

## 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

# PROJECT SUMMARY

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) 1/2" 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.

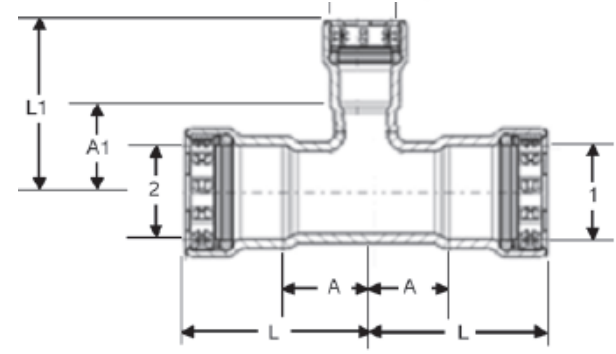
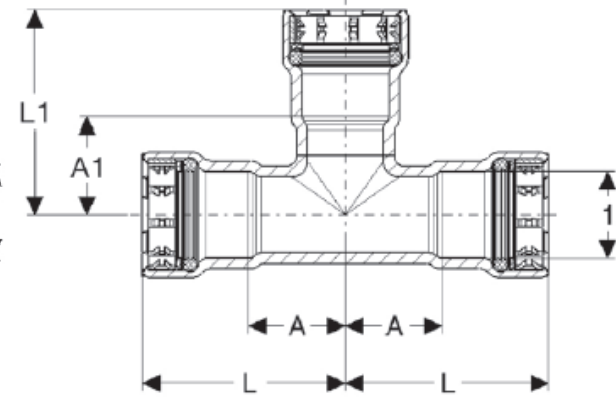
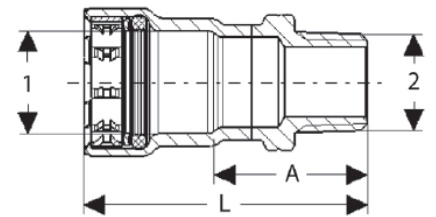
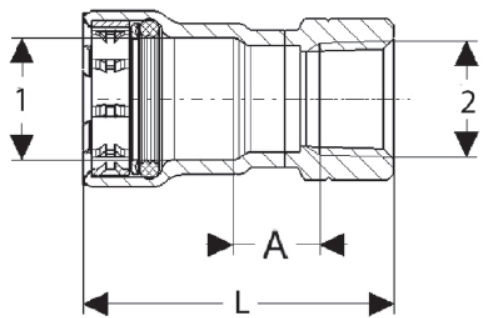
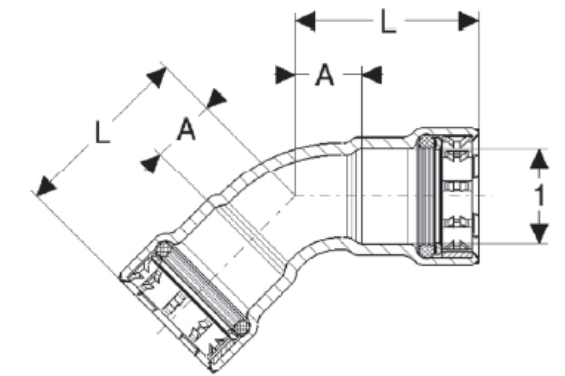
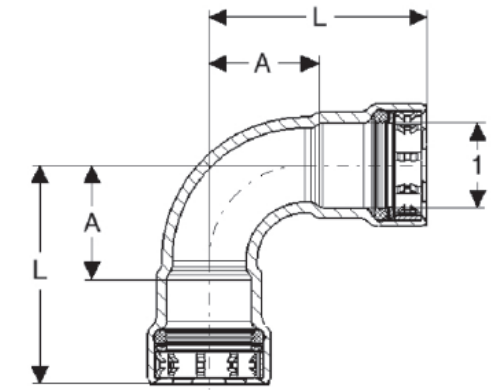
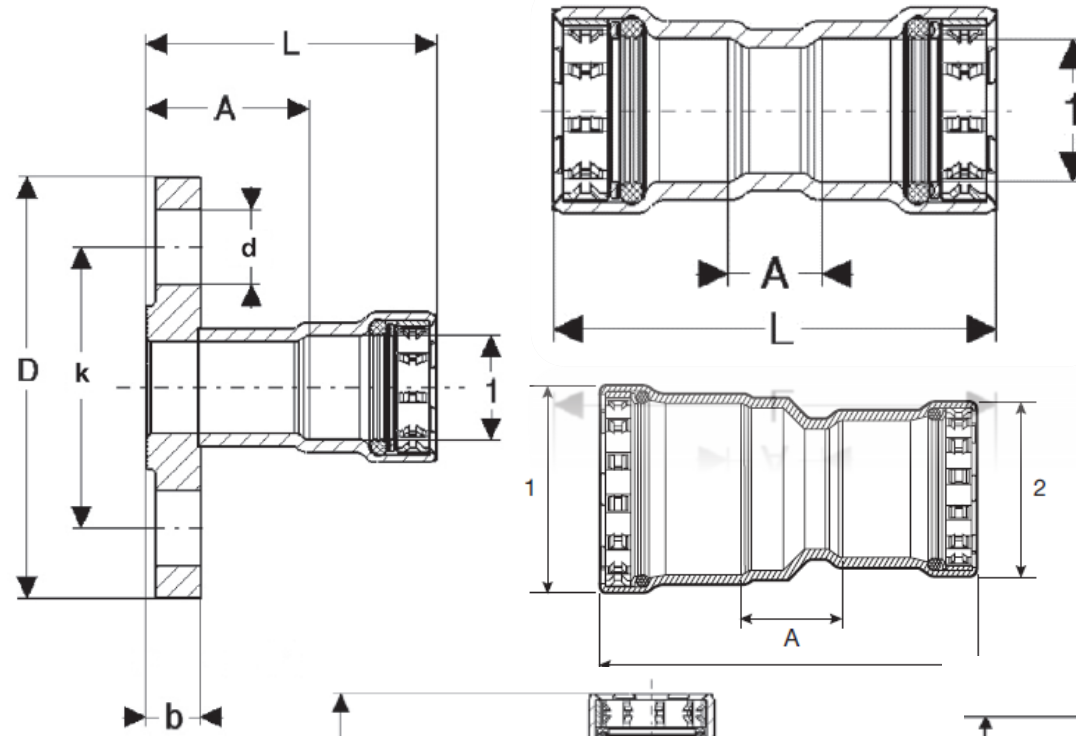
Table R-1 – Waste water and weather deck drainage.

