INTERNATIONAL STANDARD

ISO 11148-3

Second edition
2012-12-15

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

Part 3: Drills and tappers

Machines portatives à moteur non électrique — Exigences de sécurité —

Partie 3: Perceuses et taraudeuses

Reference number
ISO 11148-3:2012(E)

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Published in Switzerland

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

This second edition cancels and replaces the first edition (ISO 11148-3:2010), of which it constitutes a minor revision.

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 provisions of this type C standard are different from those that 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 elements of this part 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 types A and B where such standards are applicable.

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

Part 3: Drills and tappers

IMPORTANT — The electronic file of this document contains colours that are considered useful for the correct understanding of the document. Users should consider printing this document using a colour printer. ISO 3864-4 provides colorimetric and photometric properties together with, as a guideline, references from colour order systems.

1 Scope

This part of ISO 11148 applies to hand-held non-electric power tools (hereinafter “drills and tappers”) intended for rotary drilling of holes in all kinds of material, e.g. wood, metal, concrete and plastics, or for tapping and cleaning threads in metal and plastics. The drills and tappers can be powered by compressed air, hydraulic fluid or internal combustion engines and are intended for use 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

— drills;

— heavy duty drills with two handles;

— tappers.

NOTE 1 For examples of drills and tappers, see Annex B.

This part of ISO 11148 is not applicable to special requirements and modifications of drills and tappers for the purpose of mounting them in fixtures.

This part of ISO 11148 deals with all significant hazards, hazardous situations or hazardous events when drills and tappers are used as intended and under conditions of misuse that are reasonably foreseeable by the manufacturer, with the exception of their use 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 3864-2, *Graphical symbols — Safety colours and safety signs — Part 2: Design principles for product safety labels*

ISO 5391, *Pneumatic tools and machines — Vocabulary*

ISO 7000, *Graphical symbols for use on equipment — Registered symbols*[1)]

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

1) The graphical symbol collections of ISO 7000, ISO 7001 and ISO 7010 are also available online in the ISO web store. For more information, consult http://www.iso.org/iso/fr/publications_and_e-products/databases.htm.

ISO 9159, *Road vehicles — Nozzle 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 20643, *Mechanical vibration — Hand-held and hand-guided machinery — Principles for evaluation of vibration emission*

ISO 28927-5, *Hand-held portable power tools — Test methods for evaluation of vibration emission — Part 5: Drills and impact drills*

NOTE ISO 28927-5 does not apply to tappers.

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 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 drill or tapper to perform the intended work

3.1.3
service tool
tool intended for performing maintenance or service on the drill or tapper

3.1.4
control device
device to start and stop the drill or tapper 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 drill or tapper 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 that automatically returns to the OFF position when the 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 designed so that it permits the drill or tapper 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 drill or tapper

3.1.9
positive on-off start-and-stop device
positive on-off throttle
start-and-stop device that remains in an ON position until it is manually changed

3.1.10
maximum operating pressure
maximum pressure at which a drill or tapper 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 drill or tapper

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 may also have a secondary purpose of transmitting a reaction torque.

3.2 Definitions related to drills and tappers

3.2.1
drill
rotary power tool driving an output spindle, typically through a gearbox

NOTE The output spindle is normally fitted with chuck or Morse taper, or another socket into which is fitted an inserted tool, e.g. drill bit or reamer, making the drill or tapper suitable for drilling, reaming, tube expanding and for boring in metal, wood and other materials.

3.2.2
drill bit
inserted tool for drilling operation

3.2.3
reamer
inserted tool for reaming operation

3.2.4
tap
inserted tool for tapping operation

3.2.5
tapper
power tool with a rotary spindle for the tapping of threaded holes; the rotation of the spindle is reversible

3.2.6
reaction bar
mechanical component attached to or forming part of the tool for the sole purpose of transmitting a reaction torque

4 Safety requirements and/or protective measures

4.1 General

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 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 drill or tapper 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 the drills and tappers 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

The drill or tapper shall be so designed that it can be laid aside and remain in a stable position on a plane surface.

4.2.3 Chuck keys and service tools

Chuck keys and service tools used with drilling and tapping chucks shall be so designed that they drop easily out of position when released. They may be fixed to the drill or tapper by design, e.g. clip, but not by a chain or string or other similar means. The avoidance of entanglement should be considered; see 6.2.2.5.

4.2.4 Hydraulic fluid ejection

Hydraulic systems of the drills and tappers shall be enclosed so as to give protection against high-pressure fluid ejection.

4.2.5 Guards

Guards covering the chuck and the inserted tools are not required.

4.2.6 Spindles

4.2.6.1 Spindle threads

When threaded spindles are used, the thread direction shall be such that the chuck or attachment shall tend to tighten during tool operation, or a means shall be provided to secure the chuck.

4.2.6.2 Reversible tools

Spindles for reversible tools shall be designed to drive the chuck in both directions without loosening the chuck and mounting. If a threaded spindle is used, a means shall be provided to secure the chuck.

4.2.7 Power tool construction

The drill or tapper 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 made in accordance with 5.5.

4.3 Thermal safety

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

Pneumatic tools shall be designed to avoid the cooling effects of exhaust air on the handles and other gripping zones.

4.4 Noise reduction

The drill or tapper 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 the source. Principles for designing drills and tappers with reduced noise emission are contained in ISO/TR 11688-1 and ISO/TR 11688-2.

The noise emission from using drills and tappers has three main sources:

— the drill or tapper 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 drill or tapper.

Typical sources of noise emitted by the drill or tapper itself are

a) the motor and drive mechanism;

b) the exhaust air or gases;

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 can 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 drill or tapper 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 drills and tappers with reduced vibration emission are contained in CR 1030-1.

Typical sources of vibration emitted by a drill or tapper are

— unbalance of rotating parts;

— poorly designed motors and gears;

— resonances in the structure of the machine, particularly the handles and their mounts.

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

a) increasing inertia;

b) isolated casing or handles.

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

Drills and tappers 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 the dust and reflected air or gas from the workpiece onto the operator, are minimized.

4.6.2 Dust and fumes

So far as is reasonably practicable, the drill or tapper shall be designed to facilitate the collection and removal or suppression of airborne dust particles and fumes generated by the work process. The user instructions 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.