
**Hand-held non-electric power tools —
Safety requirements —**

**Part 5:
Rotary percussive drills**

*Machines portatives à moteur non électrique — Exigences de
sécurité —*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11148-5 was prepared by Technical Committee ISO/TC 118, *Compressors and pneumatic tools, machines and equipment*, Subcommittee SC 3, *Pneumatic tools and machines*.

ISO 11148 consists of the following parts, under the general title *Hand-held non-electric power tools — Safety requirements*:

- *Part 1: Assembly power tools for non-threaded mechanical fasteners*
- *Part 2: Cutting-off and crimping power tools*
- *Part 3: Drills and tappers*
- *Part 4: Non-rotary percussive power tools*
- *Part 5: Rotary percussive drills*
- *Part 6: Assembly power tools for threaded fasteners*
- *Part 7: Grinders*
- *Part 8: Sanders and polishers*
- *Part 9: Die grinders*
- *Part 10: Compression power tools*
- *Part 11: Nibblers and shears*
- *Part 12: Circular, oscillating and reciprocating saws*

A part 13, dealing with fastener driving tools, is under preparation.

Introduction

This document is a type-C standard as stated in ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are defined in the Scope of this part of ISO 11148.

When requirements of this type-C standard are different from those which are stated in type-A or -B standards, the requirements of this type-C standard take precedence over the requirements of other standards, for machines that have been designed and built according to the requirements of this type-C standard.

ISO 11148 consists of a number of independent parts for individual types of hand-held non-electric power tools.

Certain parts of ISO 11148 cover hand-held non-electric power tools driven by internal combustion engines powered by gaseous or liquid fuel. In these parts, the safety aspects relating to internal combustion engines are found in a normative annex.

The parts are type-C standards and refer to pertinent standards of type A and B where such standards are applicable.

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Hand-held non-electric power tools — Safety requirements —

Part 5: Rotary percussive drills

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1 Scope

This part of ISO 11148 specifies safety requirements for hand-held non-electric power tools (hereinafter “rotary percussive drills”) intended for making holes in hard materials, such as rock and concrete. The rotary percussive drills can be powered by compressed air, hydraulic fluid or internal combustion engines (ICEs) and are intended to be used by one operator and supported by the operator's hand or hands, with or without a suspension, e.g. a balancer.

This part of ISO 11148 is applicable to:

- plug hole drills; [ISO 11148-5:2011](https://standards.iteh.ai/catalog/standards/sist/ad41b4c9-16d6-4a8e-b80a-ed84a8cbac9e/iso-11148-5-2011)
- rock drills; <https://standards.iteh.ai/catalog/standards/sist/ad41b4c9-16d6-4a8e-b80a-ed84a8cbac9e/iso-11148-5-2011>
- rotary hammers.

NOTE 1 For examples of rotary percussive drills, see Annex B.

This part of ISO 11148 is not applicable to special requirements and modifications of rotary percussive drills for the purpose of mounting them in a fixture.

This part of ISO 11148 deals with all significant hazards, hazardous situations or hazardous events relevant to rotary percussive drills when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer, with the exception of the use of rotary percussive drills in potentially explosive atmospheres.

NOTE 2 EN 13463-1 gives requirements for non-electrical equipment for potentially explosive atmospheres.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3857-3, *Compressors, pneumatic tools and machines — Vocabulary — Part 3: Pneumatic tools and machines*

ISO 5391, *Pneumatic tools and machines — Vocabulary*

ISO 11148-5:2011(E)

ISO 9158, *Road vehicles — Nozzles spouts for unleaded gasoline*

ISO 9159, *Road vehicles — Nozzles spouts for leaded gasoline and diesel fuel*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces*

ISO 13732-3, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 3: Cold surfaces*

ISO 15744, *Hand-held non-electric power tools — Noise measurement code — Engineering method (grade 2)*

ISO 17066, *Hydraulic tools — Vocabulary*

ISO 28927-10, *Hand-held portable power tools — Test methods for evaluation of vibration emission — Part 10: Percussive drills, hammers and breakers*

EN 12096, *Mechanical vibration — Declaration and verification of vibration emission values*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3857-3, ISO 5391, ISO 12100 and ISO 17066 (for hydraulic tools) and the following apply.

