CERTIFICATE NUMBER
17-HS1663797-PDA

DATE
18 Aug 2017

ABS TECHNICAL OFFICE
Houston ESD - Piping

CERTIFICATE OF DESIGN ASSESSMENT

This is to certify that a representative of this Bureau did, at the request of

NEPTUNE RESEARCH, INC.

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product: **Pipe Repair System**
Model: **SynthoGlass XT**

This Product Design Assessment (PDA) Certificate 17-HS1663797-PDA, dated 18/Aug/2017 remains valid until 17/Aug/2022 or until the Rules or specifications used in the assessment are revised (whichever occurs first).

This PDA is intended for a product to be installed on an ABS classed vessel, MODU or facility which is in existence or under contract for construction on the date of the ABS Rules or specifications used to evaluate the Product.

Use of the Product on an ABS classed vessel, MODU or facility which is contracted after the validity date of the ABS Rules and specifications used to evaluate the Product, will require re-evaluation of the PDA.

Use of the Product for non ABS classed vessels, MODUs or facilities is to be to an agreement between the manufacturer and intended client.

AMERICAN BUREAU OF SHIPPING

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Tier: 3 - Type Approved, unit certification not required

Product: **Pipe Repair System**
Model: **SynthoGlass XT**
Intended Service:
Marine and Offshore Applications, including topside and subsea -Temporary repair, retrofit and structural reinforcement of corroded or otherwise damaged piping.

Description:
The Syntho-Glass XT composite repair system is comprised of individual component units which work together to achieve the desired goal of the composite system in repairing/retrofitting structural integrity to the host member. These include:
Syntho-Poxy HC or Syntho-Steel: NRI high compression strength filler epoxies to fill corrosion defects/dents back to original pipe geometry;
Syntho-Subsea LV: NRI epoxy primer system for corrosion prevention and bonding to the host substrate; and,

Syntho-Glass XT wrap: NRI asymmetric bi-directional plain weave fiberglass tape (fabric) pre-impregnated by an uncured (liquid) polyurethane resin. The resin component of Syntho-Glass XT is activated by fresh or salt water and hardens as it cures, resulting in a thermoset composite. The hardening of the resin component produces a pressure-retaining fiberglass-reinforced composite sleeve, which provides the strength and structural integrity of the system.

Rating:
The pressure / temperature limits are to be determined on a case by case basis as per the repair system design and qualification testing requirements in ASME PCC-2 and/or ISO 24817.

See attachment.

Service Restriction:
1) ABS Surveyor acceptance of any application of Syntho-Glass XT composite repair system is required. Non-metallic composite repair systems may only be acceptable for temporary repairs, pending the next available repair period. Repair lifetime is to be agreed with the attending Surveyor.

2) ABS Surveyor is to attend application planning meeting together with NRI technical consultant and application team. Intended use is to be agreed with the attending Surveyor prior use.

3) Any Syntho-Glass XT composite repair system application is to be designed, qualified, installed, tested and inspected in accordance with Part 4 of ASME PCC-2 and / or ISO 24817. A risk assessment associated with both defect and the repair method is to be completed prior to application and is to consider all factors listed in 4.1.3 of ASME PCC-2 and/or 6.1 of ISO 24817. The requirements for fire performance (i.e., flame spread and smoke generation) are to be identified in the risk assessment, as per 3.4.10.3 of ASME PCC-2 and/or 6.5.9.4 of ISO 24817.

4) ABS Surveyor is to attend upon completion of surface cleaning and surface preparation as specified and immediately prior to application of the composite repair system.

5) Personnel involved in the installation of the repair system are to be trained and qualified in accordance with Article 4.1, Appendix VII, of ASME PCC-2 and / or Annex I of ISO 24817.

6) When required by the service environment, the installation must be coated with a UV-blocking and weather resistance coating approved by NRI. Water resistant epoxy is to be used if the materials are in contact with water.

7) Not to be used for any structural applications.

8) Unit certification is not required for this product. If the manufacturer or purchaser requests an ABS Certificate for compliance with a specification or standard, the specification or standard, including specification standards and

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tolerances, must be clearly defined.

Comments:
The design of this particular coating was found in compliance with the identified standards.

The installation procedures are to be those used in the repair system qualification and are to be in accordance with NRI's installation guide and recommendations for specific types of repairs.

ABS expressly disclaims all warranties with respect to the repair coating and the design assessment, including warranties of merchantability and fitness for a particular purpose. Successful repair coating is dependent on coating properties (some of which may not have been addressed in the approval standard), proper application (including surface preparation, application and curing environment) and proper maintenance. These aspects are beyond the scope of this design assessment.

The manufacturer has provided a declaration that the product is asbestos free.

Notes/Drawing/Documentation:
Supporting Documentation (Previous Task: 923417)
Drawing No. -, Technical Overview Syntho-Glass XT, Revision: 16, Pages: 155
Drawing No. -, Syntho-Poxy HC Part A (Resin) Datasheet, Revision: 4, Pages: 2
Drawing No. -, Syntho-Poxy HC Part B (Catalyst) Datasheet, Revision: 4, Pages: 2
Drawing No. -, Syntho Sub-Sea Epoxy Part A (Resin) Datasheet, Revision: 3, Pages: 2
Drawing No. -, Syntho Sub-Sea Epoxy Part B (Catalyst) Datasheet, Revision: 3, Pages: 2
Drawing No. -, Syntho-Steel Epoxy Mastic Part A (Resin) Datasheet, Revision: 2, Page: 1
Drawing No. -, Syntho-Steel Epoxy Mastic Part B (Catalyst) Datasheet, Revision: 2, Page: 1
Drawing No. -, Syntho-Glass XT Installation Validation Procedure Quality Control Records, Revision: 11, Pages: 3
Drawing No. -, Syntho-Glass XT Extreme Strength Fiberglass Composite System, Page: 1
Drawing No. 310389-1A, Bonded Lap Shear Panel for Syntho-glass XT-SubLV Steel, Revision: A, Pages: 7

Terms of Validity:
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STANDARDS

ABS Rules:
Rules for Conditions of Classification, Part 1 - 2017 Steel Vessels Rules 1-1-4/7.7, 1-1-Appendix 3, 1-1-Appendix 4

Rules for Conditions of Classification, Part 1 - 2017 Offshore Units and Structures 1-1-4/9.7, 1-1-Appendix 2, 1-1-Appendix 3

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National:
NA

International:
ASME PCC-2 (2015)
ISO 24817 (2015)

Government:
NA

EUMED:
NA

OTHERS:
NA