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Agricultural machinery — Safety —

Part 10: Rotary tedders and rakes

Matériel agricole — Sécurité —

Partie 10: Faneuses et andaineuses rotatives

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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 4254-10 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 144, in collaboration with ISO Technical Committee TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 7, *Equipment for harvesting and conservation*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO 4254 consists of the following parts, under the general title *Agricultural machinery — Safety*:

— *Part 1: General requirements*

— *Part 5: Power-driven soil-working machines*

— *Part 6: Sprayers and liquid fertilizer distributors*

— *Part 7: Combine harvesters, forage harvesters and cotton harvesters*

— *Part 8: Solid fertilizer distributors*

— *Part 9: Seed drills*

— *Part 10: Rotary tedders and rakes*

— *Part 11: Pick-up balers*

— *Part 12: Rotary disc and drum mowers and flail mowers*

Part 2, *Anhydrous ammonia applicators*, has been withdrawn.

Part 3, *Tractors*, has been cancelled and replaced by ISO 26322.

Part 4, *Forestry winches*, has been cancelled and replaced by ISO 19472.

Introduction

The structure of safety standards in the field of machinery is as follows:

a) type-A standards (basic standards) giving basic concepts, principles for design, and general aspects that can be applied to machinery;

b) type-B standards (generic safety standards) dealing with one safety aspect or one type of safeguards that can be used across a wide range of machinery:

   — type-B1 standards on particular safety aspects (e.g. safety distances, surface temperature, noise);

   — type-B2 standards on safeguards (e.g. two-hand control devices, interlocking devices, pressure-sensitive devices, guards);

c) type-C standards (machinery safety standards) dealing with detailed safety requirements for a particular machine or group of machines.

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

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 the other standards for machines that have been designed and built according to the requirements of this type-C standard.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this part of ISO 4254. These hazards are specific to rotary tedders and rakes.

Significant hazards that are common to all the agricultural machines (self-propelled, mounted, semi-mounted and trailed) are dealt with in ISO 4254-1.

Agricultural machinery — Safety —

Part 10: Rotary tedders and rakes

1 Scope

This part of ISO 4254, to be used together with ISO 4254-1, specifies the safety requirements and their verification for the design and construction of rotary tedders, rotary rakes and rotary tedder–rakes, including rotary drum rakes, used by one person (the operator) only, having one or several powered rotors, mounted, semi-mounted, trailed or self-propelled. In addition, it specifies the type of information on safe working practices, including residual risks, to be provided by the manufacturer.

This part of ISO 4254 is not applicable to:

a) machines with ground-driven tines or ground-wheel–driven tines (e.g. sunflower rakes);

b) parallel bar rakes;

c) chain or endless belt type rakes;

d) pedestrian-controlled tedders and rakes;

e) machines equipped with a pick-up device.

When requirements of this part of ISO 4254 are different from those which are stated in ISO 4254-1, the requirements of this part of ISO 4254 take precedence over the requirements of ISO 4254-1 for machines that have been designed and built according to the provisions of this part of ISO 4254.

This part of ISO 4254, taken together with ISO 4254-1, deals with all the significant hazards, hazardous situations and events relevant to rotary tedders, rotary rakes and rotary tedder–rakes when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4), excepting the hazards arising from:

— the environment, other than noise;

— electromagnetic compatibility;

— vibration;

— overturning in regard to the protection of the operator at the driving station of a self-propelled machine;

— moving parts for power transmission except strength requirements for guards and barriers;

— safety and reliability of control systems.

NOTE 1 ISO 14982 specifies test methods and acceptance criteria for evaluating the electromagnetic compatibility of all kinds of mobile agricultural machinery.

NOTE 2 Specific requirements related to road traffic regulations (e.g. lighting, dimensions, speed limit plate) are not taken into account in this part of ISO 4254.

This part of ISO 4254 is not applicable to rotary tedders and rakes which are manufactured before the date of publication of this document by ISO.

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 3864-1:2002, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas*

ISO 4254-1:2008, *Agricultural machinery — Safety — Part 1: General requirements*

ISO/TR 11688-1:1995, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning*

ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4254-1 and ISO 12100-1, and the following, apply.

NOTE Examples of the machine types covered by this part of ISO 4254 are illustrated in Annex A.

