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

**Part 13:
Fastener driving tools**

*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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

A list of all parts in the ISO 11148 series can be found on the ISO website.

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 indicated in the Scope.

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

The ISO 11148 series 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 International Standards of type A and B where such standards are applicable.

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

Part 13: Fastener driving tools

1 Scope

This document specifies safety requirements for hand-held non-electric power tools (hereinafter referred to as “fastener driving tools”) intended for installation of a fastener (see [Annex B](#)), forming a mechanical connection or attachment with the workpiece which are for example wood and wood-based materials, plastic materials, fibre materials (loose or compacted), cementitious materials, metals and combinations of these materials. The fastener driving tools for fasteners can be powered by compressed air or combustible gases (which may be ignited by a battery or accumulator) and the energy is transmitted to an impacted element by an intermediary component that does not leave the device. These tools 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 document is applicable to fastener driving tools in which energy is applied to a loaded fastener for the purpose of driving this into a workpiece.

This document is not applicable to fastener driving tools in which the energy for driving fasteners is drawn from powder-actuated cartridges, hydraulics or from any type of electrical supply.

This document does not deal with special requirements and modifications of hand-held power tools for the purpose of mounting them in a fixture.

This document deals with all significant hazards, hazardous situations or hazardous events relevant to fastener driving tools for fasteners 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 power tools in potentially explosive atmospheres.

NOTE ISO 80079-36 gives requirements for non-electrical equipment for potentially explosive atmospheres.

2 Normative references

The following documents are referred to in text in such a way that some or all of their content constitutes requirements 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 3864-2:2016, *Graphical symbols — Safety colours and safety signs — Part 2: Design principles for product safety labels*

ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

ISO 7010:2011, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

ISO 8662-11:1999, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 11: Fastener driving tools*

ISO 8662-11:1999/Amd 1:2001, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 11: Fastener driving tools — Amendment 1*

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

ISO 13732-1:2006, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces*

ISO 13732-3:2005, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 3: Cold surfaces*

EN 12096:1997, *Mechanical vibration — Declaration and verification of vibration emission values*

EN 12549:1999+A1:2008, *Acoustics — Noise test code for fastener driving tools — Engineering method*

EN 15895:2011, *Cartridge operated hand-held tools — Safety requirements — Fixing and hard marking tools*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100, ISO 3857-3 and ISO 5391 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 General terms

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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, gaseous or liquid fuel (which may be ignited by a battery or an accumulator) 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

3.1.1.1

pneumatic tool

tool, where energy to drive the fasteners comes from compressed air

3.1.1.2

gas tool

tool, where energy to drive the fasteners comes from combustion of gases

3.1.2

horizontal-down

tool orientation, where the tool nose is normal to a horizontal work surface and pointed downwards

3.1.3

horizontal-up

tool orientation where the tool nose is normal to a horizontal work surface and pointed upwards

3.1.4

vertical

tool orientation where the tool nose is normal to a vertical work surface

3.1.5

production application

high-volume professional application such as pallets, furniture, manufactured housing, upholstery and sheathing

3.2 Terms and definitions related to fastener driving tools

3.2.1

fastener driving tool

hand-held power tool in which energy is applied in a linear motion to a loaded fastener for the purpose of driving the fastener into defined materials

3.2.1.1

coil nailer

nailer that drives fasteners from a collated coil of nails

Note 1 to entry: The primary purpose of this tool being production applications

3.2.1.2

heavy-duty stapler or bradder

stapler or bradder capable of driving

- fasteners of 18 gauge/1,2 mm nominal diameter or heavier wire, or
- fasteners with 0,8 mm nominal thickness or larger, or
- fasteners with 1,2 mm nominal width or larger

Note 1 to entry: These tools are primarily for production applications.

3.2.1.3

light-duty tool

tool capable of driving fasteners where the mass of the fastener is less than 0,5 g and the length is ≤ 26 mm or less than 0,4 g if the length is ≤ 36 mm or the tool is operated by hitting the tool in a designated area

3.2.1.4

pinner

tool capable of driving headless fasteners up to 51 mm in length and a maximum gauge of 23 (0,64 mm) diameter

Note 1 to entry: Larger gauge pinners are available.

