

BS EN 50512-2009 机场照明和航路信标指示用电气设备. 高级可视化泊位引导系统(A-VDGS)

BS EN 50512:2009 BSI Standards Publication Electrical installations for lighting and beaconing of aerodromes — Advanced Visual Docking Guidance Systems (A-VDGS) NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW??raising standards worldwide Licensed Copy:

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BS EN 50512:2009 EUROPEAN STANDARD EN 50512 NORME EUROPÉENNE

Electrical installations for lighting and beaconing of aerodromes -

Advanced Visual Docking Guidance Systems(A-VDGS) Installations é

lectriques pour l'??clairage Elektrische Anlagen für Beleuchtung

et le balisage des a??rodromes - und Befeuerung von Flugpl??tzen -

Systemes Avanc??s de Guidage Visuel Erweitertes optisches pour

l'Accostage(SAGVA)Andockf??hrungssystem(A-VDGS) This European

Standard was approved by CENELEC on 2008-12-01.CENELEC members are bound

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BS EN 50512:2009EN 50512:2009 -2 -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standards conflicting with the EN have to be withdrawn(dow)2011-12-01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
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covers essential requirements of EC Directive 2004/108/EC.See Annex ZZ.

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BS EN 50512:2009EN 50512:2009 - 4 - 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) Licensed Copy:

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BS EN 50512:2009 -5 -EN 50512:2009 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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BS EN 50512:2009 EN 50512:2009 - 6 - 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 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 Licensed Copy: athen reading, Reading University Library, 23/01/2010 05:46, Uncontrolled Copy, (c) BSI

BS EN 50512:2009-7 -EN 50512:2009 Luminance ratio(LR) shall be calculated as follows: $LR = (L - L_0) / L_a$ where L is defined as the measured luminance of the display in the ON-state when under external illumination; L₀ 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 2700 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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BS EN 50512:2009EN 50512:2009 - 8 - 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 1m 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.

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BS EN 50512:2009 – 9 – EN 50512:2009 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 Max.deviation Max.deviation Max. deviation Max.deviation presentation at stop position at 9 m at 15 m at 25 m (stop area) Azimuth A=±250 mm B=±340 mm C=±400 mm D = ±500 mm Distance a=±500 mm b=±1000 mm c=±1333 mm --- Table 2 -Maximum aircraft taxi speed during the docking procedure Remaining distance to Maximum aircraft speed in m/s the stop point in m (values in km/h and knots are informative) mm/s (km/h) (kt) 258,9 (32,2) (17,4) 187,6 (27,3) (14,8) 136,4 (23,2) (12,5) 95,4 (19,3) (10,4) 74,7 (17,0) (9,2) 54,0 (14,4) (7,8) 33,1 (11,2) (6,0) 22,5 (9,1) (4,9) 1,52,2 (7,9) (4,3) 11,8 (6,4) (3,5) 0,51,0 (3,6) (1,9)

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BS EN 50512:2009 EN 50512:2009 -10 -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.Sent 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 $\pm 25^\circ$ horizontal and $+20^\circ$ to -30° vertical to the display reference axis.Licensed Copy: athen reading, Reading University Library, 23/01/2010 05:46, Uncontrolled Copy,(c)BSI

BS EN 50512:2009 - 11 -EN 50512:20094.2.1.2 Luminance ratios and colours The luminance ratio values must be maintained for all ambient brightness conditions between 20 lx and 40000 lx.To avoid dazzling the users,the display luminance shall be adjustable to be suitable for the actual ambient brightness and background luminance.The display shall provide the minimum luminance ratios of the presentation in accordance with Table 3.Table 3 -Minimum luminance ratios (LR)for various colours, at test angles on the reference axis and off the reference axis

Colour	On display	Off display	reference axis	reference axis
White	5	3		
Yellow	3	1,8		
Green	1,5	0,9		
Red	1,25	0,75		

The definition of the display reference axis is given in 5.1.1.3.2.4.2.1.3 Alpha numeric characters If information is presented in alphanumeric characters the minimum size of the characters should be calculated by the formula: $h=D/600$ where

h is defined as the height of a capital letter; D is defined as the distance at which the information is intended to be read. For optimum performance the minimum: character width should be $\frac{5}{7} h$; character spacing should be $\frac{2}{7} h$; word spacing should be $\frac{5}{7} h$; line spacing should be $\frac{4}{7} h$; backing board border distance should be h (this distance is measured from the border of text to the border of backing board); and number of elements for an alphanumeric character should be 7 (7 elements in vertical direction) by 5 (5 elements in horizontal direction). If the display is not based on a dot matrix technology, the resolution and readability of characters should be equal to or better than a 7*5 matrix. If symbols are used to provide information, the selected size, resolution and distance between the symbols should provide the same readability as defined for the text. Licensed Copy: athen reading, Reading University Library, 23/01/2010 05:46, Uncontrolled Copy, (c) BSI

BS EN 50512:2009 EN 50512:2009 – 12 -4.2.2 Environmental condition
4.2.2.1 Outdoor equipment Equipment which is intended for outdoor operation shall be designed to operate under the following conditions:
-temperature range from -25°C to $+50^{\circ}\text{C}$; -relative humidity from 10% to 100%; -wind load up to 44 m/s (no active operation); -snow load up to 1000 N/m²; -environmental brightness range from direct sunshine down to an average illuminance of at least 10 lx with a uniformity ratio (average to minimum) of not more than 4 to 1 measured at 2 m height; -protection against dust and water according to IP54 as specified in EN 60529. NOTE The selection of the cables and components shall consider that

chemicals are used in the apron area(e.g.for the aircraft de-icing process). 4.2.2.2 Indoor equipment Equipment which is intended for permanent indoor installation shall be designed to operation under the following conditions:-temperature range from +5°C to +40°C;-relative humidity from 10 %to 95 %without dewing;-altitude from sea-level to 1000 m.4.2.2.3 Vibrations Equipment which is intended to operate outdoor close to the aircraft stand shall be capable of withstanding vibration and shall be tested in accordance with 5.1.1.7.

4.2.3 Electromagnetic compatibility(EMC)4.2.3.1 General For the EMC requirements A-VDGS with all the components installed at the stand intended for the use as an aircraft docking device on airports only will be seen as a fixed installation.4.2.3.2 Emission To ensure an acceptable level of emission,the A-VDGS shall fulfil the requirements according to EN 61000-6-3 excluding the requirements for EN 61000-3-2/3-12 and EN 61000-3-3/3-11.4.2.3.3 Immunity To ensure a sufficient level of immunity the A-VDGS shall fulfil the requirements according to EN 61000-6-2.

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BS EN 50512:2009 -13 -EN 50512:20094. 2. 4 Input power supply

4.2.4.1 Input power specification The input power supply specification shall meet the applicable requirements of HD 472.The input power supply shall be provided with a local means of isolation in accordance with HD 60364.Where necessary,overload protection devices shall be installed.

4.2.4.2 Input power availability Any power loss shall not cause any

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