3.1
tedder
machine designed to lift or raise, and spread mechanically, forage that has been cut and laid on the ground, to accelerate its drying

3.2
rake
machine designed to group together in continuous lines or in a swath, forage that has been cut and laid on the ground, in order to facilitate any further activity

3.3
rotary tedder
tedder having one or several rotors in the form of arms, each equipped with flexible tines, turning around a slightly inclined axis in relation to the vertical

3.4
rotary rake
rake having one or several rotors on the vertical axis equipped with tines constituting combs whose inclination can vary during rotation

3.5
tedder–rake
machine designed to throw forage lightly or to windrow depending on the position set for its tines and any deflectors

3.6
chain rake
endless belt type rake
rake having tines constituting combs fitted on two powered parallel chains or belts perpendicular to the direction of motion

3.7
parallel bar rake
rake with a rotor of horizontal axis, tilted in respect of the direction of motion, and equipped with tines constituting combs that are flexible and always vertical

3.8
sun flower rake
finger wheel rake
rake having tine rotors on a near-horizontal axis that revolve owing to the travel of the rake and move the forage to the successive rotor

3.9
rotary drum rake
rake with a rotor on a horizontal axis perpendicular to the direction of travel and with tines constituting a comb

3.10
machine equipped with a pick-up device
machine that uses a collecting device to move the forage onto a conveyor

4 List of significant hazards

Table 1 gives the significant hazard(s), the significant hazardous situation(s) and hazardous event(s) covered by this part of ISO 4254 that have been identified by risk assessment as being significant for this type of machine, and which require specific action by the designer or manufacturer to eliminate or to reduce the risk.

Attention is drawn to the necessity to verify that the safety requirements specified in this part of ISO 4254 apply to each significant hazard presented by a given machine and to validate that the risk assessment is complete.

Table 1 — List of significant hazards associated with rotary tedders and rotary rakes with powered rotors

No.[a]	Hazard, hazardous situation or hazardous event	Origin	Clause/subclause of ISO 4254-1:2008	Clause/subclause of this part of ISO 4254
A.1	**Mechanical hazards**			
A.1.1	Crushing hazard	Clearance from adjacent parts when actuating controls	4.4.3; 5.1.3.1; 5.1.3.3; 5.1.8; 6.1	5.4; 5.6
		Movement of boarding means	4.5.1.1.2; 4.5.1.2.5; 4.5.2.3; 4.6	—
		Design of platforms	4.5.2.2	—
		Working tools, contact with moving tines and tine arms	4.7	5.3; 5.4 ; 7.1; 7.3
		Service points, service and maintenance operations, use of supports	4.8; 4.14.1	7.1
		Movement of folding elements	4.14.3; 4.14.5; 4.14.6	5.6; 7.1; 7.3
		Shearing and pinching points at the operator's work station	5.1.4	5.1.2
		Construction of jack-up points, moving the machine, tie down and jacking operations	5.2	—
		Lack of stability	6.2	7.1
		Mounting of machines	6.2.2; 6.2.3; 6.3	—
A.1.2	Shearing hazard	Clearance from adjacent parts when actuating controls	4.4.3; 5.1.3.1; 5.1.3.3; 5.1.8; 6.1	5.4; 5.6
		Movement of boarding means	4.5.1.1.2; 4.5.1.2.5; 4.5.2.3; 4.6	—
		Design of platforms	4.5.2.2	—
		Working tools, contact with moving tines and tine arms	4.7	5.3; 5.4; 7.1; 7.3
		Service points, service and maintenance operations, use of supports	4.8; 4.14.1	7.1
		Movement of folding elements	4.14.3; 4.14.5; 4.14.6	5.6; 7.3
		Shearing and pinching points at the operator's work station	5.1.4	5.1.2
		Construction of jack-up points, moving the machine, tie down and jacking operations	5.2	—
		Lack of stability	6.2	7.1
		Mounting of machines	6.2.2; 6.2.3; 6.3	—

Table 1 (*continued*)

No.[a]	Hazard, hazardous situation or hazardous event	Origin	Clause/subclause of ISO 4254-1:2008	Clause/subclause of this part of ISO 4254
A.1.4	Entanglement hazard	Working tools, contact with moving tines and tine arms	4.7	5.3; 5.4; 7.1; 7.3
		Starting/stopping the engine with engaged drive(s)	5.1.8	—
A.1.6	Impact hazard	Movement of boarding means	4.5.1.2.5	—
		Movement of folding elements	4.14.5; 4.14.6	5.6; 7.1; 7.3
		Design of steering system	5.1.3.2	—
A.1.7	Stabbing or puncture hazard	Working tools, contact with tines in storage position	4.7	5.5; 7.1
A.1.8	Friction or abrasion hazard	Actuation of controls	4.4.3; 5.1.3.2	5.4
		Electrical equipment, location of cables	4.9.1	—
		Location of boarding means	4.5.1.1.2	—
A.1.9	High-pressure fluid injection or ejection hazard	Hydraulic components and fittings (e.g. rupture)	4.10; 6.5	—
A.2	**Electrical hazards**			
A.2.1	Contact of persons with live parts (direct contact)	Uninsulated electrical equipment	4.9; 5.3, 6.5	—
A.2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	Electrical equipment	4.9.1	—
A.2.3	Approach to live parts under high voltage	Contact with overhead power lines	8.1.3, 8.2.1	—
A.2.4	Thermal radiation or other phenomena such as the projection of molten particles and chemical effects from short circuits, overloads, etc.	Failure of electrical equipment	4.9.2	—
		Failure of battery	5.3.1	—
A.3	**Thermal hazards**			
A.3.1	Burns, scalds and other injuries by possible contact between persons and objects or materials with an extreme high or low temperature, by flames or explosions and also by the radiation of heat sources	Hydraulic system, operating fluids (e.g. fuel, hydraulic oil, engine coolant)	4.12	—
		Cabin material (in case of fire)	5.1.6	—
		Hot surfaces (e.g. of engine and associated parts)	5.5	—