3.2.1.5

single-blow tool

fastener driving tool that drives the fastener with a single stroke of the driving element

3.2.1.6

multi-blow tool

fastener driving tool that drives the fastener with more than one stroke of the driving element

3.2.1.7

special application tools

tools without a workpiece contact whose fasteners are formed or clamped during application by devices such as integrated anvils or self-contained clinching anvils which prevents free flight of fasteners

3.2.2

fastener

mechanical device used for securing fixings to surfaces, or joining materials together, such as: nails, staples and pins

3.2.3

collating material

material for joining together single fasteners in strips or coils with adhesive, paper or plastic tape, plastic strap or wire

3.2.4

trigger

tool control operated manually by a tool operator

3.2.4.1

actuation mode selector

tool control, manually set by the operator, so that the tool operates in a specific actuation mode

3.2.4.2

dual activation

two devices such as triggers, levers or switches that work in conjunction with each other such that both devices require activation to actuate the tool

Note 1 to entry: A sequence of activation may be necessary for tool actuation.

3.2.5

workpiece contact

control element or assembly that needs to be activated before a fastening operation can be performed

3.2.5.1

extended workpiece contact

control element or assembly that is extended from the tool and is retracted by pressing on the workpiece, preventing the tool from driving a fastener when not pressed against the workpiece

3.2.5.2

retracted workpiece contact

workpiece contact that is retracted and extends when the trigger is activated, preventing the tool from driving a fastener when not pressed against the workpiece

3.2.6

full sequential actuation

actuation mode which allows single driving operations via the trigger after the workpiece contact has been operated and further driving operations are only performed after the trigger and the workpiece contact have been returned to the non-driving position

Note 1 to entry: The evaluation of actuation modes is given in [5.2.5.1](#)

3.2.7

single sequential actuation

actuation mode which allows single driving operations via the trigger, after the workpiece contact has been operated, and further driving operations are only performed after the trigger has been returned to the non-driving position whilst the workpiece contact remains in the operating position

3.2.8

contact actuation

actuation mode which allows the tool to operate by operating the workpiece contact whilst the trigger is continually depressed and held

3.2.9

continual contact actuation

actuation mode in which the driving operations continue as long as the trigger and the workpiece contact remain in their operating positions

3.2.10

contact actuation with automatic reversion

actuation mode that is capable of contact actuation or continual contact actuation and reverts to single-sequential actuation, full-sequential actuation, neutral or off if the trigger is depressed for a specified period of time without operation of the workpiece contact

3.2.11**selective actuation**

actuation system that allows discrete selection of two or more of the following actuation modes, single sequential actuation, full sequential actuation or contact actuation; however, one or more of the selections shall be single sequential actuation or full sequential actuation

3.2.12**gas container**

non-refillable container which stores and dispenses, using a release device, combustible gas, compressed or liquefied

Note 1 to entry: See [Figures 1](#) and [2](#).

3.2.12.1**metering valve**

mechanical or electro-mechanical mechanism designed to control quantity of the combustible gas provided to the gas tool which can be either fitted directly onto the release device, integrated into the release device or be a part of the gas tool

Note 1 to entry: A typical metering valve is shown in [Figure 1](#)

3.2.12.2**release device**

valve mechanism which allows the combustible contents of the gas container to be dispensed and is a part of the gas container

Note 1 to entry: Typical release devices are shown in [Figures 1](#) and [2](#).

