

# TYPE APPROVAL CERTIFICATE

## This is to certify:

That the Centrifugal Pump

with type designation(s)

**ARTIKA 120 - 3S, ARTIKA 120 - 6S, ARTIKA 160 - 2S, ARTIKA 160 - 3S, ARTIKA 160 - 4S, ARTIKA 200 - 1S, ARTIKA 200 - 2S**

Issued to

**Vanzetti Engineering S.p.A**  
**Cavallerleone, CN, Italy**

is found to comply with

**DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers**  
**DNV class programme DNV-CP-0505 – Type approval – Pumping units**

## Application :

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

| Type            | Max. working press.: | Operating media:           | Temperature range: |
|-----------------|----------------------|----------------------------|--------------------|
| ARTIKA 120 - 3S | 30 bar               | LIN (liquid nitrogen); LNG | -196 deg C         |
| ARTIKA 120 - 6S | 30 bar               | LIN (liquid nitrogen); LNG | -196 deg C         |
| ARTIKA 160 - 2S | 15 bar               | LIN (liquid nitrogen); LNG | -196 deg C         |
| ARTIKA 160 - 3S | 22 bar               | LIN (liquid nitrogen); LNG | -196 deg C         |
| ARTIKA 160 - 4S | 30 bar               | LIN (liquid nitrogen); LNG | -196 deg C         |
| ARTIKA 200 - 1S | 30 bar               | LIN (liquid nitrogen); LNG | -196 deg C         |
| ARTIKA 200 - 2S | 30 bar               | LIN (liquid nitrogen); LNG | -196 deg C         |

Issued at **Høvik** on

This Certificate is valid until .

for **DNV**

DNV local unit: **Italy FIS**

Approval Engineer: **Yury Ilchenko**

**Endre Lajord**  
**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

Pumps ARTIKA of series 120, 160 and 200 and their variants are submersible single or multi-stage centrifugal pumps, lubricated and cooled by pumping media. Pumps are integrated with electric motors and installed in the tank or cryostat (submerged in liquid together with motor and supply cables). The pumps, their bearings and motor windings are cooled down with pumped media.

Pump stressed parts are manufactures from Aluminium alloy AlSi7Mg0,3 and Austenitic stainless steel type 304.

## Application/Limitation

The pump is intended for handling of liquefied gases at cryogenic temperature such as LNG and LIN (liquefied nitrogen)

| ARTIKA pump type              | 120-3S   | 120-6S | 160-2S | 160-3S | 160-4S | 200-1S | 200-2S |
|-------------------------------|----------|--------|--------|--------|--------|--------|--------|
| Number of stages              | 3        | 6      | 2      | 3      | 4      | 1      | 2      |
| Flow rate, m <sup>3</sup>     | 10-120   | 10-120 | 40-420 | 40-420 | 40-420 | 80-880 | 80-880 |
| Power, kW                     | 7.5      | 15     | 12.6   | 18.5   | 22     | 22     | 30     |
| Frequency, Hz                 | 122      | 122    | 104    | 104    | 104    | 104    | 104    |
| Motor operating speed, rpm    | 6900     | 6900   | 5835   | 5820   | 5845   | 6015   | 6015   |
| Impeller diameter, mm         | 125      | 125    | 162    | 162    | 162    | 200    | 200    |
| Pump head, mlc                | 285      | 570    | 270    | 405    | 540    | 215    | 430    |
| Mas working pressure, bar     | 30       | 30     | 15     | 22     | 30     | 30     | 30     |
| Fluid                         | LIN; LNG |        |        |        |        |        |        |
| Minimum fluid temperature, °C | -196     | -196   | -196   | -196   | -196   | -196   | -196   |

