



TYPE APPROVAL CERTIFICATE

Certificate no.:
TAP00001SX
Revision No:
1

This is to certify:
that the Pumps

with type designation(s)
Centrifugal Pump TC-34.2

issued to
Nikkiso ACD
Santa Ana, CA, USA

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

Application:

Submerged pump to be installed in cargo and fuel tanks for transfer of liquefied nitrogen, liquefied gases including LNG.

Products designed fabricated and tested according to above DNV Rules are approved by this certificate and are accepted for installation on all vessels classed by DNV.

Max. working press.: 26 bar
Operating media: Liquefied gases, Liquefied Natural Gas LNG , Liquefied Nitrogen (LIN)
Temperature range: -196°C to + 40°C

Issued at **Hamburg** on **2024-08-08**

for **DNV**

This Certificate is valid until **2029-03-03**.

DNV local unit: **Long Beach**

Approval Engineer: **Ana Cristina Do Carmo Insfran**

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

TC-34.2 centrifugal pump type series designed for installation as a submerged motor pump in cargo or fuel tanks for transfer of liquefied gases, such as liquefied natural gas (LNG) and liquid nitrogen (LIN). The TC-34.2 pump type series consists of an integrated motor providing motor bearings lubricated by the liquefied gas which acts also as the cooling medium. The balanced pump rotor assembly consisting of impeller and pump shaft ensures optimized submerged pump performance data within the required performance curves.

Depending on the requested service conditions the TC-34.2 pump type series may provide impeller configurations with different several stages of the following types:

TC-34.2 Type	D90	C125	D125	D145	E145	F145	G145	H170	H210
Impeller Diameter [mm]	90	125	125	145	145	145	145	170	210
Motor Size [kW]	10	25	25	125	125	125	125	400	400

ACD pump type	Design pressure [bar]	Test pressure [bar]	Design temperature [°C]
ACD Model TC-34.2	26	39	-196° to +40°

Application

Installation as a submerged pump in cargo or fuel tanks for liquefied gases, e.g. Liquefied Natural Gas (LNG), Liquid Nitrogen (LIN).

Limitation

Submerged pump to be installed in cargo and fuel tanks for transfer of liquefied nitrogen, liquefied gases including LNG.

Any electric cable to be connected to the pump for power supply as well as for remote operating and control including additional junction box outside the cargo or fuel tank is excluded from this type approval.

Type Approval documentation

Renewal without changes: TAP00001SX, Rev.1
 Type Approval Application dated on 2024-07-10
 Type Approval Assessment Report dated on 2024-01-18

ACD TC-34.2 pump data sheets
 T-34.2 design drawings Rev. A dated 2023-05-17
 TC-34.2 Parts Lists with material specifications
 TC-34.2 Centrifugal Pump Test Procedure
 Rotor shaft assembly balancing records
 Quality Assurance Manual; MSP/TC-34.2 ACD LLC Manufacturing Data Record Book
 Electric motor technical performance data. (Power, frequency, voltage)
 Electric motor test certificate, Test results for resistance test, high voltage and surge voltage test
 Electric motor high potential and insulation resistant test certificates
 Inspection and Test Plan (ITP) for cryogenic test of ACD TC-34.2 pump
 Pressure test and pump performance test records

Tests carried out

The following tests have been carried out on the ACD Model TC-34.2 pump type:

- Pressure test
Test pressure in amount of 1,5 times the design pressure
- ACD TC-34.2 pump functional and performance / capacity test.
Test medium: liquid nitrogen (LIN),
Test temperature: -196°C

The following operating data have been recorded during pump performance test:

Volume flow rate	[m ³ /hr]
Delivery head	[m]
Pump power input / output	[kW]
Speed of rotation	[min ⁻¹]
Suction pressure (p1)	[bar]
Discharge pressure (p2)	[bar]

Marking of product

For traceability to this type approval the ACD TC-34.2 pumps are to be marked with:

- Manufacturers name or trade mark
- Pump type designation
- Size
- Design pressure and temperature

Periodical assessment

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 DNV-CP-0338.

End of Certificate