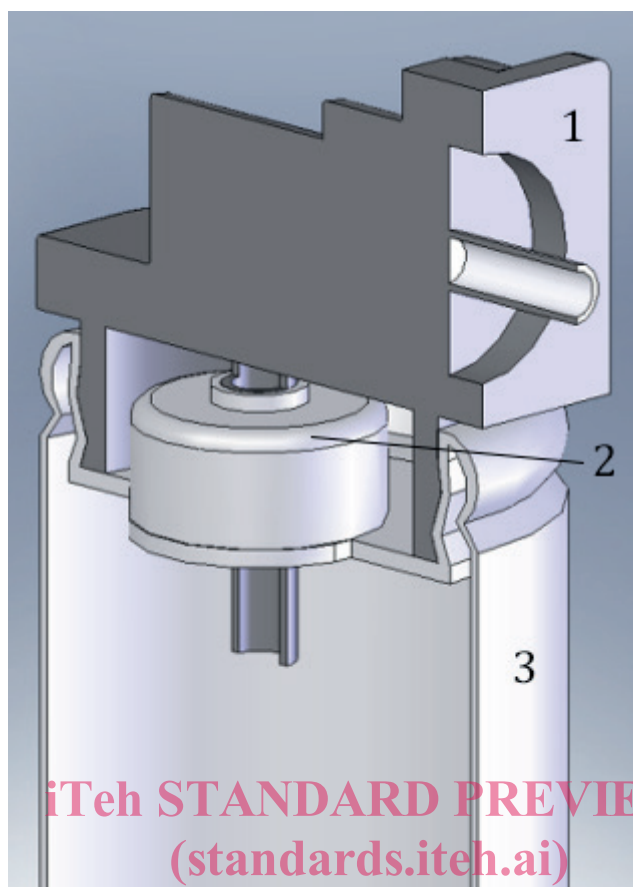
3.2.12.3**adapter**

fitting, typically installed on the gas container by the user, that allows the gas container to be connected to the gas tool

Note 1 to entry: A typical adapter is shown in [Figure 2](#).

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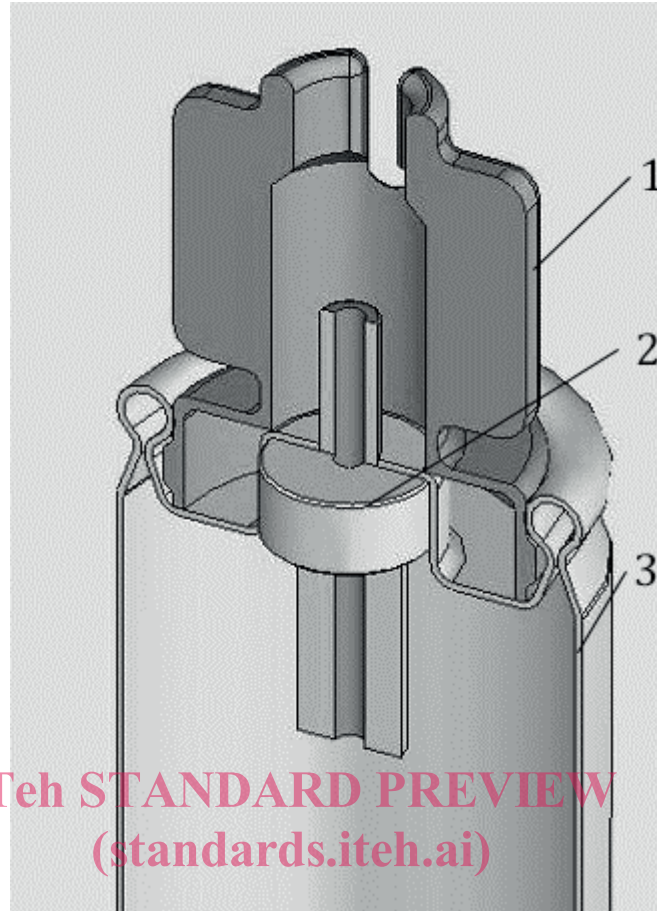
Key

- 1 metering valve
- 2 release device
- 3 gas container

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Figure 1 — Example of gas container, release device and metering valve



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Key

- 1 adapter
- 2 release device
- 3 gas container

NOTE In this case, metering valve (not shown) is a part of the tool.

