools, and shall be incapable of remaining in place without their fixings, if applicable.

Their fixing systems shall remain attached to the GUARDS or to the machine when the GUARDS are removed, with the exception of fixing systems that can remain detachable without impairing safety. This does also not apply if, after removal of the fixing systems, or if the component is incorrectly repositioned, the machine becomes inoperative or is obviously incomplete.

NOTE This requirement does not necessarily apply to fixed GUARDS that are only liable to be removed, for example, when the machine is completely overhauled, is subject to major repairs or is dismantled for transfer to another site. This requirement does also not necessarily apply to the casings of machines intended to be used by laymen, where the manufacturer's instructions specify that the repairs requiring removal of these casings are only to be carried out in a specialist repair workshop. In that case, fixing systems can be used that are not easy to remove.

If movable GUARDS are interlocked, the interlocking devices shall prevent the start of hazardous machine functions until the GUARDS are fixed in their position, and give a stop command whenever they are no longer closed.

Interlocking movable GUARDS shall, as far as possible, remain attached to the machine when open and they shall be designed and constructed in such a way that they can be adjusted only by means of an intentional action.

Interlocking movable GUARDS must be designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous functions of the machine.

Adjustable GUARDS may be used only to restrict access to those areas of the moving parts strictly necessary for the work. They shall be manually or automatically adjustable based on the type of work involved and shall be adjustable without the aid of a TOOL.

Compliance is checked by inspection.

22.106 Machines shall be designed in such a way to avoid incorrect mounting, if this can lead to an unsafe situation. If this is not possible, information on the correct mounting shall be given directly on the part and/or the enclosure.

Compliance is checked by inspection.

22.107 Machines, except HAND-HELD APPLIANCES, shall be constructed so that they can be adapted to the OPERATOR's physical dimensions.

Compliance is checked by inspection and by functional test.

22.108 For machines where the OPERATOR is required to use personal protective equipment (PPE), controls shall be designed in such a way that they can be operated safely.

Compliance is checked by inspection and by functional test.

22.109 On machines with combustion engines, the engine exhaust shall not be directed towards the OPERATOR.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

23.101DV D2 *Add the following Clause to the Part 1:*

All wiring not part of an LVLE CIRCUIT shall comply with the standards specified in Annex DVA of the Part 1 or Annex 101.DVB.

Wiring in an LVLE CIRCUIT is not required to be protected against mechanical damage.

Wiring connections to a continuously moving part, or a part for which the degree of movement is appreciable shall be a Type such as S, SJ, SJE, SJO, SEO, SJT, SJTO, SJEO, SO, ST, SE, or STO flexible cord, or the cord shall be of a type at least equally as serviceable for the intended use.

Individual conductors having flexible stranding and enclosed in flexible tubing such as flexible nonmetallic conduit, nonmetallic insulated tubing, or other suitable method in which the wiring is protected sufficiently against mechanical damage may be used in place of flexible cord. For other than mains supplied machines, the tubing is not required on exposed moving conductors that are readily visible to the OPERATOR and are therefore subject to replacement when damaged.

Cords determined to be equivalent to those within UL 62 / CSA C22.2 No. 49, or CSA C22.2 No. 96, but with an increased number of conductors, are acceptable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1DV D2 *Modification by adding the following text to Clause 24.1 of the Part 1:*

A tab used in an electrical quick-connect terminal shall comply with the standards specified in Annex DVA or the requirements of Annex 101.DVC.

24.1.3 *Addition:*

The OPC shall be tested for 50 000 cycles of operation.

24.1.3DV D2 *Add Clauses 24.1.3ADV.1 and 24.1.3ADV.2 to the Part 1:*

24.1.3ADV.1 General

24.1.3ADV.1.1 Switches located in other than LVLE circuits shall comply with the standards specified in Annex DVA of the Part 1 or Clauses 24.1.3ADV.1.2.

24.1.3ADV.1.2 A switch or relay used outside of the manufacturer's ratings shall comply with the overload test of Clause 24.1.3ADV.2.

Compliance is checked by inspection and test.

24.1.3ADV.2 Overload test

24.1.3ADV.2.1 A switch or other device that controls a motor of a product shall perform acceptably when subjected to an overload test consisting of 50 cycles of operation as described in Clauses 24.1.3ADV.2.2 – 24.1.3ADV.2.5 as applicable. Results are acceptable if there is no electrical or mechanical malfunction or breakdown of the device or undue burning or pitting of the contacts, and the fuse in the grounding connection does not open.

Exception No. 1: A device interlocked so that it will never break the locked-rotor motor current need not be tested for overload.

Exception No. 2: For battery connected machines, temperature-limiting devices and current-limiting devices (such as electronic monitoring circuits) of a power controller shall be allowed in the power circuit to limit the current or open the circuit under the test conditions. When one of those devices causes an interruption of the power, the test shall be discontinued.

24.1.3ADV.2.2 Exposed dead metal parts of the product shall be connected to ground through:

a) a 3-ampere plug fuse, and the product shall be connected to a grounded supply circuit of rated frequency for main connected machines; or

b) a 30-ampere non-time delay connected between the non-energized metal part of the switch for battery connected machines.

24.1.3ADV.2.3 During the test the device shall be operated at a rate of not more than 10 cycles per minute.

Exception: A faster rate of operation may be used if agreeable to those concerned.

24.1.3ADV.2.4 The rotor of the motor shall be locked in position. For a mains operated machine, the product shall be connected to a supply circuit of maximum rated voltage. For a battery powered machine, a fully charged battery shall be used.

24.1.3ADV.2.5 The connection shall be such that any single-pole, current-interrupting device will be located in the ungrounded conductor of the supply circuit.

24.101 Machines with motors provided with SELF-RESETTING THERMAL CUT-OUTS shall work reliably under overvoltage conditions.

