



UL 62841-3-14

STANDARD FOR SAFETY

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-14: Particular Requirements for Transportable Drain Cleaners

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UL Standard for Safety for Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-14: Particular Requirements for Transportable Drain Cleaners, UL 62841-3-14

First Edition, Dated April 5, 2019

Summary of Topics

Adoption of the First Edition of IEC 62841-3-14, Standard for Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-14: Particular Requirements for Transportable Drain Cleaners, as the First Edition of ANSI/UL 62841-3-14.

The new requirements are substantially in accordance with Proposal(s) on this subject dated December 14, 2018.

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CSA Group
CSA C22.2 No. 62841-3-14:19
First Edition
(IEC 62841-3-14:2017, MOD)



Underwriters Laboratories Inc.
UL 62841-3-14
First Edition

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-14: Particular Requirements for Transportable Drain Cleaners

April 5, 2019

This national standard is based on publication IEC 62841-3-14, First Edition (2017).



ANSI/UL 62841-3-14-2019



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 any time. 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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This ANSI/UL Standard for Safety consists of the First Edition. The most recent designation of ANSI/UL 62841-3-14 as an American National Standard (ANSI) occurred on April 5, 2019. 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.

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Preface

This is the harmonized CSA Group and UL Standard For Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-14: Particular Requirements for Transportable Drain Cleaners. It is the First edition of CSA C22.2 No. 62841-3-14 and the First edition of UL 62841-3-14.

This harmonized standard is based on IEC Publication 62841-3-14: First edition, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-14: Particular Requirements for Transportable Drain Cleaners, issued October 2017. IEC 62841-3-14 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the International Harmonization Committee (IHC) for the adoption of the IEC series of standards for Hand-Held, Motor-Operated, and Transportable Tools and Lawn and Garden Machinery UL 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 Safety of Hand-Held Motor-Operated Electric Tools, 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.

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.

CSA C22.2 No. 62841-3-14 is to be used in conjunction with the First edition of CAN/CSA-C22.2 No. 62841-1. The requirements for transportable drain cleaners are contained in this Part 3 Standard and CAN/CSA-C22.2 No. 62841-1. Requirements of this Part 3 Standard, where stated, amend the requirements of CAN/CSA-C22.2 No. 62841-1. Where a particular subclause of CAN/CSA-C22.2 No. 62841-1 is not mentioned in CSA C22.2 No. 62841-3-14, the CAN/CSA-C22.2 No. 62841-1 subclause applies.

UL 62841-3-14 is to be used in conjunction with the First edition of UL 62841-1. The requirements for transportable drain cleaners are contained in this Part 3 Standard and UL 62841-1. Requirements of this Part 3 Standard, where stated, amend the requirements of UL 62841-1. Where a particular subclause of UL 62841-1 is not mentioned in UL 62841-3-14, the UL 62841-1 subclause applies.

Level of harmonization

This standard adopts the IEC text with editorial 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

National differences from the IEC are being added in order to address safety and regulatory 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 62841-3-14, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-14: Particular Requirements for Transportable Drain Cleaners, copyright 2017, are used in this standard with the consent of the International Electrotechnical Commission. The IEC Foreword is not a part of the requirements of this standard but is included for information purposes only.

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NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication 62841-3-14, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-14: Particular Requirements for Transportable Drain Cleaners, copyright 2017, 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.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – Part 3-14: Particular requirements for transportable drain cleaners

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 62841-3-14 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

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

FDIS	Report on voting
116/340/FDIS	116/349/RVD

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

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

This Part 3-14 is to be used in conjunction with the first edition of IEC 62841-1 (2014).

This Part 3-14 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for transportable drain cleaners.

Where a particular subclause of Part 1 is not mentioned in this Part 3-14, that subclause applies as far as relevant. Where this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in small roman type;
- **terms defined in Clause 3: bold typeface.**

Subclauses, notes and figures which are additional to those in Part 1 are numbered starting from 101.

