Fire Resistant Watertight Structural Doors

All Panel Meeting Presentation
March 2023

INGALLS SHIPBUILDING
A Division of HII

NSRP
NATIONAL SHIPBUILDING RESEARCH PROGRAM™
Taking Shipbuilding and Repair to the Next Level

HII Ingalls Shipbuilding

- **Largest manufacturing employer** in Mississippi
- **Major contributor** to the economic growth of Alabama and Mississippi
- **Largest supplier** of U.S. Navy surface combatants
- Only shipyard **simultaneously building 4 classes** of ships
- **Comprehensive life-cycle services** for CG 47, LPD 17 and LCS class ships

***America*-class**
Large Deck Amphibious Assault Ships

***San Antonio*-class**
Amphibious Transport Dock Ships

***Arleigh Burke*-class**
Aegis Guided Missile Destroyers

***Legend*-class**
National Security Cutters

11,000
employees

800
acre shipyard

85 Years
History of building world-class ships

The Issue

- Structural doors aren't fire resistant, and fire resistant doors aren't structural (i.e., watertight)
- We need a door that is both fire resistant AND watertight

Inside the charred amphibious warship HSS Bonhomme Richard by Dailymail.com and Associated Press

USCG Cutter Waesche Suffers Stack Fire at Sea by The Maritime Executive

Project Goals

- Goals
  - Develop a design for a fire resistant variant of the new family of Navy standard watertight doors developed under the prior NSRP Standardization of Watertight Closures project
  - Perform fire testing on the 26” x 66” and 30” x 66” watertight door sizes that are most commonly used on Navy ships

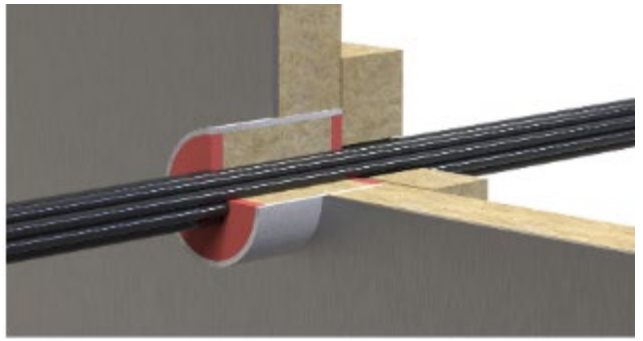
Project Team

- HII Ingalls Shipbuilding
  - John Walks, Michael Thompson
- STI Marine
  - Paul Switzer, Julio Lopes
- Southwest Research Institute
  - Kyle Fernandez, Karen Carpenter
- ATI (NSRP Program Administrator)
  - Jim House, Project Manager
- HII Newport News Shipbuilding
  - Alicia Harmon, Program Technical Representative

Fire Retardant Materials

- STI E-Wrap Marine
  - Flexible and compact material
  - Endothermic – releases chemically-bound water to have a cooling effect

- STI Marine Wrap Strip and Marine Firestop Sealant
  - Provides rapid intumescent expansion

