Whitepaper: Type Approvals for Marine Displays

Abstract: This whitepaper will present what Type Approval is, a brief history for context, and why it is important to all commercial mariners.

What is Type Approval?

To ensure conformance with International Maritime Organization (IMO) requirements, all electronics used on the bridge of a commercial vessel, and especially a display used in an Electronic Chart Display and Information System (ECDIS), must pass type approval and test procedures developed by the International Electrotechnical Commission (IEC) IEC60945 Environmental Standards and 61174 IMO ECDIS Performance Standards, applying the IHO requirements S-52 and S-57 in particular. Type approval is normally conducted by reputable independent testing laboratories that are recognized by marine classification societies created or nominated by flag states. Some maritime nations have type-approval programs within their maritime safety administration and most maritime nations recognize the certificates issued by other nations.

A Product Type Approval lasts for an indefinite time period. If there is a significant change to the design or manufacture of the product, the type approval must be renewed. Periodic audits of the manufacturing quality control process may be done. The type approval process usually takes from a few weeks to a few months. An ECDIS display that is type-approved may need to be type-approved again if and when the IMO changes its performance standards for ECDIS (as it did in 2009).

Who offers type approvals of ECDIS Displays?

An ECDIS display must be type-approved by a Classification Society or recognized maritime safety organization established within a flag country or by a classification society authorized by a flag state to undertake ECDIS type approvals. Once Type Approval is granted, the equipment that is Type Approved is suitable for use on a Classed vessel without additional certification or testing.

As an example, a US flagged vessel operating under IMO rules will have ABS Certification, or obtain Type Approval from another Classification Society that ABS recognizes as equivalent. Alternatively, Australia's Maritime Safety Administration, has delegated type approval and certification of ECDIS and other marine equipment to several of the other well-recognized classification societies.

The major countries engaged in international shipping will generally have their own Classification Society. A Classification Society provides technical support for it's own country in the interpretation and application of IMO standards, generally accepted

standards and practices and country or application specific standards, for the proper design, construction, inspection and maintenance of commercial vessels and other maritime structures. Different size vessels and different functional attributes of those vessels each have their own set of regulations and guidelines and are called classes. The concept of classification dates back to the late 1700's when insurer's gathered at Lloyd's coffeehouse in London and created the Lloyd's Register of Shipping as a means of grading the condition of ships so that the insurers could uniformly classify each ship for purposes of valuing risk.

While over 50 countries have their own classification societies, the largest and most important ones came together in 1968 to form the International Association of Classification Societies. They have published a normalized set of guidelines to provide a common set of standard test criteria to allow inter-agency acceptance of one another's Approvals. Particular to Electronic Displays and Computers is the IACS-E-10 (See Appendix A).

The major members of the IACS are as follows:

- ABS - (American Bureau of Shipping of USA)
- BV - Bureau Veritas (of France)
- CCS - (China)
- CRS - (Croatia)
- DNV GL - (Det Norske Veritas of Norway and Germanischer Lloyd of Germany)
- IRS - (India)
- KR (South Korea)
- LR - Lloyd’s Register of Shipping (United Kingdom)
- NK - (Nippon Kaiji Kyokai of Japan)
- PRS - (Poland)
- RINA (Italy)
- RS (Russia)

European Council Directive 96/98 (EC Standard on Marine Equipment) states that any marine equipment – including ECDIS – that has been type approved in one EU member state (“wheelmarked”) must be accepted by all other member states, plus Norway and Iceland. This has recently been broadened as the EU RO - EU Recognized Organizations Common Technical and Procedural Conditions for Mutual Recognition of Type Approval Certificates. The Classification Societies listed above are all Recognized Organizations, even though most of them are not in the EU.

Today, the purpose of a Classification Society is to provide classification and statutory services and assistance to the maritime industry and regulatory bodies as regards maritime safety and pollution prevention based on the accumulation of maritime knowledge and technology.

All certification societies accept testing performed from qualified independent facilities that their society has approved, and some even have in-house testing capabilities. Typically, vessels flagged in a particular country receive their Type Approvals from their own country Classification Society.