## Type Approval documentation

Following documents were submitted for class review:

| Drw No    | Rev | Title                                                             |
|-----------|-----|-------------------------------------------------------------------|
| ---       | 2   | IECEX EUT 17.0008X Issue 2                                        |
| ---       | 2   | EPT 20 ATEX 3716 X Feed through All III_ Issue 2                  |
| ---       |     | Double feed-through connector 100A drawings                       |
| ---       |     | Double feed-through connector 55A drawings                        |
| ---       | 00  | ITP standard Vanzetti for Submerged pump marine DNV certification |
| ---       |     | Type Test report for Artika 200-2 stages&el. connector            |
| ---       |     | Type Test report for Artika 200-1 stages&el. connector            |
| ---       |     | Structural analysis ARTIKA200-2S                                  |
| ---       | 00  | Stress analysis for ARTIKA 200 pump housing                       |
| ---       |     | Technical features of Pump Artika 200                             |
| MA0000033 | 03  | O&M manual Cryogenic submerged pump ARTIKA 200-2S                 |
| VA0000197 | 00  | Submerged pump ARTIKA 200-1S (22 kW)                              |
| VA0000140 | 01  | Submerged pump ARTIKA 200-2S (30 kW)                              |
| ---       |     | Type Test report for Artika 160-4 stages&el. connector            |
| ---       |     | Type Test report for Artika 160-3 stages&el. connector            |
| ---       |     | Type Test report for Artika 160-2 stages&el. connector            |
| ---       |     | Structural analysis ARTIKA160-4S                                  |
| ---       | 03  | Stress analysis for ARTIKA 160 pump housing                       |
| ---       |     | Technical features of Pump Artika 160                             |
| MA0000014 | 06  | O&M manual Cryogenic submerged pump ARTIKA 160-4S                 |
| VA0000126 | 03  | Submerged pump ARTIKA 160-3S (18,5kW)                             |
| VA0000073 | 03  | Submerged pump ARTIKA 160-4S (22kW)                               |
| VA0000053 | 00  | Submerged pump ARTIKA 160-2S                                      |
| VA0000018 | 02  | Submerged pump ARTIKA 160-2S (12,6kW)                             |
| VA0000009 | 01  | Submerged pump ARTIKA 160-3S (braket installation)                |
| ---       |     | Type Test report for Artika 120-6 stages&el. connector            |
| ---       |     | Type Test report for Artika 120-3 stages&el. connector            |
| ---       |     | Structural analysis ARTIKA120-6S                                  |
| ---       | 00  | Stress analysis for ARTIKA 120 pump housing                       |
| ---       |     | Technical features of Pump Artika 120                             |
| MA0000054 | 00  | O&M manual Cryogenic submerged pump ARTIKA 120-6S                 |

|           |    |                                                    |
|-----------|----|----------------------------------------------------|
| VA0000182 | 00 | Submerged pump ARTIKA 120-6S (15kW)                |
| VA0000180 | 00 | Submerged pump ARTIKA 120-3S (7,5 kW)              |
| VA0000074 | 00 | Submerged pump ARTIKA120-6S (bracket installation) |
| VA0000054 | 00 | Submerged pump ARTIKA 120-3S(bracket installation) |

### Tests carried out

Satisfactory in-service experience as an alternative to prototype testing was taken into consideration (ref. DNV-RU-SHIP Pt.5 Ch.7 Sec.5 §13.5.1)

### Marking of product

The product to be marked with manufacturer's name or trademark and type number identification

### Periodical assessment

The pump is subject to periodical surveys in service following HSSC (IMO Resolution A.1156(32)).

A renewal assessment will be performed at renewal of this certificate.

In case where the type approved product is manufactured at other companies production lines, the periodical assessment shall verify that the type approval applicant has a quality control system for consistent production at their licensees/subcontractors. Furthermore, periodical assessment shall be carried out randomly at these companies.

### Other conditions

The pump installation requires a low-flow (low liquid level) protection.

Pumps are subject to a performance test at the manufacturer's works under attendance of a DNV Surveyor and are to be presented for final inspection.

Certification requirements for the product shall be observed before the pump is concluded for installation and service on concrete ship type and application.

The requirements for design temperatures below -165°C shall be specially agreed with the Administration.