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I-01

NAVTEX RECEIVERS

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Foreword

CCS Product Inspection and Testing Guideline (hereinafter referred to as this Guideline) contains the technical requirements, inspection and testing criteria related to classification and statutory survey of marine products to be applied for CCS approval/inspection.

This Guideline frees the users to adopt other test methods and requirements which are equivalent to or are stricter than this Guideline.

This Guideline is published and updated by CCS, and is released at http://www.ccs.org.cn. Your comments or suggestions are welcomed and may be sent to our email addressed mp@ccs.org.cn.

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Main changes:

1. Update the relevant requirements according to IMO resolution MSC.508 (105).

2. Edit modifications and corrections.

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NAVTEX RECEIVERS

1 Scope of Application

This Guideline applies to the approval and inspection of NAVTEX receivers installed on or after 1 January 2024, for the reception of navigational and meteorological warnings and urgent information.

2 Normative References

2.1 IMO MSC.508(105) Performance standards for the reception of maritime safety information and search and rescue related information by MF (NAVTEX) and HF;

2.2 IEC 61097-6:2005/AMD1:2011/AMD2:2019 Narrowband direct-printing telegraph equipment for the reception of navigational and meteorological warnings and urgent information to ships (NAVTEX);

2.3 IMO 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;

2.4 IEC 60945:2002/COR1:2008 Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results.

3 Terms and Definitions

3.1 Navigational warning receiver is NAVTEX receiver, i.e. the radio equipment which is used to receive and at the same time automatically print and/or display maritime safety information regularly released by means of CEFC of Mode B in the specified NBDP format;

3.2 NAVTEX is one system for the broadcast and automatic reception of maritime safety information by means of narrow-band telegraphy;

3.3 BAM means bridge alert management;

3.4 INS means integrated navigation system;

3.5 RTC means real time clock;

3.6 USB means universal serial bus;

3.7 UTC means co-ordinated universal time.

4 Drawings and Documents

4.1 The following drawings and documents shall be submitted to CCS for approval:

4.1.1 Technical specifications;

4.1.2 Drawing of overall size and structure (including arrangement of panel and backboard);

4.1.3 Schematic circuit diagram;

4.1.4 Type test outline.

4.2 The following drawings and documents shall be submitted to CCS for future reference:

4.2.1 Schematic block diagram;

4.2.2 Operation instructions for the products;

4.2.3 Drawing of external wiring.

5 Technical Requirements

5.1 General requirements

The NAVTEX receiver shall comprise radio receivers of at least one frequency band, a signal processor and either:

5.1.1 an integrated printing device; or

5.1.2 a dedicated display device, printer output port and a non-volatile message memory; or

5.1.3 a connection to an integrated navigation system (INS) and a non-volatile message memory.

5.2 The degree of protective enclosure of the NAVTEX receiver is generally IP22 and where the degree IP22 is impractical due to the associated printing devices, at least IP20 is to be reached. The degree of protective enclosure of antennas is not to be lower than IP56.

5.3 Specific characteristics

5.3.1 The NAVTEX receiver shall be capable of automatically rejecting unwanted information using character B_1 of the different transmitter coverage areas.

5.3.2 The NAVTEX receiver shall be capable of disabling print-out, transmission to the INS port or display of selected types of messages using character B_2 with the exception of messages with B_2 characters A, B, D and L.

5.3.3 B_3B_4 is a two-character serial number for each B_2, starting with 01 except in special cases where the serial number 00 is used.

5.3.4 The printer or message store shall only be activated if the preamble $B_1B_2B_3B_4$ is received without errors.

5.3.5 Facilities shall be provided to avoid printing, storage or display of the same message several times on the same ship, when such a message has already been satisfactorily received.

5.3.6 A message shall always be printed, stored and displayed if B_3B_4 = 00 and if it is transmitted by a coast station that the equipment is programmed to select.

5.3.7 The characters ZCZC $B_1B_2B_3B_4$ need not be printed/displayed.

5.3.8 Reception of messages with character errors

(1) Only messages or message identifications which have been satisfactorily received shall be stored; A message is satisfactorily received if:

the character error rate is ≤ 4%; or

the received character error rate does not exceed 33% for more than 5 seconds.

(2) Messages with character error rate of > 4% and ≤ 33%

The NAVTEX receiver shall store the message (non-printing NAVTEX receivers) or message identification (printing NAVTEX receivers) but shall allow the stored message/message identification to be replaced if it is subsequently received with lower error rate.