Compliance is checked by the following test.

The machine is supplied at a voltage equal to 1,1 times RATED VOLTAGE, under locked rotor conditions so as to cause the THERMAL CUT-OUT to operate within a few minutes, until the THERMAL CUT-OUT has performed 200 cycles of operation.

After the test, the machine shall withstand the tests of Clause 16.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 *Addition:*

Machines classified as IPX7 shall not be provided with an appliance inlet.

Machines classified as IPX4, IPX5 or IPX6 shall not be provided with an appliance inlet, unless both inlet and connector have the same classification as the machine when coupled or separated, or unless inlet and connector can only be separated by the use of a TOOL and have the same classification as the machine when coupled.

Machines provided with an appliance inlet shall also be provided with an appropriate cord set.

25.1DV D2 *Modification by adding the following to Clause 25.1 of the Part 1:*

25.1DV.1 The length of the detachable or nondetachable supply cord shall be at least 4,6 m, including fittings.

25.1DV.2 Alternatively to the requirement of Clause 25.1DV.1, a product may be provided with not more than 0,5 m of nondetachable supply cord if the plug connection cannot be placed within 75 mm of the floor and:

a) It is likely that the product will be connected by means of an extension cord during operation, and the manufacturer recommends the use of a suitably rated extension cord and provides the ratings; or

b) The manufacturer provides with the product a suitably rated extension cord that is not less than 4.6 m long, including fittings.

25.1DV.3 A three-to-two-wire, earthing-type adapter shall not be provided with a product.

25.7 *Replacement:*

SUPPLY CORDS shall be one of the following types:

– Polychloroprene sheathed

Their properties shall be at least those of ordinary polychloroprene sheathed cords (code designation 60245 IEC 57);

NOTE 101 Ordinary tough rubber-sheathed flexible cord (60245 IEC 53) is not suitable for this type of machines due to the influence by chemicals commonly used.

– Cross-linked polyvinyl chloride sheathed

Their properties shall be at least those of cross-linked polyvinyl chloride sheathed cords (code designation 60245 IEC 87);

NOTE 102 These cords are suitable for machines when they can come into contact with hot surfaces. Due to the composition of the conductors, the cords are suitable for applications where high flexibility is required.

– Polyvinyl chloride sheathed

These cords shall not be used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of Clause 11. Their properties shall be at least those of ordinary polyvinyl chloride sheathed cord (code designation 60227 IEC 53);

– Heat-resistant polyvinyl chloride sheathed

These cords shall not be used for TYPE X ATTACHMENT other than specially prepared cords. Their properties shall be at least those of heat-resistant polyvinyl chloride sheathed cord (code designation 60227 IEC 57).

Compliance is checked by measurement.

25.7DV D2 *Modification by replacing the text of 25.7 of the Part 2 with the following:*

25.7DV.1 A heater cord is required where the temperature measured during the test of Clause 11 exceeds 121°C on any surface that the cord is likely to touch when the machine is used as intended.

25.7DV.2 For rug shampooers, the cord shall be Type SJ, SJO, SJT, or SJTO; for all other products, the cord shall be Type S, SO, ST, or STO. Alternatively, the cord shall be of a type at least equally as serviceable for the intended use.

25.14 *Addition:*

For machines incorporating a TYPE X ATTACHMENT or TYPE Y ATTACHMENT, the number of flexings is 20 000.

25.15 *Modification:*

Replace Table 12 by the following:

Table 12 – Pull force and torque

Mass of appliance *kg*	*Pull force* *N*	*Torque* *Nm*
≤ 1	*30*	*0,1*
> 1 and ≤ 4	*60*	*0,25*
> 4	*125*	*0,40*

Addition:

The test is also applied to the cord in the cord set for machines classified as IPX4 or higher that are provided with an appliance inlet. The cord set is fitted to the appliance inlet prior to the commencement of the test.

25.22DV D2 *Modification by adding the following to 25.22 of the Part 1:*

If a product incorporates a disconnecting means (such as a cord connector in the cord between the handle and the motor), the construction shall be such that no live part will be exposed when used as intended. The probe illustrated in Figure 12DV of the Part 1 shall be used to determine if live parts are accessible.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 *Addition:*

The microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution due to normal use of the machine.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 *Addition:*

For parts of machines containing rechargeable batteries that can be charged from the mains supply, 30.2.3 is applicable (see Annex B). For other machines, 30.2.2 is applicable.

30.2DV D2 ***Modification by adding the following to Clause 30.2 of the Part 2:***

A nonmetallic enclosure of a switch or relay located in other than an LVLE circuit shall have a minimum flammability rating of V-2.

