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SLOVENSKI STANDARD
SIST EN 50512:2009

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Električne inštalacije za osvetlitev in svetilnike na letališčih - Napredni sistem vodenja za vizualno pristajanje (A-VDGS)

Electrical installations for lighting and beaconing of aerodromes - Advanced Visual Docking Guidance Systems (A-VDGS)

Elektrische Anlagen für Beleuchtung und Befeuerung von Flugplätzen - Erweitertes optisches Andockführungssystem (A-VDGS)

Installations électriques pour l'éclairage et le balisage des aérodromes - Systèmes Avancés de Guidage Visuel pour l'Accostage

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93.120	Gradnja letališč	Construction of airports

SIST EN 50512:2009 **en,fr,de**

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 50512

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ICS 93.120

English version

Electrical installations for lighting and beaconing of aerodromes - Advanced Visual Docking Guidance Systems (A-VDGS)

Installations électriques pour l'éclairage
et le balisage des aérodromes -
Systèmes Avancés de Guidage Visuel
pour l'Accostage (SAGVA)

Elektrische Anlagen für Beleuchtung
und Befeuerung von Flugplätzen -
Erweitertes optisches
Andockführungssystem (A-VDGS)

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This European Standard was approved by CENELEC on 2008-12-01. CENELEC 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 CENELEC 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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 50512:2009 E

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Foreword

This European Standard was prepared by Working Group 3 of the Technical Committee CENELEC TC 97, Electrical installations for lighting and beaconing of aerodromes.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50512 on 2008-12-01.

The following dates were fixed:

– latest date by which the EN has to be implemented
  at national level by publication of an identical
  national standard or by endorsement   (dop)   2009-12-01

– latest date by which the national standards conflicting
  with the EN have to be withdrawn   (dow)   2011-12-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 2004/108/EC. See Annex ZZ.

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Introduction

This European Standard contains the requirements for an Advanced Visual Docking Guidance System (A-VDGS) as it is described in the ICAO Annex 14. This standard covers the characteristics of the electrical and mechanical components. This standard includes the software design where this affects the required system performance and safety.

An A-VDGS is to be designed to achieve safe and precise guidance during the docking procedure of an aircraft. The system provides at least a display which shows information of azimuth guidance and stop information.

The use of an A-VDGS is in principle limited to a defined area with an opening angle and a border distance to the stop point related to the centre line. The reference point for all distances and guidance information at the aircraft is the central axis of the nose wheel.

It has to be considered that in some cases the topographical situation of an airport requires a reduced working area for an A-VDGS which will result in the area being different from the requirements stated herein.

For practical use on the airport it has to be considered that the detection range can be limited due to the actual weather and visibility condition prevailing (fog, rain, snow, etc.).

1 Scope

This European Standard specifies requirements of electrical and mechanical design, installation, maintenance and testing procedures for advanced visual docking guidance systems.

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.

EN 60068-2-1, Environmental testing - Part 2-1: Tests - Test A: Cold (IEC 60068-2-1)

EN 60068-2-2, Environmental testing - Part 2-2: Tests - Test B: Dry heat (IEC 60068-2-2)

EN 60068-2-5, Environmental testing - Part 2-5: Tests - Test Sa: Simulated solar radiation at ground level (IEC 60068-2-5)

EN 60068-2-30, Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle) (IEC 60068-2-30)

EN 60068-2-64, Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64)

EN 60439-1:1999, Low-voltage switchgear and control gear assemblies - Part 1: Type-tested and partially type-tested assemblies (IEC 60439-1:1999)

EN 60529, Degrees of protection provided by enclosures (IP Code) (IEC 60529)

EN 60825-1, Safety of laser products - Part 1: Equipment classification and requirements
(IEC 60825-1)

EN 61000-3-2, Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) (IEC 61000-3-2)

EN 61000-3-3, Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection (IEC 61000-3-3)

EN 61000-3-11, Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection (IEC 61000-3-11)

EN 61000-3-12, Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase (IEC 61000-3-12)

EN 61000-6-2, Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2)

EN 61000-6-3, Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3)

HD 472, Nominal voltages for low-voltage public electricity supply systems
(IEC 60038 'IEC standard voltages', mod.)

HD 60364 series, Low voltage electrical installations (IEC 60364 series, mod.)

3   Definitions

For the purposes of this document, the following terms and definitions apply.

The following definitions were developed to be included in international standards relating to A-VDGS on aerodromes.