A list of all parts of the IEC 62841 series, under the general title: *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document 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.

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 36 months from the date of publication.

101DV DE Modification: Add the following to the IEC Foreword:

The numbering system in the 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.

102DV DE Modification: Add the following to the IEC Foreword:

For this Standard, all references to "Part 1" refer to CAN/CSA-C22.2 No. 62841-1 and UL 62841-1.

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ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – Part 3-14: Particular requirements for transportable drain cleaners

1 Scope

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

Addition:

This part of IEC 62841 applies to transportable **drain cleaners**.

NOTE 101 **Drain cleaners** are also known as pipe cleaners.

This standard does not apply to hand-held **drain cleaners**.

NOTE 102 Hand-held drain cleaners are covered by IEC 62841-2-21.

This standard does not apply to high pressure cleaners to clean drains.

NOTE 103 High pressure cleaners are covered by IEC 60335-2-79.

This standard does not apply to machines that use a solid rod to clean drains.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

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

Additional definitions:

3.101

cutter

accessory that is attached to the end of the **drain cleaner cable** or is a specially formed section of the **drain cleaner cable**

3.102

drain cleaner

tool designed to clean out drains and pipes using a **drain cleaner cable** and that rests on the ground, floor or a counter top during operation

3.103

drain cleaner cable

rotating flexible **accessory** of a **drain cleaner** that is inserted into the pipe or drain

3.104

drum

cylindrical container that rotates and houses the **drain cleaner cable**

3.105

drum machine

drain cleaner that uses a **drain cleaner cable** contained in a rotating drum

Note 1 to entry: See [Figure 101](#).

3.106

guide tube

rotating tube that guides the **drain cleaner cable** from the **drum** to the front exit of a **drum machine**

3.107

rear guide hose

device connected to the rear of a **sectional machine** and which encloses a portion of the **drain cleaner cable** that extends out of the rear of the tool

3.108

sectional machine

drain cleaner that uses individual sections of the **drain cleaner cable** which are connected together to extend the overall length of the **drain cleaner cable**

Note 1 to entry: See [Figure 102](#).

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for the tests

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

5.17 *Addition:*

A **drain cleaner cable** is considered to be an **accessory** and is not included in the mass of the tool.

6 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

7 Classification

This clause of Part 1 is applicable.

8 Marking and instructions

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

8.14.1 *Addition:*

For **drain cleaners**, the additional safety instructions as specified in [8.14.1.101](#) shall be given. This part may be printed separately from the “General Power Tool Safety Warnings”.

8.14.1.1 *Addition:*

Item 2) b) is not applicable.

8.14.1.101 **Safety instructions for drain cleaners**

NOTE 1 In the below instructions, on discretion of the manufacturer the term “drain” is replaced with the term “pipe”.

a) Before using the tool, test the residual current device (RCD) provided with the supply cord to insure it is operating correctly. A properly operating RCD reduces the risk of electrical shock.

NOTE 2 It is possible to replace the term “residual current device (RCD)” with the term “ground fault circuit interrupter (GFCI)” or “earth leakage circuit breaker (ELCB)”.

b) Only use extension cords that are protected by an RCD. The RCD on the machine power cord will not prevent electrical shock from the extension cords.

NOTE 3 It is possible to replace the term “residual current device (RCD)” with the term “ground fault circuit interrupter (GFCI)” or “earth leakage circuit breaker (ELCB)”.

c) Only grasp the rotating cable with gloves recommended by the manufacturer. Latex or loose fitting gloves or rags can become wrapped around the cable and may result in serious personal injury.

d) Do not allow the cutter to stop turning while the cable is turning. This can overstress the cable and may cause twisting, kinking or breaking of the cable and may result in serious personal injury.

e) One person must control both the cable and the switch. If the cutter stops rotating, the operator must be able to turn the tool off to prevent the cable from twisting, kinking and breaking.

