SLOVENSKI STANDARD
oSIST prEN 12525:2024

01-november-2024

Nadomešča:
SIST EN 12525:2000+A2:2010

Kmetijski stroji - Sprednji nakladalnik - Varnost

Agricultural machinery - Front loaders - Safety

Landmaschinen - Frontlader - Sicherheit

Machine agricole - Chargeurs frontaux - Sécurité

Ta slovenski standard je istoveten z: **prEN 12525**

ICS:

65.060.10	Kmetijski traktorji in prikolice	Agricultural tractors and trailed vehicles

oSIST prEN 12525:2024 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 12525

September 2024

ICS 65.060.10

Will supersede EN 12525:2000+A2:2010

English Version

Agricultural machinery - Front loaders - Safety

Matériel agricole - Chargeurs frontaux - Sécurité

Landmaschinen - Frontlader - Sicherheit

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 144.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. prEN 12525:2024 E

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European foreword

This document (prEN 12525:2024) has been prepared by Technical Committee CEN/TC 144 “Tractors and machinery for agriculture and forestry”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12525:2000+A2:2010.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annexes ZA and ZB, which are an integral part of this document.

The main changes compared to the previous edition are as follows:

— new requirements about the risk of falling objects, including requirements for the allowed combinations tractors-front loader to be specified in the operator’s manual;

— alignment to CEN Guide 414;

— new Figures 2 and 3, showing the controls arrangement which also allows the floating function for bucket unload;

— this new edition is not a stand-alone standard, but it applies together with EN ISO 4254-1:2015[1];

— electromagnetic compatibility is now covered;

— new Annex F to determine the maximum lifting capacity;

— new requirements for lifting loads;

— Performance Levels required are now specified.

Introduction

This European Standard is a type C standard as defined in EN ISO 12100:2010.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document. These hazards are specific to front loaders.

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

Hazards that are common to agricultural machines (self-propelled, mounted, semi-mounted and trailed) are dealt with in EN ISO 4254-1:2015[1].

EN 12525 provides requirements for front loaders in addition to those of EN ISO 4254-1:2015[1].

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (for example trade unions, organizations for people with special needs);

— service providers, for example for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

1 Scope

This document specifies safety requirements and their verification for the design and construction of front loaders designed to be mounted on agricultural and forestry tractors (as defined in the Regulation EU 167/2013).

It deals with all significant hazards, hazardous situations and events relevant to front loaders when used as intended and under the conditions of misuse which are reasonably foreseeable. This includes hazards related to the handling of unit loads during operations (for example, using bale forks), hazards related to mounting/demounting the lifting arms to/from the frame mounted on the tractor, and also hazards related to devices for mounting/demounting attachments to/from the lifting arms.

In addition, it specifies the type of information on safe working practices.

Hazards related to the mounted attachments with or without powered functions are excluded, as well as hazards related to visibility and those related to the mobile elevating work platform applications to a front loader, because the front loader is not designed to lift and/or transport people. Front loaders with fully or partially self-evolving behaviour or logic and/or with varying levels of autonomy are also excluded.

Environmental aspects, other than noise, have not been considered in this document.

This document is not applicable to front loaders which are manufactured before the date of its publication as EN.

2 Normative references

The following documents are referred to in the 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.

EN ISO 4254-1:2015,[1] *Agricultural machinery - Safety - Part 1: General requirements (ISO 4254-1:2013)*

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

EN ISO 13849-1:2023, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2023)*

EN ISO 14982-1:—,[2] *Agricultural and forestry machinery — Electromagnetic compatibility — Part 1: General EMC requirements*

EN ISO 14982-2:—,[3] *Agricultural and forestry machinery — Electromagnetic compatibility — Part 2: Additional EMC requirements for functional safety*

[1] As impacted by EN ISO 4254-1:2015/A1:2021.

[2] Under preparation. Stage as of June 2024: prEN ISO 14982-1:2021 (ISO/FDIS 14982-1 - FDIS/Formal Vote to be started).

[3] Under preparation. Stage as of June 2024: prEN ISO 14982-2:2021 (ISO/FDIS 14982-2 - FDIS/Formal Vote to be started).