Figure 2 — Example of gas container, adapter and release device

3.2.12.4

gas container chamber

compartment in the gas tool where the gas container is installed

3.2.13

battery or accumulator

any source of electrical energy generated by direct conversion of chemical energy and consisting of one or more primary battery cells (non-rechargeable) or consisting of one or more secondary battery cells (rechargeable)

3.2.14

tool without workpiece contact

any tool that drives a fastener and which does not have a workpiece contact

3.2.15

single actuation

actuation mode in which the trigger has to be operated for each driving operation

3.2.16

continual actuation

actuation mode in which the driving operations are carried out for as long as the trigger remains in its operating position

3.2.17

pressurized section

chamber(s) of a pneumatic fastener driving tool that is/are pressurized

3.2.18

maximum operating pressure

$P_{s \max}$

greatest gas or compressed air pressure for which the tool is designed to operate

4 Safety requirements and 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 not dealt with by this document.

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 fastener driving tool that satisfies each requirement, so far as is reasonably practicable, and remains fit for purpose.

4.2 Mechanical safety

4.2.1 Protection against points and edges of fasteners

Fastener driving tools shall be designed in such a way as to prevent injuries caused by the projecting points or edges of fasteners, for example by a protection cover. Exceptions are permissible at the location of the nose if there are technological reasons for such exceptions, for example, on fastener driving tools designed for driving fasteners through holes of punched metal sheets in which the fastener points are used as a locator.

4.2.2 Prevention of unintended ejection of fasteners

4.2.2.1 Prevention of unintended ejection of fasteners during connection/disconnection of the energy supply system

4.2.2.1.1 Connection of the fastener driving tool to the energy supply system shall not perform a driving operation by the tool.

4.2.2.1.2 Disconnection of the fastener driving tool from the energy supply system shall make the tool incapable of a driving operation.

4.2.2.1.3 Pneumatic tools shall be designed to allow the fitting of a quick release coupler.

4.2.2.2 Prevention of accidental trigger operation

The design of fastener driving tools and the placement of the trigger shall be such as to prevent unintentional operation, for example, when the tool is placed on, or moved across, a work surface.

4.2.2.3 Prevention of slipping of fasteners from hard or slippery surfaces like steel and plastic

Tools, with workpiece contacts designed to normally push against hard surfaces like steel or concrete shall be designed in such a way, that the likelihood of the fastener to slip from the hard surface is reduced to a minimum. These tools shall be thus designed that they can only be operated if a force of 1,25 times of the tool weight including the weight of the fasteners but a minimum 50 N is applied to the workpiece contact.

4.2.3 Prevention of free flight of fasteners

4.2.3.1 Fastener driving tools shall be fitted with an extended workpiece contact or a retracted workpiece contact element. No driving operation shall be performed before the workpiece contact is activated. The extended workpiece contact shall have a minimum 5 mm travel before a fastener can be driven. A workpiece contact is not required on light duty tools.

NOTE The requirements for retracted workpiece contacts are given in [4.2.4.2](#).

4.2.3.2 For tools, other than light-duty tools, it might not be practical to meet the requirements of [4.2.3.1](#) and for those tools, a workpiece contact is not required, provided the requirements of [4.2.3.3](#), [4.2.3.4](#) or [4.2.3.5](#) are met.

4.2.3.3 Pinner driving fasteners up to 51 mm in length and a maximum 23 gauge (0,64 mm), where viewing/accurate placement is necessary shall operate by a dual activation device which only operates by two sequential dissimilar actions.

4.2.3.4 Special application tools such as carton closing staplers, sisal/bedding tools with fixed anvils, carton pliers.

4.2.3.5 The same degree of safety as provided by [4.2.3.1](#) can be demonstrated or is obtained with tools such as: hardwood flooring tools, multi-blow metal hardware nailers and palm nailers.

4.2.4 Design of the workpiece contact

4.2.4.1 Extended workpiece contact

To minimize the possibility of a free flying fastener occurrence by accidentally touching the workpiece with the edge or corner of the workpiece contact, and therefore placing the nose outside the workpiece surface, or while being transported, the external dimensions of the workpiece contact ([Figure 3](#)) should not be greater than

- $l = 18$ mm for fastener driving tools with:
 - contact actuation;
 - continuous contact actuation;
 - full sequential actuation using fasteners of a driving length of more than 130 mm,
- $l = 30$ mm for fastener driving tools with:
 - single sequential actuation;
 - full sequential actuation using fasteners of a driving length of 130 mm or below.