f) Use latex or rubber gloves inside the gloves recommended by the manufacturer, goggles, face shields, protective clothing, and respirator when chemicals, bacteria or other toxic or infectious substances are suspected to be in a drain line. Drains may contain chemicals, bacteria and other substances that may cause burns, be toxic or infectious or may result in other serious personal injury.

g) Practice good hygiene. Do not eat or smoke while handling or operating the tool. After handling or operating drain cleaning equipment, use hot, soapy water to wash hands and other body parts exposed to drain contents. This will help reduce the risk of health hazards due to exposure to toxic or infectious material.

h) Only use the drain cleaner for the recommended drain sizes. Using the wrong size drain cleaner can lead to twisting, kinking or breaking of the cable and may result in personal injury.

i) Always use the rear guide hose while operating the tool and ensure the cable does not extend beyond the rear guide hose. This prevents the cable from whipping which may result in entanglement and personal injury.

NOTE 4 The above warning only applies for **sectional machines**.

8.14.2 a) *Additional items:*

101) Information on the permitted length(s) and diameter(s) of the **drain cleaner cable** or **drain cleaner cable** sections;

102) Instruction on how to install the **drain cleaner cable**;

103) For **sectional machines**: instruction on how to install the **rear guide hose**;

104) Information on recommended **drain cleaner cable** diameters for different pipe diameters.

8.14.2 b) *Additional items*:

101) Information on the correct gloves to wear during operation;

102) Information on the distance the **drain cleaner** is to be placed from the drain or pipe opening.

103) Instruction on **drain cleaner cable** feed and rotation.

8.14.2 c) *Additional items*:

101) Instruction on how to inspect and maintain the **drain cleaner cable**.

9 Protection against access to live parts

This clause of Part 1 is applicable.

10 Starting

This clause of Part 1 is applicable.

11 Input and current

This clause of Part 1 is applicable.

12 Heating

This clause of Part 1 is applicable.

13 Resistance to heat and fire

This clause of Part 1 is applicable.

14 Moisture resistance

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

14.5 *Replacement*:

A **residual current device** used to provide protection from shock in the case of moisture shall comply with IEC 61540:1999 and shall meet the following requirements a) to c):

1) The **RCD** shall disconnect both mains conductors, but not the earth conductor if provided, when the leakage exceeds 10 mA and with a maximum response of 300 ms.

Compliance is checked by inspection and the test of 9.9.2 of IEC 61540:1999. In addition, during the test, the earthing conductor shall not become disconnected.

2) The **RCD** shall be reliable for its intended use.

Compliance is checked at **rated voltage** by operating the **residual current device** under conditions of simulated leakage as in a) above during conditions of locked rotor of the tool for 50 cycles. The **residual current device** shall operate correctly for all cycles.

3) The **RCD** shall be installed such that it is unlikely to be removed during use or normal maintenance.

This requirement is considered fulfilled if the **residual current device** is fixed to the tool or the **supply cord** connected to the tool.

Where fitted in the **supply cord**, the **residual current device** shall be provided with **type Y attachment** or **type Z attachment** for connection with the **supply cord** and **interconnection cord**.

Compliance is checked by inspection.

15 Resistance to rusting

This clause of Part 1 is applicable.

16 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

17 Endurance

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

17.101 The device for sectional machines as required in [21.18.2.1](#) shall have sufficient endurance for safe operation.

Compliance is checked by the following test.

The **sectional machine** is fitted with the longest **drain cleaner cable** section of the largest diameter permitted in accordance with [8.14.2](#) a) 101). The tool is switched on.

For the endurance test, the device is actuated with the minimum required force to rotate the **drain cleaner cable** section and then released until the **drain cleaner cable** section rotation has completely stopped. This actuation and release is repeated for 10 000 cycles or until the device fails to rotate the **drain cleaner cable** section, whichever occurs first. During the test, any **user maintenance** to ensure the correct operation of the device is allowed.

