UL 62841-3-13

STANDARD FOR SAFETY

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-13: Particular Requirements for Transportable Drills

UL Standard for Safety for Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-13: Particular Requirements for Transportable Drills, UL 62841-3-13

First Edition, Dated May 4, 2018

Summary of Topics

Adoption Of The First Edition Of IEC 62841-3-13, Standard For Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-13: Particular Requirements for Transportable Drills As The First Edition Of UL 62841-3-13

This standard is an adoption of IEC 62841-3-13, Edition 1, published by the IEC February 2017. Please note that the National Difference document incorporates all of the U.S. National Differences for UL 62841-3-13.

The new requirements are substantially in accordance with Proposal(s) on this subject dated August 25, 2017 and February 9, 2018.

No Text on This Page

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First Edition
(IEC 62841-3-13:2017, MOD)

Underwriters Laboratories Inc.
UL 62841-3-13
First Edition

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-13: Particular Requirements For Transportable Drills

May 4, 2018

This national standard is based on publication IEC 62841-3-13, First Edition (2017).

ANSI/UL 62841-3-13-2018

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

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This ANSI/UL Standard for Safety consists of the First Edition. The most recent designation of ANSI/UL 62841-3-13 as an American National Standard (ANSI) occurred on May 4, 2018. The ANSI approval for this standard does not include the Cover Page, Transmittal Pages, Title Page, Preface Page, National Difference Page or IEC Foreword.

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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 3-13: Particular Requirements for Transportable Drills. It is the First edition of CAN/CSA-C22.2 No. 62841-3-13 and the First edition of UL 62841-3-13.

This harmonized standard is based on IEC Publication 62841-3-13: First edition Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-13: Particular Requirements for Transportable Drills, issued February 2017. IEC 62841-3-13 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.

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

Application of Standard

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

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

CAN/CSA-C22.2 No. 62841-3-13 is to be used in conjunction with the First edition of CAN/CSA-C22.2 No. 62841-1. The requirements for transportable drills 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 CAN/CSA-C22.2 No. 62841-3-13, the CAN/CSA-C22.2 No. 62841-1 subclause applies.

UL 62841-3-13 is to be used in conjunction with the First edition of UL 62841-1. The requirements for transportable drills 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 62841-3-13, the UL 62841-1 subclause applies.

Level of harmonization

This standard adopts the IEC text with national differences.

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

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

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

Reasons for Differences From IEC

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 IEC 62841-3-13 Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-13: Particular Requirements for Transportable Drills, 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.

NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication 62841-3-13, Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 3-13: Particular Requirements for Transportable Drills, 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.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – PART 3-13: PARTICULAR REQUIREMENTS FOR TRANSPORTABLE DRILLS

FOREWORD

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

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

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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 62841-3-13 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
116/309/FDIS	116/315/RVD

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

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

This Part 3-13 is to be used in conjunction with the first edition of IEC 62841-1 (2014).

This Part 3-13 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for transportable drills.

Where a particular subclause of Part 1 is not mentioned in this Part 3-13, 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.

The terms defined in Clause 3 are printed in **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 publication will remain unchanged until the stability date indicated on the IEC website under ″http://webstore.iec.ch″ in the data related to the specific publication. At this date, the publication will be

• reconfirmed,

• withdrawn,

• replaced by a revised edition, or

• amended.

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.

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – PART 3-13: PARTICULAR REQUIREMENTS FOR TRANSPORTABLE DRILLS

1 Scope

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

Addition:

This part of IEC 62841 applies to transportable **drills**, with manually fed axial movement of the spindle, having a maximum chuck capacity of 13 mm.

NOTE 101 Transportable **drills** are also known as bench **drills** or **drill** presses.

This part of IEC 62841 does not apply to stationary **drilling** machines.

This part of IEC 62841 does not apply to radial arm **drills**.

This part of IEC 62841 does not apply to magnetic **drill** stands and **drill** motors.

NOTE 102 Magnetic **drill** stands and **drill** motors will be covered by a future part of IEC 62841-3.

NOTE 103 In Europe (EN 62841-3-13), the following conditions apply:

Radial arm **drills** and stationary drilling machines are covered by EN 12717.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

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

3.2 **accessory:** *Addition:*

Note 1 to entry: Typical accessories for drills are bits for drilling and deburring.

3.101 **drill:** tool equipped with a typical three jaw chuck specifically designed to bore holes in various materials such as metal, plastics, wood, etc., consisting of a **drill unit** and a **drill stand**, see Figure 101.

