



DPC: 22/30448531 DC

**BSI Group Headquarters**

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 14 February 2022

Origin: European

**Latest date for receipt of comments: 30 March 2022**

Project No. 2021/03393

Responsible committee: CPL/116 Safety of motor-operated electric tools

Interested committees:

Title: Draft BS EN 62841-2-22 Ed.1.0 Electric motor-operated hand-held tools; transportable tools and lawn and garden machinery - Safety. Part 2-22: Particular requirements for hand-held cut-off machines.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

**WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 30 March 2022**

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email [cservices@bsigroup.com](mailto:cservices@bsigroup.com). British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

Responsible Committee Secretary: Jasnam Channe (BSI)

Direct tel:

E-mail: [jasnam.channe@bsigroup.com](mailto:jasnam.channe@bsigroup.com)

Full document details: 22/30448531 DC

## Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

## UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

## Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

## Template for comments and secretariat observations

|                  |                        |
|------------------|------------------------|
| Date: xx/xx/20xx | Document: ISO/DIS xxxx |
|------------------|------------------------|

| 1  | 2                                          | (3)                          | 4               | 5                                                                                                                                  | (6)                                                                      | 7                                                  |
|----|--------------------------------------------|------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------|
| MB | Clause No./ Subclause No./Annex (e.g. 3.1) | Paragraph/ Figure/Table/Note | Type of comment | Comment (justification for change) by the MB                                                                                       | Proposed change by the MB                                                | Secretariat observations on each comment submitted |
|    | 3.1                                        | Definition 1                 | ed              | Definition is ambiguous and needs clarifying.                                                                                      | Amend to read '...so that the mains connector to which no connection...' |                                                    |
|    | 6.4                                        | Paragraph 2                  | te              | The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK. | Delete reference to UV photometer.                                       |                                                    |



# 116/568/CDV

## COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

**IEC 62841-2-22 ED1**

DATE OF CIRCULATION:

**2022-02-04**

CLOSING DATE FOR VOTING:

**2022-04-29**

SUPERSEDES DOCUMENTS:

**116/529/NP, 116/542/RVN**

|                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEC TC 116 : SAFETY OF MOTOR-OPERATED ELECTRIC TOOLS                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                           |
| SECRETARIAT:<br>United States of America                                                                                                                                                                                                                                                                                                                                                    | SECRETARY:<br>Mr Joseph Harding                                                                                                                           |
| OF INTEREST TO THE FOLLOWING COMMITTEES:                                                                                                                                                                                                                                                                                                                                                    | PROPOSED HORIZONTAL STANDARD:<br><input type="checkbox"/><br>Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary. |
| FUNCTIONS CONCERNED:<br><input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input checked="" type="checkbox"/> SAFETY                                                                                                                                                                                                             |                                                                                                                                                           |
| <input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING<br><br><b>Attention IEC-CENELEC parallel voting</b><br><br>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.<br><br>The CENELEC members are invited to vote through the CENELEC online voting system. | <input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING                                                                                        |

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

**Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery - Safety - Part 2-22: Particular requirements for hand-held cut-off machines**

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

**Copyright © 2021 International Electrotechnical Commission, IEC.** All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