Insurance underwriters uniformly expect and may insist on strict adherence to the Approvals given by the Classification Societies. Operators may find it illegal and financially disastrous to operate without proper approvals.

AMERICAN BUREAU of SHIPPING (ABS)

The American Bureau of Shipping was founded in 1862. It continues to this day as the only US-based Classification Society and is recognized worldwide as a leader in their mission to protect life, property and the environment. Recently, they have also shown leadership in the development of new rules to help classify new types of vessels and technologies, such the use of LNG for fuel, as well as offshore vessels, production platforms and new renewable energy systems. In addition to developing rules for all classes of ships, ABS also provides surveying of new and existing vessels to certify compliance to these rules, and to Type Approve a wide variety of products for use on Classed vessels. This aids the maritime industry by allowing ship builders/designers to select Approved products and avoid additional time and expense for testing and evaluation of each product for each vessel. This also aids service companies who provide maintenance and upgrading of existing vessels by assuring them of the suitability of products and to prevent compromising the Classification Certificate of each vessel. ABS is based in Houston, Texas, with some 200 locations in 70 countries and 5,000+ employees worldwide.

The ABS Type Approval process mimics the European Union's Marine Equipment Directive (MED). The International Association of Classification Societies (IACS) AD-Hoc Committee for the Certification of Materials and Components has determined that Product Type Approval requires:

1. A technical evaluation of the product, including prototype tests as deemed necessary;
2. Witness of the manufacture of the product (type test); and
3. An assessment of the manufacturer's ability to consistently manufacture the product in accordance with the approved specifications.

The ABS Type Approval program incorporates a two-step process for issuance of a relevant Unit Certification:

1. Product Design Assessment (PDA)

Description: Satisfactory evaluation of a product to ABS Rules or other approved standards is evidenced by the issuance of a PDA certificate. The process is similar to the Module B category of the MED.
Process: Send test documents to ABS, ABS sends PDA certification after successful review.

2. Manufacturing Assessment (MA)

   Description: Satisfactory evaluation of the manufacturing facility and processes to confirm its ability to consistently manufacture the product in accordance with the PDA is evidenced by the issuance of a Manufacturing Assessment (MA) certificate. This is comparable to Modules D and E of the MED.
   Process: On-site visit by local ABS representative, must witness production of unit, review of quality program.

For a Product to be correctly offered as ABS Type Approved, both steps must be satisfactorily completed and maintained. Most manufacturers will also insure through the initial testing process that the products are tested to the standards agreed to by the IACS, allowing the manufacturer to test once and be acceptable to all member Classification Societies, provided the testing is performed by a reputable laboratory. A Certificate of Conformance may also be offered by the Manufacturer with the product to assist the Surveyor in his acceptance procedure.

Appendix A

IACS Unified Requirements - UR E

Electricity: Test Specification for Type Approval

E10.1 General
This Test specification is applicable, but not confined, to all equipment used for*:
- control, protection and safety;
- internal communication.

E10.2 Testing
These tests are to demonstrate the ability of the equipment to function as intended under the specified testing conditions.
The extent of the testing (i.e. the selection and sequence of carrying out tests and number of pieces to be tested) is to be determined upon examination and evaluation of the equipment or component subject to testing giving due regard to its intended usage.
Equipment is to be tested in its normal position if otherwise not specified in the test specification.
Relevant tests are as listed in the Table**.

E10.3 Navigational and Radio Equipment
Test conditions as specified in IEC 60945 (Marine navigational and radio communication equipment and systems - General requirements, Methods of testing and required test results) are to be applied for the above mentioned equipment.

Note: * These test requirements are harmonized with IEC 60092-504 “Electrical Installations in Ships - Part 504: Special features - Control and Instrumentation” and IEC 60533 “Electrical and electronic installations in ships - electromagnetic compatibility”. Electrical and electronic equipment on board ships, required neither by classification rules nor by International Conventions, liable to cause electromagnetic disturbance shall be of type which fulfill the test requirements of test specification items 19 and 20.

Note**: Additional details and Table can be found on the IACS website. www.iacs.org.uk/