3.1 General terms and definitions

3.1.1

hand-held power tool

machine operated by one or two hands and driven by rotary or linear motors powered by compressed air, hydraulic fluid, gaseous or liquid fuel, electricity or stored energy (e.g. by a spring) to do mechanical work and so designed that the motor and the mechanism form an assembly that can easily be brought to its place of operation

NOTE Hand-held power tools driven by compressed air or gas are called pneumatic tools (or air tools). Hand-held power tools driven by hydraulic liquid are called hydraulic tools.

3.1.2

inserted tool

tool inserted in the rotary percussive tool to perform the intended work

3.1.3

service tool

tool for performing maintenance or service on the rotary percussive tool

3.1.4

control device

device to start and stop the rotary percussive tool or to change the direction of the rotation or to control the functional characteristics such as speed and power

3.1.5

start-and-stop device

throttle

manually operated control on the rotary percussive tool by which the energy supply to the motor can be turned on and off

3.1.6**hold-to-run start-and-stop device****constant-pressure throttle**

start-and-stop device which automatically returns to the OFF position when force on the start-and-stop device actuator is released

3.1.7**lock-on start-and-stop device****constant pressure throttle with instant release lock**

hold-to-run start-and-stop device that can be locked in the ON position and which is designed so that it permits the rotary percussive tool to be turned off by a single motion of the same finger or fingers used to turn it on

3.1.8**lock-off start-and-stop device****lock-off throttle**

start-and-stop device that automatically latches in the OFF position when the actuator is released and where two motions are required to energize the rotary percussive tool

3.1.9**positive on-off start-and-stop device****positive on-off throttle**

start-and-stop device that remains in the ON position until it is manually changed

3.1.10**maximum operating pressure**

maximum pressure at which a rotary percussive tool may be operated

3.1.11**whip hose**

air hose connecting the main air hose with an air tool for the purpose of providing more flexibility

3.1.12**rated air pressure**

air pressure, required at an air tool inlet port to ensure rated performance of the tool, also considered the maximum pressure at which the tool may be operated

3.1.13 Rated speed**3.1.13.1****rated speed**

<pneumatic tool> speed of an air tool at no load and rated air pressure at the tool inlet port

NOTE The rated speed is expressed in revolutions per minute.

3.1.13.2**rated speed**

<hydraulic tool> nominal speed of a hydraulic tool at no load and rated flow at the tool inlet port

NOTE The rated speed is expressed in revolutions per minute.

3.1.14**maximum attainable speed**

maximum speed which the tool can achieve under the most adverse condition of possible maladjustment or malfunction of its speed control devices, when supplied with compressed air at the pressure marked on the rotary percussive tool

3.1.15

suspension device

device, which is attached to the tool, whose primary purpose is to reduce the strain on the operator caused by the weight of the tool

NOTE The device can also have a secondary purpose of transmitting a reaction torque.

3.2 Terms and definitions related to rotary percussive power tools

3.2.1

rotary percussive drill

power tool with both rotary and percussive action for making holes in rock, concrete, etc.

3.2.2

plug hole drill

rotary percussive drill with spiral or straight drill and without air flushing, mainly intended for drilling in concrete, bricks, etc.

3.2.3

rock drill

rotary percussive drill with straight drill bit and with, for example, air or water flushing, mainly intended for drilling in rock, concrete, etc.

3.2.4

rotary hammer

rotary percussive drill with spiral drill bit and without air flushing

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4 Safety requirements and/or protective measures

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4.1 General

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The machine shall comply with the following safety requirements and/or protective measures and be verified in accordance with Clause 5. In addition, the machine shall be designed in accordance with the principles of ISO 12100 for relevant, but not necessarily significant, hazards, which are not dealt with by this part of ISO 11148.

The measures adopted to comply with the requirements of Clause 4 shall take account of the state-of-the-art.

It is recognized that optimizing the design with respect to some safety measures can result in a degradation of performance against other safety requirements. In such cases, it is required to strike a balance between the various requirements in order to achieve a power tool design that satisfies each requirement, so far as is reasonably practicable, and remains fit for purpose.

