



National Differences For

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – Part 2-72: Particular Requirements for Floor Treatment Machines With or Without Traction Drive, for Commercial Use

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – Part 2-72: Particular Requirements for Floor Treatment Machines With or Without Traction Drive, for Commercial Use

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UL 60335-2-72 is an adoption of IEC 60335-2-72, Safety Standard for Household and similar electrical appliances - Safety - Part 2-72: Particular requirements for floor treatment machines with or without traction drive, for commercial use, (Edition 3.0, Issued by the IEC April, 2012). Please note that the national difference document incorporates all of the U.S. national differences for UL 60335-2-72.

This document provides a single listing of the National Differences included in the UL adoption of the corresponding IEC standard.

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Preface

This document provides a single listing of the technical National Differences included in the UL adoption of the corresponding IEC standard.

In its IEC-based standards, UL uses the notations indicated below to identify national difference type, and these types are additionally noted in this document. The standard may not use all types of these deviations.

D1 - These are deviations which are based on basic safety principles and requirements, elimination of which would compromise safety for U.S. consumers and users of products.

D2 - These are deviations based on safety practices. These are deviations for IEC requirements that may be acceptable, but adopting the IEC requirements would require considerable retesting or redesign on the manufacturer's part.

DC - These are deviations 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 deviations based on editorial comments or corrections.

DR - These are deviations based on the national regulatory requirements.

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.

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

National Differences

1DV.1 DE *Modify by replacing the second sentence following Note 102 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 DE *Modify the first four dashed items by replacing with the following:*

- floor treatment appliances for household use according to CAN/CSA-E60335-2-10 / CSA C22.2 No. 243 / UL 1017;
- floor treatment machines for COMMERCIAL USE according to CAN/CSA-E60335-2-67 / CSA C22.2 No. 10 / UL 561;
- spray extraction machines for COMMERCIAL USE (CAN/CSA-E60335-2-68 / CSA C22.2 No. 10 / UL 561);
- wet and dry vacuum cleaners, including power brush, for COMMERCIAL USE (CAN/CSA-E60335-2-69 / CSA C22.2 No. 243 / UL 1017;

1.101.DV DR *Add the following clause to the Part 1:*

Except as noted, powered cleaning machines covered by this standard, other than mains supplied machines, are those identified by NFPA 505 as Types E, EE, ES, CGH, CNS, G, GS, D, DS, LP, LPS, CN, G/LP, GS/LPS, G/CN, and GS/CNS. Not covered by this standard are NFPA 505 Types EX, DY, and DX.

NOTE Additional requirements applicable to machine designations that include the letters “EE” or “S” can be found in Annexes 101.DVD and 101.DVE.

2DV.1 DC *Modify by adding the following reference publications:*

CSA Group

C22.2 No. 10-1965 (R2013), Electric floor surfacing and cleaning machines

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C22.2 No. 243-15, Vacuum cleaners, blower cleaners, and household floor finishing machines

CAN/CSA-E60335-2-10:15, Household and similar electrical appliances — Safety — Part 2-10: Particular requirements for floor treatment machines and wet scrubbing machines

CAN/CSA-E60335-2-69-01 (R2015), 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-E730-2-2-94 (R2013), Automatic electrical controls for household and similar use - Part 2: Particular requirements for thermal motor protectors

UL

21 , Standard for LP-Gas Hose

62 , Flexible Cords and Cables

157 , Gaskets and Seals

561 , Standard for Floor-Finishing Machines

569 , Standard for Pigtails and Flexible Hose Connectors for LP-Gas

558 , Standard for Industrial Trucks, Internal Combustion Engine-Powered

583 , Standard for Electric-Battery-Powered Industrial Trucks

746C , Standard for Polymeric Materials - Use in Electrical Equipment Evaluations

969 , Standard for Marking and Labeling Systems

1004-1 , Standard for Rotating Electrical Machines - General

1004-3 , Standard for Thermally Protected Motors

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

1337 , Outline of Investigation for LP-Gas, Natural Gas, and Manufactured Gas Devices for Engine Fuel Systems

2003 , Outline of Investigation for LP-Gas Cylinder Assemblies

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

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

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60695-11-20:2015, Fire hazard testing - Part 11-20: Test flames - 500 W flame test method

62885-2, Surface cleaning appliances – Part 2: Dry vacuum cleaners for household or similar use – Methods for measuring the performance

ISO

3405, Petroleum products - Determination of distillation characteristics at atmospheric pressure

SAE

J30, Fuel and Oil Hoses

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

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

J2045, Fuel System Tubing Assemblies

J2260, Nonmetallic Fuel System Tubing with One or More Layers

NFPA

NFPA 505, Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations

3.1.9.103DV DE *Replace the first paragraph with the following:*

Carpet shampooers are operated on a test surface consisting of a carpet, in accordance with IEC 60312-1 or IEC 62885-2, the carpet being fastened to the floor.