A NAVTEX receiver with an integral printer shall print the messages indicating a character error rate of ≤ 33%.

A NAVTEX receiver with an integral display shall display the messages indicating a character error rate of ≤ 33%.

(3) Messages with character error rate of > 33%

The NAVTEX receiver shall not store or print messages if the received character error rate > 33%.

(4) Calculation of character error rate

The character error rate shall be calculated for each complete message. The character error rate shall be rounded up to the nearest integer. For example a single error in a message of less than 100 characters shall result in a character error rate of 1%.

5.3.9 Controls and indicators

Details of the coverage areas and message categories which have been excluded by the operator from reception and/or display shall be readily available.

It shall be possible to exclude at least four different message categories. It shall not be possible to exclude message categories A, B, D and L.

5.3.10 Programmable control memories

Information for location (B_1) and message (B_2) designators in programmable memories shall be permanently stored in non-volatile memory and shall not be erased by interruptions in the power

supply of less than 6 h.

Default programmable settings shall be:

All characters from A to Z for B_1;

Characters of ABCDEFHJKLVZ for B_2.

5.3.11 Alert

(1) Generation of alert

The receipt of search and rescue information (B_2 = D) shall give an alert at the position from which the ship is normally navigated. It shall only be possible to reset this alert manually.

If an additional alert is provided at the equipment to indicate, for example, the reception of navigational and/or meteorological warnings, it shall be capable of being suppressed.

If an additional alert is provided it shall be distinguishable from a search and rescue alert.

The audible volume of the alert shall be 75 dBA to 85 dBA.

The alert condition shall be reported via an ALR command on the INS serial port.

(2) Using the ALR formatter

An ALR command shall be used to report the reception of a search and rescue alert, navigational or meteorological warnings or to indicate a failure or malfunction that will reduce the integrity of the NAVTEX receiver.

Alert messages shall be IEC 61162-1 compliant "$--ALR" sentences and shall contain the local alert numbers and alert text shown in Table 5.3.11(2).

Alert Conditions Signaled Using the ALR Sentence Formatter Table 5.3.11(2)

Alert number	Alert text
001	"NAVTEX: Navigational warning"
002	"NAVTEX: Meteorological warning"
003	"NAVTEX: Search and rescue information"
004	"NAVTEX: Receiver malfunction "[a]
005	"NAVTEX: Built in self test failure "[b]
006	"NAVTEX: General failure"

[a] The text may be extended to indicate which receiver has the malfunction
[b] The text may be extended to indicate the nature of the test failure

Additional numbers may be used by the manufacturers for other purposes but shall be in the range 051-099.

(3) Repetition of alert conditions

Whilst any alert conditions persist, the NAVTEX receiver shall repeat the appropriate ALR

sentences once every 30 s until acknowledged.

When all the alert conditions are acknowledged (but still active), the NAVTEX receiver shall stop the output of any audible alert indication (whether by integral sounder or by relay contacts) but shall continue to repeat the ALR sentences once every 30 s.

When the alert condition has returned to “healthy”, an ALR sentence with the status set to “V” shall be sent out at one minute intervals.

When there are no active alerts, the NAVTEX receiver may send out a single ALR sentence with alert number 006 and a status of “V” once every minute as an indication that all is well.

5.3.12 Test facilities

The equipment shall be provided with a facility to test that the radio receiver, the display device/printer and non-volatile message memory are functioning correctly.

Equipment with a dedicated display shall include a visual or aural alert if a malfunction or general failure occurs.

5.4 Interfaces

5.4.1 The equipment shall include at least one interface for the transfer of received data to other navigation or communication equipment.

5.4.2 All interfaces provided for communication with other navigation or communication equipment shall comply with IEC 61162 series of standards.

As a minimum the NAVTEX receiver shall be capable of communicating with the sentences ACK, ALR, NRM and NRX with the electrical signal characteristics given in IEC 61162-1. The equipment shall also be capable of responding to query sentences as defined in IEC 61162-1 for the NRM and NRX sentences.

5.4.3 If there is no integrated printer, the equipment shall include a standard printer interface.

5.4.4 The equipment shall include an interface for alert management in accordance with resolution MSC.302(87).

In addition to the sentences previously mentioned, the NAVTEX receiver shall be capable of communicating alert related information with the sentences ACN, ALC, ALF, ARC and HBT as

described in IEC 61162-1.

