



CERTIFICATE NUMBER

DATE

01-SG248534-4-PDA -DUP3

01 November 2013

ABS TECHNICAL OFFICE

Singapore Engineering Services

CERTIFICATE OF DESIGN ASSESSMENT

This is to Certify that a representative of this Bureau did, at the request of
FIBER GLASS SYSTEMS (SUZHOU) CO. LTD - SUZHOU

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: Thermosetting, Fiberglass (FRP) Pipe, Fittings and Joints

MODEL: Bondstrand Filament Wound, Fiberglass Reinforced Piping System - 2000M, 2000M-FP, 7000M, PSX-L3, PSX-JF

This Product Design Assessment (PDA) Certificate 01-SG248534-4-PDA -DUP3, dated 01/Nov/2013 remains valid until 31/Oct/2018 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


Kee Wing (Keith) Yeo

Engineer

AB258(01/10)

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of ABS or a statutory, industrial or manufacturer's standards. It is issued solely for the use of ABS, its committees, its clients or other authorized entities. Any significant changes to the aforementioned manufacturing process without approval from ABS will result in this certificate becoming null and void. This certificate is governed by the terms and conditions as contained in ABS Rule 1-1-A3/5 9 Terms and Conditions of the Request for Product Type Approval and Agreement (2010).



FIBER GLASS SYSTEMS (SUZHOU) CO. LTD
NO. 848 LITANGHE ROAD,
XIANGCHENG ECONOMIC DEVELOPMENT,
ZONE, SUZHOU, JIANGSU CHINA – 215131

Reference: MP/T1092241
File Ref: T-8-6-TA
Project No: 3105005

01 November 2013

01-SG248534-4-PDA-DUP3

Bondstrand Filament Wound, Fiberglass Reinforced Piping System
2000M, 2000M-FP, 7000M, PSX-L3, PSX-JF

Gentlemen:

We have your application and the agreement from NOV FGS SINGAPORE (PTE) LTD to issue your company a Duplicated Product Design Assessment (PDA-DUP) Certificate.

We also have your acknowledgement 04 Jan 2013 that you will accept the PDA-DUP Certificate and recognize that primary control belongs to the NOV FGS SINGAPORE (PTE) LTD. You will be responsible for the continued validity of this PDA-DUP Certificate, and will be obliged to maintain contact with the OEM to stay aware of any changes in the product.

We also have received copies of the approved OEM drawings. The list of drawings is shown below.

In order to hold a PDA-DUP, it is mandatory for the manufacturer to also hold a valid Manufacturing Assessment (MA). If you do not have a valid MA, an assessment must be completed within 90 days of the issue of the PDA-DUP. Manufacturing Assessment audits must be kept current for the term of the PDA-DUP certificate. Overdue audits or an expired MA will invalidate the PDA-DUP.

Enclosed is your original copy of the Duplicated Certificate of Design Assessment (PDA-DUP). Your details are published on our web site at www.typeapproval.org and can also be downloaded there.

Please be sure that you understand the scope and conditions of the validity of the certificate. In particular we draw your attention to the restrictions on the certificate and any service restrictions for Unit Certification.

This PDA is intended for products to be used 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. The use of the product in a non ABS classed vessel, MODU or facility is to be mutual agreement between your company and your client

We recommend that you monitor the ABS Rules and other standards used in the approval. These Rules and standards often change on an annual basis, and you must comply with the new Rules and standards in order for the product to be used on an ABS classed vessel or facility contracted under the new Rules or specifications.

We do caution you that the use of the ABS logo is copyrighted. Our "Product Type Approval" Logo may be used as long as you are conducting regular audits of your manufacturing process. Please contact our Survey Office/s, nearest to the location/s of fabrication/construction/assembly. The office will arrange for the production testing as may be necessary and audit of your quality assurance and control arrangements. To find an office, please use the directory of ABS offices on the ABS Web Site at www.eagle.org. You may also ask the ABS Program staff at Tel. (281) 877-6107, Fax (281) 877-6591, or e-mail absta-programs@eagle.org.

PACIFIC DIVISION

438B ALEXANDRA ROAD, #06-05, BLK B ALEXANDRA TECHNOPARK, SINGAPORE 119968
TEL: 65-6276-8700 FAX: 65-6272 2195 (SED) 65-6276 8130 (ESD) EMAIL: ABSSingapore@eagle.org WEB: www.eagle.org
CO. UEN: S58FC1284D



To: FIBER GLASS SYSTEMS (SUZHOU) CO. LTD

Reference: MP/T1085363
Project Number: 3105005

01 November 2013

We appreciate your confidence in ABS type Approval. If you should have any comments relative to the scope and conditions of the assessment of your product, or if we can be of any further assistance, please do not hesitate to contact us. Please also find enclosed our invoice to cover the cost of the issue of the PDA.

Very truly yours.