Note 1 to entry: The drill unit or the chuck is manually moved up and down by a means such as a hand wheel or lever.

3.102 **drill unit:** device consisting of a motor and the chuck

3.103 **drill stand:** device for supporting the **drill unit** in its operating position, consisting of a base plate, a **workpiece support** and a vertical column to which the **drill unit** is mounted

3.104 **rest position:** position of a **drill unit** on the column of the **drill stand** from where it is moved downwards onto the workpiece

Note 1 to entry: Some drill units have an adjustable rest position.

3.105 **workpiece support:** device for supporting the workpiece during drilling that is typically mounted to the column and typically adjustable in height

Note 1 to entry: For some drills, the base plate is used as a workpiece support.

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:*

*The mass of the tool shall include the **drill unit** including the **drill** chuck, even if removable, and the **drill stand** including the **workpiece support**. A fence or a workpiece vice, if any, 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:

8.1 *Addition:*

Drills shall be marked with the **rated no-load speed** of the output spindle.

NOTE 101 The **rated no-load speed** is checked by 19.6.

In addition, tools designed for operation at more than one speed setting shall be marked in such a way that it is clear which typical speed corresponds with each of the settings. For variable speed settings, marking of the typical minimum and maximum speed is sufficient.

NOTE 102 The above additional speed markings are not considered to be markings of the rated no-load speed.

8.1.1 This subclause is not applicable for speed markings as required by 8.1.

8.3 *Addition:*

Chucks of **drills** shall be marked with the maximum capacity of the chuck.

8.14.1 *Addition:*

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".

8.14.1.101 **Safety instructions for transportable drills**

Drill safety warnings

a) **The drill must be secured.** *A drill that is not properly secured may move or tip over and may result in personal injury.*

b) **The workpiece must be clamped or secured to the workpiece support. Do not drill pieces that are too small to be clamped securely.** *Holding the workpiece by hand during operation may result in personal injury.*

c) **Do not wear gloves.** *Gloves may be entangled by the rotating parts or chips leading to personal injury.*

d) **Keep your hands out of the drilling area while the tool is running.** *Contact with rotating parts or chips may result in personal injury.*

e) **Make sure the accessory rotating before feeding into the workpiece.** *Otherwise the accessory may become jammed in the workpiece causing unexpected movement of the workpiece and personal injury.*

f) **When the accessory is jammed, stop applying downward pressure and switch off the tool. Investigate and take corrective actions to eliminate the cause of the jam.** *Jamming can cause unexpected movement of the workpiece and personal injury.*

g) **Avoid generating long chips by regularly interrupting downward pressure.** *Sharp metal chips may cause entanglement and personal injuries.*

h) **Never remove chips from the drilling area while the tool is running. To remove chips, move the accessory away from the workpiece, switch off the tool and wait for the accessory to stop moving. Use tools such as a brush or hook to remove chips.** *Contact with rotating parts or chips may result in personal injury.*

i) **Accessories with speed ratings must be rated at least equal to the maximum speed marked on the power tool.** *Accessories running faster than their rated speed can break and fly apart.*

8.14.2 b) *Addition:*

101) Information about which **drill** chucks may be used with the tool and instruction on how to fit it;

102) Instruction on how to change speed settings;

103) Instruction how to secure the workpiece, including additional supports for overhanging workpieces.

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, except as follows:

12.5 *Addition:*

The temperature-rise limit specified for the external enclosure does not apply to external surfaces which are unlikely to be inadvertently contacted during use.

External surfaces are regarded as unlikely to be inadvertently contacted if they are located

*– a minimum of 300 mm from the chuck and the **power switch**; and*

*– on the rear of the column of the **drill stand** in relation to the operator.*

13 Resistance to heat and fire

This clause of Part 1 is applicable.

14 Moisture resistance

This clause of Part 1 is applicable.

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 *Replacement of Table 4:*

Table 4 – Required performance levels

Type and purpose of SCF	Minimum performance level (PL)
power switch – prevent unwanted switch-on	b
power switch – provide desired switch-off	b
Any electronic control to pass the test of 18.3	a
Prevent output speed from exceeding 130 % of **rated no-load speed** without **accessories** mounted	a
Provide desired direction of rotation	Not an SCF
Prevent exceeding thermal limits as in Clause 18	a
Prevent self-resetting as required in 23.3	b
Provide run-down time as required by 19.103	a
Stopping as required by 19.104	a
Restart prevention as required by 19.104	b

NOTE In Europe (EN 62841-3-13), the following additional requirement applies:

Restart prevention as required by 21.18.2.1	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 rotating **drill** chuck and **accessory** shall be so arranged or enclosed that adequate protection against injury is provided. The guarding of the rotating **drill** chuck is covered in 19.101.