3.1
Advanced Visual Docking Guidance System (A-VDGS)
those systems that provide additional guidance information to pilots, e.g. aircraft type indication, distance-to-go information and closing speed. Docking guidance information is provided on an A-VDGS display. Advanced-VDGS also permit interfacing to external management, guidance or allocation systems

3.2
A-VDGS display
display which presents the guidance and other information to the pilots in the left and/or right hand seats and to the drivers and to any other persons assisting the aircraft docking procedure

3.3
aircraft type
the aircraft manufacturer's designation for an aircraft grouping with similar design or style of structure

3.4
ambient brightness
the overall brightness level in the viewing environment surroundings

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3.5
azimuth guidance
information which will enable the pilot of an aircraft to follow the required track

3.6
control of the A-VDGS
any manual or automatic means to operate the A-VDGS. This includes the required settings for an individual guidance procedure

3.6.1
local control
the control of the A-VDGS from a position where the A-VDGS display and the docking area can be observed by the A-VDGS operator

3.6.2
remote control
the control of the A-VDGS from any remote position where the operator may not be able to observe the docking procedure

3.7
detection range
the distance within which the A-VDGS is able to detect an aircraft

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3.8
earthed
connected to the general mass of earth in such a manner as to ensure at all times an immediate
discharge of electrical energy to reduce the danger of equipment damage or personnel injury

3.9
electrical equipment
anything used, intended to be used or installed for use, to generate, provide, transmit, transform, rectify, convert, conduct, distributes, control, store, measure or use electrical energy

3.10
emergency stop
the event caused by manual or automatic means that initiates the emergency stop indication

3.11
emergency stop indication
a stop indication to pilots, drivers and any other persons assisting the docking procedure to immediately interrupt the docking procedure

3.12
guidance
presentation of any information assisting the pilot and/or driver to reach safely and with the required accuracy the designated stop area

3.13
Luminance Ratio (*LR*)
the ratio of luminance emitted from the display in the ON state compared to the luminance in the OFF state

Luminance ratio (*LR*) shall be calculated as follows:

$$LR = (L_a - L_b) / L_b$$

where

L_a is defined as the measured luminance of the display in the ON-state when under external illumination;

L_b is defined as the measured luminance of the display in the OFF-state when under external illumination

3.14
Meteorological Optical Range (MOR)
the length of the path in the atmosphere required to reduce the luminous flux in a collimated beam from an incandescent lamp, at a colour temperature of 2 700 K, to 0,05 of its original value, the luminous flux being evaluated by means of photometric luminosity function of the International Commission on Illumination (CIE) (metre (m) or kilometre (km))

3.15
nose wheel
the single or multiple wheels of the undercarriage at the front of the aircraft used to steer the aircraft on the ground. The reference point for the docking is the centre of the nose wheel footprint

3.16
on-block
end of a docking procedure where the aircraft is parked in the dedicated stop area

3.17
off-block
end of the aircraft parking period usually initiated by the push-back procedure

3.18
working area of an A-VDGS
the area the A-VDGS is intended to perform the aircraft docking. The working area can be temporarily limited by environmental or operational influences

3.19
functional safety
part of the overall safety which depends on the correct functioning of the A-VDGS

3.20
power loss
the abnormal power supply condition or a total loss of the external energy supply that does not allow operating the A-VDGS or parts of the system

3.21
stop point
the predefined location where the particular aircraft shall be parked related to the predefined aircraft reference point

3.22
stop area
the area defined by the maximum lateral and longitudinal tolerance around the stop point

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3.23
towed aircraft
an aircraft that is moved by an external device like a towing truck or any other towing or pushing equipment operated outside the aircraft

4   Requirements

4.1   System performance

4.1.1   General conditions

The manufacturer shall state the electrical, mechanical, environmental conditions and functional performances for which the A-VDGS is designed.

The A-VDGS shall cover an area having a horizontal opening angle of at least 10° to either side of the centre line with a border distance to the stop point of 1 m to either side of the centre line according to Figure 1.

The origin of the defined distances is the stop point of the actual aircraft type. The reference point at the aircraft is the nose wheel.

Due to the topographical situation of an airport the A-VDGS shall provide the capability to limit the working area.