ABS

Yeo Kee Wing (Keith)
Principal Engineer
Ship/Offshore Engineering Systems

Enc.: PDA 01-SG248534-4-PDA-DUP3

cc:
Original Equipment Manufacturer (OEM): NOV FGS SINGAPORE (PTE) LTD

ABS SG Files (12IRF2674)

ABS Surveyor (via ABS Eagle Construct System)

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To: FIBER GLASS SYSTEMS (SUZHOU) CO. LTD

Reference: MP/T1085363
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01 November 2013

Drawings List

Drawing No	Revision No	Drawing Title
01-SG248534_4-PDA	0	Review Letter from EPN : 3038365
1 inch 90D E052-09(S)(1)_	0	1 inch 90D E052-09(S)(1)_76637080
1 inch E47-01-2 TP_	0	1 inch E47-01-2 TP_76636388
1 inch PE X PE E073-08(S)(3-2)	0	1 inch PE X PE E073-08(S)(3-2)_76637018
1 inch QLM X QLF TR144-98	0	1 inch QLM X QLF TR144-98_76636544
16 X 12 inch E123-01 Spool 1	0	16 X 12 inch E123-01 Spool 1_76637081
173563-1	0	173563-1_76636456
173752-1	0	173752-1_76636797
20 inch PEXPE E068-11(M)(07)-1 TP	0	20 inch PEXPE E068-11(M)(07)-1 TP_76637010
213563-1	0	213563-1_76636545
22 inch PE X PE E110-09(M)(1)	0	22 inch PE X PE E110-09(M)(1)_76636459
4 inch E43-03(4) TP	0	4 inch E43-03(4) TP_76636455
4 inch E47-01 TP	0	4 inch E47-01 TP_76636462
5 inch QLM X QLF E074-07(S)(1-4)	0	5 inch QLM X QLF E074-07(S)(1-4)_76637411
713563-1	0	713563-1_76637011
733563-1	0	733563-1_76637012
8 inch E48-01 TP	0	8 inch E48-01 TP_76636747
8 inch QLM X QLF TR088-97	0	8 inch QLM X QLF TR088-97_76637021
ENG5000 Marine Design Manual	0	ENG5000 Marine Design Manual_76636385
MOS2210 2000M-FP Spec Guide	0	MOS2210 2000M-FP Spec Guide_76637513
PD2000M_	0	PD2000M_76637241
PD2000M-FP-FV8	0	PD2000M-FP-FV8_76638110
PD2000M-FP-PC8	0	PD2000M-FP-PC8_76638585
PD7000M	0	PD7000M_76637517
PDPSX.JF-16BAR	0	PDPSX.JF-16BAR
PDPSX.JFC-16BAR	0	PDPSX.JFC-16BAR
PDPSX.L3-16BAR	0	PDPSX.L3-16BAR
PDPSX.L3C-16BAR	0	PDPSX.L3C-16BAR
STB Test Report for 14 inch PSX-L3	0	STB Test Report for 14 inch PSX-L3_76637408
STB Test Report for 2 in 2000M	0	STB Test Report for 2 in 2000M_76637514
T0016,Jet Fire Test of S2000M-FP,SwRI Report	0	T0016,Jet Fire Test of S2000M-FP,SwRI Report_76636739
T0018B,IMO L3 Fire Test of S2000M Pipe and QL Cplg with PSX34 Adhesive,DNV_	0	T0018B,IMO L3 Fire Test of S2000M Pipe and QL Cplg with PSX34 Adhesive,DNV_76637082

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CO. UEN: S58FC1284D



To: NOV FIBER GLASS SYSTEMS

Reference: MP/T1092241
Project Number: 3105005

01 November 2013

Drawing No	Revision No	Drawing Title
T0046,IMO L3 Fire Test of S7000M Pipe with QL Joint,SwRI Report	0	T0046,IMO L3 Fire Test of S7000M Pipe with QL Joint,SwRI Report_76636541
T0085,External Pressure Test of S2000M & 7000M Pipe,ASTM D2924	0	T0085,External Pressure Test of S2000M & 7000M Pipe,ASTM D2924_76637083
T0150,Bondstrand PSX Piping for Offshore Jet Fire and IMO-L3 Fire Service - Summary Report	0	T0150,Bondstrand PSX Piping for Offshore Jet Fire and IMO-L3 Fire Service - Summary Report_76637237
T0170,IMO-L3 Fire Endurance Test of PSX-L3 Tee	0	T0170,IMO-L3 Fire Endurance Test of PSX-L3 Tee_76636588
T0246, Level 3 Fire Endurance and Hydrostatic Evaluations of 1-in S7000M Pipe with QL Joint_	0	T0246, Level 3 Fire Endurance and Hydrostatic Evaluations of 1-in S7000M Pipe with QL Joint_76637014
T0247,2-inch 2000M L3 Fire Test,SwRI_	0	T0247,2-inch 2000M L3 Fire Test,SwRI_76636546
T0266,2-in,S2000M-FP,Favuseal, Jet Fire Test,SwRI	0	T0266,2-in,S2000M-FP,Favuseal, Jet Fire Test,SwRI_76636740
V53452-1_	0	V53452-1_76636589
V53563-1_	0	V53563-1_76637008
V73763-1_	0	V73763-1_76636746

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CO. UEN: S58FC1284D

NOV FIBER GLASS SYSTEMS

COMPLEXO INDUSTRIAL PORTUARIO DE SUAPE
NOSSA SENHORA DA CONCEICAO
IPOJUCA
PE 55590-000
Brazil

Product: Thermosetting, Fiberglass (FRP) Pipe, Fittings and Joints

Model: Bondstrand Filament Wound, Fiberglass Reinforced Piping System - 2000M, 2000M-FP, 7000M, PSX-L3, PSX-JF

Intended Service:

Applications refer to 4-6-3/Table 1 of 2012 Steel Vessels Rules, 4-2-2/Table 2 of 2012 MODU Rules, Appendix 1 Section 2/Table 1 of 2012 Facilities Rules.

