
Machinery for forestry — Portable hand-held brush-cutters and grass-trimmers with backpack-mounted combustion-engine power source — Safety requirements and testing

Matériel forestier — Débroussailleuses et coupe-herbe portatifs équipés d'une source motrice portée à dos à moteur à combustion interne — Exigences de sécurité et essais



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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.

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.

International Standard ISO 14865 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable forest machinery*.

Annexes A, B and C form an integral part of this International Standard.

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Introduction

This International Standard covers brush-cutters as well as grass-trimmers, because the design of both machines is basically identical. Frequently one and the same unit can be either a brush-cutter or a grass-trimmer, depending on what type of cutting attachment is used. As grass-trimmers are often used in forestry, the relevant requirements have been included in this International Standard.

The requirements for backpack-powered brush-cutters and grass-trimmers are equivalent to those for brush-cutters and grass-trimmers with an integrated power source as given in ISO 11806:1997, *Agricultural and forestry machinery — Portable hand-held combustion engine driven brush cutters and grass trimmers — Safety*.

In addition, machinery is to comply as appropriate with ISO/TR 12100 for hazards which are not covered by this International Standard.

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Machinery for forestry — Portable hand-held brush-cutters and grass-trimmers with backpack-mounted combustion-engine power source — Safety requirements and testing

1 Scope

This International Standard specifies safety requirements and their verification for design and construction of portable hand-held brush-cutters and grass-trimmers with a backpack-mounted combustion-engine power source.

It is not applicable to units with an integrated power source, to lawn edge-trimmers or to brush-cutters equipped with metallic blades consisting of several parts.

It describes methods for the elimination or reduction of hazards arising from their use. In addition, it specifies the type of information on safe working practices to be provided by the manufacturer. It does not however give any technical requirements to reduce noise and vibration hazards. Indeed the different means available to reduce these hazards are a matter for the technical aids to which the manufacturer may resort, through specialized books or specific bodies.

The list of significant hazards dealt with requiring action to reduce the risk is given in annex A.

Environmental aspects have not been considered in this International Standard.

This International Standard is primarily applicable to machines which are manufactured after the date of issue of the International Standard.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7112:—¹⁾, *Machinery for forestry — Portable hand-held brush-cutters and grass-trimmers — Vocabulary.*

ISO 7113:—²⁾, *Portable hand-held forestry machines — Brush-cutters — Cutting attachments.*

ISO 7916:1989, *Forestry machinery — Portable brush-saws — Measurement of hand-transmitted vibration.*

ISO 7917:1987, *Acoustics — Measurement at the operator's position of airborne noise emitted by brush saws.*³⁾

ISO 7918:1995, *Forestry machinery — Portable brush-cutters and grass-trimmers — Cutting attachment dimensions.*

¹⁾ To be published. (Revision of ISO 7112:1982)

²⁾ To be published. (Revision of ISO 7113:1991)

³⁾ Equivalent to EN 27917:1991.

ISO 8380:1993, *Forestry machinery — Portable brush-cutters and grass-trimmers — Cutting attachment guard strength*.

ISO 8893:1997, *Forestry machinery — Portable brush-cutters and grass-trimmers — Engine performance and fuel consumption*.

ISO 10884:1995, *Manually portable brush-cutters and grass-trimmers with internal combustion engine — Determination of sound power levels — Engineering method (Grade 2)*.

ISO/TR 12100-1:1992, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*.⁴⁾

ISO/TR 12100-2:1992, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications*.⁵⁾

ISO 14740:—⁶⁾, *Machinery for forestry — Backpack power unit for brush-cutters and grass-trimmers, pole-cutters, hedge-trimmers and similar appliances — Safety requirements and testing*.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 7112 and the following apply.

3.1 dry mass

total unit mass without fuel, cutting attachment or guard

3.2 unit

complete brush-cutter or grass-trimmer including backpack power unit equipped with harness, power transmission shaft, cutting attachment and guard, but excluding the harness

NOTE — Certain commonly used terms relating to the unit are given in figure 1.

4 Safety requirements

4.1 General

Each brush-cutter or grass-trimmer with a backpack power unit shall conform with the requirements below. If a grass-trimmer can be converted to a brush-cutter, then the converted unit shall comply with requirements for a brush-cutter and vice versa.

