ASTM F1387 Testing for Mechanically Attached Fittings
Post Project Deliverables

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PROJECT PARTICIPANTS

• BIW
  • Wendy Greenbaum – Project Technical Lead
• ATI
  • Nick Laney – Business Manager
• NASSCO
  • Monika Skowronska – PTR
• HII
  • Mike Poslusny – TPOC (now Gibbs and Cox)
  • Michael Thompson
  • John Walks – Admin Lead
• Laboratory
  • Southwest Research Laboratories, NuLaboratories
• NAVSEA
  • Erin Babik, Willard Calvert, Matt Worris, Thomas Brodrick
• Viega LLC
  • Jesus Herrero, Paul Switzer, Jessica Galassie, TJ Tracy
Standing at the end of the project (03/12/2021)

• MegaPress CuNi Fittings had previously demonstrated compliance to ASTM F1387 qualifications except those indicated below.
• ProPress (copper) ½” coupling subjected to ASTM F1387(19) Shock Test as a possible potable water Lead Free alternative system
• ASTM F1387 Qualification Tests for MegaPress CuNi (1/2” thru 2”)
  • Shock Test (S6) - Completed
  • Fire Test (S7) – Completed
  • Vibration Test (S8) - Completed
  • Impulse Test (A5) - Completed
  • Flexure Fatigue Test (A6) - Completed
  • Tensile Test (A7) - performance similar to silver brazed connections
  • Stress Corrosion Test (S4) - PENDING
• The fittings performed better than the vendor, the shipyards, and the TWHs expected them to.
PROJECT SUMMARY

• Recommendations:

• Couplings and other shapes, the assessment is that these fittings should be approved for use when coupled with Mil-T-16420, class 200 pipe, 90/10, in sizes ½” through 2”, for applications that do not require fire hardening and only for applications for which sil-braze joints are allowed.

• Mil-STD-777 qualifying systems are as follows:
  Table C-1, C-2 – Freshwater, including feed, chilled water, condensate, potable water, gas turbine wash down.
  Table C-2 – Freshwater, feed water, condensate, potable water, gas turbine wash down.
  Table L-1 – Cooling, (electronic equipment, diesel equipment, diesel engine) – ethylene glycol, freshwater, distilled water, washdown counter measure system.
  Table M-1 – Washdown counter measure system.
  Table R-1 – Waste water and weather deck drainage.
  Table R-3 – Plumbing drains and vents, interior space deck drains and condensate drains.
  Table R-4 – Sewage Collection, Holding and Transfer (CHT) and Vacuum Collection, Holding and Transfer (VCHT)
Recommended Configurations:

- Couplings
- 45 elbow
- 90 elbow
- Flanges (ANSI)
- Adapters (MPT)
- Adapters (FPT)
- Reducer Couplings
- Reducing TEEs
- Threaded TEEs
POST PROJECT DELIVERABLES

• APPROVED:
  • ProPress NAVSEA Letter Ser 05Z/191 29 Mar 21 Viega ProPress 0.500 OD Coupling
  • Stress Corrosion Test (S4) – Completed
  • MegaPress CuNi NAVSEA Letter Ser 05Z/177 3 May21 Viega MegaPress CuNi Coupling
  • SCN-02640 and CACN A0541 have been authorized for implementation (DDG-118-AF)

• In Process:
  • Shock Extension Qualification – taken over by Fincantieri Marinette for the FFG-62 Constellation Class Frigate Program and being performed by Gibbs and Cox
  • NAVSEA Cost Comparison – Silver Brazing vs MegaPress CuNi
POST PROJECT DELIVERABLES

- NAVSEA Approval Letter - ProPress ½” couplings (Copper)

- Approved Systems
  a) Potable Water Service, Distribution and Disinfection.
  b) Condensate (Non-Oily) Vents and Drains.
  c) Interior Spaces Deck Drains.
  d) Plumbing Vents and Drains

- Only one shock test was performed as an exploration for a lead free alternative