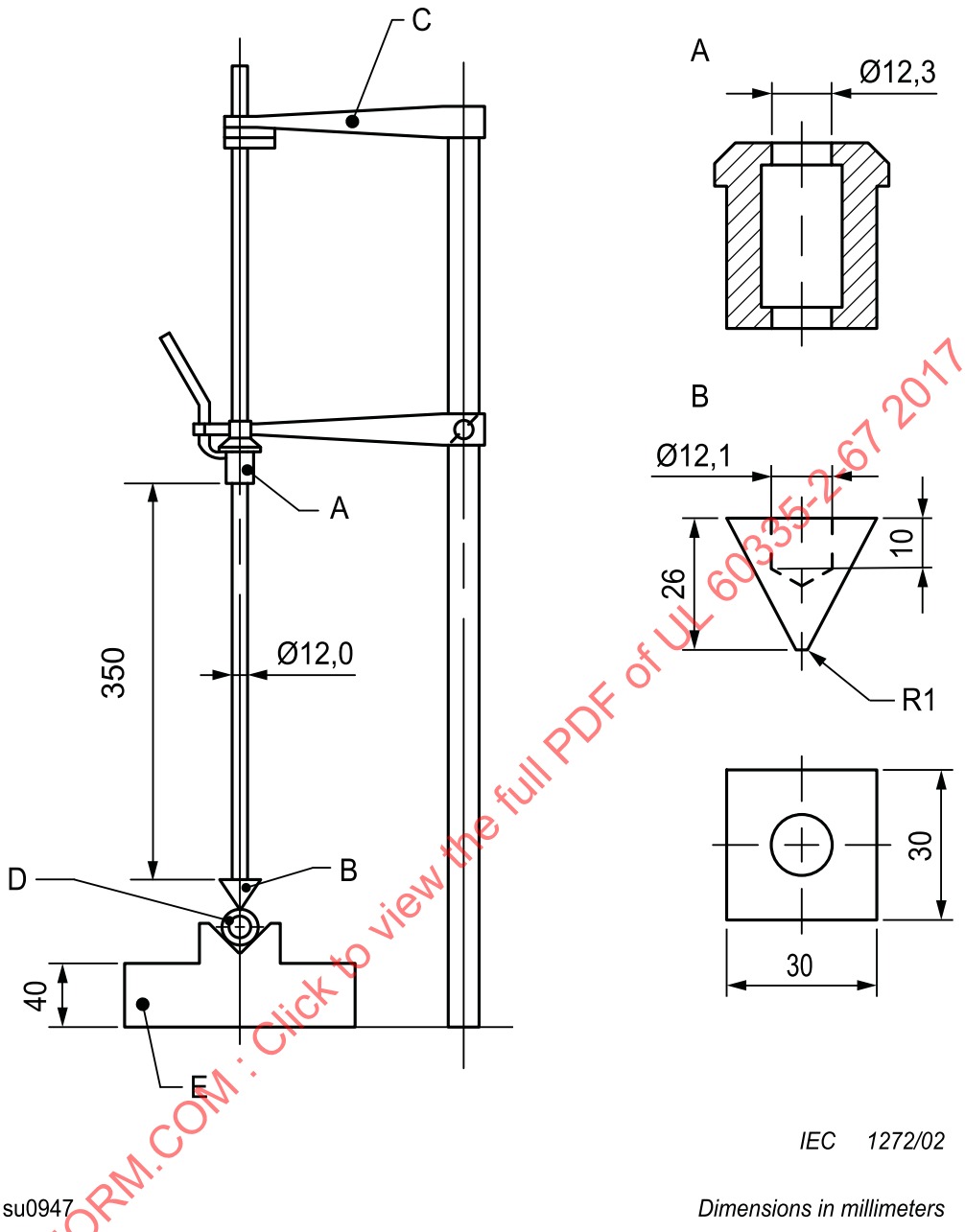
NOTE 1DV A switch complying with the standards specified in Annex DVA are considered to comply with this requirement.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity, and similar hazards

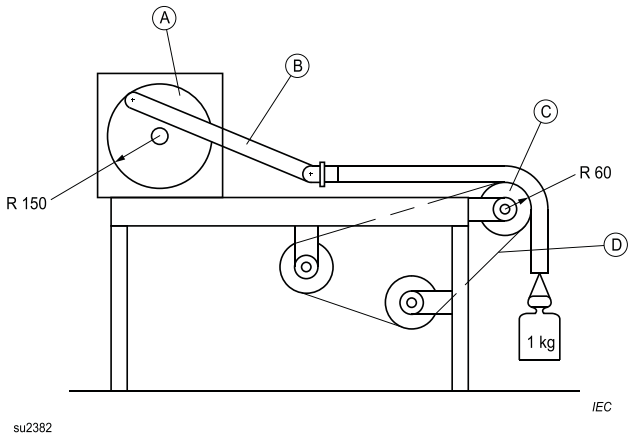
This clause of Part 1 is applicable.



Key

A	weight
B	chisel
C	fixing arm
D	sample
E	base having mass of 10 kg

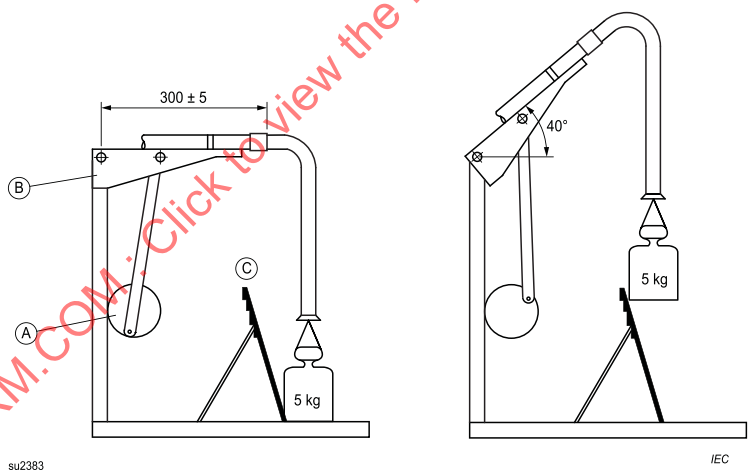
Figure 101 – Impact test apparatus



Key

A	crank mechanism
B	connecting rod
C	roller, diameter 120 mm
D	abrasive cloth belt

Figure 102 – Apparatus for testing the abrasion resistance of current-carrying hoses

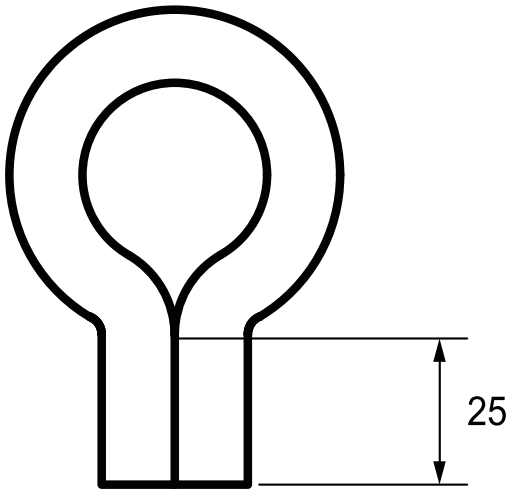


Key

A	crank mechanism
B	arm
C	inclined plane

Figure 103 – Apparatus for testing the resistance to flexing of current-carrying hoses