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 1/2" 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.



DEPARTMENT OF THE NAVY  
NAVAL SEA SYSTEMS COMMAND  
1333 ISAAC HULL AVE SE  
WASHINGTON NAVY YARD DC 20376-0001

IN REPLY REFER TO  
9505  
Ser 05Z/191  
March 29, 2021

Mr. Jesus Herrero  
Marine Program Manager  
Viega, LLC  
585 Interlocken Blvd.  
Broomfield, CO 80021

Dear Mr. Herrero:

SUBJECT: VIEGA PRO-PRESS® PIPE COUPLING APPROVAL FOR LIMITED USE ON SURFACE SHIPS

Naval Sea Systems Command (NAVSEA) is in receipt of General Dynamics Bath Iron Works (GDBIW) report of March 12, 2021, titled "ASTM F1387 Testing for Mechanically Attached Fittings". This document provides discussion and shock test results performed in conjunction with a National Shipbuilding Research Program (NSRP) on the Viega Pro-Press® pipe coupling, 1/2" OD, copper, Class 200 PSIG, for use with 1/2" OD copper tubing, ASTM B88, Type K (0.049 wall), 250°F.

Viega Pro-Press® couplings are press-connect fittings, Grade C (copper), Class 2 (200 PSIG), Type 1 (Ethylene Propylene Diene Monomer (EPDM) o-ring) as described in ASTM Specification F3226, titled "Metallic Press-Connect Fittings for Piping and Tubing Systems". There are very limited approved uses for ASTM F3226 fittings on U.S. Navy Surface Combatant piping systems, primarily due to press-connect fitting liabilities with respect to shock resistance.

The purpose of the NSRP with respect to the Viega Pro-Press® 1/2" OD pipe coupling was to determine whether this coupling would pass shock testing, with the goal of approving it for use in shipboard potable water systems. NAVSEA has reviewed the submitted test results and finds that the Viega Pro-Press® 1/2" OD pipe coupling passed shock testing and, as such, demonstrates superior performance to the "typical" ASTM F3226 press-connect fitting.

Based on these test results, NAVSEA considers the Viega Pro-Press® 1/2" OD pipe coupling acceptable for use on Non-Nuclear U.S. Navy Surface Combatants with the following restrictions:

The approved Viega Pro-Press® piping components is limited to the 1/2" OD, copper, Class 200 PSIG coupling, for use with 1/2" OD copper tubing, ASTM B88, Type K (0.049 wall), 250°F, as identified below:

Coupling, Model 2915 (P/N 78047)

# POST PROJECT DELIVERABLES

## NAVSEA Approval Letter - MegaPress CuNi 1/2" thru 2"

- Approved Systems
  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
  19. Void Vents, Escapes and Overflows.



DEPARTMENT OF THE NAVY  
NAVAL SEA SYSTEMS COMMAND  
1333 ISAAC HULL AVE SE  
WASHINGTON NAVY YARD DC 20376-0001

IN REPLY REFER TO  
9505  
Ser 052/177  
May 3, 2021

Mr. Jesus Herrero  
Marine Program Manager  
Viega, LLC  
585 Interlocken Blvd.  
Broomfield, CO 80021

Dear Mr. Herrero:

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

Naval Sea Systems Command (NAVSEA) is in receipt of General Dynamics Bath Iron Works (GDBIW) report of 12 March 21, titled "ASTM F1387 Testing for Mechanically Attached Fittings" and Southwest Research Institute (SwRI) Project 18057.21.007 of 27 April 21, titled "Testing of Mechanically Attached Fittings According to ASTM F1387-19 - Stress Corrosion Cracking (S4)". These documents provide discussion and consolidated test results performed in conjunction with a National Shipbuilding Research Program (NSRP) on the Viega Mega-Press® pipe couplings, 1/2" to 2", 90/10 CUNI, Class 250 PSIG, for use with MIL-T-16420 tubing, Class 200, Alloy 706, Type I.

Viega Mega-Press® couplings are press-connect fittings, Grade D (CuNi), Class 2 (200 PSIG), Type 3 (Fluoro-Elastomer or Synthetic Fluorinated Rubber (FKM) o-ring) as described in ASTM Specification F3226, titled "Metallic Press-Connect Fittings for Piping and Tubing Systems". There are very limited approved uses for ASTM F3226 fittings on U.S. Navy Surface Combatant piping systems, primarily due to press-connect fitting 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 F1387 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 couplings was to determine whether these couplings would pass all required and supplemental testing identified in ASTM F1387, with the goal of classifying them as equivalent to ASTM F1387 compliant MAFs. NAVSEA has reviewed the submitted test results and finds that the Viega Mega-Press® pipe couplings did not pass all testing identified in ASTM F1387, specifically, failing to pass Tensile Testing (Test A7 of ASTM F1387) and Fire Testing (Test S7 of ASTM F1387). The Viega Mega-Press® pipe couplings did pass the other tests, notably Shock





# 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.