19.7.101 **Drills** shall be provided with means to facilitate the fixing of the tool to a bench, e.g. by providing holes in the base plate of the tool.

Compliance is checked by inspection.

19.101 To minimise the risk of entanglement, **drill** chucks shall either be:

– of substantially round shape free of sharp corners, edges and protrusions that are likely to cause injury in the case of accidental contact with the rotating perimeter of the **drill** chuck. Gripping surfaces on the **drill** chuck such as knurls or grooves and the teeth provided for chuck key adjustment are not regarded as protrusions;

Compliance is checked by inspection.

or

– protected with a **fixed guard** or a combination of **fixed guard** and **adjustable guard** to prevent accidental contact with the **drill** chuck at least from the front and from the sides.

*Compliance is checked by applying the test probe of Figure 102 while the **guard** is adjusted to cover the **drill** chuck. While the **drill unit** is in its **rest position**, the test probe is held horizontally and approached to the **drill** chuck from the front and the sides over a total angle of 180° (see Figure 103) with a force not exceeding 5 N. It shall not be possible to contact the **drill** chuck with the test probe.*

19.102 The **drill unit**, when released by the operator, shall automatically return to its **rest position**.

Compliance is checked by the following test.

*The **drill unit** is fitted with the largest **drill** chuck available in accordance with 8.14.2 b) 101) and a steel rod with a diameter equal to the maximum capacity of the chuck and a length of either:*

– 15 times the maximum capacity of the chuck; or

*– 0,8 times the maximum length that can be mounted on the **drill unit**,*

whichever is smaller.

***Drill units** with an adjustable **rest position** are adjusted to their uppermost **rest position**.*

*The **drill unit** is moved from its uppermost **rest position** to its fully down position and released. The **drill unit** shall return to the uppermost **rest position** within 10 s.*

19.103 **Run-down time**

The run-down time of the **drill** spindle shall not exceed 10 s after switching off the motor.

Compliance is checked by inspection and by the following test.

*A steel rod as specified in 19.102 is mounted to the **drill unit**. The tool motor is switched on for a minimum of 30 s, then switched off. The run-down time is measured. The test is conducted ten times. For each test, the run-down time shall not exceed 10 s.*

19.104 **Guards** that are required to be opened for the purpose of adjusting speed as identified in 8.14.2 b) 102) shall not require the use of a tool and shall remain attached to the main part of the tool when open.

Hazardous moving parts and the **drill** chuck shall stop within 10 s when the **guard** is opened and shall not restart automatically when the **guard** is closed.

Compliance is checked by inspection and by measurement.

19.105 Chuck keys shall be so designed that they drop easily out of position when released. This requirement does not exclude the provision of clips for holding the key in place when not in use; metal clips fixed to the flexible cable or cord are not allowed.

Compliance is checked by inspection and by manual test.

The key is inserted in the chuck and then released without tightening. The key shall fall out within 10 s.

20 Mechanical strength

This clause of Part 1 is applicable except as follows:

20.3.2 *Addition:*

*This test is not applicable to the **guard** as required in 19.101.*

20.3.101 The **guard** required in 19.101 shall have sufficient strength against displacement and deformation.

Compliance is checked by the following test.

*A force of 20 N is applied to any point on the **guard** perpendicular to the axis of rotation of the **drill** chuck. The **guard** shall not be:*

– damaged in such a way as to impair compliance with 19.101;

– separated from the tool;

*– displaced or deformed such that it contacts the **drill** chuck.*

20.5 This subclause is not applicable.

20.101 Means for transportation of **drills** as required by 19.4 and as identified in accordance with 8.14.2 b) 8), except for motor housings, shall be of adequate strength to safely transport the tool.

Compliance is checked by inspection and the following test.

Carrying means are subjected to a force corresponding to three times the weight of the equipment but not more than 600 N per carrying means. The force is applied in the direction of lifting uniformly over a 70 mm width at the centre of the carrying means. The force is steadily increased so that the test value is attained within 10 s and maintained for a period of 1 min.

If more than one carrying means is provided, the force is distributed between the carrying means in the same proportion as in the normal transportation position. If the equipment is provided with more than one carrying means, but so designed that it may readily be carried by only one carrying means, each carrying means shall be capable of sustaining the total force.

