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CONSOLIDATED VERSION

INTERNATIONAL STANDARD

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Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety –
Part 2-21: Particular requirements for hand-held drain cleaners

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –

Part 2-21: Particular requirements for hand-held drain cleaners

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International Standard IEC 62841-2-21 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

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

This Part 2-21 is to be used in conjunction with the first edition of IEC 62841-1 (2014).

This Part 2-21 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC standard: Particular requirements for hand-held drain cleaners.

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ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –

Part 2-21: Particular requirements for hand-held drain cleaners

1 Scope

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

Addition:

This part of IEC 62841 applies to hand-held **drain cleaners**.

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

This standard does not apply to transportable **drain cleaners**.

NOTE 102 Transportable **drain cleaners** will be covered by a future part of IEC 62841-3.

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**

Note 1 to entry: See Figure 101.

3.102
drain cleaner
tool designed to clean out drains and pipes with a rotating **drain cleaner cable** that is either fed manually or with an automatic feed mechanism

Note 1 to entry: See Figure 101.

3.103
drain cleaner cable
flexible **accessory** of a **drain cleaner** that is inserted into the pipe or drain

Note 1 to entry: See Figure 101.

3.104
drum
cylindrical container that rotates and houses the **drain cleaner cable**

Note 1 to entry: See Figure 101.

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 In the instructions below, at the 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 ensure it is operating correctly.** *A properly operating RCD reduces the risk of electrical shock.*

NOTE 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 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) **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.*

f) **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.*

g) **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.*

8.14.2 a) *Additional items:*

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

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

103) 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.

8.14.2 c) *Additional item:*

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):

a) 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 61540:1997. In addition, during the test, the earthing conductor shall not become disconnected.

b) 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.*

c) 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 power **supply cord** connected to the tool.

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.

18 Abnormal operation

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

18.8.1 *Replacement of Table 4:*

Table 4 – Required performance levels

Type and purpose of SCF	Minimum performance level (PL)
Power switch – prevent unwanted switch-on	a
Power switch – provide desired switch-off	a
Provide desired direction of rotation	a
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~~ 18.4 and 18.5.3	a

19 Mechanical hazards

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

19.1 *Replacement of the first paragraph:*

Moving dangerous parts and other dangerous parts other than the **drain cleaner cable** and the **drum**, which is covered by 19.101, 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**.

19.4 *Replacement:*

Drain cleaners shall have at least two handles or grasping surfaces to ensure safe handling during use.

Compliance is checked by inspection.

19.6 This subclause is not applicable.

19.101 The **drum** shall have a continuous outer surface without any openings. Any protrusions from or indentations in the **drum** shall be smooth, free of burrs and shall not have an acute angle in the forward direction of rotation and protrusions shall not exceed 12 mm.

Compliance is checked by inspection and by measurement.

20 Mechanical strength

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

20.1 *Addition:*

Damage to the **drum**, **drum** mounting or **drain cleaner cable** feed mechanism is permitted, provided that protection against access to live parts in accordance with Clause 9 is not impaired.

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**, 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.

21.18.1.1 *Addition:*

The **power switch** shall not have any locking device to lock it in the “on” position.

21.18.1.2 This subclause is not applicable.

21.30 This subclause is not applicable.

21.35 This subclause is not applicable.

21.101 A **drain cleaner cable** locking mechanism that rotates with the **drain cleaner 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 102.*