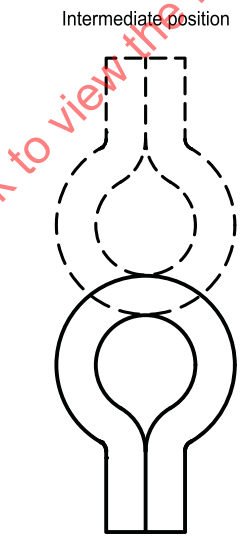
Dimesions in millimetres



IEC

su1186a

Figure 104 – Configuration of the hose for the freezing treatment



IEC

su2384

Figure 105 – Flexing positions for the hose after removal from the freezing cabinet

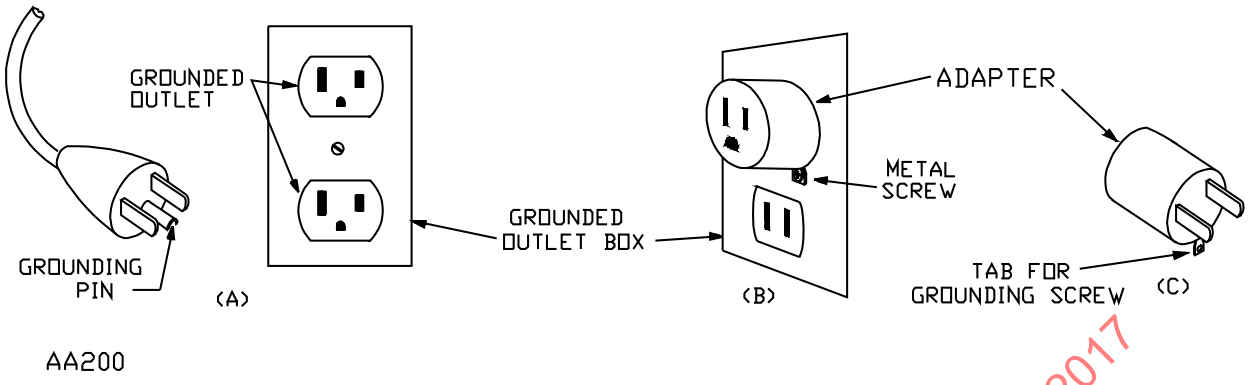
IEC 1257/07

su0950

Figure 106 – Warning symbol: Do not inhale exhaust fumes

Figure 107DV DR *Add the following figure:*

Figure 107DV - Earthing methods



AA200

Annexes

The annexes of Part 1 are applicable except as follows.

Annex A
(informative)
Routine tests

ADV.1 D2 ***Modification to Annex A of the Part 1 as follows:***

Following the title, replace "informative" with "normative."

ADV.2 D2 ***Modification to Annex A of the Part 1 to add the following to the*** *"Introduction"**:***

The tests of Clauses A.1 and A.2 do not apply to battery-powered products.

A.101DV D2 ***Add Clauses A.101DV.1 and A.101DV.2 to Annex A of the Part 1:***

A.101DV.1 Each internal combustion engine powered machine using liquefied petroleum gas shall be tested for leaks of an LP-Gas system. All fuel-system connections, including the container with associated valves and fittings, shall be tested for leaks with a soap-and-water or equivalent solution while the system is under LP-Gas pressure of not less than 621 kPa. All leaks detected shall be repaired.

A.101DV.2 The fuel container and associated valves and fittings may be tested separately using air pressure.

Additionally, printed wiring assemblies and other electronic circuit components that would be damaged by application of the test potential, or that short-circuit the test potential, shall be removed, disconnected, or otherwise rendered inoperative before the dielectric voltage-withstand tests are made. Testing a representative subassembly instead of an entire unit is permitted. Individually shunting the semiconductor devices in the unit before the test is made to avoid destroying them in the case of a malfunction elsewhere in the secondary circuits is permitted.

Annex B
(normative)
Appliances powered by rechargeable batteries

BDV.1 D2 ***Modification to Annex B of the Part 1 as follows:***

13 Leakage current and electric strength at operating temperature

13.101DV ***Delete Subclause 13.1DV.1 of the Part 1.***

13.102DV ***Add the following Subclause to the Part 1:***

Printed wiring assemblies and other electronic circuit components that would be damaged by application of the test potential, or across which the test potential is applied, shall be removed, disconnected, or otherwise rendered inoperative before the dielectric voltage-withstand tests are made. Testing a representative subassembly instead of an entire unit is permitted. Individually shunting the semiconductor devices in the unit before the test is made to avoid destroying them in the case of a malfunction elsewhere in the secondary circuits is permitted.

16 Leakage current and electric strength

16.101DV ***Delete subclause 16.1DV.1.***

16.102DV ***Add the following subclause to the Part 1:***

Printed wiring assemblies and other electronic circuit components that would be damaged by application of the test potential, or across which the test potential is applied, shall be removed, disconnected, or otherwise rendered inoperative before the dielectric voltage-withstand tests are made. Testing a representative subassembly instead of an entire unit is permitted. Individually shunting the semiconductor devices in the unit before the test is made to avoid destroying them in the case of a malfunction elsewhere in the secondary circuits is permitted.

