

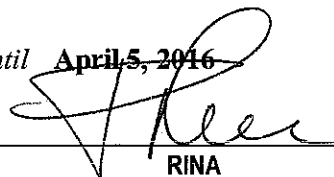


TYPE APPROVAL CERTIFICATE
No. MAC094711CS/002

This is to certify that the product identified below is in compliance with the regulations herewith specified.

<i>Description</i>	FIBERGLASS REINFORCED PIPES AND FITTINGS (GRP)
<i>Type</i>	BONDSTRAND SERIES 2000M
<i>Applicant</i>	AMERON-COMPOSITE FIBERGLASS PIPE DIV.-ASIA 7A TUAS AVENUE 3 SINGAPORE 639407 SINGAPORE
<i>Manufacturer</i>	AMERON-COMPOSITE FIBERGLASS PIPE DIV.-ASIA
<i>Place of manufacture</i>	7A TUAS AVENUE 3 SINGAPORE 639407 SINGAPORE
<i>Reference standards</i>	2005 RINA RULES FOR THE CLASSIFICATION OF SHIPS (PART C CHAPTER 1 APPENDIX 3)
<i>Reference documents</i>	RINA TYPE APPROVAL SYSTEM

Issued in **Genoa** on **April 5, 2011**. This Certificate is valid until ~~April 5, 2016~~


RINA

Francesco Sciacca

This certificate consists of this page and 1 enclosure.

This Certificate annuls and replaces the Certificate MAC401305CS/1 issued on 24/11/2005.

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BONDSTRAND SERIES 2000M

Reference documents

AMERON product data catalogues:

- FP 194 B 1.5M (5/86) "Bondstrand Series 2000M Fiberglass Pipe and Fittings"
- FP 168 B (6/93) "Bondstrand Series 2000M and 7000M Flanges"
- FP 918 A 01/07 "Bondstrand 2000M/7000M Glassfiber Reinforced Epoxy (GRE) pipe systems for marine service (with external pressure requirements)"

Test reports:

- TUV report No. 719188825-MEC10-GZJ dated 07/01/2010 (flame spread test according to ASTM D635)
- TNO report No. 96-CVB-R0410 issued on February 1996 (fire endurance according to IMO Res. A.753(18))
- Ameron report No. E117/10(M)(1) dated 3/12/2010 (short term burst on 40")
- Veritec report No. VT/SL/891234
- Veritec report No. VT/SL/891252
- DNV report No. VT/SL/901606
- impact test report dated 23/01/1996
- Long term test data
- Water absorption test report
- Deflection temperature test under flexural load, doc. ref. T-19030/ST/SDQ/TCK
- DNV report No. DNV/SL/R932099

Technical characteristics

- Nominal diameters : 1" to 40"
- Maximum working pressure : 1.6 N/mm²
- Fire endurance Level 3 according to IMO A 753 (18).

Fields of application

- The fields of application for the pipe and fittings are indicated, as appropriate, in the Table 1

"Fire endurance of piping systems" of Part C Chapter 1 Appendix 3 of the RINA Rules.

- The definitions of the locations are as per Appendix 4 of the IMO Resolution A.753 (18).

Acceptance conditions

- The media conveyed through the GRP piping or through which the GRP pipings are layed have not to effect the properties of the piping itself.

- When the piping pierces watertight or fire bulkhead or decks, suitable means shall be provided to maintain the integrity of the bulkhead or deck in case of failure of the pipe, as for instance in case of fire. Detailed plans showing the proposed means are to be submitted to RINA for approval.

- The arrangement and installation on board is to be carried out in accordance with Manufacturer's guidelines.

- RINA Rules for Classification of Ships Part C, Chapter 1, Appendix 3 are to be applied with regard to :

i - Arrangement and installation on board (see Para. 3);

ii- Inspection and testing (see para. 4.2 and 4.3, as appropriate).

Marking for identification

The pipe and fittings are to be permanently marked with:

- Manufacturer's name or trade mark

- Type designation

- The material of which the pipe or fitting is made


- The design standards that the pipe or fitting is manufactured in accordance with

- Pressure rating

Remarks

This certificate annuls and replaces the previous one No. MAC401305CS/1 issued on 24/11/2005.

Genoa April 5, 2011



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