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

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

23.3 This subclause is not 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

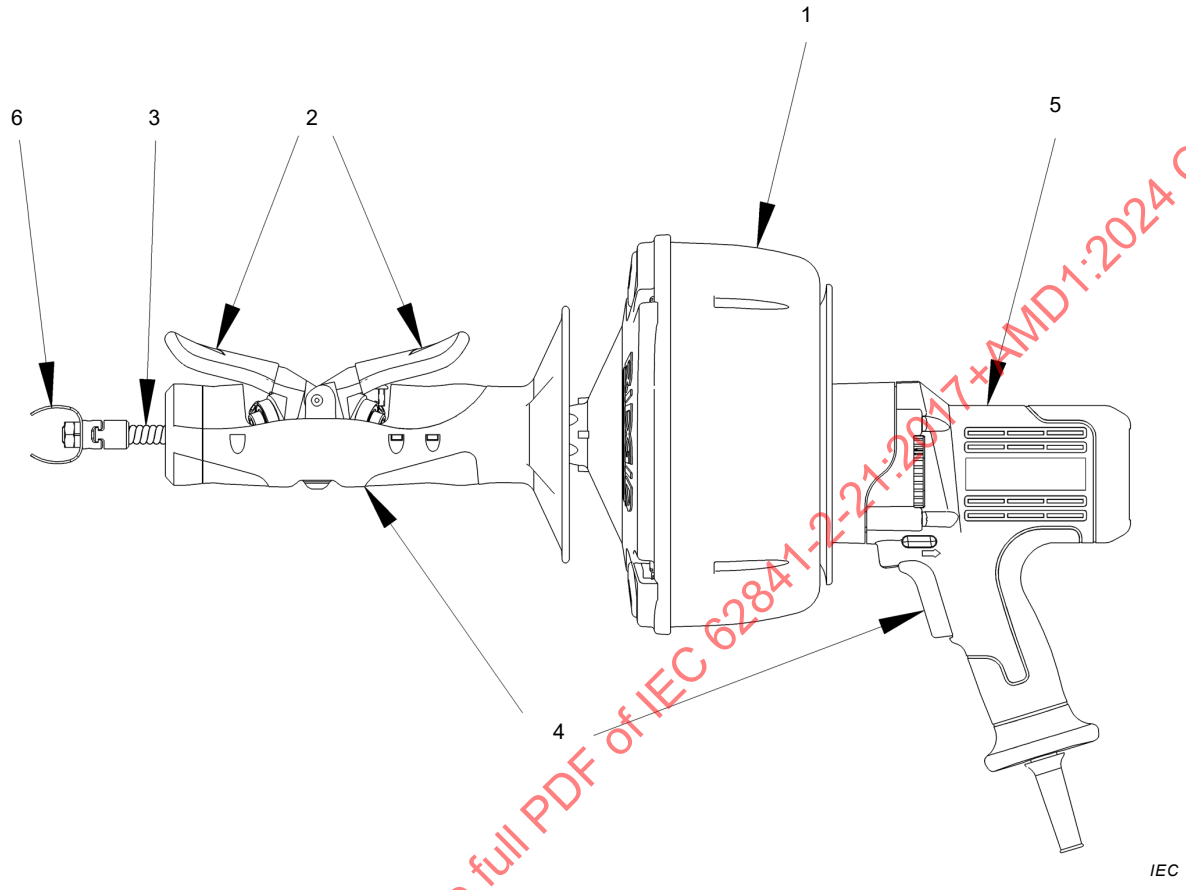
This clause of Part 1 is applicable.

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.