Annex D
(normative)
Thermal motor protectors

Annex DDV D2 ***Modification by replacing all of Annex D of the Part 1 following the first paragraph with the following:***

A motor incorporating a thermal protector shall comply with Clause 8 of UL 1004- 3:2015-2 / CSA C22.2 No 77:2014-1 and Clause 17.101 of UL 60730-2-2:2014-9 /CAN/CSA E730-2-2 :1994-6 (R2013).

Annex DVA
(informative)
Component standards cross reference

Annex DVA D2 ***Modification of Table DVA.3.1 by adding the following to the Clause 24 rows:***

Automotive-type overcurrent protective devices complying with ISO 8820, SAE J554, UL 275, or UL 275A.

Arc-fault circuit interrupters (AFCIs) and leakage current detector-interrupters (LCDIs) complying with UL 1699/ CSA T.I.L. No. M-02A-Arc Fault Circuit Interrupters

Annex AA
(normative)
Precast paving slabs

The cement in the manufacturing of these paving slabs shall be of or similar to one of the following:

– Portland cement (ordinary or rapid hardening);

– Portland blast furnace cement.

The fine and coarse aggregate shall consist of either natural occurring materials, crushed or uncrushed, or alternatively of coarse aggregate to meet the following requirements:

– 10 % fines test: not less than 10 tons;

– flakiness index: not more than 35 %.

The normal maximum size of the aggregate shall not exceed 14 mm.

The total sulphate content of the concrete mix shall not exceed 4.0 % as SO3 by weight of the cement. The sulphate of the cement shall be calculated from the known sulphate contents of the cement, aggregates (where applicable) and pulverised fuel ash, as determined by tests.

The slabs may be made by any process. The escape of the finer particles of mortar during the process of manufacture shall be prevented as far as practicable. A slab described as ″pressed″ shall only be made by employing a pressure of not less than 7 MN/m^2 over the entire surface.

After casting, the slabs shall be stored so as to prevent undue loss of moisture particularly during the early stages of curing.

Slabs shall be manufactured to the following size: 65 mm × 600 mm × 750 mm.

The maximum deviation from a 750 mm straight edge placed in any position on the wearing surface shall not exceed 2 mm.

There shall be no special preparation for smoothing of the test surface. The slab should be made under normal production conditions for COMMERCIAL USE.

Annex BB
(normative)
Requirements for internal combustion engine powered machines using liquefied petroleum gas (LPG)

BB.1 Containers

BB.1.1 General

Containers for LPG shall be either permanently fixed on the machine or removable.

Pipe fittings and accessories on containers shall be protected against mechanical damage when used as specified by the manufacturer.

The fuel take-off on the container shall be equipped with an easily and quickly accessible manually operated valve. The position and method of operation of this valve shall be clearly marked on the outside of the machine, near the valve or on each removable container.

It shall be mechanically ensured that the fuel take-off is in a liquid form unless the container and engine are specially equipped for a direct vapour withdrawal. In this case, the direct vapour withdrawal shall also be mechanically ensured.

If containers are installed in a compartment, this compartment shall have permanent openings at the bottom. The total surface area of these ventilation openings shall be at least 200 cm^2 allowing adequate ventilation to the outside atmosphere and without risk to the OPERATOR.

Containers shall be positioned in such a way that they are not exposed to the damaging effects of heat, particularly heat from the engine and the exhaust system. This requirement is deemed to be met if the distance between the container and the exhaust system is at least 300 mm or if a suitable heat shield is fitted which shall not inhibit ventilation under any circumstances.

Containers shall be fitted on the machine in such a way that they are not unduly exposed to abrasion or shock nor to the corrosive action of the products handled by the machine.

Containers and their connections shall be installed in such a way that there are no projections outside the plan view outline of the machine.

If an additional container is carried on the machine, it shall be secured in the same manner as the main container.

BB.1.2 Containers to be filled by the user

Containers to be filled by the user shall have the following fitted.

– A safety pressure relief valve shall be connected to the vapour space of the container. Where such containers are fitted inside compartments of machines, the discharge side of the relief valve shall be piped to atmosphere. The gas shall be led away safely outside of the motor compartment.

– Containers shall not be possible to be filled more than 80 % of the container capacity. Where containers are fitted inside compartments of machines the discharge side of any maximum level indicating device which relies on bleeding gas to atmosphere shall terminate at a readily visible position on the outside of the machine.

– Maximum level indicating devices which rely on bleeding to atmosphere shall be designed so that the bleed hole is not larger than 1,5 mm in diameter and also so that the parts of the device cannot be completely withdrawn in normal gauging operations.

– Maximum liquid level devices shall be suitable for the LPG in use, indicate the maximum product level and shall not vent to atmosphere.

BB.1.3 Removable containers

Removable containers shall be secured on the machine in such a way that only intentional release is possible.

When containers are removable, their fastenings shall permit easy handling and checking of the installation after the exchange of containers.

Removable containers which incorporate a safety pressure relief valve shall be so positioned on the machine that the safety pressure relief valve opening is always in communication with the vapour space at the top of the container. This may be accomplished by an indexing pin which positions the container when the container is properly installed.

BB.1.3.101DV D2 ***Add Clause BB.1.3.101DV.1 and Figure BB.1DV.1 to Clause BB.1.3 of the Part 2:***

BB.1.3.101DV.1 LP-Gas container bracket load test

BB.1.3.101DV.1.1 An LP-Gas fuel container shall be secured in place on the vehicle in a manner that will withstand, without visible permanent deformation, loadings in any direction equal to four times the filled weight of the container.

BB.1.3.101DV.1.2 For this test, the container shall be empty of fuel and shall be secured in the manner covered by the manufacturer's instructions. Loadings shall be applied in any convenient manner capable of being measured by gauges or weights. The load shall be applied in no less than the six directions shown Figure BB.1DV.1, as applicable to the design.

Exception: When a design incorporates a swing-out, swing-down, or other similar construction, the load directions shall be adjusted accordingly to demonstrate compliance.