3.4.2DV D1 *Modification by replacing 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

3.121DV DE *Delete Clause 3.121 of the Part 2: .*

This definition does not apply.

3.123DV D2 *Add the following definition 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 3.123DV.

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 3.123DV; or

– a BATTERY with output current limited by overcurrent protection in accordance with Table 3.123DV.

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

Table 3.123DV – Rating for secondary fuse or circuit protector

Circuit voltage (V r.m.s.)	Current (A)
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.	

3.124DV 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 482-01-04.

3.125DV 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, and shared hardware and that is furnished with a single connection cable that has an electrical connector at the end

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

4DV DE Modification of Clause 4 of the Part 2:

Replacing “cause no danger to person or surroundings” with “reduce the risk of fire, electric shock, and/or injury to persons” in the third paragraph.

5.14DV.1 DE Modification of Clause 5.14 of the Part 1:

Replace “NOTE” with “NOTE 1DV”.

5.14DV.2 DE Modification of Clause 5.14 of the Part 1 by adding the following NOTE:

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.

7.1DV.1 D2 Modify by adding the following dashed item after the Part 2 replacement of the 4th dashed item:

– 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 may be identified as the product of a particular factory.

7.1DV.2 DE Modify by adding the following dashed item after the second dashed item below NOTE 102 of the Part 2:

– the applicable NFPA 505 Type designation (i.e., E, EE, ES, CGH, CNS, G, GS, D, DS, LP, LPS, CN, G/LP, GS/LPS, G/CN, GS/CNS). (This requirement is not applicable to mains supplied machines.)

7.1.103DV D2 Add the following text 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.

Exception: 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.

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

7.12.104.DV.1 The instructions for Class I, mains supplied machines 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 machine rated less than 15 A and intended for use on a nominal 120-V supply circuit, the instructions shall include the statements in either (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 107.DV. 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, 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 107.DV. 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 2.4 mm (3/32 inch) 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 7.101DV.1 - 7.101DV.6. The statement, “Do Not Remove This Tag”, or equivalent wording, shall be included on the cord tag.

7.12.104.DV.2 A Class II mains supplied machine 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.

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7.101DV D2 Modification of Subclause 7.14 of the Part 1: add the following:

7.101DV Tags

7.101DV.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 7.101DV.2 – 7.101DV.5; and
- b) For permanence and legibility in UL 969/ C22.2 No. 0.15.

7.101DV.2 Three as-received samples and six samples of the tag that have been subjected to the conditioning specified in 7.101DV.4, three for each condition, shall be subjected to the test described in 7.101DV.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.

7.101DV.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.

7.101DV.4 The conditioning required by 7.101DV.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 $87,0 \pm 1,0^{\circ}\text{C}$. Following removal from the oven, the samples shall remain at a temperature of $23,0 \pm 2,0^{\circ}\text{C}$ 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 $32,0 \pm 2,0^{\circ}\text{C}$. The samples shall be tested within 1 min after the conditioning.

7.101DV.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 7.101DV.2(d), manipulation such as straightening of the tag by hand is permitted.

7.101DV.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.

8.1.4DV D2 *Add a dash item to 8.1.4 of the Part 1:*

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

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.

9DV.5 DR *Add the following text to Clause 9 of the Part 1:*

Subclauses 9DV.1 – 9DV.4 apply to all mains supplied machines.

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

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

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.

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

The requirements of 13.1DV.1 do not apply.

13.1.DV.2 D2 *Modification by adding the following Clause to 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.

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

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

The requirements of 16.1DV do not apply.

16.2.DV.2 D2 Delete Clause 16.2.DV.1 of the Part 1:

The requirements of 16.2.DV.2 do not apply.

16.1.DV.3 D2 Modification adding the following to 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 electric strength test of 16.3 is 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.

20.104.DV D2 Modification to replace the fourth through seventh paragraphs of Clause 20.104 of the Part 2 with the following:

20.104.DV.1 The machine, while traveling up a slope, shall be brought to a stop. The PARKING BRAKE shall be applied and/or the TRACTION DRIVE shall be switched off.

20.104.DV.2 The SLOPE shall consist of dry paving slabs in accordance with Annex AA.

20.104.DV.3 The PARKING BRAKE, if any, shall be applied with a force not exceeding 200 N.

20.104.DV.4 The machine shall be operated while loaded to the GVW rating. If the machine is designed for a SULKY, the load shall be increased with an additional mass of 75 kg, replacing the OPERATOR on the SULKY.

