Certificate no.:
TAP000032J

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Heat Exchanger

with type designation(s)
TBF-1800 VX

issued to
Alfa Laval Golbey SAS
Golbey, Vosges, **France**

is found to comply with
DNV rules for classification – Ships Pt.4 Ch.7 Pressure equipment
DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers

Application:

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

Temperature range:	**-196°C to +65°C**
Design pressure:	**Chambers HP/ LP: 45 bar(g) / LNG 24 bar(g)**
Operating media:	**Chambers HP/ LNG/ LP: He & N2 vapor/ Liquefied natural gas/He & N2 vapor**

Issued at **Høvik** on **2025-11-27**

This Certificate is valid until **2030-11-26**.

for **DNV**

DNV local unit: **France CMC**

Approval Engineer: **Alexandru Asmarandei**

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 USD 300 000.

Product description

Brazed heat exchangers with header made of SB-209 (5083 H112/O), fin made of SB-209 (3003 O), nozzle made of SB-241 (5083 H112/O) and SB-209 (5083 H112/O) classified as Class I pressure equipment as per DNV-RU-SHIP Pt.4 Ch.7.

Application/Limitation

Heat exchangers covered by this certificate are approved to be used in LNG/LPG applications with A Polyisocyanurate (PIR) insulation (with fire resistive properties and a minimum thickness of 150 mm) protected with a stainless-steel jacketing weather barrier.

Backing rings shall be removed in pipes welding joints after welding.

Full radiography shall be considered for all pressure joints as per DNV Ship Rules Pt.5 Ch.7 Sec.5 [9].

Design review for the heat exchanger is limited to the pressure envelope and does not include review of non-pressure retaining parts such as lifting lugs, internals, instrumentation and components, evaluation of safety devices, etc.; Evaluation of lifting, installation, fatigue/cyclic loads, thermal stresses, nozzle loads, and foundation loads are also excluded.

Transition joints and other connected piping are not covered under the scope of approval.

Type Approval documentation

Tests carried out

Burst pressure test

Production testing and Certification

Marking of product

Periodical assessment

This certificate is only valid if required periodical assessments are carried out with satisfactory results.

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNVCP-0338.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com.