The equipment shall be capable of classifying, handling, displaying and reporting alerts as required in IEC 62923-1 and IEC 62923-2. In the BAM concept, the NAVTEX receiver acts as an alert source.

The equipment shall be capable of releasing an alert with priority Warning and Category A with alert identifier 3122 on receipt of search and rescue information (B2 = D).

The alert title for the first ALF sentence shall be "SAR RX". The additional information in the second ALF sentence shall be "Incoming SAR information. Check NAVTEX".

The alert, if not acknowledged, shall be repeated as a warning after a limited time period not exceeding 5 min. Unacknowledged warnings shall not be changed to alarm priority.

5.5 Receivers

5.5.1 Number of receivers and receive frequencies

The NAVTEX receiver shall contain one receiver operating on the frequency prescribed by the Radio Regulations for the international NAVTEX system (518 kHz). The equipment shall contain at least a second receiver capable of working at the same time as the first one on at least two other frequencies recognized for the transmission of NAVTEX information. The first receiver shall have priority in the display or printing of received information. Printing or displaying of messages from one receiver shall not prevent reception by the other receiver.

The recognized receive frequencies shall be 490 kHz, 518 kHz and 4209.5 kHz.

Where the second receiver can be switched between operating frequencies, this shall be done both manually and via the INS port.

5.5.2 Sensitivity

The receiver sensitivity shall be such that for a source with an e.m.f. of 2 μV in series with a non-reactive impedance of 50 Ω, the character error rate is less than 4%.

5.6 Display

If a display is included as part of the NAVTEX receiver then the following requirements shall be met.

5.6.1 User interface

(1) There shall be a display mode that clearly shows the user which transmitter coverage area (B1) and message types (B2) are currently selected for each receiver;

(2) There shall be controls for adjusting the display illumination and contrast settings;

(3) There shall be an indication of which receiver(s) are currently receiving;

(4) New search and rescue (SAR) messages shall be displayed immediately that they are received and stored, and shall cause an alert to be set. SAR messages shall be displayed until they are acknowledged by the cancellation of the alert;

(5) The reception and storage of new messages other than SAR messages shall be clearly indicated to the user by a method declared by the manufacturer;

(6) It shall be possible to select transmitter coverage area (B_1) and message types (B_2) independently for message storage to non-volatile memory, for message output to the INS port and for message output to the printer port.

5.6.2 Number of characters displayed per line

The display device shall be able to display a minimum of 32 characters per line.

5.6.3 Number of lines displayed

The display device shall be able to display at least 16 lines of message text.

5.6.4 Display requirements

If a dedicated display device is used, the following requirements shall be met:

(1) an indication of newly received unsuppressed messages shall be immediately displayed until acknowledged or until 24 h after receipt; and

(2) newly received unsuppressed messages shall also be displayed; and

(3) stored messages shall be capable of being displayed and searchable by B_1 and B_2.

5.6.5 Visibility of display

The design and size of the display device shall be such that displayed information is easily read under all conditions by observers at normal working distances and viewing angles.

5.6.6 Automatic line feed

If automatic line feed entails division of a word, this shall be indicated in the displayed text.

5.6.7 End of message display

When displaying received messages on a display device, a clear indication of the end of a message shall be given by automatically adding line feeds after the message or including some other form of delineation.

5.6.8 Corrupt characters

The equipment shall display an asterisk if the character is received corrupted.

5.6.9 Printer interface message selection requirements

Where the printer is not integrated, it shall be possible to select the following data to be output to the printer interface:

(1) all messages as they are received;

(2) all messages stored in the message memory;

(3) all messages received on specified frequencies, from specified locations or having specified message designators;

(4) all messages currently displayed; and

(5) individual messages selected from those appearing on the display.

5.7 Integral printer

If a printer is included as part of the NAVTEX receiver then the following requirements shall be met.

5.7.1 Number of characters printed per line

The printer shall be able to print a minimum of 32 characters per line.

5.7.2 Automatic line feed

If automatic line feed entails division of a word, this shall be indicated in the printed text.

5.7.3 End of message display

The printer or printer output shall automatically insert line feeds after completing print of the received message.

5.7.4 Corrupt characters

The equipment shall print an asterisk if the character is received corrupted.