**Documents**  
**AVA** Document Sharing Hub

# CONTENTS

|    |                                                                                           |    |
|----|-------------------------------------------------------------------------------------------|----|
| 1  |                                                                                           |    |
| 2  | FOREWORD.....                                                                             | 4  |
| 3  | 1 Scope.....                                                                              | 6  |
| 4  | 2 Normative references .....                                                              | 6  |
| 5  | 3 Terms and definitions .....                                                             | 6  |
| 6  | 4 General requirements .....                                                              | 8  |
| 7  | 5 General conditions for the tests.....                                                   | 8  |
| 8  | 6 Radiation, toxicity and similar hazards .....                                           | 8  |
| 9  | 7 Classification.....                                                                     | 8  |
| 10 | 8 Marking and instructions .....                                                          | 8  |
| 11 | 9 Protection against access to live parts .....                                           | 13 |
| 12 | 10 Starting .....                                                                         | 13 |
| 13 | 11 Input and current .....                                                                | 13 |
| 14 | 12 Heating .....                                                                          | 13 |
| 15 | 13 Resistance to heat and fire .....                                                      | 13 |
| 16 | 14 Moisture resistance .....                                                              | 13 |
| 17 | 15 Resistance to rusting .....                                                            | 13 |
| 18 | 16 Overload protection of transformers and associated circuits.....                       | 13 |
| 19 | 17 Endurance.....                                                                         | 13 |
| 20 | 18 Abnormal operation .....                                                               | 13 |
| 21 | 19 Mechanical hazards.....                                                                | 14 |
| 22 | 20 Mechanical strength.....                                                               | 19 |
| 23 | 21 Construction.....                                                                      | 23 |
| 24 | 22 Internal wiring.....                                                                   | 24 |
| 25 | 23 Components .....                                                                       | 24 |
| 26 | 24 Supply connection and external flexible cords .....                                    | 24 |
| 27 | 25 Terminals for external conductors .....                                                | 24 |
| 28 | 26 Provision for earthing.....                                                            | 24 |
| 29 | 27 Screws and connections .....                                                           | 24 |
| 30 | 28 Creepage distances, clearances and distances through insulation .....                  | 25 |
| 31 | Annexes .....                                                                             | 26 |
| 32 | Annex I (informative) Measurement of noise and vibration emissions .....                  | 26 |
| 33 | Annex K (normative) Battery tools and battery packs .....                                 | 35 |
| 34 | Annex L (normative) Battery tools and battery packs provided with mains connection        |    |
| 35 | or non-isolated sources .....                                                             | 36 |
| 36 | Bibliography .....                                                                        | 37 |
| 37 |                                                                                           |    |
| 38 | Figure 101 – Examples of gaps and rake angles.....                                        | 12 |
| 39 | Figure 102 – Typical wheel guard designs .....                                            | 16 |
| 40 | Figure 103 – Principal dimensions of flanges.....                                         | 18 |
| 41 | Figure 104 – Guard strength test: explanation of guard positions .....                    | 21 |
| 42 | Figure 105 – Guard strength test: preparation of the cut-off machine .....                | 22 |
| 43 | Figure 106 – Guard strength test box .....                                                | 22 |
| 44 | Figure I.101 – Test set-up for cut-off machines other than wall chasers (side view) ..... | 27 |

|    |                                                                                           |    |
|----|-------------------------------------------------------------------------------------------|----|
| 45 | Figure I.102 — Noise test set-up for wall chasers (side view).....                        | 28 |
| 46 | Figure I.103 – Test set-up for cut-off machines other than wall chasers (top view).....   | 30 |
| 47 | Figure I.104 – Positions of transducers for various kinds of cut-off machines .....       | 32 |
| 48 | Figure I.105 — Vibration test set-up for wall chasers (side view).....                    | 34 |
| 49 |                                                                                           |    |
| 50 | Table 4 – Required performance levels .....                                               | 14 |
| 51 | Table 101 – Torques for testing flanges.....                                              | 19 |
| 52 | Table 102 – Guard thickness for diamond wheels .....                                      | 20 |
| 53 | Table I.101 —Test conditions for cut-off machines other than wall chasers .....           | 29 |
| 54 | Table I.102 — Noise test conditions for wall chasers .....                                | 30 |
| 55 | Table I.103 — Concrete formulation (per cubic metre) .....                                | 31 |
| 56 | Table I.104 — Categories of wall chasers according to the cutting depth of the tool ..... | 31 |
| 57 | Table I.105 — Vibration test conditions for wall chasers .....                            | 33 |
| 58 |                                                                                           |    |
| 59 |                                                                                           |    |

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE  
TOOLS AND LAWN AND GARDEN MACHINERY –  
SAFETY –****Part 2-22: Particular requirements for hand-held cut-off machines**

## 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.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 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.