EN ISO 25119-1:2023,[4] *Tractors and machinery for agriculture and forestry - Safety-related parts of control systems - Part 1: General principles for design and development (ISO 25119-1:2018)*

EN ISO 25119-2:2023, *Tractors and machinery for agriculture and forestry - Safety-related parts of control systems - Part 2: Concept phase (ISO 25119-2:2019)*

EN ISO 25119-3:2023,[5] *Tractors and machinery for agriculture and forestry - Safety-related parts of control systems - Part 3: Series development, hardware and software (ISO 25119-3:2018)*

EN ISO 25119-4:2023,[6] *Tractors and machinery for agriculture and forestry - Safety-related parts of control systems - Part 4: Production, operation, modification and supporting processes (ISO 25119-4:2018)*

ISO 3600:2022, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment - Operator's manuals - Content and format*

ISO 3767-2:2016,[7] *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 2: Symbols for agricultural tractors and machinery*

ISO 10448:2021, *Agricultural tractors — Hydraulic pressure for implements*

ISO 11684:2023, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment- Safety labels — General principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 apply.

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

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp/

3.1
front loader
unit consisting of non-telescopic lifting arms and fastening devices designed to be mounted on a frame on the front of a tractor and equipped with a basic attachment and which may mount other types of allowable attachments

Note 1 to entry See Figure 1.

[4] As impacted by EN ISO 25119-1:2023/A1:2023.

[5] As impacted by EN ISO 25119-3:2023/A1:2023.

[6] As impacted by EN ISO 25119-4:2023/A1:2023.

[7] As impacted by ISO 3767-2:2016/AMD 1:2020.

3.2
basic attachment
working attachment, without powered functions, to be mounted on a front loader

EXAMPLE Bucket, pallet fork or bale spear.

Note 1 to entry: This is used to perform the conformity assessment of the front loader.

3.3
allowable attachment
working attachment, with or without powered functions, to be mounted on a front loader according to the front loader instructions, which replaces the basic attachment(s)

3.4
attachment without powered functions
attachment where there are no movements or functions actuated by power other than directly applied manual effort

Note 1 to entry: See Figure 1.

3.5
attachment with powered functions
attachment where there is at least one movement or function, as part of the attachment, which is actuated by power other than directly applied manual effort

3.6
supporting device
device for supporting the lifting arms in a stable condition when it is demounted from the tractor

Note 1 to entry: For example, for storage, see Figure 1.

3.7
operator controls of the front loader
control equipment supplied with the front loader to enable the loader and attachments to be operated from the driving position of the tractor

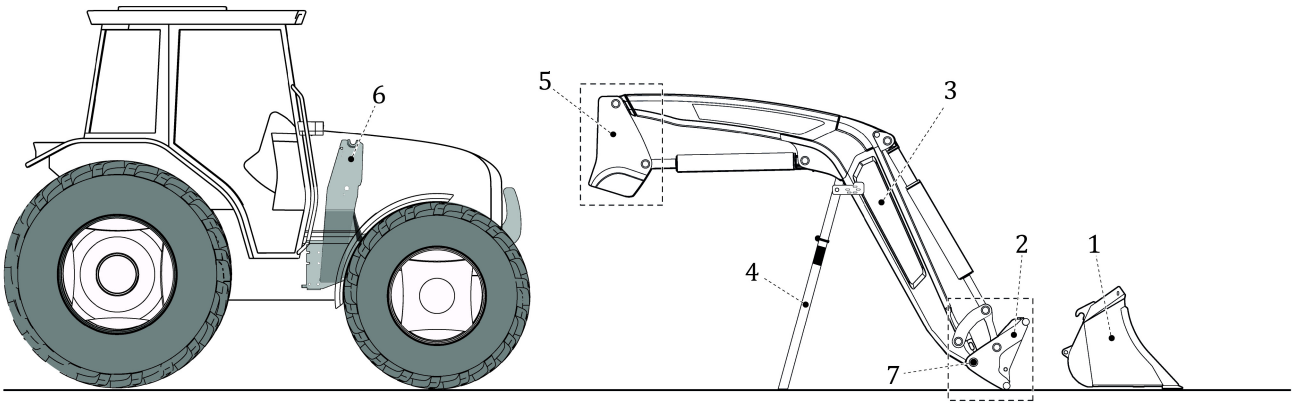
3.8
locking system
mechanical system which engages with and retains the attachment enabling it to perform its intended function

3.9
float position
position of operator control(s) that allows the actuator (for example hydraulic cylinders) free movement triggered by external forces (for example gravity, unevennes of the ground, etc.)