Figure BB.1DV.1 D2 ***Add the following figure:***

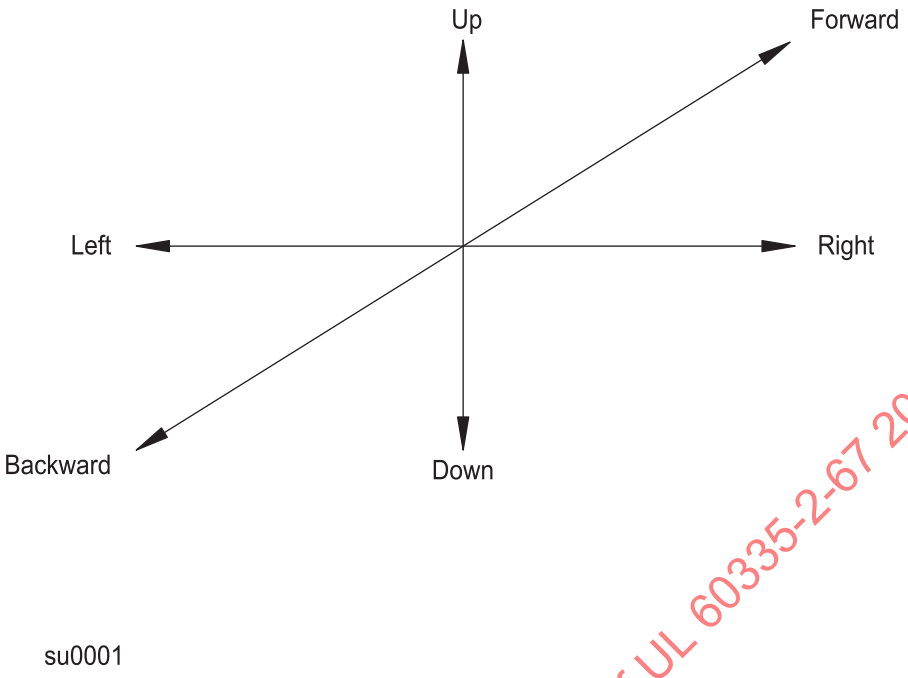


Figure BB.1DV.1 – Load directions

BB.1.4.101DV D2 *Add Clause BB.1.4.101DV.1 to Clause BB.1 of the Part 2:*

BB.1.4.101DV.1 Non-removable containers

BB.1.4.101DV1.1 When a machine incorporates a non-removable ASME fuel container, the container shall have a maximum allowable working pressure of 2.15 MPa. It shall be marked with the ASME "U" symbol and the design working pressure.

BB.1.4.101DV1.2 When a machine incorporates a non-removable DOT fuel container, the container shall be constructed, tested, and marked for a minimum service pressure of 1.7 MPa. It shall bear the marking DOT-4B240, DOT-4BA240, DOT-4BW240, or DOT-4E240. A DOT fuel container assembly shall comply with the requirements in UL 2003.

BB.2 LPG piping

Connecting piping and all associated parts shall be easily accessible, protected against damage and wear, and flexible enough to withstand vibration and deformation in service, as follows.

– Piping shall be so arranged that damage or leaks are easily detectable.

– Piping shall be installed in such a way that it cannot be damaged by the hot parts of the engine or the exhaust system.

– Fully rigid pipes shall not be used for connecting the container to equipment on the engine.

Pressure flexible hoses above 0,1 MPa shall be supported at least every 500 mm. Rigid pipes shall be supported at least every 600 mm.

Hoses, pipes and all connections operating at pressures above 0,1 MPa shall be suitable for a working pressure of 2,4 MPa and shall withstand without bursting a test pressure of 7,5 MPa. Hoses, pipes and all connections operating below 0,1 MPa shall withstand without bursting a test pressure of five times the maximum pressure likely to be encountered in service.

Excessive pressure shall be avoided in any section of pipe work containing LPG in liquid form between two shut-off valves which may be closed; e. g. a pressure relief valve or other suitable means may be used if necessary. The gas shall be led away safely outside of the motor compartment.

Aluminium piping shall not be used in LPG lines.

Hose lengths shall be as short as practical.

Pressure unions and joints above 0,1 MPa shall be made of metal except for any constrained sealing washers.

BB.2.101DV D2 *Add Clauses BB.2.101DV.1 to BB.2.101DV.9 to Clause BB.2 of the Part 2:*

BB.2.101DV.1 Tubing burst test requirements are considered to be met if the wall thickness is at least 1,25 mm for steel and 0,81 mm for annealed copper.

BB.2.101DV.2 Flexible hose and hose assemblies shall comply with the requirements in UL 21 and UL 569 / CSA 8.1 and CSA 8.3.

BB.2.101DV.3 A tubing fitting or other fuel line fitting, including a pipe threaded fitting, shall comply with one or more of the following:

- **UL 109 (No CSA equivalent);**
- **ASTM F1387 (No CSA equivalent);**
- **CGA V-1; and**
- **ASME B31.3 (No CSA equivalent).**

BB.2.101DV.4 A cast fitting shall not be employed for either piping or tubing.

BB.2.101DV.5 A fuel line shall be supported to reduce the likelihood of chafing and to maintain at least a 51 mm clearance from exhaust- and electrical-system parts.

BB.2.101DV.6 Flexible hose passing through sheet metal shall be installed to reduce the likelihood of hose abrasion, such as by use of clamps and grommets.

BB.2.101DV.7 A pipe-threaded fuel-system fitting, including a container fitting, shall be assembled using a pipe-joint sealing compound intended for use with LP-Gas.

BB.2.101DV.8 Each vaporizer shall be marked with the design working pressure in MPa.

BB.2.101DV.9 A vaporizer shall not be equipped with a fusible plug. A vaporizer shall comply with the requirements in UL 1337.