During the test, the **drain cleaner cable** section shall always stop rotating when the device is released.

18 Abnormal operation

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

18.8 Replacement of [Table 4](#):

Table 4
Required performance levels

Type and purpose of SCF	Minimum performance level (PL)
Power switch – prevent unwanted switch-on for drain cleaners with a clutch that disengages the output from the motor	Not an SCF
Power switch – prevent unwanted switch-on for other drain cleaners	a
Power switch – provide desired switch-off	a
Provide desired direction of rotation	Not an SCF
Any electronic control to pass the test of 18.3	a
Any speed limiting device	Not an SCF
Prevent exceeding thermal limits as in Clause 18	a

19 Mechanical hazards

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

19.1 Replacement of the first paragraph:

Moving and dangerous parts other than the **drain cleaner cable**, the **drum**, the **guide tube** and the drive belt, as applicable, which are covered by [19.101](#) and [19.102](#), shall be so positioned or enclosed to provide adequate protection against personal injury.

The **drain cleaner cable** shall be smooth and free from sharp edges except for the **cutter**.

19.6 This subclause is not applicable.

19.8 This subclause is applicable for **drain cleaners** with wheels.

19.101 Additional requirements for drum machines

19.101.1 The drive belt shall be guarded to provide adequate protection against personal injury.

Compliance is checked by inspection and by manual test. Using test probe 'a' of [Figure 104](#), it shall not be possible to touch the inner surface of the drive belt, see [Figure 103](#).

19.101.2 Any part of a **guide tube** or a **guide tube** assembly, if any, that is outside of the drum shall be smooth, free of burrs and shall not have any openings larger than 12,5 mm.

*Compliance is checked by inspection and by manual test using the test probe 2 of IEC 61032:1997 (12,5 mm sphere). The test probe shall not pass through any opening in the **guide tube** or **guide tube** assembly that is outside of the **drum** or **guard**.*

19.101.3 Either the **drum** shall not be accessible or all of the following conditions shall be met, see [Figure 105](#):

– the outer circumference of the **drum** has a smooth continuous surface without any openings; however openings in the front of the **drum** are allowed;

- there is at least a 12,5 mm radial distance between the **drum** and any stationary member of the tool other than the **guard** per [19.101.1](#);
- if the rear plane of the **drum** is accessible, the rear of the **drum** or any component protruding from the rear of the **drum** is at least 12,5 mm away from any stationary member of the tool;
- any protrusions from or indentations in the front or rear plane of the **drum** are smooth and free of burrs;
- any protrusions from or indentations in the front or rear plane of the **drum** do not have an acute angle in the forward direction of rotation in accordance with [8.14.2.b](#)) 103).

*Compliance is checked by inspection, by measurement and by manual test. Accessibility is checked by using the test probe 'a' of [Figure 104](#). The 12,5 mm distance is checked by using the test probe 2 of IEC 61032:1997 which shall pass freely between the **drum** and any stationary member.*

19.102 Additional requirements for sectional machines

19.102.1 A **sectional machine** shall be provided with a **rear guide hose**. The removal of the **rear guide hose** without the aid of a tool is permitted.

19.102.2 The **rear guide hose** shall be long enough to protect the entire portion of the **drain cleaner cable** that extends past the rear of the tool.

Compliance is checked by the following test.

*With the longest single section of the **drain cleaner cable** in accordance with [8.14.2 a](#)) 101) extending out the front of the tool equal to the recommended distance from the drain or pipe opening according to [8.14.2 b](#)) 102), the end of the **drain cleaner cable** section shall not extend past the end of the **rear guide hose**.*

20 Mechanical strength

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

20.5 This subclause is not applicable.

21 Construction

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

21.15 *Replacement:*

Drain cleaners shall protect the user against the increased risk of shock due to the presence of moisture.

Drain cleaners shall be either:

- of **class III construction**; or
- of **class I construction** or **class II construction** and be provided with a **residual current device** and comply with [14.5](#); or
- of **class I construction** or **class II construction** and be designed for use in combination with an isolating transformer.