Key

1 **drum**

2 **drain cleaner cable** forward/reverse feed mechanism

3 **drain cleaner cable**

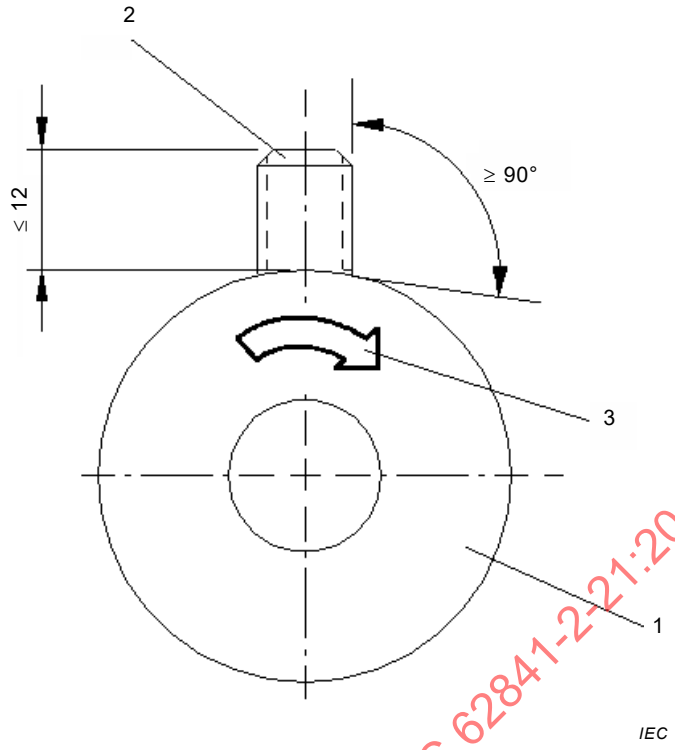
4 handle/grasping surface

5 motor

6 **cutter**

Figure 101 – Example of a drain cleaner

Dimensions in millimetres



Key

1 locking collar

2 **drain cleaner cable** locking mechanism

3 direction of rotation

Figure 102 – Locking mechanism for drain cleaner cable

Annexes

The annexes of Part 1 are applicable except as follows:

Annex I
(informative)

Measurement of noise and vibration emissions

NOTE In Europe (EN 62841-2-21), Annex I is normative.

I.2 Noise test code (grade 2)

This clause of Part 1 is applicable except as follows:

I.2.4 Installation and mounting conditions of the power tools during noise tests

Addition:

Drain cleaners are suspended in such a way as to correspond to **normal use**. They are tested without a **drain cleaner cable** installed.

I.2.5 Operating conditions

Addition:

Drain cleaners are tested at no-load. Speed settings are set to the highest speed.

The temperature requirements of 5.6 are not applicable.

I.3 Vibration

This clause of Part 1 is applicable except as follows:

I.3.3.2 Location of measurement

Addition:

Figure I.101 shows the positions for **drain cleaners**.

I.3.5.1 General

Addition:

For **battery** operated tools, the tests are conducted with the lightest **battery** in accordance with K.8.14.2 e) 2) of Part 1 that has sufficient capacity to operate the tool at no-load for at least 25 min.

I.3.5.3 Operating conditions

Addition:

Drain cleaners are tested at no-load with no **drain cleaner cable** installed. Speed settings are set to the highest speed.

The **drain cleaner** is held horizontally during the test.

I.3.6.2 Declaration of the vibration total value

Addition:

The vibration total value a_h of the handle with the highest emission and the uncertainty K shall be declared.