BB.3 Equipment

The supply of gas shall be automatically cut off when the engine stops irrespective of whether or not the ignition system has been switched off.

For multi-fuel applications, the system shall be designed to avoid the possibility of LPG entering any other fuel container, and to shut off each fuel source before the alternative one is opened.

If the machine is equipped with two or more containers to supply fuel, they shall be connected via a multiway valve, or other suitable means, so that LPG can only be drawn from one container at a time. The use of two or more containers at the same time shall not be possible.

Safety pressure relief valves or liquid level indicators shall be installed in such a way that they cannot discharge in the direction of the OPERATOR or onto machine components which may be a source of ignition.

All fuel system components shall be firmly secured to the machine.

Pressure reducing valves shall be readily accessible for inspection and maintenance.

BB.3.101DV D2 *Add Clauses BB.3.101DV.1 to BB.3.101DV.4 to Clause BB.3 of the Part 2:*

BB.3.101DV.1 An automatic shutoff valve shall permit the back flow of fuel from a vaporizer in the event of a pressure build-up in the vaporizer. Automatic shut-off valves shall comply with the requirements in UL 1337.

BB.3.101DV.2 Each vaporizer shall have a valve or plug located at or near the lowest portion of the section occupied by the water or other heating medium to permit substantially complete draining of the vaporizer. A vehicle cooling-system drain or water hose that completely drains the vaporizer is considered to comply with the intent of the requirement.

BB.3.101DV.3 Each applicable LP-Gas component, excluding fuel lines, hoses, and tanks, shall comply with the requirements in UL 1337.

BB.3.101DV.4 A nonmetallic part in contact with LP-Gas shall not show a volume change or loss of weight exceeding the requirements in UL 1337.

BB.101DV D2 *Add Clause BB.101DV.1 to Annex BB of the Part 2:*

BB.101DV.1 Marking

BB.101DV.1.1 Machines equipped to use a removable fuel container shall be marked to identify the correct fuel container assembly to be used. The markings shall be on or adjacent to the container mounting hardware.

BB.4.101DV.1.2 Machines equipped to use a removable fuel container may be shipped without the fuel container if a nameplate that identifies all of the following is attached adjacent to the container-mounting hardware:

a) Fuel container (tank) capacity (weight);

b) Type of mounting (horizontal or vertical);

c) Disconnect coupling (thread type); or

d) Type of withdrawal (liquid or gas).

Annex CC
(informative)
Emission of acoustical noise

CC.1 Noise reduction

Noise reduction at floor-treatment machines is an integral part of the design process and can be achieved by applying measures at source to control noise, see for example ISO/TR 11688-1. The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values in relation to other machines of the same type with comparable non-acoustical technical data

The major sound sources in floor-treatment machines are: motors, fan, brushes, pads.

CC.2 Noise test code

CC.2.1 Emission sound pressure level determination

The emission sound pressure level is measured in accordance with ISO 11201, grade 2.

The microphone is placed at a distance of 0,40 m ± 0,025 m behind the handle at a height of 1,55 m ± 0,075 m and directed towards to the geometrical center of the machine. The handle shall be positioned according to normal use as specified in the instructions for use.

CC.2.2 Sound power level determination

The sound power level is measured in accordance with ISO 3744, or with ISO 3743-1 if a suitable hard-walled test room is available, or with ISO 9614-2. The handle of the machine has to face towards the opposite direction of the x-axis defined for the microphone configurations in ISO 3744.

CC.2.3 Operating conditions

The operating condition shall be identical for the determination for both sound power and emission sound pressure level at the specified positions.

The machines shall be tested in a stationary position. The engine respective motors and auxiliary units operate at the speed provided by the manufacturer for the operation of the working equipment. The machine shall be placed on a surface in accordance with 3.1.9.101 to 3.1.9.103, as applicable. The cleaning head operates at its highest speed; it is in contact with the ground. The suction system (if applicable) operates at its maximum suction power with the distance between ground and mouth of the suction system not exceeding 25 mm. The measurement time shall be at least 15 s after the machine had been operated for at least 10 min.

CC.2.4 Measurement uncertainties

A standard deviation of reproducibility σ_{RO} of less than 1,5 dB is expected for the A-weighted sound power level determined according to ISO 3744 and the A-weighted emission sound pressure level determined according to ISO 11201, grade 2.

CC.2.5 Information to be recorded

The information to be recorded covers all of the technical requirements of this noise test code. Any deviations from this noise test code or from the basic standards upon which it is based are to be recorded together with the technical justification for such deviations.

CC.2.6 Information to be reported

The information to be included in the test report is at least that which the manufacturer requires for a noise emission declaration or the user requires to verify the declared values.

CC.2.7 Declaration and verification of noise emission values

The declaration of the emission sound pressure level shall be made as a dual-number noise emission declaration and shall declare the noise emission value L_{pA} and the respective uncertainty K_{pA}. The emission value shall be given where it exceeds 70 dB(A). Where this value does not exceed 70 dB(A), this fact may be stated in place of the emission value and uncertainty, e.g. by declaring $L_{pA} \leq 70$ dB(A).

The sound power level shall be given as a dual-number noise emission declaration, where the emission sound pressure level exceeds 80 dB(A). It shall declare the emission value L_{WA} and separately the respective uncertainty K_{WA}.

For both, the declaration of the emission sound pressure level and the sound power level, the uncertainty K_{pA} and K_{WA} shall be calculated in accordance with ISO 4871.

Alternatively, if a minimum sample size of $n = 5$ is measured with at least 9 microphones simultaneously, both the uncertainty K_{pA} and K_{WA} may be determined as follows if measurement is done with enhanced accuracy at an ambient temperature of 20 C ± 10 C.

