



CERTIFICATE NUMBER

DATE

01-SG248533-6-PDA -DUP2

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
NOV FGS MALAYSIA SDN BHD - SENAI

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 - 2410, 2412, 2414, 2416, 2420, 2425, 2410C, 2412C, 2414C, 2416C, 2420C, 2425C


This Product Design Assessment (PDA) Certificate 01-SG248533-6-PDA -DUP2, 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).



NOV FGS MALAYSIA SDN BHD
PLO 202, SENAI INDUSTRIAL PARK,
PHASE IV, SENAI, JOHOR,
Malaysia - 81400

Reference: MP/T1084959
File Ref: T-8-6-TA
Project No: 3104978

01 November 2013

01-SG248533-6-PDA-DUP2

Bondstrand Filament Wound, Fiberglass Reinforced Piping System
2410, 2412, 2414, 2416, 2420, 2425, 2410C, 2412C, 2414C,
2416C, 2420C, 2425C

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: NOV FGS MALAYSIA SDN BHD

Reference: MP/T1084959
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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-SG248533-6-PDA-DUP2

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

ABS SG Files (12IRF2674)

ABS Surveyor (via ABS Eagle Construct System)

PACIFIC DIVISION

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Drawings List

Drawing No	Revision No	Drawing Title
01-SG248533_6-PDA	0	Review Letter from EPN : 3038365
16 inch E123-03(1-1) TP	0	16 inch E123-03(1-1) TP_76636022
16 inch PEXPE E055-11(M)(1-5) TP	0	16 inch PEXPE E055-11(M)(1-5) TP
18 inch TM X TF E07-01-2	0	18 inch TM X TF E07-01-2
1A37G9-1	0	1A37G9-1_76636308
1B37G9-1	0	1B37G9-1_76636698
1C37G9-1	0	1C37G9-1_76636341
1D37G9-1	0	1D37G9-1_76636321
1E37G9-1	0	1E37G9-1_76636318
1F37G9-1	0	1F37G9-1_76636311
2 inch TF X TM E050-07(S)-1	0	2 inch TF X TM E050-07(S)-1
2 inch E24-01-2	0	2 inch E24-01-2
229530g9	0	229530g9_76636322
22C530g9	0	22C530g9_76636407
24 inch E016-05(1)	0	24 inch E016-05(1)
24 inch PE X PE E75-02TP	0	24 inch PE X PE E75-02TP_76636412
28 inch PEXPE E052-07(S)(2)	0	28 inch PEXPE E052-07(S)(2)_76636056
28 inch TM X TF E053-08(M)(1)	0	28 inch TM X TF E053-08(M)(1)_76635869
30 inch E023-06(1-3)	0	30 inch E023-06(1-3)_76636714
32 inch TMXTF E031-11(M)(2) TP	0	32 inch TMXTF E031-11(M)(2) TP_76636497
339530g9	0	339530g9_76636342
33C530g9	0	33C530g9_76636363
36 inch TMXTF E097-09(M)(1) TP	0	36 inch TMXTF E097-09(M)(1) TP_76636419
40 inch E054-09(M)(1)1 TP	0	40 inch E054-09(M)(1)1 TP_76636518
40 inch E127-06(M)(2)	0	40 inch E127-06(M)(2)_76635872
40 inch KLM X KLF 2K E100-07(M)-4	0	40 inch KLM X KLF 2K E100-07(M)-4_76636718
40 inch TMXTF E068-11(M)-B(01) TP	0	40 inch TMXTF E068-11(M)-B(01) TP_76636713
40 X 36 inch E083-08(M)(1) TP	0	40 X 36 inch E083-08(M)(1) TP_76636515
449530g9	0	449530g9_76636063
44C530g9	0	44C530g9_76636080
4648G9-1	0	4648G9-1_76636044
6 inch TM X TF E083-02	0	6 inch TM X TF E083-02_76635782
669535g9	0	669535g9_76635783
66C530g9	0	66C530g9_76636426