The carrying means shall not break loose from the equipment and there shall not be any permanent distortion, cracking or other evidence of failure.

21 Construction

This clause of Part 1 is applicable except as follows:

21.18.2.1 This subclause is not applicable.

NOTE In Europe (EN 62841-3-13), this subclause of Part 1 is applicable and the following requirement applies:

The tool shall not restart after an interruption of the mains supply without releasing and re-actuating the **power switch**.

21.18.2.1DV D2 ***Modification: Replace Clause 21.18.2.1 with the following:***

This subclause of the Part 1 is applicable, except as follows:

The tool shall not restart after an interruption of the mains supply without releasing and re-actuating the power switch unless the tool is equipped with a momentary power switch, which cannot be locked in the "on" position.

21.30 This subclause is not applicable.

21.35 *Replacement:*

Connection ports for external dust collection equipment, if any, shall be directed away from the operator.

Compliance is checked by inspection.

21.101 The **workpiece support** shall be equipped with facilities to securely affix the workpiece or a workpiece vice to it.

Compliance is checked by inspection.

NOTE Examples of such facilities are mounting holes and T-slots.

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

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

23.3 Addition:

Protection devices (e.g. overload or over-temperature protection devices) or circuits that switch off the **drill** shall be of the non-self-resetting type.

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.