The detection range can be limited caused by the actual weather and visibility situation (fog, rain, snow, etc.).
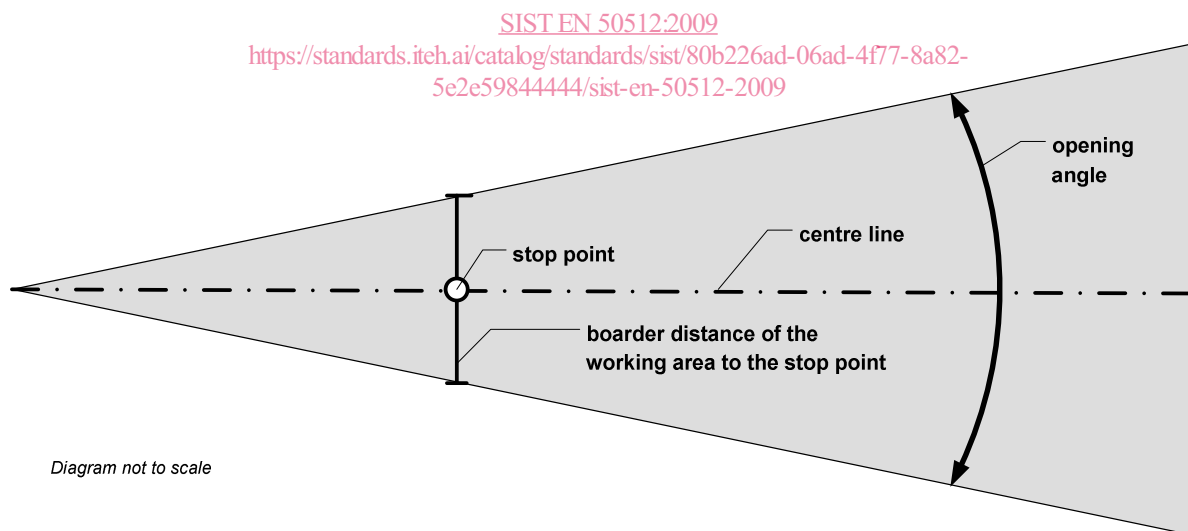
Figure 1 – Area covered by the A-VDGS

4.1.2   System accuracy

The A-VDGS shall provide at least the accuracy defined in Table 1.

The accuracy defines the maximum acceptable deviation between the presented information on the A-VDGS display and the actual aircraft position.

The deviation is divided in a lateral and longitudinal portion.

The accuracy shall be provided in the range of aircraft speed defined in Table 2.

Indication to the user shall be provided when the A-VDGS is used outside the defined specification or an internal failure does not allow guidance with the required accuracy.

A positive indication has to be provided when the aircraft stops inside the defined stop area.

The docking procedure shall not be affected by persons, vehicles or other objects as long as they do not mask the aircraft significantly.

The A-VDGS shall be capable to guide towed aircraft. The guidance information shall be related always to the aircraft position.

Table 1 – A-VDGS accuracy

Guidance presentation	Max. deviation at stop position (stop area)	Max. deviation at 9 m	Max. deviation at 15 m	Max. deviation at 25 m
Azimuth	A = ± 250 mm	B = ± 340 mm	C = ± 400 mm	D = ± 500 mm
Distance	a = ± 500 mm	b = ± 1 000 mm	c = ± 1 333 mm	---

Table 2 – Maximum aircraft taxi speed during the docking procedure

Remaining distance to the stop point in m	Maximum aircraft speed in m/s (values in km/h and knots are informative)		
m	m/s	(km/h)	(kt)
25	8,9	(32,2)	(17,4)
18	7,6	(27,3)	(14,8)
13	6,4	(23,2)	(12,5)
9	5,4	(19,3)	(10,4)
7	4,7	(17,0)	(9,2)
5	4,0	(14,4)	(7,8)
3	3,1	(11,2)	(6,0)
2	2,5	(9,1)	(4,9)
1,5	2,2	(7,9)	(4,3)
1	1,8	(6,4)	(3,5)
0,5	1,0	(3,6)	(1,9)

4.1.3 Control

4.1.3.1 General

The local control function shall be able to override or disconnect the remote control.

4.1.3.2 Local control

The A-VDGS shall be provided with means for local control with at least the following functionalities:

- password or key for access control;
- selection of aircraft type to be docked;
- start of docking procedure;
- emergency stop (no interlock by password or key).

4.1.3.3 Remote control

Where an A-VDGS remote control interface is provided it shall support the exchange of at least the following information:

Receive by the individual docking system at the gate:

- selection of aircraft type to be docked;
- activating and cancelling of docking procedure;
- bridge interlock signal by which the docking procedure can be blocked in case the boarding bridge is not properly parked;
- emergency stop.

Send by the individual docking system at the gate:

- selected aircraft type;
- actual A-VDGS status:
    - On / Off;
    - technical failure;
    - docking activated / deactivated;
    - emergency stop activated locally,
- actual stand status:
    - docking in progress;
    - aircraft stopped too far;
    - aircraft stopped in range,
- on-block and off-block time.

4.2 Design

4.2.1 Display for the presentation

4.2.1.1 Reading angle

The minimum reading area shall be ± 25° horizontal and +20° to -30° vertical to the display reference axis.