4.2 Mechanical safety

4.2.1 Surfaces, edges and corners

Accessible parts of rotary percussive drills, except the inserted tool, shall not have sharp edges or angles or rough or abrasive surfaces; see ISO 12100:2010, 6.2.2.1.

4.2.2 Supporting surface and stability

Rotary percussive drills shall be so designed that they can be laid aside and remain in a stable position on a plane surface.

4.2.3 Ejection of parts

Rotary percussive drills shall be equipped with a retainer or other device to prevent the ejection or falling out of the inserted tool.

4.2.4 Hydraulic fluid ejection

Hydraulic systems of the rotary percussive drill shall be enclosed so as to provide protection from high-pressure fluid ejection.

4.2.5 Guards

Guards covering the inserted tools are not required to be fitted to a rotary percussive drill.

4.2.6 Power tool construction

The rotary percussive drill shall be so designed and constructed as to prevent the loosening or loss of components during expected use, including rough handling and occasional dropping, which can compromise its safety functions. Verification shall be carried out in accordance with 5.5.

4.3 Thermal safety

Surface temperatures of parts of the rotary percussive drill which are held during use or that can be inadvertently touched shall follow the provisions of ISO 13732-1 and ISO 13732-3.

Rotary percussive drills shall be designed to minimize the cooling effects of exhaust air on the handles and other gripping zones.

4.4 Noise reduction

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The rotary percussive drill shall be designed and constructed so that the emission of noise is reduced to the lowest level, taking account of technical progress and the availability of means of reducing noise, in particular at source. Principles for designing rotary percussive drills with reduced noise emission are contained in ISO/TR 11688-1 and ISO/TR 11688-2.

The noise emission from using rotary percussive drills has three main sources:

- the rotary percussive drill itself;
- the inserted tool;
- the workpiece.

NOTE Generally, the noise emitted due to the characteristics of the workpiece cannot be controlled directly by the manufacturer of the rotary percussive drill.

Typical sources of noise emitted by the rotary percussive drill itself are

- a) the motor and drive mechanism,
- b) the exhaust air or gases, and
- c) the vibration or impact-induced noise.

Where the exhaust air or gases are the major contributor to the noise, means to reduce the noise, for example a silencer or equivalent means, shall be included in the design.

Alternatively, where practicable, the exhaust air or gases may be piped away from the operator in a hose.

Vibration-induced noise can often be reduced by vibration isolation and damping.

This list is not exhaustive; where alternative technical measures for noise reduction, with greater efficiency, are available, they should be used by the manufacturer.

4.5 Vibration

The rotary percussive drill shall be designed and constructed so that the vibration is reduced to the lowest level at the handles and at any other parts of the tool in contact with the operator's hands, taking account of technical progress and the availability of means of reducing vibration, in particular at source. Principles for designing rotary percussive drills with reduced vibration emission are contained in CR 1030-1.

Typical sources of vibration emitted by a rotary percussive drill are

- impacts,
- poorly designed motors, and
- resonances in the structure of the machine, particularly the handles and their mounts.

The following design features have been found to be effective and should be considered by manufacturers when designing rotary percussive drills:

- a) reaction masses and springs,
- b) increasing inertia;
- c) isolated casing or handles.

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This list is not exhaustive; where alternative technical measures for vibration reduction, with greater efficiency, are available, they should be used by the manufacturer.

4.6 Materials and substances processed, used or exhausted

4.6.1 Exhaust air or gas

Rotary percussive drills driven with compressed air, gas or an internal combustion engine shall be designed in such a way that exhaust air or gases are directed so as not to cause a hazard to the operator and so that any other effects, such as blowing dust and reflected air or gas from the workpiece on to the operator, are minimized.

4.6.2 Dust and fumes

So far as is reasonably practicable, the rotary percussive drill shall be designed to facilitate the collection and removal or suppression of airborne dust particles and fumes generated by the work process. The instruction handbook shall include sufficient information to enable adequate control of the risks from dust and fumes.

4.6.3 Lubricants

When specifying lubricants, the manufacturer shall take environmental and occupational health aspects into account.