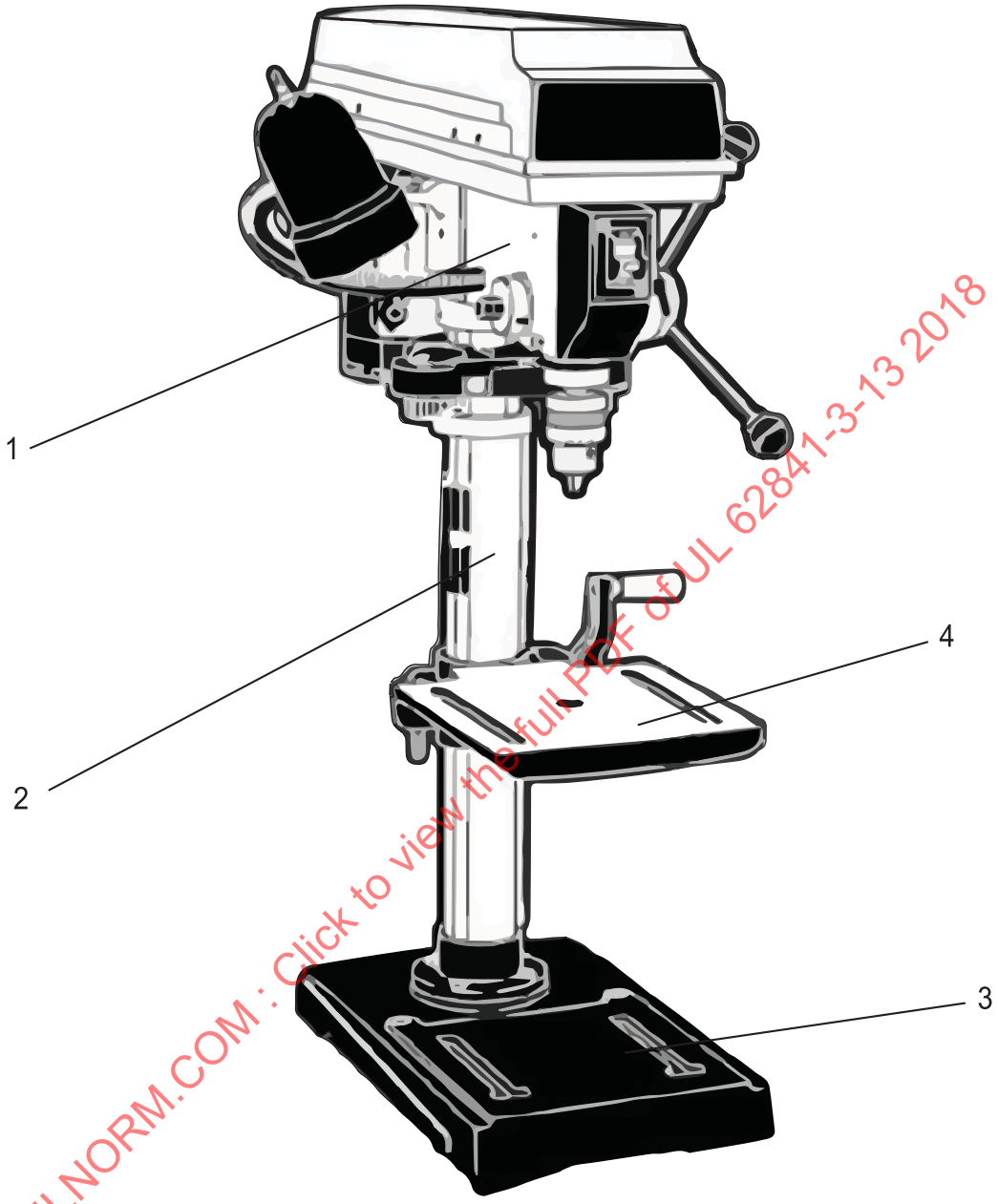
27 Screws and connections

This clause of Part 1 is applicable.

28 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.

Figure 101 (a) – Examples of drill designs
Example 1



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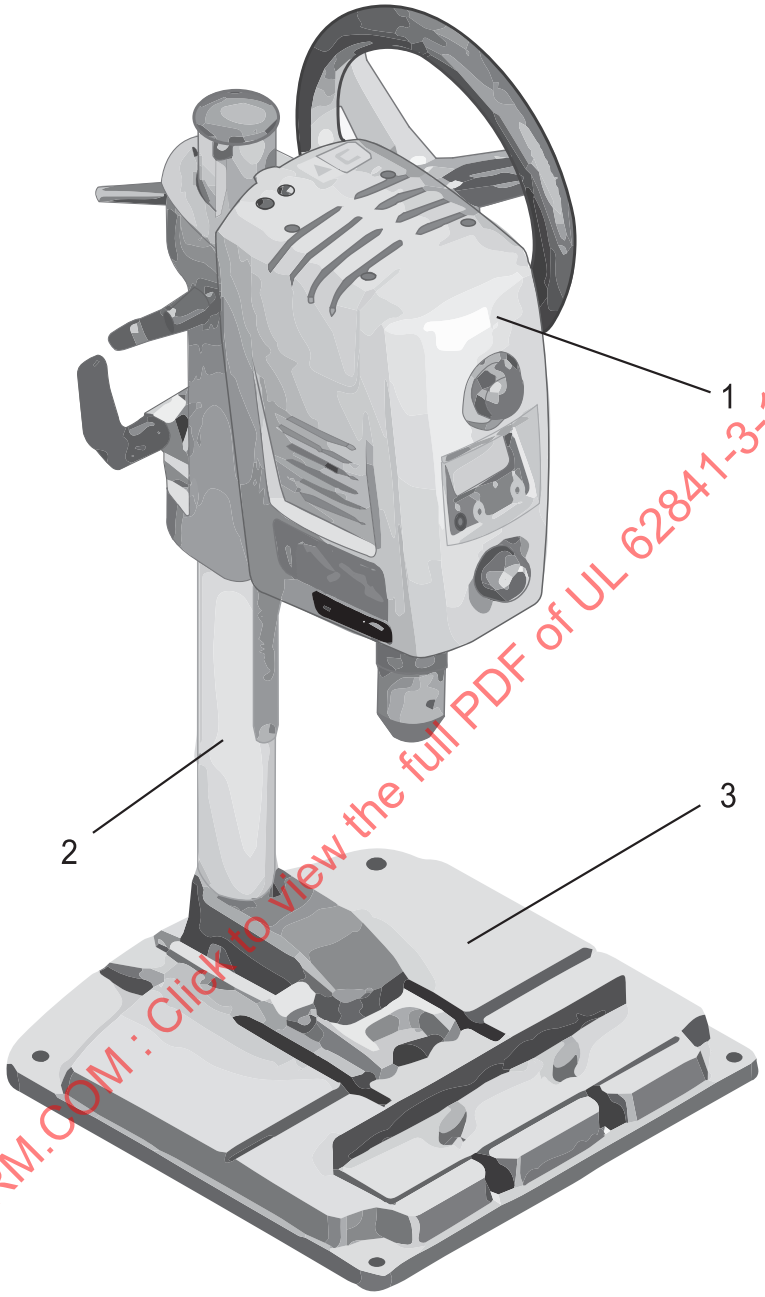
Key
1 **drill unit**
2 column
3 base plate
4 **workpiece support**

Figure 101 (b)– Examples of drill designs
Example 2



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Key
1 **drill unit**
2 column
3 base plate
4 **workpiece support**