5.7.5 Printer requirements

The integral printer:

(1) shall print easily legible signs and produce a level of acoustic noise < 60 dBA;

(2) shall print the message received on paper. Changing the paper or printing mechanism, if required, shall be a simple operation. The paper and printing capacity shall be sufficient to enable at least 200,000 characters to be printed;

(3) shall be provided with an alert to indicate that the paper has nearly run out or has run out;

(4) shall provide temporary storage for partially printed messages. If any message is incompletely printed because the paper has run out or the printer is out of order, the message shall be stored in the memory and printed once new paper has been loaded. Memory storage of further new message identifications shall be inhibited if there is no paper available in the printing device.

5.7.6 Printer message selection requirements

It shall be possible to select the following data to be output to the integral printer:

(1) all messages as they are received;

(2) all messages received on specified frequencies, from specified transmitter coverage areas or having specified message type designators.

5.8 NAVTEX message memory

5.8.1 NAVTEX receivers without integral printers

These requirements shall apply to the NAVTEX receiver that does not contain an integral printer such as devices incorporating an integral display.

(1) Number of messages

For each receiver fitted it shall be possible to record at least 200 messages of average length 500 characters (printable and non-printable) in non-volatile message memory. It shall not be possible for the user to erase messages from memory. When the memory is full, the oldest messages shall be overwritten by new messages.

It shall be possible to record individual messages up to 8,000 characters in length.

(2) Message tagging

The user shall be able to tag individual messages for permanent retention. These messages may occupy up to 25 % of the available memory and shall not be overwritten by new messages. When no longer required, the user shall be able to remove the tag on these messages which may then be overwritten in normal course.

The message tagging function does not need to be supported on a NAVTEX receiver which does not have a dedicated display device.

(3) Automatic erasure

After between 60 h and 72 h, a message and message identification shall automatically be erased from the store (unless tagged for permanent retention). If the number of received messages exceeds the capacity of the store, the oldest message and message identification shall be erased.

5.8.2 NAVTEX receivers with integral printer

These requirements shall apply only to the NAVTEX receiver that contains an integral printer.

(1) Number of messages

The equipment shall be capable of internally storing at least 200 message identifications for each receiver provided.

(2) Automatic erasure

After between 60 h and 72 h, a message shall automatically be erased from the store. If the number of received messages exceeds the capacity of the store, the oldest message shall be erased.

5.9 Power supply

The NAVTEX receiver shall be powered from the ship's main source.

5.10 Source of UTC

The NAVTEX receiver may optionally use an externally provided source of UTC or an internal RTC to provide timing data for handling message ageing.

6 Materials and Components

At least, the display and/or printer and integrated circuit shall be included in the list of suppliers, and its manufacturer shall not be changed without the Society's approval.

7 Type Test

7.1 Principles of sampling: in principle, one set of type test samples shall be chosen at random for all type test items in Article 7.2 herein.

7.2 Type test items and methods:

Table 7.2

S/N	Type test items	Type test methods	Remarks
1	Power supply		
1.1	Extreme power supply variation	Article 7.1 and 5.2.2 in IEC 60945:2002/COR1:2008	
1.2	Excessive conditions	Article 7.2 and 5.2.3 in IEC 60945:2002/COR1:2008	
1.3	Immunity to power supply short-term variation (if applicable)	Article 7.3 and 10.7 in IEC 60945:2002/COR1:2008	
1.4	Immunity to power supply failure	Article 7.4 and 10.8 in IEC 60945:2002/COR1:2008	

Continued Table 7.2

2	Environmental conditions		
2.1	Dry heat	Article 8.2 in IEC 60945:2002/ COR1:2008	
2.2	Damp heat	Article 8.3 in IEC 60945:2002/ COR1:2008	
2.3	Low temperature	Article 8.4 in IEC 60945:2002/ COR1:2008	
2.4	Vibration	Article 8.7 in IEC 60945:2002/ COR1:2008	
2.5	Rain and spray (only applicable to antenna)	Article 8.8 in IEC 60945:2002/ COR1:2008	
2.6	Salt mist (corrosion)	Article 8.12 in IEC 60945:2002/ COR1:2008	
3	Electromagnetic compatibility		
3.1	Conducted emissions	Article 9.2 in IEC 60945:2002/ COR1:2008	
3.2	Radiated emissions from enclosure port	Article 9.3 in IEC 60945:2002/ COR1:2008	
3.3	Immunity to conducted radio frequency disturbance	Article 10.3 in IEC 60945:2002/ COR1:2008	
3.4	Immunity to radiated radiofrequencies	Article 10.4 in IEC 60945:2002/ COR1:2008	
3.5	Immunity to fast transients	Article 10.5 in IEC 60945:2002/ COR1:2008	
3.6	Immunity to Surges (if applicable)	Article 10.6 in IEC 60945:2002/ COR1:2008	
3.7	Immunity to electrostatic discharge	Article 10.9 in IEC 60945:2002/ COR1:2008	
4	Special purpose		
4.1	Acoustic noise and signals	Article 11.1 in IEC 60945:2002/ COR1:2008	
4.2	Compass safe distance	Article 11.2 in IEC 60945:2002/ COR1:2008	
5	Safety precautions		
5.1	Protection against accidental access to dangerous voltages	Article 12.1 in IEC 60945:2002/ COR1:2008	
5.2	Electromagnetic radio frequency radiation	Article 12.2 in IEC 60945:2002/ COR1:2008	
5.3	Emission from visual display unit(VDU)	Article 12.3 in IEC 60945:2002/ COR1:2008	
5.4	X-radiation	Article 12.4 in IEC 60945:2002/ COR1:2008	
6	Appearance inspection	Article 8～9 in IMO A.694(17)	
7	Operational checks	Article 6.1～6.4 in IEC 60945:2002/ COR1:2008	
8	Performance tests		

