

Maritime navigation and radiocommunication equipment and systems - Global navigation satellite systems (GNSS) - Part 5: BeiDou navigation satellite system (BDS) - Receiver equipment - Performance requirements, methods of testing and required test results

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 61108-5:2020 sisaldab Euroopa standardi EN IEC 61108-5:2020 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 61108-5:2020 consists of the English text of the European standard EN IEC 61108-5:2020.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 08.05.2020.	Date of Availability of the European standard is 08.05.2020.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 47.020.70

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

ICS 47.020.70

English Version

Maritime navigation and radiocommunication equipment and systems - Global navigation satellite systems (GNSS) - Part 5: BeiDou navigation satellite system (BDS) - Receiver equipment - Performance requirements, methods of testing and required test results
(IEC 61108-5:2020)

Matériels et systèmes de navigation et de radiocommunication maritimes - Système mondial de navigation par satellite (GNSS) - Partie 5: Système de navigation par satellite BeiDou (BDS) - Matériels de réception - Exigences de performances, méthodes d'essai et résultats d'essai exigés
(IEC 61108-5:2020)

Navigations- und Funkkommunikationsgeräte und -systeme für die Seeschifffahrt - Weltweite Navigations-Satellitensysteme (GNSS) - Teil 5: BeiDou Satellitennavigationssystem (BDS) - Empfangsanlagen - Leistungsanforderungen, Prüfverfahren und geforderte Prüfergebnisse
(IEC 61108-5:2020)

This European Standard was approved by CENELEC on 2020-04-15. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 80/952/FDIS, future edition 1 of IEC 61108-5, prepared by IEC/TC 80 "Maritime navigation and radiocommunication equipment and systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61108-5:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-01-15
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-04-15

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61108-5:2020 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61108 (series)	NOTE	Harmonized as EN 61108 (series)
IEC 61162-460	NOTE	Harmonized as EN IEC 61162-460

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms, definitions and abbreviated terms	7
3.1 Terms and definitions.....	7
3.2 Abbreviated terms.....	8
4 Minimum performance requirements	9
4.1 Object.....	9
4.2 BDS receiver equipment	9
4.2.1 Minimum facilities	9
4.2.2 Configuration.....	9
4.2.3 Quality assurance.....	10
4.3 Performance of BDS receiver equipment.....	10
4.3.1 General	10
4.3.2 Equipment interfaces	10
4.3.3 Accuracy	12
4.3.4 Acquisition.....	12
4.3.5 Protection.....	13
4.3.6 Antenna design.....	13
4.3.7 Sensitivity and dynamic range	13
4.3.8 Effects of specific interfering signals.....	13
4.3.9 Position update.....	14
4.3.10 Differential BDS input	14
4.3.11 Navigation warnings and status indications.....	15
4.3.12 Output of COG, SOG and UTC	17
4.3.13 Typical interference conditions	18
5 Methods of testing and required test results	18
5.1 Test sites	18
5.2 Test sequence	19
5.3 Standard test signals	19
5.4 Determination of accuracy	19
5.5 General requirements and presentation requirements	20
5.5.1 Normal environmental conditions for tests	20
5.5.2 General requirements	20
5.5.3 Presentation requirements.....	20
5.6 Receiver performance tests	20
5.6.1 BDS receiver equipment.....	20
5.6.2 Position output.....	20
5.6.3 Equipment interfaces	20
5.6.4 Accuracy	20
5.6.5 Acquisition.....	22
5.6.6 Protection.....	23
5.6.7 Antenna design.....	23
5.6.8 Sensitivity and dynamic range	23
5.6.9 Protection from other shipborne transmitters	23
5.6.10 Position update.....	24
5.6.11 Differential BDS input	24

5.6.12	Navigational warnings and status indications	25
5.6.13	Accuracy of COG and SOG.....	27
5.6.14	Validity of COG and SOG information	28
5.6.15	Output of UTC	28
5.7	Tests for typical RF interference conditions.....	28
5.7.1	Simulator conditions	28
5.7.2	Navigation solution accuracy test.....	28
5.7.3	Re-acquisition test.....	29
Annex A	(normative) Typical BDS interference environment.....	31
A.1	BDS CW in-band and near-band interference environment.....	31
A.2	Band-limited noise-like interference	32
A.3	Pulsed interference	33
A.4	BDS minimum antenna gain	34
Annex B	(normative) Alert management	35
Annex C	(normative) Sentences to support BDS receiver operation	36
C.1	General.....	36
C.2	DTM – Datum reference	36
C.3	GBS – GNSS satellite fault detection	37
C.4	GDC – GNSS differential correction	39
C.5	GFA – GNSS fix accuracy and integrity	41
C.6	GNS – GNSS fix data.....	42
C.7	GRS – GNSS range residuals	45
C.8	GSA – GNSS DOP and active satellites	47
C.9	GST – GNSS pseudorange error statistics	49
C.10	GSV – GNSS satellites in view.....	50
Bibliography	53
Figure 1	– Logical interfaces of BDS receiver	11
Figure A.1	– CW interference thresholds for BDS receivers in steady-state navigation.....	32
Figure A.2	– Interference thresholds versus bandwidth for BDS	33
Table 1	– Acquisition time limits.....	13
Table 2	– RAIM integrity states	17
Table 3	– Accuracy of COG	18
Table 4	– RF interference value	29
Table A.1	– CW interference thresholds for BDS receivers in steady-state navigation.....	31
Table A.2	– Interference threshold for band-limited noise-like interference to BDS receivers in steady-state navigation	33
Table A.3	– Interference characteristics for pulsed interference	34
Table A.4	– BDS minimum antenna gain	34
Table B.1	– Required alerts and their classification.....	35

