ASTM F25 Fire Testing for SOLAS & Naval Vessels

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ABS Fire Testing Requirements for Commercial & Naval Vessels

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Presentation Outline

- Certification and classification
- Process of certification and classification
- General background information on ABS
- NVR requirements for structural fire protection
- SVR requirements for SFP
- Plan review and survey
What is Certification?

- Certification is a structured, auditable process for assessing components, equipment and/or systems to specified requirements.
- When done properly, it is a tool for the owner and protection for the provider.
- Certification applies standards created by other organizations.
- Certification refers to the time at which the certificate was issued.
What is Classification?

- Classification covers a ship or marine structure as a whole.
- Classification addresses the life cycle of a ship or offshore unit from design to scrapyard.
- Classification societies establish and apply technical standards in relation to the design, construction and survey of marine-related facilities including ships and offshore structures.
- Only classification societies are able to class ships and other marine structures.
Building on Success

- A core function of a Navy is ship certification
- Streamlining the infrastructure impacted resources
- Solution was extension of a successful process

### ABS Classification
- Existing and proven process
- Stable and updated requirements
- Independent assessment
- Recognized in statute

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Why ABS??

Risk Management Model

- Developer/Provider
- Owner/Operator

Independent 3rd Party Review

- ABS is in essentially the same business
- Long-standing relationships across many programs
- Well established processes
- Self-sustaining business model

Examples:
- FAA
- NRC
- UL
- Building Code Inspectors
- Classification Societies
- Naval Technical Authorities

Must be a credible technical authority:
- Body of Standards
- Certification Criteria
- Certification Agents
Integrated Closed Loop Process

**Develop Relevant Rules**

1. Establish recognized technical standards

2. Review designs against these standards

3. Verify the vessel is built in accordance with approved plans

4. Verify vessel is maintained to the accepted standards

**Applicable Rules**

Rules are updated based on experience gained from application and industry.

**Engineering**

Class surveyors attend the ship and vendor facilities. Not a substitute for yard QA

**Survey**

Apply knowledge gained from design review and construction attendance to in-service maintenance.

**Rule Update**

Review designs for conformance. Not a substitute for good design practices

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Develop Relevant Rules

Rules are updated based on experience gained from application and industry.
What Does Class Cover?

- **Systems and Equipment Covered**
  - Hull and structures including structural fire protection
  - Propulsion and maneuvering systems
  - Electrical systems
  - Control and navigation
  - Auxiliary systems
  - Habitability and outfit
  - Materials and welding
What Does Class Cover?

- **Processes Covered**
  - Establishing technical baseline
  - Design review
  - Material certification
  - Vendor equipment certification
    - Diesel engines, gas turbines and generators
    - Switchboards and other critical equipment
  - Construction, testing and trials
  - In-service maintenance and repair
About ABS

- Founded in 1862
- Not-for-profit marine classification society – no owners or shareholders
- ABS Board of Directors are reflective of the industry
- ABS Members are individuals considered eminent in their maritime field of endeavor
- ABS as a class society represents industry self-regulation
ABS Worldwide Network

- Nearly 3,000 employees
- 200 offices
- 70 countries
ABS Dedicated Global Workforce

Distribution of Surveyors & Engineers by Division

- Pacific: 30%
- Europe: 20%
- Greater China: 24%
- Americas: 26%

Surveyors & Engineers: 2,092
Management & Support: 908
Total: 3,000

October 2011
ABS Principal Activities

- Classification
- Statutory services
- Research and development
- Technology
- Third-party certification
Ships
Offshore
Survey & Engineering
New Construction & In-service
ABS & the US Government

- One-half of all US Government vessels built to ABS class
- One-third of all Navy ships built to ABS class (built in last decade)
- MSC policy to class their entire fleet with ABS
- MARAD policy to class their entire fleet with ABS
- NOAA policy to class their fleet with ABS
- Navy building ships to ABS class where applicable
- USCG building ships to ABS class where applicable
- Army Corps of Engineers Policy to build new vessels to ABS class
- ARMY TACOM builds new vessels to ABS class
- ABS surveyors support NAVSEA and SUPSHIPS staff on Navy combatants
- ABS surveyors have been used to assess damage and repair on combatants
Naval Programs in 2010

- T-AKEs at NASSCO
- T-AOE, T-AS and T-ARS transfers
- T-AGM-25 being ABS classed
- T-AGS to be ABS classed
- NOAA FRVs at VT Halter
- NOAA SWATH
  - JHSV will be ABS classed
- DDG-1000 to be ABS classed
- LCS being ABS classed
- LHD-8 engine certification and survey attendance
- LPD engine certification
- MLP to be ABS classed
- SBX MDA Platform ABS classed
- SEA FIGHTER ABS classed
- ONR E-Craft to be ABS classed
- ONR T-Craft to be ABS classed
- DEEPWATER NSC using ABS certification
- DEEPWATER OPC to be ABS classed
- DEEPWATER FRC B being ABS classed
- All current Army Corps of Engineers Projects
  - YPs being ABS classed
- Egyptian Fast Missile Craft to be ABS classed
- Kuwaiti Coast Guard patrol craft using ABS plan approval
- Mexican Patrol Craft ABS classed
- Indian Patrol Vessels ABS classed
- Canadian Navy YAP ORCA ABS classed
Developing Naval Rules

- Initial Naval Rules – Guide for Building and Classing High Speed Naval Craft
- In collaboration with NSWC Combatant Craft department, developed the model for cooperation a highly successful worldwide application published in 2002
- Establish ground Rules for extension to combatants
- Navy retains control through the NTA shared with USCG Technical Authority as appropriate, similar to the relationship with the USCG as a statutory agent
- Form expert panels
- Develop draft
- Reading session including industry
- Maintain through Technical Committee Structure
- The industry has significant role
Naval Vessel Rules
The US Navy and ABS have worked together on the ship classification process of many Sealift and Naval Auxiliary programs over several decades.