Compliance is checked by inspection.

21.17 Replacement:

Drain cleaners shall be fitted with a **power switch** which is not a **momentary power switch**. The actuating member of this switch shall be easily accessible. A **power switch** that controls rotation of the **drain cleaner cable** in the reverse direction in accordance with [8.14.2 b\) 103](#)) may be a **momentary power switch**.

Compliance is checked by inspection.

21.18.2.1 Replacement:

In addition to the **power switch** required in [21.17](#), **drum machines** shall be fitted with a foot switch which is a **momentary power switch** without a lock-on device. It shall be necessary that both the **power switch** and the foot switch are in the “on” position in order to operate the machine.

In addition to the **power switch** required in [21.17](#), **sectional machines** shall be provided with a device that requires constant actuation applied by the operator to rotate the **drain cleaner cable**.

NOTE 101 The endurance requirements of the device are covered in [17.101](#).

Compliance is checked by inspection.

21.18.2.3 Replacement:

A **drain cleaner** shall be designed so that unintentional movement of the **drain cleaner cable** is unlikely.

It shall not be possible to simultaneously actuate the foot switch/mechanical device required by [21.18.2.1](#) and the **power switch** required by [21.17](#) with a single grasping or a straight line motion.

Compliance is checked by inspection and by manual test.

21.30 This subclause is not applicable.

21.101 A **drain cleaner cable** locking mechanism that rotates with the cable shall be smooth and free from burrs. To prevent entanglement, protrusions shall

- not exceed 12 mm radially; and
- not have an acute angle in the forward direction of rotation.

*Compliance is checked by inspection and by measurement with the locking mechanism fully tightened with the largest **drain cleaner cable** installed in accordance with [8.14.2 b\) 102](#)). See [Figure 106](#).*

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

This clause of Part 1 is applicable.

24 Supply connection and external flexible cords

This clause of Part 1 is applicable.

25 Terminals for external conductors

This clause of Part 1 is applicable.

26 Provision for earthing

This clause of Part 1 is applicable.

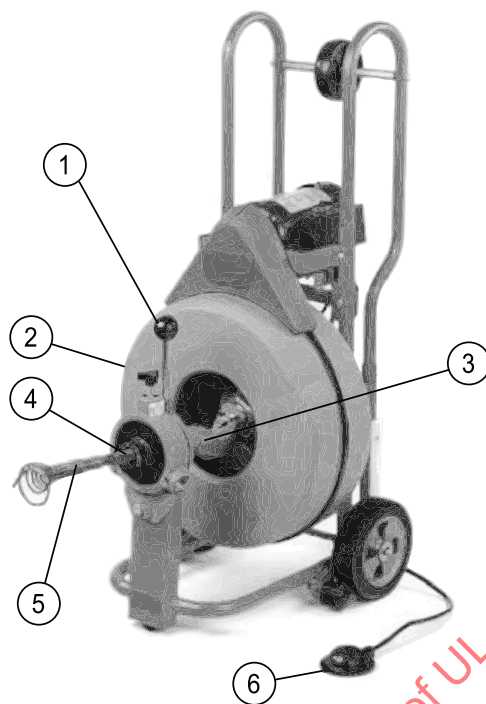
27 Screws and connections

This clause of Part 1 is applicable.

28 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.