4.2 Power unit

The backpack power unit, including the controls and harness shall comply with the requirements given in ISO 14740.

⁴⁾ Equivalent to EN 292-1:1991.

⁵⁾ Equivalent to EN 292-2:1991.

⁶⁾ To be published.

Key

- 1 harness
- 2 backpack power unit
- 3 barrier
- 4 blade
- 5 cutting attachment guard
- 6 shaft housing
- 7 front handle
- 8 rear handle

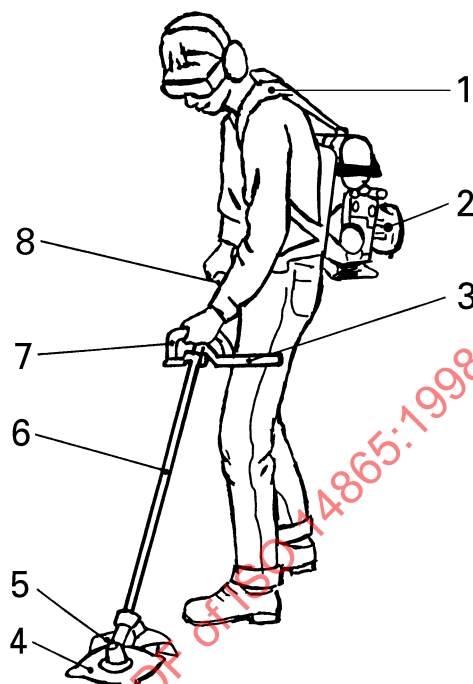


Figure 1 — Example of a brush-cutter with a backpack power unit

4.3 Noise and vibration

4.3.1 Noise emission

The time-averaged sound pressure levels at the operator's ear shall be measured in accordance with ISO 7917, with the backpack power unit mounted on the operator according to the manufacturer's instructions.

For brush-cutters, sound pressure levels shall be measured at idling and racing.

For grass-trimmers, sound pressure levels shall be measured at idling and with wide open throttle and maximum length in case of flexible line, and the guard in place according to manufacturer's recommendations.

The sound power levels shall be measured according to ISO 10884 with all cutting attachments recommended by the manufacturer and at the same operating conditions as given in 4.3.1.

4.3.2 Vibrations at the handles

The weighted acceleration sum shall be measured according to ISO 7916 for all cutting attachments recommended by the manufacturer.

For brush-cutters, the weighted acceleration sum shall be measured at idling and racing.

For grass-trimmers, the weighted acceleration sum shall be measured at idling and with wide open throttle and maximum length in case of flexible line, and the guard in place according to manufacturer's recommendations.

4.4 Handles

4.4.1 Two handles, one for each hand, shall be provided for all units.

4.4.2 The handles shall be designed so that the distance L between the centre of the handles is at least 500 mm for those units which are intended to be equipped with metal saw blades, and 250 mm for all other units (see figure 2).

The handles shall be adjustable so that a suitable ergonomic working position can be achieved. An adjustment below the minimum dimensions shall be prevented by design.

NOTE — The position of the operator towards the cutting attachment is defined by the suspension point (see 4.9) and the barrier (see 4.5).