Navy’s GENSPECs and military standards needed updating.

The Navy and ABS partnered to lower risk aspects of designing and certifying non-nuclear naval combatant ships.

In-house Navy engineering resources now more focused on higher risk mission related aspects of combatants.

Maintain technical control via close collaboration on the NVR.

Navy retains technical authority, but uses ABS as a business partner to administer and class vessels to the NVR.
NVR: Spectrum of Applicability

Ship Types
- T-Ships
- Conventional Combatants
- Nuclear Submarines

Disciplines
- Structures/Marine Systems
- Warfare Systems
NVR: Elements

- Design margins
- Human systems integration
- Stability (static and dynamic)
- Structures (including SFP)
- Propulsion systems
- Electrical systems
- Controls, navigation and communication systems
- Auxiliary systems and CPS
- Deck systems and aviation interface
- Damage control and firefighting
- Habitability and outfitting
- Materials and welding

The baseline technical standards for H, M & E on naval combatants foundation for the naval combatant certification process
NVR, Part 1: Structure

- Chapters
  - 1 – Deals with general issues including materials and scantlings
  - 2 – Provides requirements for structural fire protection
  - 3 – Provides for requirements for hull structure
  - 4 – Covers composite hull construction
  - 5 – Covers structural and non-structural closures such as doors and hatches
  - 6 – Covers hull testing
High Speed Naval Craft Guide
High Speed Naval Craft Guide

- HSNC recognizes military use and specific design features while maintaining basis in commercial design standards
  - HSNC built from ABS-HSC, SVR and IMO-HSC, not the NVRs
    - Combines various specs into a better single source reference
      - Hull, mechanical and electrical systems
      - Subdivision and stability
      - Mission system interface with vessel

- HSNC developed as a collaborative partnership between US Navy and ABS for keeping design and construction Rules for Naval Craft current
  - Initially issued in 2003 with subsequent updates in 2004 and 2006
Philosophy of the HSNC Guide

- Large scope – 10 m RIBs to 150 m monohulls
- Requirement set is all inclusive
- It is intended to be shaped by the customer’s needs
- Applied to many vessels both US Navy and non-US Government vessels (Egypt, Oman, Kuwait, India, Canada)
Index

- Part 1 – General Provisions
- Part 2 – Materials and Welding
- Part 3 – Hull Construction and Equipment
  - Chapter 4 Fire Safety Measures – SFP
- Part 4 – Machinery Equipment and Systems
- Part 7 – Surveys After Construction
General Provisions

- Naval administration requirements
- Define class notations, including Naval Craft
  - Still some service restriction
  - Coastal Naval Craft
  - Riverine Naval Craft
- Applicability and direct analysis limits

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<th>Craft Type</th>
<th>Length</th>
<th>Speed</th>
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<tbody>
<tr>
<td>Naval Craft</td>
<td>All</td>
<td>All</td>
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<tr>
<td>Coastal Naval Craft</td>
<td>$\geq 45$ m (150 ft)</td>
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<tr>
<td></td>
<td>$&lt; 45$ m (150 ft)</td>
<td>40 knots</td>
</tr>
<tr>
<td>Riverine Naval Craft</td>
<td>None</td>
<td>None</td>
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Fire Safety Measures

- HSNC craft over 50 m are to comply with IMO HSC Code unless specified by the Naval Administration
  - See 3-4-1 /1.1

- HSNC craft less than 50 m are to comply with ship specifications
  - See 3-4-1 /1.3

- Fiber reinforced plastic (FRP) vessels – SFP must meet fire tests requirements for divisions of deck and bulkheads or comply with fire risk assessment
  - See 3-4-1 /5
Commercial Ship Fire Safety

- 1974 SOLAS (as amended)
- IMO Maritime Safety Committee Circulars 602, 669, 847, 915 and 917
- Fire Safety Systems Code
- Fire Test Procedures Code
- ABS Rules for Building and Classing Steel Vessels
Applying the HSNC & NVRs

- The Rules require input from the Naval Technical Authority for Novel Concepts or Interpretations
- ABS tracks alternatives through the justification for technical determinations (JTDs) – requiring agreement between ABS and NTA
- JTDs are evaluated for Rule changes on a yearly basis
- A key element to certification and classification is input from
  - The Shipyard and SFP Vendor
  - The Naval Program Office
  - The Naval Technical Authority
  - The Overall Design Integrator
  - The Naval Architects
  - The ABS Engineers and Surveyors
Keys to Success

- The Rules and requirements must be clearly defined
- Communication must be open between all parties