NOTE 1 Where the uncertainty is not calculated in accordance with the given standards or procedure, K_{pA} and K_{WA} are usually expected to be 3 dB.

$$K_{pA} = K_{WA} = 1{,}5 \cdot \sigma_t$$

with

– the total standard deviation

$$\sigma_t = \sqrt{\sigma_R^2 + \sigma_P^2}$$

– the standard deviation of reproducibility

$$\sigma_R = \sqrt{\sigma_{R0}^2 + \sigma_{omc}^2}$$

– and the standard deviation of production $_P$ which has to be assumed for later (mass-)production.

Values for σ_R may be estimated to σ_R = 0,5 dB, if the environment correction K_2 (according to ISO 11201 and ISO 3744, see CC.2.1 and CC.2.2) is determined using a calibrated reference sound source (measurement and correction) with a value of not more than 0,4 dB.

NOTE 2 If K_2 is more than 0,4 dB, a value of σ_R = 0,5 dB as proposed here cannot be achieved. Correction of K_2 needs a lot of experience and comparison-measurements at optimal conditions. The value for σP shall be calculated individually from the measurement

The value for σ_P shall be calculated individually from the measurement results of at least the first 5 machines produced after determination of s_p for a sample size of n ≥ 5 machines. Because the production variation may change under later production conditions, it is recommended to calculate σ_P as follows:

$$\sigma_P = SF \cdot s_p$$

The necessary size of the safety factor SF depends on the relation between s_p and σ_R as well as on the sample size n as shown in Table CC.1.

Table CC.1 – Determination of uncertainty

n	$s_p \leq \sigma_R$	$s_p > \sigma_R$
5 to 7	1,3	1,5
8 to 12	1,2	1,3
13 to 19	1,0	1,1
≥ 20	1,0	1,0

The noise declaration shall state that the noise emission values have been obtained according to the given standard or procedure. The noise declaration shall indicate clearly which standard or procedure was used regarding measurement as well as statistical calculation.

If undertaken, verification shall be conducted according to ISO 4871 by using the same mounting, installation and operating conditions as those used for the initial determination of the noise emission values.

Annex DD
(informative)
Emission of vibration

DD.1 Reduction of vibration

The machine shall be designed and constructed in such a way that risks resulting from vibrations produced by the machine are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source.

The handles shall be designed and constructed in such a way as to reduce the vibrations transmitted to the upper limbs of the OPERATOR to the lowest level that is reasonably possible.

DD.2 Information on vibration emission

The instructions shall give the following information:

– the vibration total value to which the hand-arm system is subjected, measured in accordance with ISO 5349-1 for arm vibrations, the machine being supplied at RATED POWER INPUT or at the maximum RATED POWER INPUT for machines with a range of power, if the vibration total value exceeds 2,5 m/s^2. Where this value does not exceed 2,5 m/s^2, this fact may be stated in place of the emission value and uncertainty, e.g. by declaring $a_h \leq 2{,}5$ m/s^2;

– the uncertainty surrounding these values in accordance with the above given standards.

These values shall be either those actually measured for the machine in question or those established on the basis of measurements taken for a technically comparable machine which is representative of the machine being produced.

Regarding operating conditions during measurement and the methods used for measurement, the reference of the standard applied (IEC 60335-2-67) shall be specified.

Annex 101.DVA
(normative)

Requirements for internal combustion engine powered machines using fuels such as, but not limited to, ethanol-gasoline blends, gasoline, bio-diesel, and diesel

Annex 101.DVA D2 *Add Annex 101.DVA to the Part 2 as follows:*

101.DVA.1 Test liquids

101.DVA.1.1 Ethanol test liquids

101.DVA.1.1.1 Ethanol test fluids are designated by a format that fits the form of CEXXa; where "C" indicates ASTM Reference Fuel C (50% Isooctane, 50% Toluene on a volumetric basis); "E" indicates synthetic ethanol (designated CDA20); "XX" indicates percentage amount of the ethanol that is added to the solution; and "a" indicates aggressive elements that are added to the synthetic ethanol. The aggressive elements are used to represent contaminants that can be found in actual use and are used to help represent the worst-case test fluid. The aggressive elements are mixed in accordance with SAE J1681.

101.DVA.1.1.2 The aggressive elements described in 101.DVA.1.1.1 include deionized water, sodium chloride, sulfuric acid, and glacial acetic acid. Table 101.DVA.1 outlines the amounts of each of these elements in one liter of aggressive ethanol.

Table 101.DVA.1 - Aggressive ethanol test liquid

Component	Units	1 Liter of CE85a	1 Liter of CE25a
ASTM Reference Fuel C	Liter	0.150	0.750
Synthetic Ethanol	Liter	0.843	0.248
Deionized Water	Liter	0.007	0.002
Sodium Chloride	Gram	0.003	0.001
Sulfuric Acid	Milliliter	0.010	0.003
Glacial Acetic Acid	Milliliter	0.050	0.010

101.DVA.1.1.3 CE25a consists of a 75% ASTM Reference Fuel C and 25% aggressive ethanol mixture. CE85a consists of a 15% ASTM Reference Fuel C and 85% aggressive ethanol mixture. These two fluids may be used to condition samples as noted in each specific test that indicates that these fluids are to be used. The test fluids shall be prepared just prior to use to minimize effects on the test fluid. The aggressive ethanol is corrosive and changes can occur to the solution from interactions with the storage and transfer containers that are not inert. Exposure to air and/or moisture can affect the test fluid. These changes should be minimized.

101.DVA.1.1.4 Products intended to be rated for use with gasoline or gasoline/ethanol blends with nominal ethanol concentrations up to 25 % (E0 – E25) shall be evaluated using the CE25a test fluid as the only applicable test fluid. Products intended to be rated at gasoline/ethanol blends with nominal ethanol concentration greater than 25 percent shall be evaluated using both the CE25a test fluid and the CE85a test fluid.