Note 1 to entry: See Annex C.

3.10
Operator Protective Guard
OPG
fixed or self-adjusting guard designed to protect the operator from a unit load that may fall from the attachment and/or roll along the lifting arms of the front loader

Note 1 to entry: See Annex G.



Key
1 example of basic attachment
2 attachment carrier
3 lifting arms
4 supporting devices
5 fastening devices
6 mounting frame (fixed on the tractor)
7 attachment pivot point

Figure 1 — Front loader

3.11
failure-simulating device
hydraulic valve(s) used for simulating a hydraulic line rupture in the front loader circuit

3.12
test load
mass (50 ± 10) % of the maximum lifting capacity determined according to Annex F

4 Safety requirements and/or measures

4.1 General safety

Front loader shall comply with the safety requirements and/or protective measures of this clause. In addition, it shall be designed according to the principles of EN ISO 12100:2010 for hazards relevant but not significant, which are not dealt with by this document.

4.2 General safety for agricultural machinery

Except where otherwise specified in this document, the front loader shall be designed in accordance with EN ISO 4254-1:2015[1].

4.3 Mounting of the front loader on a tractor

4.3.1 Intended use

The front loader shall be designed for specific model(s) of tractor(s), taking into account the specific technical characteristics of the tractor(s) and the intended use of the combined unit. The tractor(s) which is (are) suitable for the mounting and use with the front loader shall be clearly identified in the front loader's operator's manual or be accessible from it, in terms of specific tractor model(s) or specifying the range of all the needed technical features. See also 4.9.

4.3.2 Mounting frame fixed on the tractor and fastening devices of the front loader

The design of the mounting frame and its fastening devices intended for use with front loaders that are demountable and have supporting devices:

— shall allow the operator alone to mount and demount the front loader,

— shall take ergonomic principles for the engagement system into account,

— shall indicate that the front loader is safely connected, once it has been locked, or the locking mechanism cannot be engaged unless the front loader is correctly mounted,

— shall not disengage unintentionally by use or by failure of the engagement system. This requirement can be met for example by use of a locking system.

The operator's manual shall indicate the operation(s) and/or manoeuvre(s) to make, before using the front loader, in order to confirm that mounting is properly made according to 6.3.4.

4.3.3 Stability of the combined tractor/front loader

4.3.3.1 General

The stability of the combined tractor/front loader is dependent on the range and capacity of the attachment with or without powered functions, on the arrangement of the front loader on the tractor and on the type of tractor. Improvements in stability can be achieved by fitting a counterweight to the rear of the tractor or ballasting the rear wheels and observing limits to driving and operating conditions.

4.3.3.2 Longitudinal static stability

For ensuring a sufficient longitudinal static stability the counterweight to be fitted shall be determined according to Annex A.

4.3.3.3 Longitudinal dynamic stability

Specific instructions shall be provided regarding the longitudinal dynamic stability while the tractor is travelling in the operator's manual according to 6.3.6.

4.3.3.4 Lateral stability during lifting

Specific instructions shall be provided regarding the lateral stability during lifting in the operator's manual according to 6.3.7.

4.4 Demounting and storing of the front loader

4.4.1 Supporting devices

Devices shall be provided to support the demounted lifting arms when stored on the ground. They shall:

— be so designed that the strength of the structure is able to hold the weight of the lifting arms and of the heaviest allowable attachment with or without powered functions, under the conditions specified in 4.4.2;

— have a supporting surface area which exerts a ground pressure of not more than 400 kPa. This requirement shall be met with any allowable attachment in the lowered position;

— have a locking device to prevent inadvertent lowering and creation of drawing-in or trapping hazards at the supporting devices themselves;

— be available at any time when demounting the lifting arms. They shall be attached to the lifting arms or stored separately from the front loader somewhere on the vehicle. When the supporting devices are stored on the vehicle, a dedicated storage solution shall be provided.