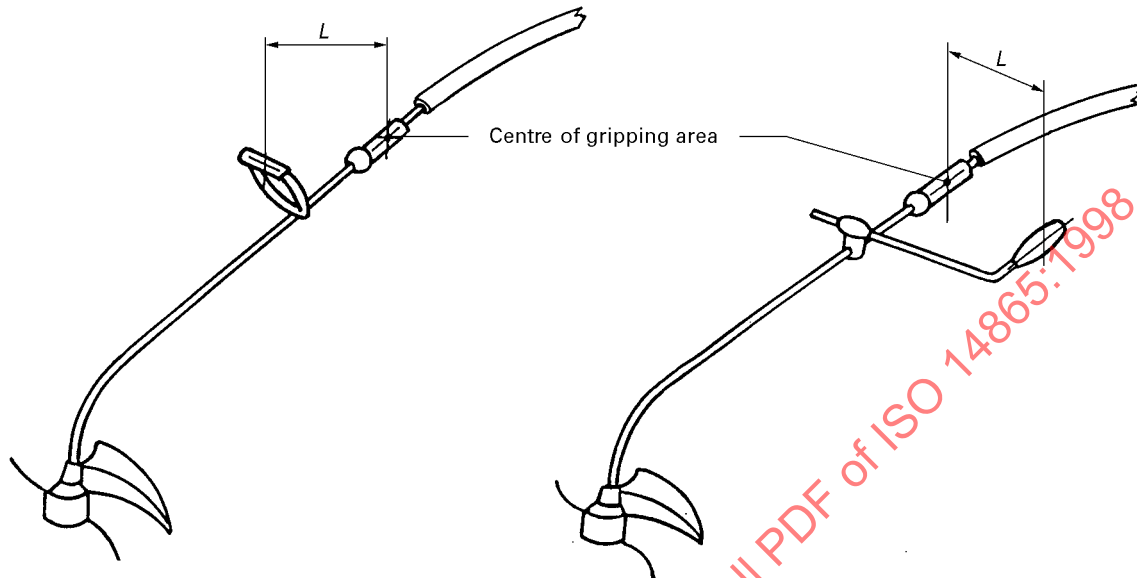


Figure 2 — Handle distance

4.4.3 Handles shall be designed so that they can be fully gripped by an operator when wearing different types of gloves, provide the necessary sureness of grip by their shape and surface and have a length of at least 100 mm.

4.5 Barrier

Brush-cutters shall be equipped with a barrier to prevent an unintentional contact with the cutting attachment. The barrier shall project at least 200 mm horizontally, perpendicular to the centreline of the shaft tube. The handle assembly may serve as a barrier. See also figure 2.

Adjustable barriers shall be in accordance with 4.4.2

4.6 Cutting attachment strength

4.6.1 General

The cutting attachment as specified by the manufacturer shall first be tested and meet the requirements according to 4.6.2. The same cutting attachment shall then, without any changes, be tested and meet the requirements according to 4.6.3. An exception is made for cutting attachment of single piece metal blade for which no overspeed test (4.6.3) is made. Such blades shall instead meet the material requirements in 4.6.4.

4.6.2 Impact

Cutting attachment, excluding flexible cutting lines, shall not break or crack when impacted once against a 25 mm diameter steel rod, according to annex B.

NOTE — Minor damage at the point of contact is not a cause for test failure.

4.6.3 Overspeed

The cutting attachment shall not break or crack when operated for 5 min, either at maximum speed or at 133 % of the maximum power speed, according to ISO 8893, whichever is less.

4.6.4 Single piece metal blade material

Single piece metal blades shall be made of materials which comply with ISO 7113.

4.7 Retention of cutting attachment

4.7.1 The mounting of a metallic cutting attachment shall not show any relative motion between the cutting attachment and the retainer when tested as follows:

- a) install the cutting attachment according to the manufacturer's instructions;
- b) lock the power transmission shaft;
- c) apply a rotational torque, M , to the cutting attachment, the value of which is

$$M = 0,4 \times V \times k$$

where

M is the torque, in newton metres;

V is the engine displacement, in cubic centimetres;

k is the gear ratio, or the engine rotational frequency divided by the cutting attachment rotational frequency.

The test shall be conducted five times in the normal direction, then five times in the opposite direction.

4.7.2 If tools are necessary to replace the cutting attachments, they shall be supplied with the machine.

4.8 Guards for cutting attachment

4.8.1 Metallic cutting attachments shall be equipped with a transport guard.

4.8.2 Guards for the cutting attachment shall fulfil the minimum dimensions according to ISO 7918.

4.8.3 It shall not be possible to adjust the guard so that it does not comply with the dimensions and location shown in ISO 7918:1995, figures 2 and 3.

4.8.4 Guard strength shall be in accordance with ISO 8380 for all guards. The test at $-25\text{ }^{\circ}\text{C}$ does not apply to the cutting attachment of grass trimmers.

4.8.5 In a thrown object test for all guards according to annex C, no more than three penetrations in the area from 0,3 m to 2 m height is allowed. If more than three penetrations occur, the test has to be repeated five times with no more than three penetrations in each test. The guard shall not crack or break.