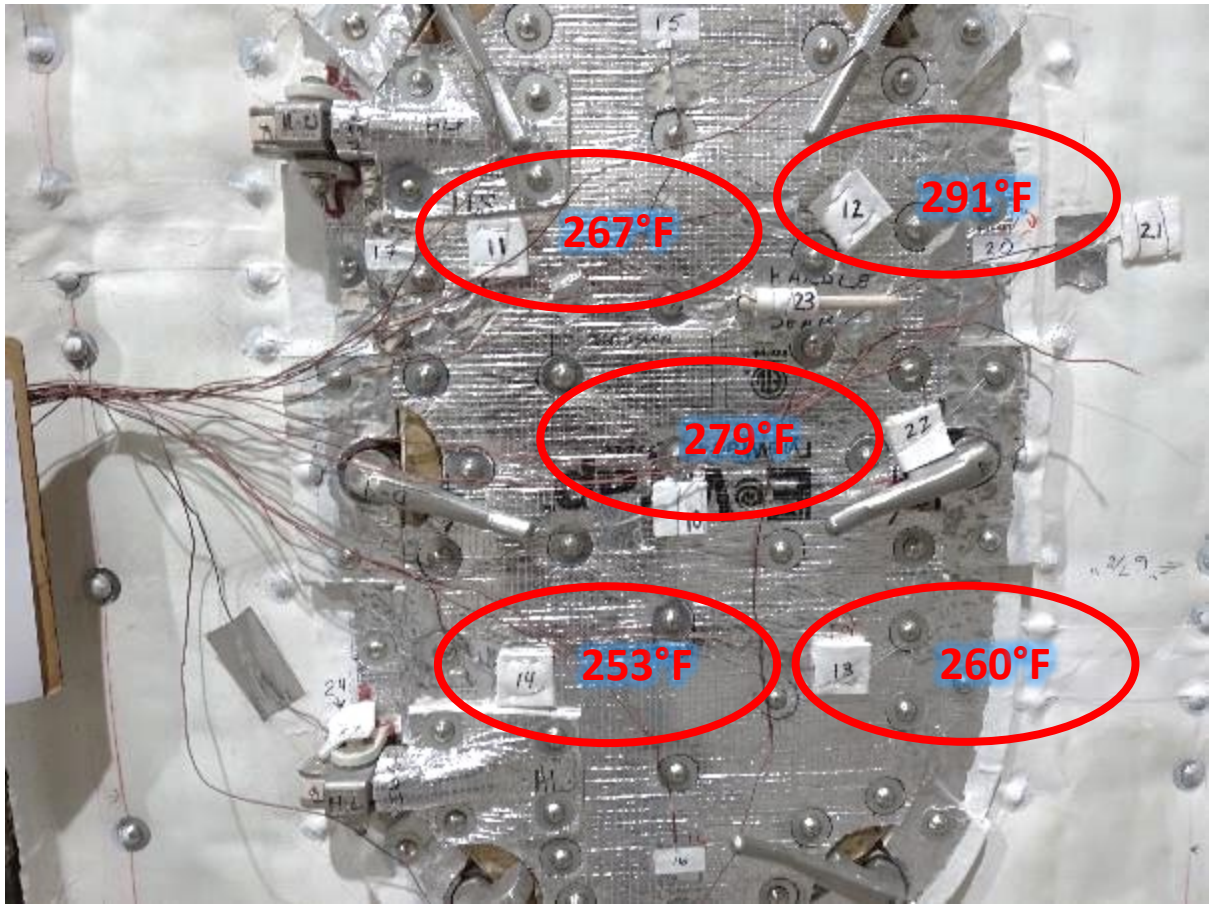


Door with Fire Retardant Material

- 18″ x 36″ door tested for risk reduction during Phase 1
- E-Wrap installation method similar to current practice for other shipboard insulation

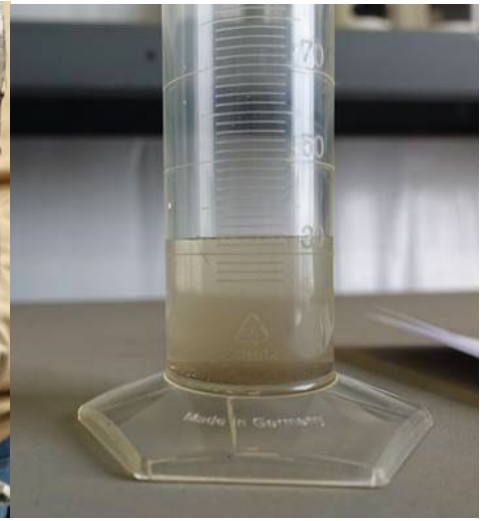
Results of Risk Reduction Testing

- Temperature requirements of MIL-STD-3020 were met
  - 30 minute test
  - Several sensors
  - Temperatures did not increase more than 325°F from initial value
- Failed pressure test
  - Leakage around door dogs
  - Damage to bushings and O-rings



Phase II Risk Reduction

- Upgraded door dog bushings and O-rings being used for 26″ x 66″ and 30″ x 66″ doors
  - Improved high temperature performance
  - Products were shown as options on prior Navy standard door drawings
  - In-house component level testing conducted prior to ordering sets for each door



Current Status

- Doors have had dog bushings and O-rings upgraded and have been pressure tested
  - Delay in receiving bushings and O-rings
  - Challenges with doors re-used from prior qualification project
- STI Marine fire retardant material has been received at Ingalls
  - The plan is to install the material shortly before fire testing to minimize risk of damage

Summary

- Status: Fire Testing Pending
  - Watertight doors have been pressure tested
  - Fire retardant material is onsite at Ingalls
  - Working with Southwest Research Institute to establish test dates
- Next steps
  - Install fire retardant material
  - Ship doors to Southwest Research Institute
  - Conduct fire testing and document test results

Questions?

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