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – GLOBAL NAVIGATION SATELLITE SYSTEMS (GNSS) –
Part 5: BeiDou navigation satellite system (BDS) – Receiver equipment – Performance requirements, methods of testing and required test results

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61108-5 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
80/952/FDIS	80/955/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

All text of this document, whose meaning is identical to that in IMO resolution MSC.379(93), is printed in italics and the resolution and paragraph numbers are indicated in brackets, i.e. (M.379/A1.2).

A list of all parts in the IEC 61108 series, published under the general title *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS)*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – GLOBAL NAVIGATION SATELLITE SYSTEMS (GNSS) –

Part 5: BeiDou navigation satellite system (BDS) – Receiver equipment – Performance requirements, methods of testing and required test results

1 Scope

This part of IEC 61108 specifies the minimum performance requirements, methods of testing and required test results for BDS shipborne receiver equipment, based on IMO resolution MSC.379(93), which uses the signals from the BeiDou navigation satellite system in order to determine position. It takes account of the general requirements given in IMO resolution A.694(17) and is associated with IEC 60945. When a requirement in this document is different from IEC 60945, the requirement in this document takes precedence. This document also takes account, as appropriate, of requirements for the presentation of navigation-related information on shipborne navigational displays given in IMO resolution MSC.191(79) and is associated with IEC 62288 and MSC.302(87) associated with IEC 62923-1.

This receiver standard applies to navigation in the ocean, coastal, harbour entrances, harbour approaches and restricted waters, as defined in IMO resolution A.915(22) and IMO resolution A.1046(27).

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.

IEC 60721-3-6:1987, *Classification of environmental conditions. Part 3: Classification of groups of environmental parameters and their severities. Ship environment*

IEC 60945, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61108-4, *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS) – Part 4: Shipborne DGPS and DGLONASS maritime radio beacon receiver equipment – Performance requirements, methods of testing and required test results*

IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 61162-2, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 2: Single talker and multiple listeners, high-speed transmission*

IEC 61162-450, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*

IEC 62288, *Maritime navigation and radiocommunication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results*

IEC 62923-1, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 1: Operational and performance requirements, methods of testing and required test results*

IEC 62923-2, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 2: Alert and cluster identifiers and other additional features*

ITU-R Recommendation M.823-3, *Technical characteristics of differential transmissions for global navigation satellite systems from maritime radio beacons in the frequency band 283.5-315 kHz in Region 1 and 285-325 kHz in Regions 2 and 3*

IMO resolution A.694(17), *General requirements for shipborne radio equipment forming part of the Global maritime distress and safety system (GMDSS) and for electronic navigational aids*

IMO resolution A.915(22), *Revised maritime policy and requirements for a future Global Navigation Satellite System (GNSS)*

IMO resolution A.1046(27), *Worldwide radionavigation system*

IMO resolution MSC.379(93), *Performance standards for shipborne BeiDou satellite navigation system (BDS) receiver equipment*

IMO resolution MSC.401(95), *Performance standards for multi-system shipborne radionavigation receivers*

RTCM 10402.4, *Recommended standards for differential GNSS (Global Navigation Satellite Systems) service*

BDS-SIS-ICD-B11-3.0, *BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B1I (Version 3.0)*, China Satellite Navigation Office

3 Terms, definitions and abbreviated terms

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

BeiDou coordinate system

BDCS

coordinate system adopted by BDS

Note 1 to entry: The definition of BDCS is in accordance with the specifications of the International earth rotation and reference system service (IERS), and it is consistent with the definition of the China geodetic coordinate system 2000 (CGCS2000). BDCS and CGCS2000 have the same ellipsoid parameters. The origin is located at the Earth's centre of mass. The Z-axis is the direction of the IERS reference pole (IRP). The X-axis is the intersection of the IERS Reference Meridian (IRM) and the plane passing through the origin and normal to the Z-axis. The Y-axis, together with Z-axis and X-axis, constitutes a right-handed orthogonal coordinate system. The length unit is the international system of units (SI) metre.

Note 2 to entry: This note applies to the French language only.