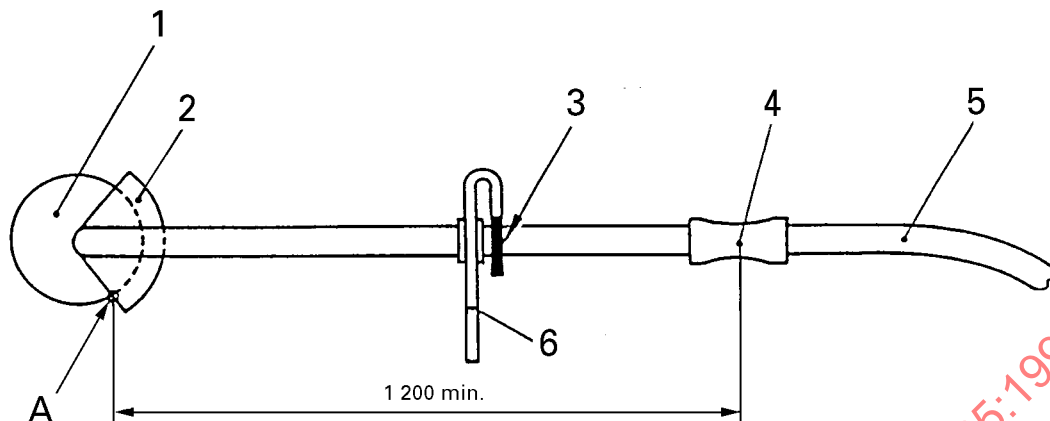
4.8.6 Grass trimmers with flexible cutting lines shall have a line limiting device or other means of line length control.

4.9 Distance to cutting attachment

The unit shall have a minimum distance of 1 200 mm from the mid-point of the rear handle to the nearest unguarded point of the cutting attachment (point A, see figure 3).

Point A is the intersection between the plane perpendicular to the cutting path and the side-edge of the cutting attachment guard.

Dimensions in millimetres

**Key**

- 1 Cutting attachment
2 Guard
3 Centre at rear of front handle

- 4 Handle grip
5 Flexible power transmission
6 Barrier

Figure 3 — Minimum distance from rear handle to the cutting attachment**5 Verification of safety requirements**

The compliance with safety requirements shall be verified according to table 1.

Table 1 — Safety requirements and testing method

Sub-clause	Safety requirements	Testing method			
		Inspection ¹⁾	Function test ²⁾	Measurement ³⁾	Reference
4.2	Power unit	×	×	×	ISO 14740
4.3.1	Noise emission			×	ISO 7917
4.3.2	Vibrations at the handles			×	ISO 7916
4.4	Handles	×	×	×	
4.5	Barrier	×	×	×	
4.6	Cutting attachment strength	×	×	×	ISO 7113, ISO 8893, annex B of this International Standard
4.7	Retention of cutting attachment	×	×		
4.8	Guards for cutting attachment	×	×	×	ISO 7918, ISO 8380, annex C of this International Standard
4.9	Distance to cutting attachment			×	

¹⁾ Consists of verifying that the machine has the relevant part.

²⁾ Consists of verifying that the machine or component operates normally.

³⁾ Consists of determining a value by using some form of device or instrument.

6 Information for use

6.1 General

Every brush-cutter and grass-trimmer shall be supplied with information about the use for which it is designed or has been tested and about conditions necessary to ensure that it will be safe and without risk to health at all times when it is being adjusted, used, cleaned or maintained.

6.2 Technical data

The following technical information shall, including those for the chosen power source, be made available for each model and/or mark where significant differences occur:

a) Dry mass:

- unit: kg
- backpack power unit: kg

b) Volume:

- fuel tank: cm³
- oil tank, if applicable: cm³

c) Engine:

- displacement: cm³
- speed at idling: min⁻¹
- maximum performance: kW
- speed at recommended max. spindle speed: min⁻¹
- maximum corresponding spindle speed: min⁻¹
- fuel consumption in accordance with ISO 8893,
at maximum engine performance (on request): kg/h
- specific fuel consumption in accordance with ISO 8893,
at maximum engine performance: g/kWh

d) Cutting tools:

- type:
- diameter for blades: mm

e) Sound pressure level (according to ISO 7917):

$$L_{p_A \text{ av}} = 10 \lg \left[0,5 \left(10^{0,1L_{p_A \text{ Id}}} + 10^{0,1L_{p_A \text{ R or Fl}}} \right) \right]$$

where

$L_{p_A \text{ Id}}$ is the A-weighted time-averaged emission sound pressure level at idling, in decibels;

L_{pAR} is the A-weighted time-averaged emission sound pressure level at racing (for brush-cutters), in decibels;

L_{pAFI} is the A-weighted time-averaged emission sound pressure level at full load (for grass-trimmers), in decibels;

L_{pAav} is the mean of the two applicable previous quantities.

- f) Octave band analysis (on request).
- g) Sound power level (in accordance with ISO 10884) average:

$$L_{WAav} = 10 \lg \left[0,5 \left(10^{0,1L_{WAId}} + 10^{0,1L_{WAR \text{ or FI}}} \right) \right]$$

where

L_{WAId} is the A-weighted sound power level at idling, in decibels;

L_{WAR} is the A-weighted sound power level at racing (for brush-cutters), in decibels;

L_{WAFI} is the A-weighted sound power level at full load (for grass-trimmers), in decibels;

L_{WAav} is the mean of the two applicable previous quantities.

- h) Vibration levels at the handles for idling and racing when measured in accordance with ISO 7916.

6.3 Instruction handbook

Comprehensive instructions and information on all aspects of operator/user maintenance and the safe use for the unit, including safety clothing and personal protective equipment requirements and the need for training in all operations shall be provided in the instruction handbook. They shall comply with ISO/TR 12100-2:1992, 5.5. The instructions shall take into account that the unit may be used by a first time inexperienced operator.

NOTE — Extensive use should be made of photographs and/or diagrams.

The importance of reading the instruction handbook thoroughly before using the unit shall be stressed on the front page of the instruction handbook. Terms used in all documentation shall be in accordance with ISO 7112.

The instruction handbook shall at least cover information relating to:

- a) transport, handling and storage of the unit, such as
 - cleaning and maintenance before storage, including the use of a saw blade guard on cutting attachments with metal blades;
- b) commissioning of the unit, such as
 - assembling instructions, initial adjustments and checks;
 - for units with a clutch, routines for checking that the cutting attachment stops turning when the engine idles;
 - a list of recommended cutting attachments and appropriate guards and their location, including a warning of possible consequences from using non-approved cutting attachments;

- filling of fuel and oil, especially concerning fire precautions;
 - explanation of symbols and safety signs;
- c) the unit itself, such as
- description, identification and nomenclature of principal parts including the safety devices and harness, explanations of their functions and necessary personal protection equipment to be used, including correct clothing;
 - regular maintenance tasks, pre-operating measures and daily maintenance techniques, including checking for loose fasteners, fuel leaks and damaged parts;
 - application of the unit and how it is intended to be used, including prohibited applications. For brush-cutters information shall also be given about the risks of kick back and blade thrust;
 - data about sound pressure and power levels (see 6.2) and vibration levels, including warning about the risks and measures to be taken to minimize those risks;
- d) the use of the unit, such as
- operating instructions and instructions for common cutting tasks, including the use of personal protection equipment (PPE) and the need for adequate training, and risks involved in operating the unit when tired, ill or under influence of alcohol or other drugs;
 - PPE instructions shall include recommendations for the type of hearing protectors and eye protectors. Clothing instructions shall include the use of foot protectors;
 - hazards which may be encountered whilst using the saw and how to avoid them during operation. A minimum distance of 15 m between bystanders and the machine is recommended;
 - starting and stopping, with particular reference to safety;
 - warning about the emission of exhaust gases;
- e) maintenance instructions, such as
- servicing and replacement tasks for the user;
 - drawings or diagrams to allow user maintenance and for fault finding tasks;
 - consequences of improper maintenance, and removal of safety devices.

6.4 Marking

All brush-cutters and grass-trimmers shall be marked legibly and indelibly with the following minimum information:

- name and address of the manufacturer,
- designation of series or type,
- serial number, if any,
- year of manufacture.