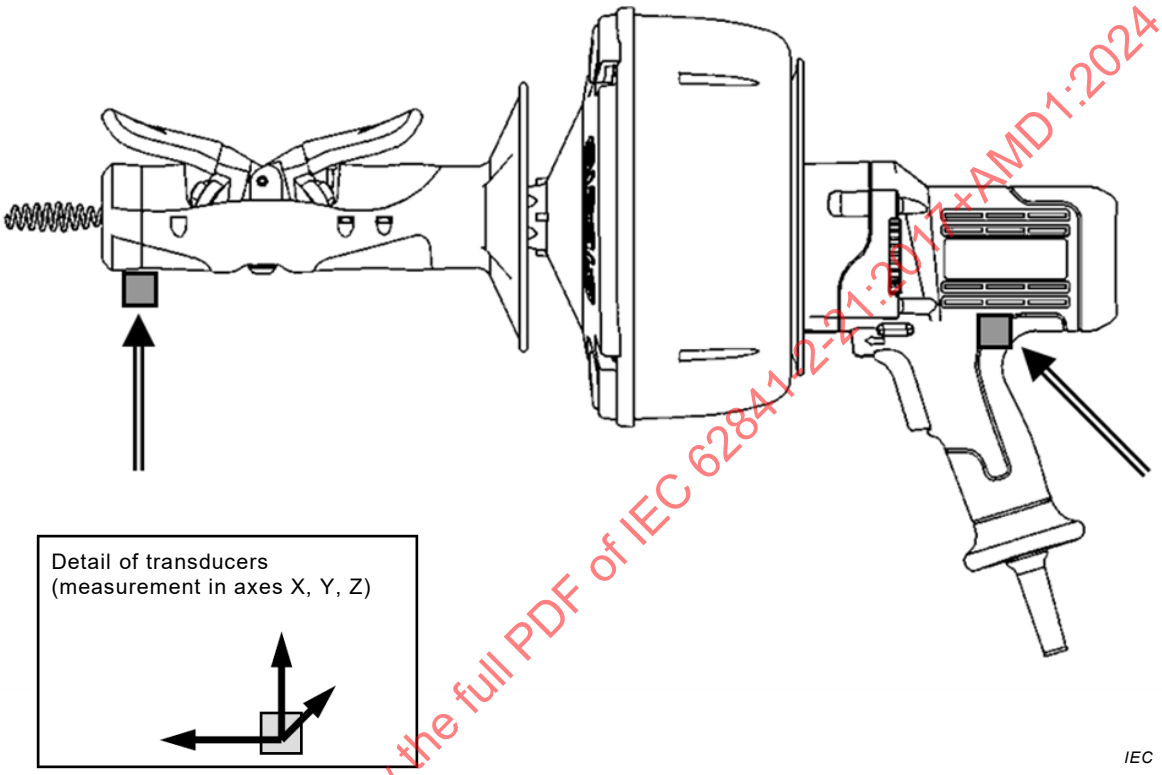


Figure I.101 – Positions of transducers for drain cleaners

Annex K
(normative)

Battery tools and battery packs

K.1 Scope

Addition:

All clauses of this Part 2-21 apply unless otherwise specified in this annex.

K.8.14.1.101 Safety instructions for drain cleaners

Items a) and b) are not applicable.

K.14.5 This subclause is not applicable.

K.21.15 This subclause is not applicable.

NOTE In Europe (EN 62841-2-21), the following additional subclause applies:

K.21.18.Z101 Isolation and disabling device

Tools with an **integral battery** shall either be equipped

– with an isolation device to prevent the risk of injury from mechanical hazards during servicing or **user maintenance**; or

– with a disabling device that prevents unintentional starting of the tool.

An isolation device shall

– provide disconnection of all poles of the **battery** from the serviceable region of the tool;

– be equipped with an unambiguous indication of the state of the disconnection device which corresponds to each position of its manual control (actuator);

– be provided with protection against accidental reconnection.

NOTE 1 Examples of methods to achieve this disconnection include removable jumpers, **integral batteries** that can be disconnected for servicing or **user maintenance**, or an electromechanical **power switch** with a direct mechanical link between the actuator and the contact.

NOTE 2 The risk of accidental reconnection for a **power switch** is addressed by the requirement of 21.18.1.2. The other examples in NOTE 1 achieve this by the necessary actions for reconnection.

A disabling device may be achieved by any of the following:

– a self-restoring or non-self-restoring lock-off device where two separate and dissimilar actions are necessary before the motor is switched on (e.g. a **power switch** which has to be pushed in before it can be moved laterally to close the contacts to start the motor). It shall not be possible to achieve these two actions with a single grasping motion or a straight line motion;

– a removable disabling device provided with the tool where it shall not be possible for the tool to be operated when either applied or removed.

Compliance is checked by inspection and by manual test.

Annex L
(normative)

Battery tools and battery packs provided with mains connection or non-isolated sources

L.1 Scope

Addition:

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NOTE In Europe (EN 62841-2-21), the following additional subclause applies:

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Bibliography

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Addition:

IEC 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*[1]

[1] Under preparation. Stage at time of publication: IEC CDV 62841-3-14:2016.

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ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –

Part 2-21: Particular requirements for hand-held drain cleaners

1 Scope

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

Addition:

This part of IEC 62841 applies to hand-held **drain cleaners**.

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

This standard does not apply to transportable **drain cleaners**.

NOTE 102 Transportable **drain cleaners** will be covered by a future part of IEC 62841-3.

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**

Note 1 to entry: See Figure 101.

3.102
drain cleaner
tool designed to clean out drains and pipes with a rotating **drain cleaner cable** that is either fed manually or with an automatic feed mechanism

Note 1 to entry: See Figure 101.