Description:

2000M Aromatic Amine cured epoxy 1 inch through 40 inch. 2000M-FP Aromatic Amine cured epoxy with 8mm thick fire protective coating - 1 inch through 16 inch. 7000M Aromatic Amine cured epoxy 1 inch through 40 inch. PSX-L3 Polysiloxane Phenolic - 1 inch through 16 inch. PSX-JF Polysiloxane modified Phenolic piping system with minimum ¼" (6.35mm thick) fire protection jacket - 1 inch through 16 inch

Ratings:

1. 2000M, 2000M-FP, 7000M - For sizes 1 inch through 1.5: pressures to 32 bar with temperature to 93 Degree C, for sizes 2 inch through 4 inch: pressures to 25 bar with temperature to 93 Degree C and for size 5 inch through 16 inch: pressures to 17.2 bar with temperature to 120 Degree C and for sizes larger than 16 inch: pressure to 15.5 bar with temperature to 120 Degree C. PSX-L3, PSX-JF - For size 1 inch through 6 inch: pressures to 17.2 bar with temperature to 93.3 Degree C; For size larger than 6 inch: pressure to 15.5 bar with temperature to 93.3 Degree C

Service Restrictions:

1. Where not subjected to static head (external pressure), pipes can be run within tanks, cofferdams, void spaces and on open decks. Where pipes are subject to static head, they are to be led through pipe tunnels. See also comment 1 below. 2. 2000M and 7000M pipes and fittings are allowed to be used in locations where low flame spread characteristics of the pipes are required by 4-6-3/5.13 of Steel Vessel Rules. 3. The installation is to be in accordance with the ABS Rules/Guides, the manufacturer's recommendations, and to the satisfaction of the attending Surveyor. 4. The materials of construction are to be suitable for the intended service and consistent with the manufacturer's recommendations. In accordance with 4-6-3/5.15 of 2012 Steel Vessels Rules, 4-2-2/7.5.8 of 2012 MODU Rules and Appendix 1/ 2.15 of 2012 Facilities Rules, plastic pipes are to be electrically conductive if the pipes pass through a hazardous zone. 2000M, 2000M-FP and PSX-L3 and PSX-JF piping may not be used where electrically conductive piping is required. 7000M piping is acceptable where electrically conductive piping is required.

Comments:

1) Where pipes are subject to static head (external pressure), ABS and OEM are to be consulted in each case. 2) Service restriction#2 for low flame spread characteristics of 2000M and 7000M pipes and fittings are based on Test Report No. 719188825-MEC-GZJ issued by PSB Singapore dated 07th Jan 11 and on the understanding that Resin material used for all the models is the same "Epoxy" · Piping system is approved to Low Flame Spread, according to ASTM D635-06 [accepted as alternative to IMO Resolution A.653 (16)] · Flame spread testing in accordance with ASTM D635 may be used in lieu of the IMO flame spread test provided such testing is acceptable to the appropriate administration of the vessel's registry · Pressure and temperature ratings are revised based on the test reports E092/10(S)(1), E092/10(S)(2), E092/11(S)(3), E092/10(S)(4), E092/10(S)(5), E092/10(S)(6), E092/11(S)(7), E092/10(S)(8), E092/10(S)(9) and E092/10(S)(10) and on understanding that 2000M and 7000M fittings have exactly the same dimensions i.e. thickness, length and joint configuration.

Notes / Drawings / Documentation:

This Product Design Assessment (PDA) is valid only 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

NOV FIBER GLASS SYSTEMS

COMPLEXO INDUSTRIAL PORTUARIO DE SUAPE
NOSSA SENHORA DA CONCEICAO
IPOJUCA
PE 55590-000
Brazil

the Product.

Term of Validity:

This Product Design Assessment (PDA) Certificate 01-SG248534-4-PDA /DUP1, dated 24/Oct/2013 remains valid until 23/Oct/2018 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.

STANDARDS

ABS Rules:

The manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product. The Rules applicable to this assessment are: 2012 Steel Vessel Rules 1-1-4/7.7, 1-1-Appendix 3, 2012 Steel Vessels Rules 4-6-3, 2012 MODU Rules 4-2-2/7, Appendix 1 of 2012 Facilities Rules

National:

NA

International:

1. IMO Resolution A.753(18) Level 3 Fire Endurance Test, as amended by MSC.313(88)
2. ASTM Standard D635-06
3. ASTM Standard D1599
4. ASTM D2992-91

Government Authority:

NA

EUMED:

NA

Others:

NA