Continued Table 7.2

8.1	Serial interface tests		
8.1.1	INS input electrical tests	Article 7.1 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.1.2	INS input performance tests	Article 7.2 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.1.3	INS output electrical tests	Article 7.3 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.1.4	INS output performance tests	Article 7.4 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.1.5	Printer output electrical tests	Article 7.5 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.1.6	Printer output performance tests	Article 7.6 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.1.7	BAM interface performance tests	Article 7.7 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.2	General and signal processing tests		
8.2.1	Exclusion of stations	Article 8.1 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.2.2	Exclusion of message categories	Article 8.2 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.2.3	Receiver test facility	Article 8.3 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.2.4	Search and rescue (SAR) alert provision and reset	Article 8.4 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.2.5	Additional alerts (if applicable)	Article 8.5 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.3	Receiver tests		
8.3.1	Call sensitivity	Article 9.1 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.3.2	Interference rejection and blocking immunity	Article 9.2 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.3.3	Co-channel rejection	Article 9.3 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.3.4	Intermodulation	Article 9.4 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.3.5	Off-frequency transmitter	Article 9.5 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.3.6	Simultaneous operation on several receive frequencies	Article 9.6 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.3.7	Protection of input circuits	Article 9.7 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.4	Printer tests		
8.4.1	Basic requirements	Article 10.1 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.4.2	Paper roll end alert and storage inhibition	Article 10.2 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	

Continued Table 7.2

8.4.3	Automatic line feed indication and paper feed	Article 10.3 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.4.4	Mutilated character indication	Article 10.4 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.4.5	Tests of technical characteristics	Article 10.5 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.5	Memory tests		
8.5.1	Internal storage, message tagging and erasure of oldest message identifications	Article 11.1 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.5.2	Erasure of message identifications/storage time	Article 11.2 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.5.3	Storage of message identifications	Article 11.3 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.5.4	Reception of messages with character errors	Article 11.4 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.5.5	Unsatisfactory reception	Article 11.5 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.5.6	Power-off check	Article 11.6 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.5.7	Brown-out test	Article 11.7 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.5.8	UTC handling check	Article 11.8 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.6	Miscellaneous tests		
8.6.1	Spurious emissions	Article 12.1 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.6.2	Equipment manuals – checks of the manufacturer's documentation	Article 12.2 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
8.6.3	Marking and identification	Article 12.3 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	

8 Unit/Batch Inspection

8.1 Product inspection from CCS shall not be applied until the type approval is gained.

8.2 The manufacturer can apply for product inspection from CCS after delivery inspection is completed for all products and all products are qualified.

8.3 Sampling inspection ratio of CCS: 10%, no less than 2 sets (unless there is only one set of products inspected).

8.4 Test items and methods of delivery test and CCS sampling inspection:

Table 8.4

S/N	Items of delivery test and CCS sampling inspection	Methods of delivery test and CCS sampling inspection	Remarks
1	Appearance inspection	Article 8～9 in IMO A.694(17)	
2	Exclusion of stations	Article 8.1 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
3	Exclusion of message categories	Article 8.2 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
4	Receiver test facility	Article 8.3 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
5	Search and rescue (SAR) alert provision and reset	Article 8.4 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	
6	Additional alerts (if applicable)	Article 8.5 in IEC 61097-6:2005/ AMD1:2011/AMD2:2019	