National Shipbuilding Research Program

Ship Design & Material Technologies

Dec 9, 2015-San Diego, CA

SeaCor™

12/9/15

Certificate Number: 08-HS242939B-7-PDA
24/NOV/2015

Confirmation of Product Type Approval

Please refer to the "Service Restrictions" shown below to determine if Unit Certification is required for this product.

This certificate reflects the information on the product in the ABS Records as of the date and time the certificate is printed.

Pursuant to the Rules of the American Bureau of Shipping (ABS), the manufacturer of the below listed product held a valid Manufacturing Assessment (MA) with expiration date of 18/MAY/2017. The continued validity of the Manufacturing Assessment is dependent on completion of satisfactory audits as required by the ABS Rules.

And; a Product Design Assessment (PDA) valid until 06/JUN/2017 subject to continued compliance with the Rules or standards used in the evaluation of the product.

The above entitle the product to be called Product Type Approved.

The Product Design Assessment is valid for products intended for use on ABS classed vessels, MODUs or facilities which are in existence or under contract for construction on the date of the ABS Rules used to evaluate the Product.

ABS makes no representations regarding Type Approval of the Product for use on vessels, MODUs or facilities built after the date of the ABS Rules used for this evaluation.

Due to wide variety of specifications used in the products ABS has evaluated for Type Approval, it is part of our contract that; whether the standard is an ABS Rule or a non-ABS Rule, the Client has full responsibility for continued compliance with the standard.

Product Name: Thermoplastic Pipe, Fittings and Joints

Model Name(s): SeaCor Thermoplastic CPVC Schedule 80 Pipe & Fittings

Presented to:
GEORG FISCHER HARVEL
7777 SLOANE DRIVE
United States

Intended Service:	Marine Applications - Non-essential systems for water per ABS Steel Vessel Rule 4-6-3/Table 1, such as Hot and Cold Water Systems, Black Water, Gray Water, Sanitary Vacuum Flush Systems, Salt and Fresh Water Systems, Deck Wash, Bilge, and Cooling Water Systems in the correct Temperature Range, where No Fire Endurance Test or Electrical Conductivity is required.
Description:	CPVC Schedule 80 pipe and fitting diameters 1/2" to 12".
Tier:	3
Ratings:	Temperature range 32 °F (0 °C) to 210 °F (99 °C); Max pressure rating for Schedule 80 CPVC Pipe at 73 °F (23 °C): 1/2" - 848 psi (57.7 bar); 3/4" - 688 psi (46.8 bar); 1" - 630 psi (42.9 bar); 1 1/4" - 520 psi (35.4 bar); 1 1/2" - 471 psi (32.0 bar); 2" - 404 psi (27.5 bar); 2 1/2" - 425 psi (28.9 bar); 3" - 375 psi (25.5 bar); 4" - 324 psi (22.0 bar); 6" - 279 psi (19.0 bar); 8" - 246 psi (16.7 bar); 10" - 234 psi (15.9 bar); 12" - 228 psi (15.5 bar); Max vacuum pressure rating (all sizes) at 73°F (23 °C) 3.5 bar*. Manufacturer and/or ASTM F441 is to be consulted concerning pressure de-rating for temperatures above ambient. (*) For higher vacuum pressures, please consult the manufacturer.
Service Restrictions:	1) Unit Certification is not required for this product. 2) This material is not considered electrically conductive and therefore cannot be used in hazardous areas, or with non-conductive fluids in accordance with SVR 4-6-3/5.15 and MODU 4-2-2/7.5.8. 3) This material has not been tested for fire endurance and therefore can only be used in services/locations indicated as 0, no fire endurance testing

U. S. Department of Homeland Security
United States Coast Guard
Certificate of Approval

Coast Guard Approval Number: 164.141/36/0 Expires: 12 November 2019

PLASTIC PIPING SYSTEMS

Georg Fischer, LLC
9271 Jeronimo Road
Irvine CA 92618

SeaCor Pipes and Fittings.

SeaCor schedule 80 pipe of nominal diameters 1/2" to 12" meet Low Flame Spread, and Smoke and Toxicity requirements of the FTP Code Annex 1, Parts 2 and 5. May be installed in concealed spaces in accommodation, service, and control spaces, and need not meet the additional requirements of 46 CFR 56.60-25(a)(2).

SeaCor piping has not been subjected to fire endurance testing and is therefore not suitable for applications requiring fire endurance testing as specified in IMO Resolution A.753(18).

Identifying Data: Test Reports: SwRI Project Nos. 01.16052.01.647a and 01.16052.01.647b dated 16 November 2011. Follow-up Procedure Document No. 01.025000.02.198, Revision No. 1 dated January 2012.

Valid only for products manufactured at:
Georg Fischer Harvel, LLC
7777 Sloane Drive
Little Rock, AR 77206

Product must be installed in accordance with manufacturer's guidelines; all bonders must hold ASME B31.3 bonder qualifications certificates.