In addition, the brush-cutters and grass-trimmers shall bear the following information:

- a) read the instruction handbook and follow all warnings and safety instructions;
- b) wear head protection, where there is a risk of falling objects;
- c) wear eye protection (goggles or face shield);
- d) wear ear protection;
- e) the distance between the machine and bystanders shall be at least 15 m;
- f) do not use metal blades (if applicable);
- g) beware of thrown objects;
- h) identification of on/off control, fuel cap, choke control, heated handle switch (if provided);
- i) the maximum speed of the cutting attachment shaft in min^{-1} , as specified by the manufacturer;
- j) rotational direction of the saw blade on a component near the saw blade.

The cutting attachment shall be marked with the following information:

- a) maximum rated rotational speed in min^{-1} ;
- b) rotational direction, when applicable;
- c) name or trade mark of the manufacturer.

Symbols should be in accordance with applicable ISO symbols and shall be explained in the instruction handbook.

Annex A (normative)

List of hazards

Table A.1 gives the list of hazards based on ISO/TR 12100-1 and annex A of ISO/TR 12100-2:1992.

The meaning of the different indications given in the last column (solutions given by this International Standard) of this table is as follows:

- "not relevant": the hazard is not significant for the machine;
- "dealt with": the hazard is significant. The measures given in the indicated clauses provide guidance for dealing with the hazard in accordance with the principles of safety integration of ISO/TR 12100, that is:
 - elimination or reduction of the risk by design, as far as possible,
 - protection measures,
 - information on the residual risks;
- "partly dealt with": the hazard is significant for several parts of the machine. The measures given in the indicated clauses deal with this hazard for some of these parts. For the other parts other measures, not included in this International Standard, will have to be applied;
- "not dealt with": the hazard is significant for the machine but has not been taken into account during the preparation of this International Standard.

Table A.1 — List of hazards

Hazards	Relevant subclauses (informative)		Solutions given by this International Standard
	ISO/TR 12100-1	ISO/TR 12100-2	
A.1 Mechanical hazards [caused for example by shape and relative location, mass and stability (potential energy of elements), mass and velocity (kinetic energy of elements), inadequacy of the mechanical strength, accumulation of potential energy by elastic elements (springs), or liquids or gases under pressure, or vacuum, or of the machine parts or workpieces]	4.2	—	—
A.1.1 Crushing hazard	4.2.1, 4.2.2	3.2	not relevant
A.1.2 Shearing hazard	4.2.1, 4.2.2	3.2, 4.1.1	not relevant
A.1.3 Cutting or severing hazard	4.2.1, 4.2.2	3.2	dealt with in 4.2, 4.5, 4.8, 4.9
A.1.4 Entanglement hazard	4.2.1, 4.2.2	—	not relevant
A.1.5 Drawing-in or trapping hazard	4.2.1	3.11, 4.1.1, 6.1.2	not relevant
A.1.6 Impact hazard	4.2.1	—	dealt with in 4.2, 4.8
A.1.7 Stabbing or puncture hazard	4.2.1	—	not relevant
A.1.8 Friction or abrasion hazard	4.2.1	3.3 b)	not relevant

Table A.1 (continued)