Table 1 (*continued*)

No.[a]	Hazard, hazardous situation or hazardous event	Origin	Clause/subclause of ISO 4254-1:2008	Clause/subclause of this part of ISO 4254
A.4	**Hazards generated by noise**			
A.4.1	Hearing loss (deafness), other physiological disorders (e.g. loss of balance, loss of awareness); accidents due to interference with speech communication and acoustic warning signals	Working of the machine	4.2; 8.1.3	5.2, 7.1
A.5	**Hazards generated by materials and substances**			
A.5.1	Hazards from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	Contact with operating fluids (fuel tank, hydraulic systems, engine cooling system)	4.10; 4.12; 5.4; 8.1.3	—
		Cabin material (in case of fire)	5.1.6	—
		Battery	5.3.1	—
		Exhaust system	5.6	—
A.5.2	Fire or explosion hazard	Cabin material	5.1.6	—
A.6	**Hazards generated by neglecting ergonomic principles in machinery design**			
A.6.1	Unhealthy postures or excessive effort	Location and design of controls	4.4; 8.1.3	5.4; 5.6; 7.1
		Location and design of boarding means	4.5.1; 4.6; 8.1.3	—
		Service and maintenance operations	4.14.2; 4.14.4	—
		Design of folding elements	4.14.5	5.3; 5.5; 5.6
		Design of operator's work station	5.1.1; 5.1.2.1; 5.1.3;	—
A.6.2	Non- or inadequate consideration of hand–arm or foot–leg anatomy	Location of controls	4.4	5.4
		Design of boarding means	4.5 ; 4.6	—
		Design of operator's work station	5.1	—
A.6.5	Mental overload and under load, stress	Multifunction controls	4.4	7.1
A.6.6	Human error, human behaviour	Identification, design and location of controls	4.4	5.4; 5.6
		Missing or insufficient explanation of controls and signs in the operator's manual	8.1	7.1
		Location and design of signs	8.2	7.3
A.6.7	Inadequate design, location or identification of manual controls	Design, location and identification of controls	4.4; 5.1.3; 6.1, 8.1.3.c)	5.4; 5.6; 7.1

Table 1 (*continued*)

No.[a]	Hazard, hazardous situation or hazardous event	Origin	Clause/subclause of ISO 4254-1:2008	Clause/subclause of this part of ISO 4254
A.8	**Unexpected start-up, unexpected overrun/overspeed**			
A.8.1	Failure/disorder of the control system	All control systems	4.8, 4.9	—
		Hydraulic, pneumatic and electrical connections	6.5	—
A.8.2	Restoration of energy supply after an interruption	All control systems	4.4; 6.1	—
A.8.4	Other external influences (gravity, wind, etc.)	Stability	6.2.1.1; 6.2.1.2	7.1
A.8.5	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities; see A.6.6)	Design and location of controls	4.4; 6.1.2	5.4; 5.6; 7.1
		Design of boarding means	4.5 , 4.6	—
		Design of operator's work station	5.1	—
		Operating system	5.2	—
		Service and maintenance systems	4.14	—
		Mounting system of machines	6.2; 6.3	5.6
		Missing or insufficient instructions in the operator's manual	8.1.3	7.1
A.9	**Impossibility of stopping the machine in the best possible conditions**	All control systems	4.4; 5.1.8, 6.1	5.6
A.11	**Failure of energy supply**	Power-operated mechanical supports, hydraulic locking devices	4.8	5.6; 5.7
		All control systems	4.9; 4.10; 4.11; 4.12; 5.1.3; 5.1.8	5.6
A.12	**Failure of the control circuit**	All control systems	4.9; 4.10; 4.11; 4.12; 5.1.3; 5.1.8	5.6
A.13	**Errors of fitting**	Mounting systems of machines	6.2; 6.3	5.6
		Missing or insufficient instructions in the operator's manual	8.1.3	7.1
A.14	**Break-up (of parts) during operation**	Guards and barriers (strength)	4.7	5.3.1
		Supports (strength)	4.8	—
		Hydraulic components	4.10	—