



SLOVENSKI STANDARD
SIST EN 909:1999

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JULIJ

Agricultural and forestry machinery - Centre pivot and moving lateral types irrigation machines - Safety

Land- und Forstwirtschaftliche Maschinen - Kreis- und Linearberegnungsmaschinen - Sicherheit

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Matériel agricole et forestier - Machines à irriguer types pivot et rampes frontales - Sécurité

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ICS:

65.060.35	Namakalna in drenažna oprema	Irrigation and drainage equipment
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English version

Agricultural and forestry machinery - Centre pivot and moving lateral types irrigation machines - Safety

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Land- und Forstwirtschaftliche Maschinen - Kreis- und Linearberegnungsmaschinen - Sicherheit

This European Standard was approved by CEN on 28 November 1998.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard was prepared by Technical Committee CEN/TC 144 "Tractors and machinery for agriculture and forestry", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 1999, and conflicting national standards shall be withdrawn at the latest by June 1999.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Annex A is normative and contains the "List of hazards".

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0 Introduction

The extent to which hazards are covered is indicated in the scope of this standard. These hazards are specific to centre pivot and moving lateral types irrigation machines.

1 Scope

This standard specifies specific safety requirements and their verification for the design and construction of center pivot and moving lateral types irrigation machines that are electrically powered.

NOTE : Figures 1 to 5 give illustrations of these machines.

In addition, it specifies the type of information on safe working practices to be provided by the manufacturer.

The list of significant hazards dealt with in this standard is given in annex A. Annex A also indicates the hazards which have not been dealt with.

Hazards due to the use of the pump associated with center pivot and moving lateral types irrigation machines are not dealt with.

Hazards induced by the use of these machines for pesticide products and liquid fertilizer application are not dealt with.

Environmental aspects have not been considered in this standard.

This standard applies primarily to machines which are manufactured after the date of issue of the standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1	1991	Safety of machinery - Basic concepts, general principles for design - Part 1 : Basic terminology, methodology
EN 292-2	1991	Safety of machinery - Basic concepts, general for design - Part 2 : Technical principles and specification (including amendment A1:1995)
EN 294	1992	Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs
prEN 12325-2	1996	Irrigation techniques - Centre pivots and moving lateral systems - Part 2 : Minimum performances and technical characteristics
EN 60204-1	1992	Safety of machinery - Electrical equipment of machines - Part 1 : General requirements

EN 60529 1991 Degrees of protection provided by enclosures (IP code)

3 Definitions

For the purpose of this standard, the definitions given in EN 292-1:1991 and EN 292-2:1991 apply together with the following :

3.1 centre pivot : Irrigation machine constituted of a long length pipe supported by towers equipped with wheels driven by motors, including a fixed point where water and energy arrive.

NOTE : This irrigation machine can be used either on a complete circle or on a circle quadrant. It can be movable i.e. the pivot point can move from a working position to a new working position, during the movement the watering is stopped.

3.2 pivot point : Fixed point from which the rotation of the whole machine is performed.

NOTE : It is characterised by a structure fixed on a concrete flagstone leaving the machine free to rotate. Here feeding of water and energy are performed.

3.3 moving lateral : Sprinkling lateral built on the same principal as centre pivot, the displacement of which is lateral (translatory motion).

NOTE : The control tower receives or pumps the water and receives or produces its own electrical energy.

3.4 control tower : In the case of a movable system, tower which initiates the movement of the whole sprinkling lateral.

NOTE : It can be situated in the centre of the lateral or at one of the ends and be equipped with 2 or 4 wheels, some of them could be driving and possibly steering.

3.5 irrigation gun : Large sprinkler with slow motion return used at the end of an irrigation machine generally watering a sector.

4 Safety requirements and/or measures

4.1 General

The machines shall comply as appropriate with EN 292 for hazards which are not dealt with and especially with annex A of EN 292-2:1991/A1:1995 when EN 292 does not give precise requirements.