3.103
drain cleaner cable
flexible **accessory** of a **drain cleaner** that is inserted into the pipe or drain

Note 1 to entry: See Figure 101.

3.104
drum
cylindrical container that rotates and houses the **drain cleaner cable**

Note 1 to entry: See Figure 101.

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 In the instructions below, at the 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 ensure it is operating correctly.** *A properly operating RCD reduces the risk of electrical shock.*

NOTE 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 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) **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.*

f) **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.*

g) **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.*

8.14.2 a) *Additional items:*

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

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

103) 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.

8.14.2 c) *Additional item:*

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):

a) 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 61540:1997. In addition, during the test, the earthing conductor shall not become disconnected.

b) 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.*

c) 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 power **supply cord** connected to the tool.

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.

18 Abnormal operation

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

18.8.1 *Replacement of Table 4:*

Table 4 – Required performance levels

Type and purpose of SCF	Minimum performance level (PL)
Power switch – prevent unwanted switch-on	a
Power switch – provide desired switch-off	a
Provide desired direction of rotation	a
Any electronic control to pass the test of 18.3	a
Any speed limiting device	Not an **SCF**
Prevent exceeding thermal limits as in 18.4 and 18.5.3	a

19 Mechanical hazards

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

19.1 *Replacement of the first paragraph:*

Moving dangerous parts and other dangerous parts other than the **drain cleaner cable** and the **drum**, which is covered by 19.101, 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**.

19.4 *Replacement:*

Drain cleaners shall have at least two handles or grasping surfaces to ensure safe handling during use.

Compliance is checked by inspection.

19.6 This subclause is not applicable.

19.101 The **drum** shall have a continuous outer surface without any openings. Any protrusions from or indentations in the **drum** shall be smooth, free of burrs and shall not have an acute angle in the forward direction of rotation and protrusions shall not exceed 12 mm.

Compliance is checked by inspection and by measurement.

20 Mechanical strength

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

20.1 *Addition:*

Damage to the **drum**, **drum** mounting or **drain cleaner cable** feed mechanism is permitted, provided that protection against access to live parts in accordance with Clause 9 is not impaired.

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**, 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.

21.18.1.1 *Addition:*

The **power switch** shall not have any locking device to lock it in the “on” position.

21.18.1.2 This subclause is not applicable.

21.30 This subclause is not applicable.

21.35 This subclause is not applicable.

21.101 A **drain cleaner cable** locking mechanism that rotates with the **drain cleaner 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 102.*