Hazards		Relevant subclauses (informative)		Solutions given by this International Standard
		ISO/TR 12100-1	ISO/TR 12100-2	
A.1.9	High-pressure fluid injection hazard	4.2.1	—	not relevant
A.1.10	Ejection of parts (of machinery and processed material/workpieces)	4.2.2	3.8	dealt with in 4.2, 4.8
A.1.11	Loss of stability (of machinery and machine parts)	4.2.2	6.2.5, 3.3	dealt with in 4.2, 4.4
A.1.12	Slip, trip and fall hazards in relationship with machinery (because of their mechanical nature)	4.2.3	6.2.4	not relevant
A.2	Electrical hazards	4.3	3.9	—
A.2.1	Electrical contact (direct or indirect)	4.3	—	not relevant
A.2.2	Electrostatic phenomena	4.3	—	not relevant
A.2.3	Thermal radiation or other phenomena such as ejection of molten particles, and chemical effects from short-circuits, overloads etc.	4.3	—	not relevant
A.2.4	External influences on electrical equipment	4.3	3.4	not relevant
A.3	Thermal hazards	4.4	3.6.3	—
A.3.1	Burns and scalds, by a possible contact of persons, by flames or explosions and also by the radiation of heat sources	4.4	—	not relevant
A.3.2	Health-damaging effects by hot or cold work environment	4.4	—	not relevant
A.4	Hazards generated by noise	4.5	3.6.3	—
A.4.1	Hearing losses (deafness), other physiological disorders (e.g. loss of balance, loss of awareness)	4.5	—	dealt with in 4.3, 6.2, 6.3
A.4.2	Interference with speech communication, acoustic signals, etc.	4.5	—	not dealt with
A.5	Hazards generated by vibration	—	—	—
A.5.1	Neurological and vascular disorders	4.6	3.6.3	not relevant
A.6	Hazards generated by radiation	4.7	—	—
A.6.1	Electrical arcs	—	—	not relevant
A.6.2	Lasers	—	—	not relevant
A.6.3	Ionizing radiation sources	4.7	—	not relevant
A.6.4	Machines making use of high-frequency electromagnetic fields	—	—	not relevant
A.7	Hazards generated by materials and substances processed, used or exhausted by machinery	4.8	3.3 b)	—
A.7.1	Hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	4.8	—	dealt with in 6.3
A.7.2	Fire or explosion hazard	4.8	—	not relevant
A.7.3	Biological and microbiological (viral or bacterial) hazards	4.8	—	not relevant
A.8	Hazards generated by neglecting ergonomic principles in machine design (mismatch of machinery with human characteristics and abilities)	4.9	3.6	—
A.8.1	Hazards due to unhealthy postures or excessive efforts	4.9	3.6.1, 3.6.4	dealt with in 4.4
A.8.2	Hazards due to inadequate consideration of human hand-arm or foot-leg anatomy	4.9	3.6.2	dealt with in 4.4
A.8.3	Hazards due to neglected use of personal protection equipment	5.5	—	dealt with in 6.3, 6.4

Table A.1 (concluded)

Hazards		Relevant subclauses (informative)		Solutions given by this International Standard
		ISO/TR 12100-1	ISO/TR 12100-2	
A.8.4	Hazards due to inadequate area lighting	—	3.6.5	not relevant
A.8.5	Hazards due to mental overload or underload, stress, etc.	4.9	3.6.4	not relevant
A.8.6	Hazards due to human error	4.9	3.6	dealt with in 6.3
A.9	Hazard combinations	4.10	—	not relevant
A.10	Hazards caused by failure of energy supply, breaking down of machinery parts and other functional disorders	5.2.2	3	—
A.10.1	Failure of energy supply (of energy and/or control circuits)	3.16	3.7	not relevant
A.10.2	Unexpected ejection of machine parts or fluids	—	3.8, 4	partly dealt with in 4.7, 4.8, 4.9
A.10.3	Failure, malfunction of control system (unexpected start up, unexpected overrun)	3.15, 3.16, 3.17	3.7	not relevant
A.10.4	Errors of fitting	—	—	dealt with in 6.3
A.10.5	Overturn, unexpected loss of machine stability	4.2.2	6.2.5	dealt with in 4.4
A.11	Hazards caused by (temporary) missing and/or incorrect positioned safety-related measures/means	—	4	—
A.11.1	All kinds of guards	3.22	4.2	dealt with in 6.3
A.11.2	All kinds of safety related (protection) devices	3.23	4.2	partly dealt with in 6.3
A.11.3	Starting and stopping devices	—	3.7	dealt with in 6.3
A.11.4	Safety signs and signals	—	3.6.7, 5.2, 5.3, 5.4	dealt with in 6.3
A.11.5	All kinds of information or warning devices	—	5.4	dealt with in 6.3
A.11.6	Energy supply disconnecting devices	—	6.2.2	not relevant
A.11.7	Emergency devices	—	6.1	not relevant
A.11.8	Feeding/removal means of workpieces	—	3.11	not relevant
A.11.9	Essential equipment and accessories for safe adjusting and/or maintaining	3.3, 3.11	3.12, 6.2.1, 6.2.3, 6.2.6	dealt with in 6.3
A.11.10	Equipment for evacuating gases, etc.	—	—	not relevant