Unless otherwise specified in this standard, the machine shall comply with the requirements of tables 1, 3, 4 and 6 of EN 294:1992.

4.2 Starting control

The switching on control and the displacement control shall be separate. Those manual controls shall be placed on a panel lockable by a key. If the main control panel is not located on the pivot point or on the cart of a moving lateral an additional external circuit breaker shall be positioned at the pivot point or on the cart.

4.3 Stopping devices in plot limits

In case of danger (road, railway, electrical line, buildings, ...), in order to limit the displacement of the centre pivot covering a circle quadrant and moving lateral type irrigation machine to the surface intended to be watered, two stopping devices shall be placed on two separate points, each stopping device shall be able independently to stop (or reverse) the displacement. The thrusts used shall have a minimum width taking into account machine dilatation and misalignment risk, their minimum height from the ground shall be 1 m. In case of danger zone one of the devices shall be a fixed impassable obstacle.

4.4 Alignment - guiding

The alignment device shall be doubled with a safety device in case of misalignment. The safety device shall be activated in passive position. In case of breaking of the alignment device, a return spring or other mechanical device shall be able to bring back the machine in safety position. For movable machines, in case of loss of guiding signal or deviation of more than 0,5 m, the machine shall stop.

4.5 Stability

4.5.1 Pivot point

The fixation of the pivot point shall withstand an horizontal load $F = 10\ 000$ N applied to the top of the pivot point (horizontal axis of the elbow) and a reversing moment of $F \times h = 40\ 000$ Nm (h is the vertical distance from the application point of F to the ground).

Each anchorage shall be able to withstand half of the load applied by the spray line, the anchorages shall be completely apparent and treated against corrosion.

4.5.2 Span

The span stability shall be checked by using the calculation note of prEN 12325-2:1996, annex A.

The permissible load in accordance with the elastic limit shall be weighted with the coefficient 1,5 under static conditions. The following loading cases will be considered for a machine with and without water :

- difference of slope between two consecutive spans = 15 % (see example in figure 1);
- total slope over several spans or the entirety = 10 % (see example in figure 2);
- relative angle between two consecutive towers = $\pm 15^\circ$ (see example in figure 3);
- relative angle between any two towers of the machine = $\pm 30^\circ$ (see example in figure 4);
- ground clearance H beneath these spans, or beneath the overhang at any point of the installation \geq minimum ground clearance specified by the manufacturer (figure 5);
- side effort due to track effect = $\pm 10\ 000$ N (5 000 N per wheel).

The minimum steel wall thickness shall not be less than 2,5 mm. Weldings of structure elements shall be able to withstand the constraints listed in prEN 12325-2:1996, annex A.

4.5.3 Overhang

A clogging indicator shall be fitted on the overhang.

Gun stroke frequency shall be different from natural frequency of the structure to avoid resonance risks.

4.5.4 Structure

The structure shall be designed to withstand a wind of 140 km/h perpendicular to the structure measured at 10 m from the ground on an horizontal surface (in accordance with Eurocode 3).

Compliance with this requirement is checked by calculation.

NOTE : A European standard on the climatic conditions of the installation area is in progress in CEN/TC 250/SC 1. 4.5.2 and 4.5.4 will be revised in due course to take into account the provisions of that standard.

4.6 Power supply

4.6.1 General

The devices used for the power supply shall conform to EN 60204-1.

NOTE : Further requirements on trailing cables will be added at the next revision of the standard.

4.6.2 Level of protection (according to EN 60529)

4.6.2.1 Gear motors

The gear motors case shall be equipped with a device to hold and protect the supply cable intake or supplied with a reinforced cable. They shall be IP 44.

4.6.2.2 Main control panel

It shall not be less than IP 55 and equipped with a double internal door.

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4.6.2.3 Other panels (standards.iteh.ai)

They shall not be less than IP 44.

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4.6.2.4 Collector ring

The collector box shall be IP 55.

4.6.2.5 Booster pump

It shall not be less than IP 44.