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Drawing No	Revision No	Drawing Title
8 inch PE X PE E006-08(S)(1)TP	0	8 inch PE X PE E006-08(S)(1)TP_76636340
8 inch TM X TF E052-07(S)-3	0	8 inch TM X TF E052-07(S)-3_76636344
889535G9	0	889535G9_76636059
88C535g9	0	88C535g9_76636715
9048g9-1	0	9048g9-1_76636328
9148g9-1	0	9148g9-1_76636027
9248g9-1	0	9248g9-1_76635776
9348g9-1_	0	9348g9-1_76635781
9448g9-1	0	9448g9-1_76636319
A137G9-1	0	A137G9-1_76636035
A237G9-1	0	A237G9-1_76636495
A337G9-1	0	A337G9-1
A437G9-1	0	A437G9-1
A537G9-1	0	A537G9-1_76636024
A637G9-1	0	A637G9-1_76636353
AA9535G9	0	AA9535G9_76636720
AAC535G9	0	AAC535G9_76636427
BB9535g9	0	BB9535g9_76636060
BBC535g9	0	BBC535g9_76636428
C048g9-1	0	C048g9-1_76636435
C148g9-1	0	C148g9-1_76636406
C248g9-1	0	C248g9-1_76636317
C348g9-1	0	C348g9-1_76636050
C448g9-1	0	C448g9-1_76636313
CC9535g9_	0	CC9535g9_76636316
CCC535g9	0	CCC535g9_76636355
PD2410	0	PD2410_76636331
PD2410C	0	PD2410C_76636404
PD2412(23)	0	PD2412(23)
PD2412C(24)	0	PD2412C(24)
PD2414	0	PD2414_76636077
PD2414C	0	PD2414C_76635780
PD2416	0	PD2416_76636705
PD2416C	0	PD2416C_76636053
PD2420	0	PD2420_76636335
PD2420C	0	PD2420C_76635584
PD2425	0	PD2425_76636323
PD2425C	0	PD2425C_76636071
Product Literature for 2400 Series Products_76636429	0	Product Literature for 2400 Series Products_76636429

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Project Number: 3104978

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Drawing No	Revision No	Drawing Title
STB Test Report for 2425 Products	0	STB Test Report for 2425 Products_76636432
T0021,IMO L3 Fire Test of 16-in S2416 Pipe with Taper Joint,TNO Report_	0	T0021,IMO L3 Fire Test of 16-in S2416 Pipe with Taper Joint,TNO Report_76636028
T0022,IMO L3 Fire Test of 6-in S2416 Pipe with Taper Joint,TNO Report_	0	T0022,IMO L3 Fire Test of 6-in S2416 Pipe with Taper Joint,TNO Report_76636315
T0196,External Pressure Resistance Test of 4-in S2410 Pipe_	0	T0196,External Pressure Resistance Test of 4-in S2410 Pipe_76635581
T0245, IMO L3 Fire Test of 2-in S2425 pipe with Taper Joint,TNO Report_	0	T0245, IMO L3 Fire Test of 2-in S2425 pipe with Taper Joint,TNO Report_76635875
T0267,2-in,S2425-FP,Favuseal,Jet Fire Test,SwRI_	0	T0267,2-in,S2425-FP,Favuseal,Jet Fire Test,SwRI_76636422
T0272, IMO L3 Fire Test of 40-in S2425 Pipe with TaperJoint,TNO Report	0	T0272, IMO L3 Fire Test of 40-in S2425 Pipe with TaperJoint,TNO Report_76636425
V037G9-1_	0	V037G9-1
V137G9-1_	0	V137G9-1_
V237G9-1	0	V237G9-1_76635873
V337G9-1	0	V337G9-1_76636398
V837G9-1	0	V837G9-1_76636431
W037G9-1	0	W037G9-1_76636700
W137G9-1	0	W137G9-1_76636417
W237G9-1	0	W237G9-1_76636048
W337G9-1	0	W337G9-1_76636054
W437G9-1	0	W437G9-1_76635877
W637G9-1	0	W637G9-1_76636357

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FIBER GLASS SYSTEMS (SUZHOU) CO. LTD

NO. 848 LITANGHE ROAD
XIANGCHENG ECONOMIC DEVELOPMENT ZONE
SUZHOU
JIANGSU 215131
China
Telephone: 86-512-8518 0099-315
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Product: Thermosetting, Fiberglass (FRP) Pipe, Fittings and Joints