20.104.DV.5 After each of the parking brake functions has been engaged, the machine shall not travel down the slope more than 50 mm, measured from the point of application of the braking function(s), within 30 s.

20.109.DV D2 Modification to replace Clause 20.109 of the Part 2 with the following:

20.109.DV.1 Ride-on machines shall be equipped with a parking brake function. This function may be realised by a separate parking brake or the switched-off traction drive.

NOTE: When stated within the manufacturer's owner's manual, the traction wheel(s) may be turned perpendicular to the slope to assist with braking.

20.109.DV.2 The parking brake function shall be capable of holding the machine on a slope with a gradient of 10 %, or the maximum cleaning or transport gradeability, whichever is greater.

Compliance is checked by the following test.

The machine, while traveling up a slope, shall be brought to a stop. The **PARKING BRAKE** shall be applied and/or the **TRACTION DRIVE** shall be switched off.

The **SLOPE** shall consist of dry paving slabs in accordance with Annex AA.

The **PARKING BRAKE**, if any, shall be applied with a force not exceeding

– 400 N, for hand operation, and

– 600 N, for foot operation.

The machine shall be operated while loaded to the GVW rating.

After each of the parking brake functions has been engaged, the machine shall not travel down the slope more than 50 mm, measured from the point of application of the braking function(s), within 30 s.

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

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

22.3DV.1 *D2 Modification to add the following to (after) 22.3DV of the Part 1:*

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.

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

22.6DV.1 Leakage from a polymeric liquid reservoir is not considered likely to occur, if the reservoir is subjected to 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 Clause 7.1 and 7.3 of IEC 60695-10-3, except that the oven shall be maintained for a duration of 7 h 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.

22.7DV D2 Modification by adding the following to Clause 22.7 of the Part 1:

For machines with air conditioning systems, adequate pressure relief on the refrigeration system shall be located on the refrigeration system in case there is a fire. Acceptable pressure relief would be the use of rubber hoses that would melt in a fire and allow the refrigerant to be released. If metal tubing with metal fittings is used, an appropriate refrigerant pressure relief device shall be used.

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

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.

22.102DV D2 Delete Clause 22.102 of the Part 2:

The requirements in 22.102 do not apply.

22.104DV D2 Modification of Clause 22.104 of the Part 2:

Delete the penultimate paragraph.

22.105DV D2 Modification of Clause 22.105 of the Part 2:

Replace the first sentence with "It shall not be possible to drive BATTERY powered machines during charging of BATTERIES".

22.118DV D2 Add Clause 22.118.DV to the Part 1:**22.118.DV Electrical accessories for field installation by qualified personnel**

22.118.DV.1 An electrical accessory intended for field installation by qualified personnel shall be provided with all necessary wiring and hardware such that the installation can be made by qualified personnel without major disturbance of factory-installed wiring, the accessory assembly, or the machine.

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22.118.DV.2 Removal of a cover plate or the like is acceptable, but rearrangement of wiring or components, cutting or splicing of existing wiring, and soldering of connections are not acceptable.

22.118.DV.3 After field installation of an electrical accessory by qualified personnel, a machine shall comply with the applicable requirements in this Standard. (In particular, see Clauses 8 and 15.)

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.

23.102DV D2 *Add the following Clause to the Part 1:*

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

23.103DV D2 *Add Clauses 23.103DV.1 to 23.103DV.3 to the Part 1:*

23.103DV.1 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.

23.103DV.2 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.

23.103DV.3 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, may be acceptable.

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 standard specified in Annex DVA or the requirements of Annex 101.DVC.

24.1.3.ADV D2 *Add Clauses 24.1.3.ADV.1 and 24.1.3.ADV.2 to Clause 24.1 of the Part 1:*

24.1.3.ADV.1 A switch or relay located in other than an LVLE CIRCUIT that has not been evaluated for controlling an inductive (motor) load or for controlling a d. c. load shall comply with the overload test of Clause 24.1.3.ADV.2.

Compliance is checked by inspection and test.

24.1.3.ADV.2 Overload test

24.1.3.ADV.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 24.1.3.ADV.2.2 – 24.1.3.ADV.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.

24.1.3.ADV.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.

24.1.3.ADV.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.

24.1.3.ADV.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.

24.1.3.ADV.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.

24.103.DV D2 Add Clauses 24.103.DV.1 to 24.103.DV.3 the Part 1:

24.103.DV.1 A motor located in an LVLE CIRCUIT is not required to comply with requirements for clearances and creepage distances.

24.103.DV.2 The removable portion of a BATTERY connector shall be provided with means for being grasped during removal. Raised gripping surfaces are an example of means for being grasped.