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

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

23.3 This subclause is not 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

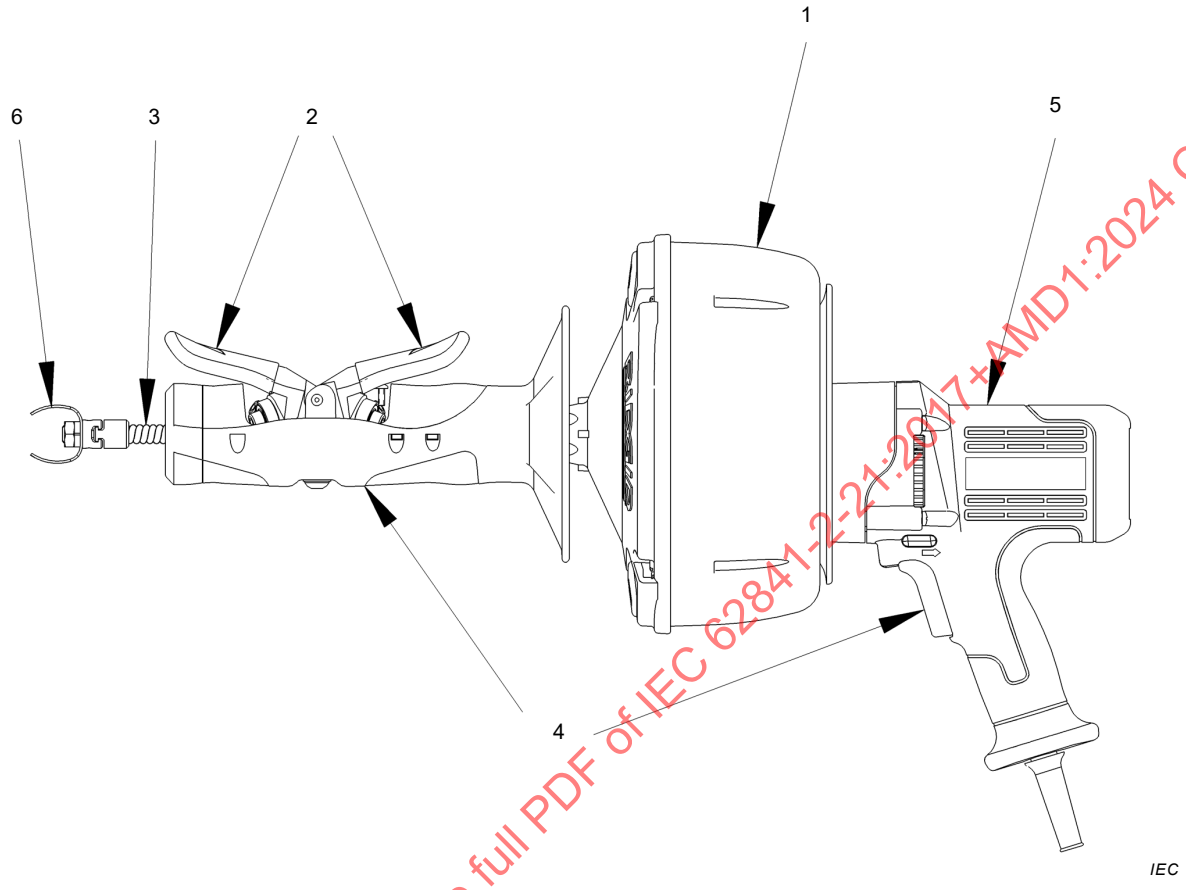
This clause of Part 1 is applicable.

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.

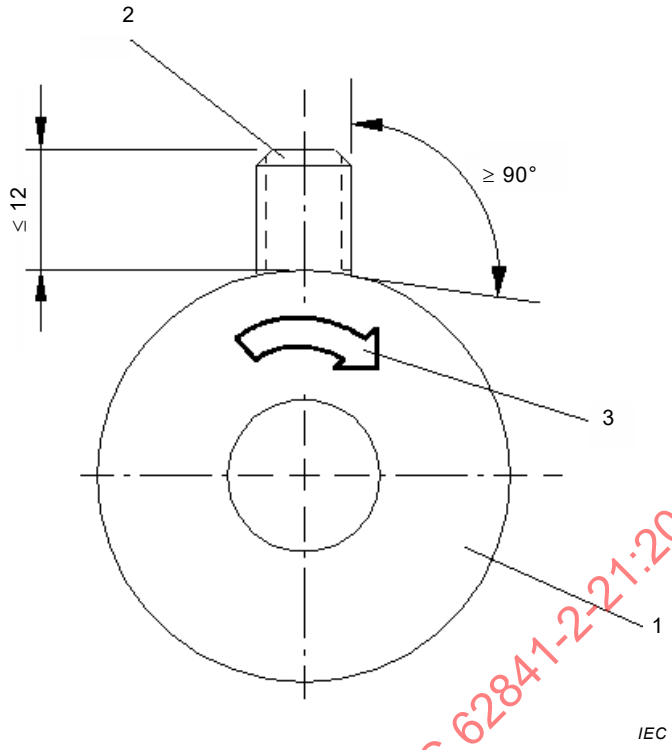


Key

1 **drum**
2 **drain cleaner cable** forward/reverse feed mechanism
3 **drain cleaner cable**
4 handle/grasping surface
5 motor
6 **cutter**

Figure 101 – Example of a drain cleaner

Dimensions in millimetres



Key

1 locking collar

2 **drain cleaner cable** locking mechanism

3 direction of rotation

Figure 102 – Locking mechanism for drain cleaner cable