Model: Bondstrand Filament Wound, Fiberglass Reinforced Piping System - 2410, 2412, 2414, 2416, 2420, 2425, 2410C, 2412C, 2414C, 2416C, 2420C, 2425C

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:

Bondstrand filament wound, fiberglass reinforced piping

Ratings:

- 2410 and 2410C: Nominal Pressure - 10 Bar(g), Temperature to 120 degree C, Nominal Diameter (in) x Min. Reinforced Wall Thickness(mm) - 2x1.8, 3x1.8, 4x1.8, 6x2, 8x2.6, 10x3.0, 12x3.4, 14x3.6, 16x4.0, 18x4.4, 20x4.9, 22x5.3, 24x5.8, 26x6.4, 28x6.9, 30x7.4, 32x7.9, 36x8.8, 40x9.8
- 2412 and 2412C: Nominal Pressure - 12 Bar(g), Temperature to 120 degree C, Nominal Diameter (in) x Min. Reinforced Wall Thickness(mm) - 2x1.8, 3x1.8, 4x1.8, 6x2.2, 8x2.7, 10x3.4, 12x4.0, 14x4.3, 16x5.0, 18x5.5, 20x6.1, 22x6.6, 24x7.2, 26x8.0, 28x8.6, 30x9.2, 32x9.8, 36x11, 40x12.3
- 2414 and 2414C: Nominal Pressure - 14 Bar(g), Temperature to 120 degree C, Nominal Diameter (in) x Min. Reinforced Wall Thickness(mm) - 2x1.8, 3x1.8, 4x1.8, 6x2.5, 8x3.2, 10x4.0, 12x4.8, 14x5.2, 16x5.9, 18x6.5, 20x7.2, 22x8.0, 24x8.8, 26x9.6, 28x10.3, 30x11.1, 32x11.8, 36x13.2, 40x14.8
- 2416 and 2416C: Nominal Pressure - 16 Bar(g), Temperature to 120 degree C, Nominal Diameter (in) x Min. Reinforced Wall Thickness(mm) - 2x1.8, 3x1.8, 4x2.0, 6x2.9, 8x3.7, 10x4.6, 12x5.5, 14x6.1, 16x6.9, 18x7.6, 20x8.4, 22x9.3, 24x10.1, 26x11.2, 28x12.1, 30x13, 32x13.8, 36x15.5, 40x17.3
- 2420 and 2420C: Nominal Pressure - 20 Bar(g), Temperature to 120 degree C, Nominal Diameter (in) x Min. Reinforced Wall Thickness(mm) - 2x1.8, 3x1.8, 4x2.2, 6x3.3, 8x4.3, 10x5.3, 12x6.3, 14x6.9, 16x7.9, 18x8.7, 20x9.6, 22x10.6, 24x11.6, 26x12.9, 28x13.8, 30x14.8, 32x15.8, 36x17.7, 40x19.8
- 2425 and 2425C: Nominal Pressure - 25 Bar(g), Temperature to 120 degree C, Nominal Diameter (in) x Min. Reinforced Wall Thickness(mm) - 2x1.8, 3x2.2, 4x2.8, 6x4.1, 8x5.3, 10x6.7, 12x7.9, 14x8.7, 16x10, 18x11, 20x12.2, 22x13.4, 24x14.6, 26x16.1, 28x17.4, 30x18.6, 32x19.9, 36x22.3, 40x24.8

Service Restrictions:

- 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.
- The installation is to be in accordance with the ABS Rules/Guides, the manufacturer's recommendations, and to the satisfaction of the attending Surveyor.
- 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. 2400 series piping may not be used where electrically conductive piping is required. 2400C series piping is acceptable where electrically conductive piping is required.
- These 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 2012 Steel Vessel Rules. See also comment 2 below.

Comments:

- Where pipes are subject to static head (external pressure), ABS and OEM are to be consulted in each case.
- Service restriction#4 is based on the 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 which is "Epoxy". Piping system is approved to Low Flame Spread, according to ASTM D635-06 [accepted as alternative to IMO Resolution

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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.

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.

Term of Validity:

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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 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning Plastics in a Horizontal Position.

Government Authority:

NA

EUMED:

NA

Others:

NA