IEC 62841-2-22 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools. It is an International Standard.

The text of this International Standard is based on the following documents:

| FDIS        | Report on voting |
|-------------|------------------|
| 116/XX/FDIS | 116/XX/RVD       |

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

The language used for the development of this International Standard is English.

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

This document supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for hand-held cut-off machines.

Where a particular subclause of IEC 62841-1 is not mentioned in this document, that subclause applies as far as reasonable. Where this document states “addition”, “modification” or “replacement”, the relevant text in IEC 62841-1 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, tables and figures which are additional to those in IEC 62841-1 are numbered starting from 101.

Subclauses, notes, tables and figures in Annex K and Annex L which are additional to those in the main body of this document are numbered starting from 301.

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.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](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.

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.

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

## Part 2-22: Particular requirements for hand-held cut-off machines

### 1 Scope

IEC 62841-1:2014, Clause 1 is applicable, except as follows:

*Addition:*

This document applies to hand-held **cut-off machines** fitted with

- one **bonded reinforced wheel** of Type 41 or Type 42; or
- one or more **diamond cut-off wheels** with the peripheral gaps, if any, not exceeding 10 mm

and with

- a **rated speed** not exceeding a peripheral speed of the wheel of 100 m/s at **rated capacity**; and
- a rated wheel capacity range of 55 mm to 410 mm.

These machines are intended to cut materials such as metals, concrete, masonry, glass and tile.

This document does not apply to:

- grinders, disc-type polishers or disc-type sanders, even if they can be converted to a **cut-off machine**, which are covered by IEC 62841-2-3; or
- circular saws which are covered by IEC 62841-2-5.

### 2 Normative references

IEC 62841-1:2014, Clause 2 is applicable, except as follows:

*Addition:*

EN 1339:2003, *Concrete paving flags - Requirements and test methods*

IEC 62841-1:2014, *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety – Part 1: General requirements*

ISO 603-15:1999, *Bonded abrasive products – Dimensions – Part 15: Grinding wheels for cutting-off on stationary or mobile cutting-off machines*

ISO 603-16:1999, *Bonded abrasive products – Dimensions – Part 16: Grinding wheels for cutting-off on hand-held power tools*

### 3 Terms and definitions

IEC 62841-1:2014, Clause 3 is applicable, except as follows:

*Addition:*

- 185 **3.101**  
186 **blotter**  
187 thin piece of an easily compressible material, between the abrasive product and **flange**
- 188 **3.102**  
189 **bonded reinforced wheel**  
190 wheels for different applications in accordance with ISO 603-15:1999 and ISO 603-16:1999
- 191 **3.103**  
192 **cut-off machine**  
193 **hand-held tool** driving a rotating spindle, with a **guide plate** or **guide roller** or similar means,  
194 on which a **bonded reinforced wheel** or **diamond wheel** is mounted and used for peripheral  
195 grinding
- 196 **3.104**  
197 **diamond wheel**  
198 metal wheels with a continuous or segmented abrasive rim
- 199 **3.105**  
200 **flange**  
201 collar, disc, or plate between or against which wheels are mounted
- 202 **3.105.1**  
203 **flange outside diameter**  
204 outside diameter of the contact surface of a **flange**
- 205 **3.105.2**  
206 **backing flange**  
207 part that contacts and provides support to the back side of the wheel and is located on the  
208 spindle between wheel and tool
- 209 **3.105.3**  
210 **locking flange**  
211 part that supports the front side of the wheel and secures and clamps the wheel to the spindle  
212 and the **backing flange**
- 213 **3.106**  
214 **guide plate**  
215 flat plate on the machine which rests on the material to be cut
- 216 **3.107**  
217 **guide roller**  
218 roller on the machine which rests on the material to be cut
- 219 **3.108**  
220 **rated capacity**  
221 maximum intended diameter of the rotating accessory to be fitted on the tool as recommended  
222 by the manufacturer's instruction
- 223 **3.109**  
224 **rated speed**  
225 maximum attainable speed as designated by the manufacturer, with any recommended  
226 accessory installed, at rated voltage or at the upper limit of the rated voltage range
- 227 **3.110**  
228 **wall chaser**  
229 **cut-off machine** on which one or more **diamond wheels** are mounted and used for non-  
230 through cutting operations by peripheral grinding

**3.111****wheel guard**

device which partly encloses the wheel and gives protection to the operator

**4 General requirements**

IEC 62841-1:2014, Clause 4 is applicable.