The supporting devices shall be so designed that they can be fastened and have their height adjusted by the operator standing beside the lifting arms or sitting on the seat of the tractor.

4.4.2 Stability when the front loader is demounted

When the front loader is standing demounted using supporting devices on horizontal, firm ground in configuration(s) and position defined in the operator's manual, the configuration(s) shall be capable of resisting a force of 400 N applied in any direction, without tilting.

NOTE A configuration can be the front loader with or without an attachment mounted.

The configuration(s) as recommended in the operator's manual shall also fulfill EN ISO 4254-1:2015[1], 6.2.1.1.

If the recommended configuration(s) requires a minimum weight of an attachment, the weight shall be stated in the operator's manual.

4.5 Mounting of attachments on the attachment carrier

4.5.1 Attachments carrier

The device shall be so designed that mounting and demounting of an attachment can be done by the operator alone.

4.5.2 Locking system

The locking system for allowable attachments shall not unintentionally be disengaged, by use of the attachment or by failure of the locking system, under any operating conditions. This requirement can, for example, be met by use of a locking valve in a hydraulic system or a spring load that generates a positive force on the locking system.

It shall be possible to check the position of the locking system (open/close) from the driving position of the tractor (see Annex B for an example). This is not required to be possible at all front loader positions.

4.6 Hydraulic circuit

4.6.1 General

EN ISO 4254-1:2015[1], 4.13, shall apply.

The system shall be so designed that it can transmit the full hydraulic power of the tractor or have the incoming hydraulic power limited by a pressure limiting valve supplied with the front loader.

If the setting pressure of the hydraulic circuit is not known, then the pressure requirements of ISO 10448:2021 shall apply.

The maximum lifting capacity shall be determined according to Annex F.

4.6.2 Pressure hoses near operator's seat

Unprotected pressure hoses having a pressure of more than 5 MPa (50 bar) shall be located at a distance greater than 1 m from the operator in his normal driving position. Hoses shall be protected in such a way that, in the case of failure, the operator cannot be reached by liquid at a temperature of more than 50 °C.

4.6.3 Protection against unintended lowering

If the front loader is also designed for operations requiring the presence of a person near to the load when the front loader is in the raised position, the hydraulic lifting arm cylinder(s) shall be equipped with a safety device according to Annex D to avoid unintentional lowering of the lifting arm. That safety device shall remain active in case of failure of the control circuit's energy supply.

If this safety device can be activated or deactivated for operations that do not require the presence of a person near to the load the following additional requirements apply:

— it shall be possible to activate or to deactivate the safety device from the operator station;

— operator control to deactivate the safety device shall be designed and located so that it cannot be actuated unintentionally by the operator;

— current state (active or deactivated) of the safety device shall be clearly indicated and clearly visible from the operator's position and from the loading area.

The correct method of operation including warnings shall be explained in the operator's manual in accordance with 6.3.2.

The front loader shall be equipped with a mandatory sign indicating that the safety device shall be activated for operations requiring presence of a person near the load (see 6.5).

The information for use of front loaders which are not designed for operations requiring the presence of a person near to the load when the front loader is in the raised position shall comply with 6.3.7 and 6.5.

4.7 Operator controls

Control movements of the lifting arms, the attachments carrier and the powered functions of the attachments shall be of the hold-to-run type, except float positions and the attachments' powered functions that are designed to be continuous (for example sweepers, sand spreading buckets, etc.). The float position of the lowering or the dumping can only be engaged after actuating the lowering of the front loader or dumping of the attachment respectively (see Figures 2 and 3).

The controls shall be designed and arranged so that they are:

— accessible and recognizable;

— marked on or near the control according to Figures 2 or 3. Other control symbols where not specified as above shall conform to ISO 3767-2:2016[7].

Unintentional operation of the front loader controls shall be prevented by:

— positively isolating the controls from the hydraulic supply so they cannot be used (for example, the controls are normally disabled and in order to use them, it is first necessary to give consent through a separate control); or

— locking of the controls so they cannot be operated (for example with a mechanical or electronical locking system); or