INTERNATIONAL STANDARD

ISO 11148-8

First edition
2011-12-01

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

Part 8: Sanders and polishers

Machines portatives à moteur non électrique — Exigences de sécurité —

Partie 8: Polisseuses-lustreuses et ponceuses

Reference number
ISO 11148-8:2011(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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 11148-8 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.

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

Part 8: Sanders and polishers

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1 Scope

This part of ISO 11148 specifies safety requirements for hand-held non-electric power tools (hereinafter "sanders and polishers") intended for polishing and sanding with all types of movement, e.g. rotary, orbital and reciprocating, using coated abrasive products, bonnets of various soft materials and endless belts. The sanders and polishers can be powered by compressed air, hydraulic fluid or internal combustion engines 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.

NOTE 1 At the time of publication, no sanders and polishers driven by internal combustion engines are known. Once these are identified, it is intended to amend this part of ISO 11148 to include such power tools.

This part of ISO 11148 is applicable to:

— belt sanders;

— orbital sanders;

— polishers;

— random orbital sanders;

— rotary sanders;

— straight-line sanders.

NOTE 2 For examples of sanders and polishers, see Annex B.

This part of ISO 11148 is not applicable to special requirements and modifications of sanders and polishers 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 sanders and polishers 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 sanders and polishers in potentially explosive atmospheres.

NOTE 3 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 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 28927-3, *Hand-held portable power tools — Test methods for evaluation of vibration emission — Part 3: Polishers and rotary, orbital and random orbital sanders*

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 sander or polisher to perform the intended work

3.1.3
service tool
tool for performing maintenance or service on the sander or polisher

3.1.4
control device
device to start and stop the sander or polisher 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 sander or polisher 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 which can be locked in the ON position and which is designed so that it permits the sander or polisher 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 sander or polisher

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 sander or polisher 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 sander or polisher

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 sanders and polishers

3.2.1
sander
pneumatic tool with rotary, orbital, random orbital or reciprocating motion for sanding, equipped with a flexible pad fitted with a coated abrasive product, such as a fibre disc or abrasive paper

3.2.2
belt sander
sander driving an endless belt, coated with abrasive material

3.2.3
orbital sander
sander driving a rectangular pad in an orbital motion

3.2.4
random orbital sander
sander driving a rotating round pad in an orbital motion allowing free rotation

3.2.5
rotary sander
sander driving a circular flexible pad in a simple rotating motion

3.2.6
straight-line sander
sander driving a rectangular pad in an alternating motion

NOTE A straight-line sander is also called a reciprocating sander.

3.2.7
polisher
power tool, fitted with a flexible pad and various soft materials or a felt pad, for polishing surfaces

NOTE A polisher is often a modified sander.

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 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 sander or polisher 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 sanders and polishers, 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

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

4.2.3 Run-down time

The run-down time, after the stop command has been given, shall be as short as possible.

4.2.4 Hydraulic fluid ejection

Hydraulic systems of the sander or polisher shall be enclosed so as to provide protection from high-pressure fluid ejection.

4.2.5 Speed control

The rated speed of a rotary or belt sander or polisher shall not be exceeded under the conditions marked on the sander or polisher. The operating speed of a rotary or belt sander shall never exceed the maximum operating speed of accessories, such as a backing pad. It shall be possible to measure rotational speed by a tachometer.

The speed control device of a rotary sander (where fitted) shall be designed to prevent incorrect assembly. The speed control device shall be manufactured of non-corrodible material.

The maximum operating speed marked on backing pads and drums shall equal or exceed the rated speed marked on the sander or polisher.

4.2.6 Power tool construction

The sander or polisher 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.

4.2.7 Distance between moving and fixed parts

Polishers and sanders shall be designed so as not to allow fingers to be caught between the moving and fixed parts.

4.2.8 Position of handles

The handles shall be so shaped and located as to minimize the risk of inadvertent contact of the operator's hand with the rotating abrasive tool. Recommendations are given in ISO 13854.

4.2.9 Guards

Portable belt sanding machines shall be provided with guarding on one side at the nip point where the sanding belt runs into a pulley.

The unused run of the sanding belt shall be guarded on one side and at the rear.

4.2.10 Backing pads and drums

Backing pads and drums for rotary sanders shall be capable of withstanding free rotational speeds of 120 % of the maximum operating speed and shall be capable of withstanding the heat generated in use. The manufacturer shall ensure that the material for the pad is suitable.

4.3 Thermal safety

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

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

4.4 Noise reduction

The sander or polisher 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 sanders and polishers with reduced noise emission are contained in ISO/TR 11688-1 and ISO/TR 11688-2.

The noise emission from using sanders and polishers has three main sources:

— the sander or polisher 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 sander or polisher.

Typical sources of noise emitted by the sander or polisher itself are

a) the motor and drive mechanism,

b) the exhaust air or gases, and

c) 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.