**5 General conditions for the tests**

IEC 62841-1:2014, Clause 5 is applicable, except as follows:

**5.17 Addition:**

*The mass of a cut-off machine includes the wheel guard, the flanges and the handles.*

**6 Radiation, toxicity and similar hazards**

IEC 62841-1:2014, Clause 6 is applicable.

**7 Classification**

IEC 62841-1:2014, Clause 7 is applicable.

**8 Marking and instructions**

IEC 62841-1:2014, Clause 8 is applicable, except as follows:

**8.1 Addition:**

Tools shall also be marked with:

- **rated speed** in revolutions per minute; and
- **rated capacity** in mm.

**8.2 Addition:**

Tools shall also be marked with:

“ **WARNING** Always wear eye protection” or sign M004 of ISO 7010 or the following safety sign:



The eye protection symbol may be modified by adding other personal protective equipment such as ear protection, dust mask, etc.

NOTE 101 In Canada and the United States of America, the following additional requirements apply:

Tools shall be marked with the following additional safety warnings:

- 260 - WARNING - To reduce the risk of injury, use proper guard and use only accessories rated at least equal  
261 to the maximum speed marked on the tool.
- 262 In Canada, the equivalent French wording is as follows: "AVERTISSEMENT - Pour réduire le risque de  
263 blessure, utiliser un carter approprié et uniquement les accessoires convenant au moins à la vitesse  
264 maximale indiquée sur l'outil."
- 265 For **cut-off machines** with a permanently fixed **wheel guard**, the following alternative warning may be  
266 used:
- 267 - WARNING - To reduce the risk of injury, use only accessories rated at least equal to the maximum  
268 speed marked on the tool.
- 269 In Canada, the equivalent French wording is as follows: "AVERTISSEMENT - Pour réduire le risque de  
270 blessure, utiliser uniquement les accessoires convenant au moins à la Vitesse maximale indiquée sur  
271 l'outil."
- 272 If the above cautionary markings are included as part of a list of cautionary markings, the words "WARNING  
273 To reduce the risk of injury" need not be repeated.
- 274 **8.3 Addition:**
- 275 Tools provided with a threaded spindle shall be marked with spindle thread size.
- 276 Tools shall also be marked with an indication of direction of rotation of the spindle. This shall  
277 be indicated by an arrow, raised or sunk, or by any other means no less visible and indelible.
- 278 **8.6 Addition:**
- 279 n ..... **rated speed**
- 280 **8.14.1.101 Additional safety instructions for cut-off machines**
- 281 **8.14.1.101.1 General**
- 282 The additional safety instructions as specified in 8.14.1.101.2 and 8.14.1.101.3 shall be given.  
283 These additional safety instructions may be printed separately from the "General Power Tool  
284 Safety Warnings".
- 285 **8.14.1.101.2 Safety instructions for abrasive cutting-off operations**
- 286 **Cut-off machine safety warnings**
- 287 a) **The guard provided with the tool must be securely attached to the power tool and**  
288 **positioned for maximum safety, so the least amount of wheel is exposed towards**  
289 **the operator. Position yourself and bystanders away from the plane of the rotating**  
290 **wheel. The guard helps to protect operator from broken wheel fragments and accidental**  
291 **contact with wheel.**
- 292 b) **Use only bonded reinforced or diamond cut-off wheels for your power tool. Just**  
293 **because an accessory can be attached to your power tool, it does not assure safe**  
294 **operation.**
- 295 NOTE 101 The wording "bonded reinforced" or "diamond" in item b) above is used as applicable depending  
296 on the designation of the tool.
- 297 c) **The rated speed of the accessory must be at least equal to the maximum speed**  
298 **marked on the power tool. Accessories running faster than their rated speed can break**  
299 **and fly apart.**
- 300 d) **Wheels must be used only for recommended applications. For example: do not grind**  
301 **with the side of cut-off wheel. Abrasive cut-off wheels are intended for peripheral**  
302 **grinding, side forces applied to these wheels may cause them to shatter.**
- 303 e) **Always use undamaged wheel flanges that are of correct diameter for your selected**  
304 **wheel. Proper wheel flanges support the wheel thus reducing the possibility of wheel**  
305 **breakage.**

