TYPE APPROVAL CERTIFICATE
No. **MAC087121XG**

This is to certify that the product identified below satisfies the requirements of the standard quoted under "Reference standard"

Description	**Metallic flexible hoses**
Type	**Type HR I/S**
Applicant	**Rattay Metallschlauch- und Kompensatorentechnik GmbH**
Manufacturer	**Rattay Metallschlauch- und Kompensatorentechnik GmbH**
Place of manufacture	**In der Beckuhl 20** **46569 Hünxe** **GERMANY**
Reference standards	**Part C, Chapter 1, Appendix 7 (Gas Fuelled Ship) RINA Rules ; Part E Chapter 9 Section 9 (Liquified Gas Carrier) RINA; Rules; IGF Code as per IMO MSC.391(95), ; IGC Code as last; amended by IMO MSC.377(93), Part C, Chapter 1, Section 10 of; RINA Rules**

Issued in **Hamburg** on **June 24, 2021**. *This Certificate is valid until* **June 23, 2026**

RINA Services S.p.A.
Giuseppe Russo

This certificate consists of this page and 1 enclosure

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Type HR I/S

Description of the Product:
corrugated stainless steel hose with one or two layers of braid (standard pitch) with welded end fittings.
The Hose is composed by 4 different components in accordance with the below table:

Component	Material
Corrugated Hose	1.4404 (Austenitic stainless steel)
	1.4541 (Austenitic stainless steel)
Braiding	1.4301 (Austenitic stainless steel)
	1.4404 (Austenitic stainless steel)
Ferrule	1.4301 (Austenitic stainless steel)
	1.4404 (Austenitic stainless steel)
Fitting	1.4404 (Austenitic stainless steel)
	1.4571 (Austenitic stainless steel)
	1.4301 (Austenitic stainless steel)
	CuZn40Pb2 (Copper-zinc-lead alloys)

Reference Docs:
- Booklet with Test Reports filed with number HMMC-19752
- Data sheet filed with number HMMC-19750
- Other relevant information are filed with number HMMC-19751 & HMMC-19753

Materials/Components:
- In accordance with the above table.

Technical characteristics:

Nominal diameter DN	Max Pressure [bar] at 20°C and No Braid	Max Pressure [bar] at 20°C and one layer of braid PN	Max Pressure [bar] at 20°C and two layer of braid PN
6	5	170	272
8	5	138	220
10	5	85	136
12	5	88	140
16	5	50	80
20	3	50	80
25	3	53	84
32	3	46	74
40	2	35	56
50	2	26	42
65	1	25	40
80	1	22	34
100	1	18	28
125	0.5	15	24
150	0.5	12	18
200	0.5	10	16
250	0.5	6	10

*The Max operating pressure may be reduced in accordance to the used End Fittings as per Manufacturer's Recommendation, and in accordance to the temperature as per the below table:

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Temperature °C	Material	
	1.4541 AISI 321	1.4404 AISI 316
-200 up to 20	1.00	1.00
20	1.00	1.00
50	0.92	0.88
100	0.83	0.74
150	0.78	0.67
200	0.74	0.62
250	0.71	0.58
300	0.67	0.54
350	0.64	0.52
400	0.62	0.50
450	0.61	0.48
500	0.60	0.47
550	0.59	0.47

Fields of application:

Fuel oil and lubrication oil systems, hydraulic oil, exhaust lines from engines, steam and condensate systems, compressed air systems, fresh water and sanitary systems, refrigerants systems, fire extinguishing systems, LNG/LPG systems.

Acceptance conditions:

- The installation on board is to be made in accordance with the Manufacturer's instructions and provisions stated in Part C Chapter 1 Section 10 par. 2,6 of RINA Rules.
- The flanges shall be suitable for the actual design pressure and temperature of on board system
- Expansion Joints are to be marked with type designation manufacturer's name and maximum working pressur
- For gas fuelled ships the following IGF Code (IMO Resolution MSC.391(95)) and RINA Rules requirements are applicable:
  - Material testing in accordance with Table 7.4
  - Welding procedure tests in accordance with 16.3.4
  - Tests on board as per 16.7.3.2 and 16.7.3.5
  - Production Test in accordance with Part C Chapter 1 Appendix 7 par. 16.7.3 of RINA Rules
- For liquefied gas carrier the following IGC code (as last amended by IMO Resolution MSC.377(93) and RINA Rules requirements are applicable:
  - Material Testing in accordance with Table 6.4
  - Welding procedure tests in accordance with 6.3.5
  - Production Test in accordance with Part E Chapter 9 Section 5 of RINA Rules.

- The installation of this product is to be in accordance with the Manufacturer's instructions.
- The acceptance of the above mentioned products on board ships and other units classed with RINA is subject to the satisfactory outcome of testing as per RINA Rules

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- Flexible hoses are to be limited to a length necessary to provide for relative movements between fixed and flexibly mounted items of machinery/equipment or systems.
- Flexible hose are not to be installed where they may be subjected to torsion deformation (twisting) under normal operating conditions.

Marking:

- Manufacturer's name or trademark
- Date of manufacture (month/year)
- Designation type reference
- Nominal diameter
- Maximum design pressure & maximum / minimum design temperature

Remarks:

This approval is given on the understanding that the Society reserves the right to require check tests to be carried out on the units at any time and that **RATTAY Metallschlauch- und Kompensatorentechnik GmbH, Hünxe / GERMANY** will accept full responsibility for informing shipbuilders, ship owners or their sub-contractors of the proper methods of use and general maintenance of the units and the conditions of this approval.

Hamburg June 24, 2021

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