Supersedes certificate dated February 2, 2012, to reflect changes in corporate address and name of manufacturing location.

*** END ***

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

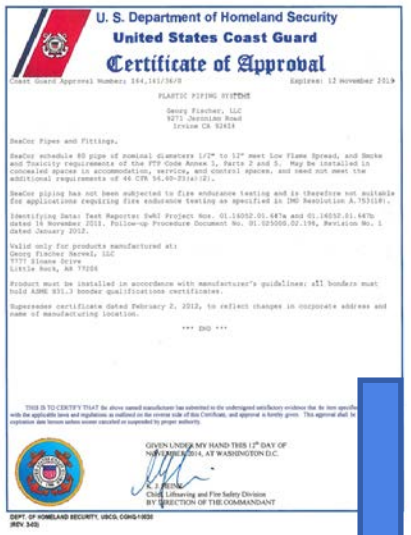
GIVEN UNDER MY HAND THIS 12th DAY OF NOVEMBER 2014, AT WASHINGTON D.C.

K. J. HEINZ
Chief, Lifesaving and Fire Safety Division
BY DIRECTION OF THE COMMANDANT

DEPT. OF HOMELAND SECURITY, USCG, CGHQ-10030
(REV. 3-03)

Fire Testing and Compliance

- IMO A.753(18)
  - Part 5 – Flame Spread
  - Part 2 – Smoke and Toxicity
    - Only thermoplastic to pass for all sizes ½” through 12”
- USCG
  - Remotely inspectable joining system
  - No smoke detection in confined spaces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SeaCor piping has not been subjected to fire endurance testing and is therefore not suitable for applications requiring fire endurance testing as specified in IMO Resolution A.753(18).

Identifying Data: Test Reports: EWAI Project Nos. 01.16052.01.447a and 01.16052.01.447b dated 16 November 2011. Follow-up Procedure Document No. 01.025000.02.196, Revision No. 1 dated January 2012.

Valid only for products manufactured at:
Georg Fischer Harvel, LLC
7777 Sloane Drive
Little Rock, AR 77206

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GIVEN UNDER MY HAND THIS 13th DAY OF NOVEMBER 2014, AT WASHINGTON D.C.

K. J. Eldridge
Chief, Lifesaving and Fire Safety Division
BY DIRECTION OF THE COMMANDANT

DEPT. OF HOMELAND SECURITY, USCG, CG-ENG-1 (REV. 3-03)

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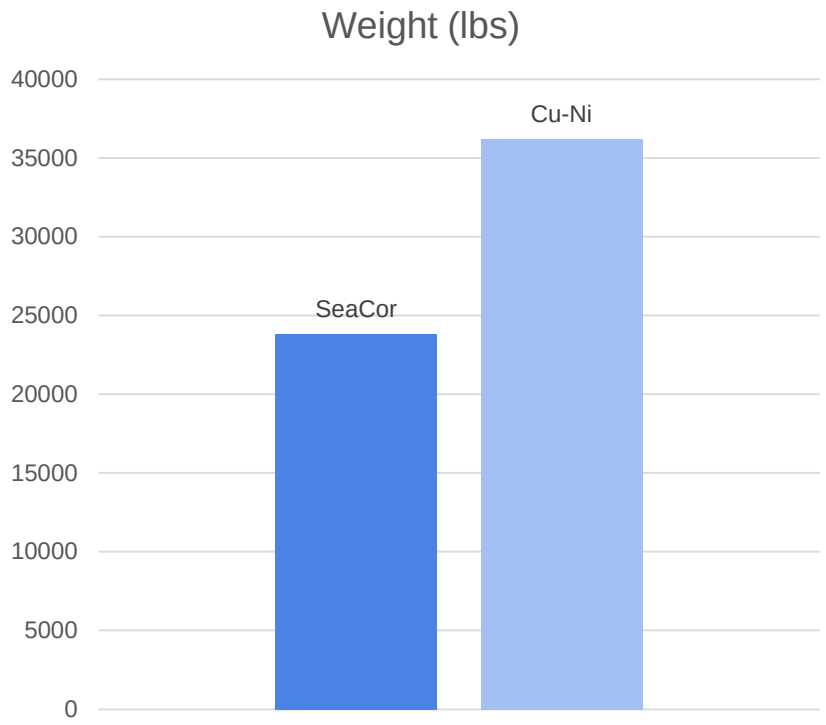
- ABS; USCG
- LR; DNV in progress

Installations

- TAKE-1 & Take-2
  - Test installation – 2009 on TAKE-1
  - Replace all black water system in 2015
- Specified as alternative material in T-AO(x) tankers
- 50 year design life as certified by NSF 14

Weight and Cost

- Change from Cu-Ni to SeaCor in test BoM



For any additional questions, please contact me at the following:

Georg Fischer Piping Systems
Rachel Holder
Rachel.holder@georgfischer.com
713-906-2424

THANK YOU!