- f) **Do not use worn down reinforced wheels from larger power tools.** *Wheels intended for a larger power tool are not suitable for the higher speed of a smaller tool and may burst.*

NOTE 102 The warning in item f) above does not apply for tools only designated to be used with **diamond wheels**.

- g) **The outside diameter and the thickness of your accessory must be within the capacity rating of your power tool.** *Incorrectly sized accessories cannot be adequately guarded or controlled.*
- h) **The arbour size of wheels and flanges must properly fit the spindle of the power tool.** *Wheels and flanges with arbour holes that do not match the mounting hardware of the power tool will run out of balance, vibrate excessively and may cause loss of control.*
- i) **Do not use damaged wheels. Before each use, inspect the wheels for chips and cracks. If power tool or wheel is dropped, inspect for damage or install an undamaged wheel. After inspecting and installing the wheel, position yourself and bystanders away from the plane of the rotating wheel and run the power tool at maximum no load speed for one minute. Damaged wheels will normally break apart during this test time.**
- j) **Wear personal protective equipment. Depending on application, use face shield, safety goggles or safety glasses. As appropriate, wear dust mask, hearing protectors, gloves and shop apron capable of stopping small abrasive or workpiece fragments. The eye protection must be capable of stopping flying debris generated by various operations. The dust mask or respirator must be capable of filtering particles generated by your operation. Prolonged exposure to high intensity noise may cause hearing loss.**
- k) **Keep bystanders a safe distance away from work area. Anyone entering the work area must wear personal protective equipment. Fragments of workpiece or of a broken wheel may fly away and cause injury beyond immediate area of operation.**
- l) **Hold the power tool by insulated gripping surfaces only, when performing an operation where the cutting accessory may contact hidden wiring or its own cord. Cutting accessory contacting a "live" wire may make exposed metal parts of the power tool "live" and could give the operator an electric shock.**
- m) **Position the cord clear of the spinning accessory. If you lose control, the cord may be cut or snagged and your hand or arm may be pulled into the spinning wheel.**
- n) **Never lay the power tool down until the accessory has come to a complete stop. The spinning wheel may grab the surface and pull the power tool out of your control.**
- o) **Do not run the power tool while carrying it at your side. Accidental contact with the spinning accessory could snag your clothing, pulling the accessory into your body.**
- p) **Regularly clean the power tool's air vents. The motor's fan will draw the dust inside the housing and excessive accumulation of powdered metal may cause electrical hazards.**
- q) **Do not operate the power tool near flammable materials. Sparks could ignite these materials.**
- r) **Do not use accessories that require liquid coolants. Using water or other liquid coolants may result in electrocution or shock.**

NOTE 103 The warning in item r) above does not apply for power tools specifically designed for use with a **liquid system**.

### 8.14.1.101.3 Further safety instructions for abrasive cutting-off operations

#### Kickback and related warnings

Kickback is a sudden reaction to a pinched or snagged rotating wheel. Pinching or snagging causes rapid stalling of the rotating wheel which in turn causes the uncontrolled power tool to be forced in the direction opposite of the wheel's rotation at the point of the binding.

For example, if an abrasive wheel is snagged or pinched by the workpiece, the edge of the wheel that is entering into the pinch point can dig into the surface of the material and cause