- The approval is intended to gather support to fund additional testing to finish the qualification process for the system and promote the use of the system.
1. Chilled Water;
2. Potable Water Service, Distribution and Disinfection;
3. Gas Turbine Freshwater Washdown;
4. Freshwater Window Washing;
5. Electronic Fresh Water Cooling;
6. Diesel Engine Fresh Water Cooling;
7. Sea Water Cooling (excluding Firemain);
8. Main and Secondary Drainage;
9. Seawater (Clean) Ballasting;
10. Seawater – Washdown Countermeasures;
11. Condensate (Non-Oily) Vents and Drains;
12. Weather Deck Drains;
13. Interior Spaces Deck Drains;
14. Plumbing Vents and Drains;
15. Sewage Collection, Holding, and Transfer (CHT);
16. Sewage Vacuum Collection, Holding, and Transfer (VCHT);
17. Freshwater Tank Sounding Tubes, Vents, Escapes and Overflows;
18. Clean Ballast Tank Vents, Escapes and Overflows; and

POST PROJECT DELIVERABLES

NAVSEA Approval Letter - MegaPress CuNi ½” thru 2”

• Approved Systems

DEPARTMENT OF THE NAVY
NAVSEA SYSTEMS COMMAND
U.S. NAVY SURFACE COMBS

Mr. Jamie Herrero
Marine Program Manager
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Dear Mr. Herrero:

SUBJECT: VIEGA MEGA-PRESS® PIPE COUPLINGS APPROVAL FOR LIMITED USE ON SURFACE VESSELS

Naval Sea Systems Command (NAVSEA) is in receipt of General Dynamics Bath Iron Works (GDWI) report of 12 March 19, titled "ASTM F1977 Testing for Mechanically Attached Fittings" and Southwest Research Institute (SWRI) Project 9207-21-007 of 27 April 21, titled "Techniques of Mechanically Attached Fittings According to ASTM F1977-13 - Stress Corrosion Cracking (SCC)". These documents provide discussion and consolidated test results performed an evaluation with a Navsea Shipbuilding Research Program (NSRP) on the Viega Mega-Press® pipe coupling, N° 27, 70110 CH0, Class 300, 2½" for use with HD-2-16510 tubing, Class 250, Alloy 707, Type I.

Viega Mega-Press® couplings are press-connect fittings, Grade D (CuNi), Class 2 (200 PSI), Type D (Flange-Ends on Synthetic Elastomeric Liners), (FM) rating as described in ASTM Specification F1977, titled "Metallic Press-Connect Fittings for Piping and Tubing Systems". These are very limited approved uses for press-connect fittings on U.S. Navy Surface Combatant piping systems, primarily due to press-connect failure liabilities with respect to shock resistance, fire resistance, vibrations, flexure fatigue and axial pull-out resistance. In comparison, Mechanically Attached Fittings (MAF) described in ASTM Specification F1977 and titled "Performance of Piping and Tubing Mechanically Attached Fittings" do not have such liabilities and are approved for a much broader use on U.S. Navy Surface Combatants.

The purpose of the NSRP with respect to the Viega Mega-Press® pipe coupling was to determine whether these couplings would pass all required and supplemental testing identified in ASTM F1977, with the qualification that they are equal to or better than ASTM F1977 compliant CuNi. NAVSEA has reviewed the submitted test results and finds that the Viega Mega-Press® pipe couplings did not pass all testing identified in ASTM F1977, specifically, failing to pass tensile testing (Test A7 of ASTM F1977), and Flex Testing (Test A7 of ASTM F1977). The Viega Mega-Press® pipe couplings did pass the other tests, notably Sheen...
Additional Resources:

• MegaPress vs Welding video (3:02 min)
  https://www.youtube.com/watch?v=XuoiCbv0icU

• MegaPress CuNi Torture Video (3:15 min)
  Video has been downloaded to ATI server (can provide YouTube link if necessary)
Benefits

- Fire Risk Mitigation – no hot work required.
- NASSCO has done studies that show significant reductions in piping testing cost due to not finding leaks during a hydro and not having to do repairs and retest. (ROI in excess of 100%, virtually 0% failure rate)
- Testing and approving two types of fittings that reduce construction, testing and rework labor and improves first time quality.