



## National Marine Electronics Association

### NMEA 2000<sup>®</sup> Certification Process Overview

The purpose of this paper is to define general guidelines for developing and certifying an NMEA 2000<sup>®</sup> certified product, and to illustrate some of the different paths a manufacturer may follow, depending on their level of expertise and business strategies. The goal is to provide an initial checklist that can be used for NMEA 2000 product development planning.

#### General

The NMEA 2000<sup>®</sup> Standard is the primary and authoritative source of information on NMEA 2000<sup>®</sup>, and should be purchased from NMEA so that a manufacturer can develop a level of expertise related to NMEA 2000<sup>®</sup> requirements. The NMEA 2000<sup>®</sup> Standard should be supplemented by other materials as required and/or referenced from the NMEA 2000<sup>®</sup> document.

The NMEA 2000<sup>®</sup> Standard has been adopted by the IEC (International Electrotechnical Commission) and is designated as the following IEC document; 61162-3. The NMEA 2000 Standards Committee and TC80 Working Group 6 collaborated to assure that NMEA 2000 met the requirements necessary for SOLAS type vessel. The 61162-3 references NMEA 2000.

Further, Lloyd's has accepted the NMEA 2000 cable and connector and it has also been approved from the United States Coast Guard under 46CFR which is for small passenger vessels.

The NMEA 2000 Standards Committee is a consensus-based international committee that meets regularly to discuss new market technologies and new messages that may be presented by manufacturers. The NMEA 2000 Standards Committee abides by the policies and procedures as written in the "*NMEA Standards Development Policies and Procedures*" approved the NMEA Board of Directors and approved by the American National Standards Institute. The development of new messages is a formal process with the NMEA 2000 Standards Committee. You can contact NMEA Technical Director, Steve Spitzer, [sspitzer@nmea.org](mailto:sspitzer@nmea.org) if you would like to join the NMEA 2000 Standards Committee.

An NMEA 2000<sup>®</sup> Certified product is an electronic unit that has all of the following characteristics:

1. Has at least one independent interface that communicates using the hardware and higher level protocols established in the NMEA 2000<sup>®</sup> Standard for Serial Data Networking of Marine Electronic Devices.
2. Has demonstrated an established level of certification with the NMEA 2000<sup>®</sup> Standard by passing the hardware and software tests identified in Appendix C of the NMEA 2000<sup>®</sup> Standard.



3. Has had the results of the hardware and software tests submitted to and verified by NMEA, who will issue a product Certification upon payment of the required fees.

The manufacturer must ensure that they, or their agent;

1. Understand the NMEA 2000® requirements
2. Must attend to certain procedural issues associated with manufacturer and product identification and attendant fees
3. Must arrange for or perform NMEA 2000® Certification testing
4. Submit a certification package of test results to NMEA.
5. Must develop a product which does meet or exceed all specified NMEA 2000® requirements.

## Product Development

To achieve an NMEA 2000® Certification, a product should provide the manufacturer's desired functionality and utilizes an NMEA 2000® interface to communicate with other NMEA 2000® products.

The NMEA 2000® Standard comprises the following documents:

- NMEA 2000® Main Document – Standard for Serial-Data Networking of Marine Electronic Devices
- Appendix A – Application Layer (Parameter Group Definitions)
- Appendix B – Database Reports (Data Format and Parameter Group Descriptions)
- Appendix C – Certification Criteria and Test Methods
- Appendix D – Development and Implementation Criteria
- Appendix E – ISO 11783-3 Data Link Layer
- Appendix F – ISO 11783-5 Network Management
- Appendix G – ISO 11898 Controller Area Network (CAN)

While full understanding of the entire NMEA 2000® Standard is required to successfully develop an NMEA 2000® Certified product, Appendices B and C provide critical information for product development planning. If you are familiar with the ISO documents, you may purchase the NMEA 2000 Standard Suite without the ISO documents. You may purchase individual documents, but NMEA recommends purchasing the entire suite of documentation. Be sure, you read the licensing agreements. NMEA 2000® is a registered trademark. All of these documents are copyrighted materials and are fully protected under all of the international copyright laws. Check the NMEA website for additional Appendices that may be an asset for development.

**Appendix B, Database Reports (Data Format and Parameter Group Descriptions);** identifies the Parameter Groups that are defined by the NMEA 2000® Standard. Parameter Groups represent the fundamental information unit on the NMEA 2000® backbone, and are used to transmit information from one device to another. Parameter Group selection for the product will depend on the specific functionality desired, and may require development of new Parameter



Groups and approval by the NMEA 2000® Working Group, particularly when the proposed functionality is new to NMEA 2000®.

**Appendix C, Certification Criteria and Test Methods;** is a good place to start when developing internal product requirement and test documentation as it itemizes the product characteristics that must be verified during the certification process. A thorough review of Appendix C will reveal certain requirements that must be implemented at the application level, even when using a third party network stack or gateway.

**Manufacturer Registration and Product Code;** uniquely identifies the product and distinguishes it from other NMEA 2000® products. NMEA administers and issues manufacturer and product codes based on application and a fee paid by the manufacturer. Application for these codes should be submitted to NMEA in a timely manner, well in advance of certification testing, as both the Manufacturer Registration and Product Code are used during operation for certain required NMEA 2000® messages and are required to be incorporated into the product design. Each product for each brand must have a separate product code. Valid code values are verified by NMEA during the certification file review process. Contact NMEA for applications. Applications are available on the NMEA website, [www.nmea.org](http://www.nmea.org).

