

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Heat Exchanger

with type designation(s)
RGL L/220-XX Heat exchanger U-Tube

Issued to

IWS-Monjé Heat Exchangers GmbH
Bochum, Nordrhein-Westfalen, Germany

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment
DNV GL rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNV GL rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Temperature range: -196°C to +105°C (tube and shell side)
Design pressure: 16 bar (tube and shell side)
Operating media: Liquids and gases (details under "Product description")

Issued at **Hamburg** on **2021-07-20**

This Certificate is valid until **2026-07-19**.

for **DNV**

DNV local station: **Augsburg**

Approval Engineer: **Le Loi Nguyen**

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Jonathan Struwe
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Product description

One type of shell & tube heat exchanger with an external shell diameter of 219.1 mm and a length of the tube bundle from 500 mm to 4000 mm. For details of the heat exchangers (e.g. design data, materials, dimensions, etc.) see Application / Limitation and Type Approval documentation listed below.

Place of Manufacturing

The heat exchangers are fabricated at the following manufacturer's site:

SEAB GmbH
Lindigstr. 1a
63801 Kleinostheim
Germany

Application / Limitation

Applied rules and design code is:

- DNVGL-RU-SHIP Pt.4 Ch.7 'Pressure Equipment' (Edition July 2020 Amended August 2020),
- DNVGL-RU-SHIP Pt.5 Ch.7 Sec.5 'Process Pressure Vessels and Liquids, Vapour and Pressure Piping Systems' (Edition July 2020) and
- DNVGL-RU-SHIP Pt.6 Ch.2 Sec.5 'Gas Fuelled Ship Installations – Gas Fuelled LNG' (Edition July 2020).

The heat exchangers are graded in the following pressure equipment class according to DNVGL-RU-SHIP Pt.4 Ch.7 Sec.1 [Table 2]:

Media	Tube side (16 bar / 105°C)	Shell side (16 bar / 105°C)
Water, Glycol	III	III
Air, Nitrogen, Helium	II	II
Lubricating Oil, Liquid Fuel	II	II
Flammable Gas, Natural Gas, Biogas	I	I
LNG	I	I
Refrigerants Group 1	II	II
Refrigerants Group 2 (Ammonia)	I	I

Type Approval documentation

Marking of product

For traceability to this type approval the products are at least to be marked with:

- the name of the manufacturer,
- the manufacturer's type designation and serial number,
- the year of manufacture,
- the design pressure,
- the design temperature in °C,
- the hydraulic test pressure, and
- DNV GL's identifying mark.

Periodical assessment

The objective of the periodical assessment is to verify that the conditions for the type approval (TA) have not been altered.

The main scope of the periodical assessment will normally include:

- verification of the TA applicant's production and quality system w.r.t. ensuring continued consistent production of the TA products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products,
- review of TA documentation and that this is still used as basis for the production,
- review of possible changes in the design, the materials and the performance of the product, and



Job Id: **262.1-035784-1**
Certificate No: **TAP00002C0**

- verification of the product marking.

For retention of the TA certificate in its validity period the periodical assessments will be carried out every two years.

Unscheduled assessments for retention of the certificate may be carried out when there is reason to believe that the type approval applicant has not adhered to the obligations stipulated in the type approval certificate.

END OF CERTIFICATE