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IEC

Key

- 1 cable feed handle
- 2 drum
- 3 guide tube
- 4 drain cleaner cable
- 5 cutter
- 6 foot switch

Figure 101
Drum machine



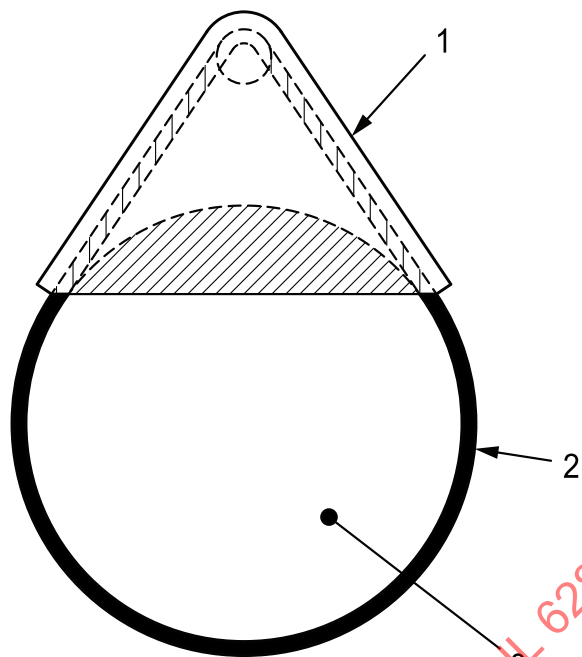
su3353

IEC

Key

- 1 drain cleaner cable
- 2 clutch handle
- 3 rear guide hose
- 4 cutter
- 5 switch

Figure 102
Sectional machine

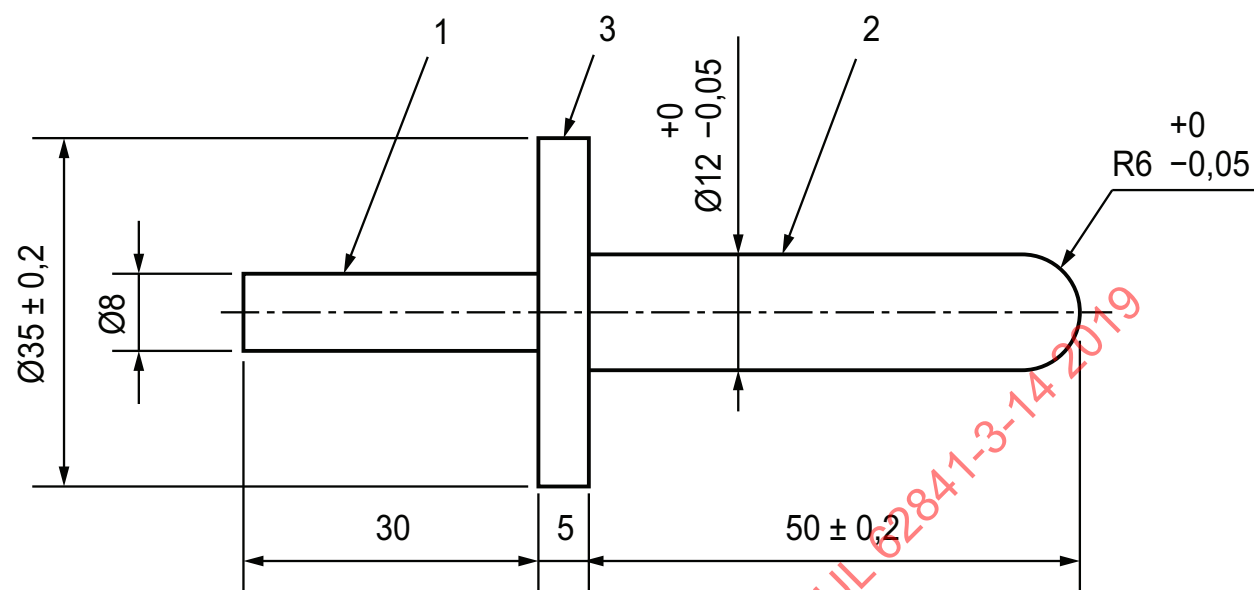


su3354

IEC

Key
1 guard
2 drive belt
3 drum

Figure 103
Guarding of drum machines

Dimensions in millimeters

su3355

IEC

Key

- 1 handle section
- 2 test section
- 3 probe's flange

Figure 104
Test probe 'a'