For a Manufacturer Registration the following will be required:

1. Official Business Name (Brand Name of Product is required, if multiple brands exist)
2. Official Business Address
3. Official Website
4. Name of Main Contact Person
5. E-mail Address of Main Contact

For a Product Code application, contact [info@nmea.org](mailto:info@nmea.org)

### License and Logo Usage



NMEA 2000® is a registered trademark. NMEA 2000 can only be used by authorized license holders. NMEA 2000 Standard is a Copyrighted Work and is protected under all of the copy right laws and treaties. There is a NMEA 2000 Pending Logo which may be used while products are under development. The time frame is 6 months for the “Pending” usage. Since the marine electronics industry has embraced “Certification,” the words NMEA 2000 “compliant” or “works with” NMEA 2000 will not be recognized as NMEA 2000 products.

### Certification Testing

The NMEA 2000® Certification Test process has been conceived to ensure a high degree of confidence that all NMEA 2000® requirements are met without incurring the costs associated with mandated testing laboratories. This means that the manufacturer may elect to perform the certification testing in-house, or may retain any reputable party who has both the capability and

tools required to perform the testing. You are not required to purchase the certification tool. You may outsource this service if so desired. However, NMEA does recommend purchasing the certification tool as it certainly will aid in the product development process. This certification may not replace a performance standard for the SOLAS market. Certain additional testing is required by IEC 61162-3.

The marine electronics industry has embraced the concept of product certification. On some level, it assures the end user that the product has met an interoperability standard. The NMEA 2000 Certification does not certify data content. Data is the responsibility the respective manufacturer. NMEA certifies “behavior” of the product.

A key element of the Certification Test process is the NMEA 2000<sup>®</sup> Certification Test tool, which can be purchased from NMEA. The Certification Test tool consists of the software and hardware necessary to connect to the products’ NMEA 2000<sup>®</sup> interface to stimulate and test the products certification with all NMEA 2000<sup>®</sup> protocol requirements. The hardware consists of a CAN Bus interface on a USB Connecting Device and the software runs on a Windows based personal computer. The NMEA Certification Test tool ensures that the tests are performed correctly, and that all test results are reported consistently. Only a NMEA 2000 Certification Tool can be used for NMEA 2000 certification testing and results. Test results are encrypted in a test data file that is sent to NMEA for validation.

Certification testing consists of two parts as detailed in Appendix C of the NMEA 2000<sup>®</sup> documentation. The first part is primarily focused on the physical and hardware requirements of NMEA 2000<sup>®</sup> and is accomplished with manual tests, while the second part is focused on required functionality and is accomplished using automatic tests incorporated in the Certification Test tool. The automatic tests are grouped in accordance with the certification level being sought for the specific product.

Hardware and software testing may be performed separately; however the hardware test results should be made available during the software testing so that the results can be entered when requested by the Certification Test tool.

The result for each applicable test criteria identified in Appendix C is recorded within the encrypted test file with one of the following status: “PASS”, “FAIL”, or “REQUIRES NMEA VERIFICATION”. In addition, information regarding the test sequence and CAN bus responses is recorded to support analysis by NMEA. On completion of certification testing a certification package is submitted to NMEA. The certification package requires the following items:

1. Certification encrypted test file from the Certification Test tool
2. A detailed MS Word document with all supporting technical information. Additional detailed technical information to substantiate or explain any test criteria with a “FAIL” or “REQUIRES NMEA VERIFICATION” status.
3. Product photographs showing all six sides of the product and the location of all connectors and conductive enclosure components. Close-ups of all connectors are a must NMEA may require further information if the certification package is not complete. Allow up to four weeks for certification result notification.



## NMEA 2000 Pricing and Timescale Summary

The following table represents pricing of NMEA 2000® documents and certification. It does not contain any other costs that may be associated with product development. All prices are subject to change. All pricing is in U.S. dollars. You should visit the NMEA website [www.nmea.org](http://www.nmea.org) for the latest updates on pricing.

Item	NMEA Member Pricing as of March 2010	Comments
NMEA 2000® Standard <sup>1</sup>	\$2,100	One time fee
Manufacturer Registration	\$2,200	One time fee
Product Code	\$350	One time fee for each product
Product Certification <sup>3</sup>	\$750	One time fee for each product certified
Certification Tool <sup>2</sup>	\$2,400	One time fee (not required, but recommended)

- Price includes a complete electronic suite of NMEA 2000 Standards documents, including the appropriate ISO documents published Appendices E, F, and G. Current Price without the ISO documents is \$1695 US. The Main Document and Appendices may be purchased individually.
- Purchasing the certification tool is not a requirement, but strongly recommended. Certification may be outsourced.
- A “family” of products may receive special consideration. A family of products is defined as the same product function but different size (i.e. family of displays 3”, 5”, 7” ).

The following table provides a conservative elongated timescale for NMEA 2000 milestones.

NMEA Events			
Manufacturers Registration	4 weeks		
Product Code		1 week	
Product Certification			4 weeks

Once certified the manufacturer:

- Shall permanently and prominently display its LEN number on the product. This allows installers to configure the electrical needs for the entire network.
- Shall publish the transmit and receive list of its respective product’s PGNs. This could be on the website or in owner’s manuals. At a minimum the manufacturer shall list the PGN numbers. If this list is in electronic format, the manufacturer may link to the NMEA website for descriptions. If the manufacturer elects to publish a description of the PGN, the manufacturer shall only use the PGN description as published on the NMEA website. If the manufacturer elects to something different, it must receive written approval from NMEA.