Certificate no.:
TAP00002UG

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Centrifugal deepwell pumps

with type designation(s)
EFP 11-1, 11-2, 11-3, 11-4, 11-5, 11-6, 11-7, 11-8, EFP 24-1, 24-2, 24-3, 24-4, 24-5, 24-6, 24-7, 24-8

issued to
Svanehøj Danmark A/S
Svenstrup J, Nordjylland, **Denmark**

is found to comply with

DNV class programme DNV-CP-0505 – Type approval – Pumping units
DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNV rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG
DNV rules for classification – Ships Pt.6 Ch.2 Sec.6 Low flashpoint liquid fuelled engines – LFL fuelled

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:
EFP 11-1, 11-2, 11-3, 11-4, 11-5, 11-6, 11-7, 11-8	30 bar	LPG, LNG, LEG, VCM, NH3, Methanol	-196°C to +90°C
EFP 24-1, 24-2, 24-3, 24-4, 24-5, 24-6, 24-7, 24-8	30 bar	LPG, LNG, LEG, VCM, NH3, Methanol	-196°C to +90°C

Issued at **Høvik** on **2024-04-11**
This Certificate is valid until **2027-05-30**.
DNV local unit: **Denmark CMC**

Approval Engineer: **Yury Ilchenko**

for **DNV**

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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

Pumps EFP 11-1, EFP 11-2, EFP 11-3, EFP 11-4, EFP 11-5, EFP 11-6, EFP 11-7, EFP 11-8, EFP 24-1, EFP 24-2, EFP 24-3, EFP 24-4, EFP 24-5, EFP 24-6, EFP 24-7 and EFP 24-8 are multi-stage centrifugal deepwell (DW) pumps, lubricated and cooled by pumping media, the pumps installed in caisson equipped with a foot valve. The pumps are driven by electric motor installed outside the storage tank. The drive train is magnetic coupling. The pump shaft is sealed with a primary oil filled seal and a static secondary seal.

Application/Limitation

The pumps design is approved for handling liquified gases (LN2, LNG and LPG) on board ships and have following operating range:

Type EFP 11	**-1**	**-2**	**-3**	**-4**	**-5**	**-6**	**-7**	**-8**
Volume rate of flow [m3/hr]	2.2 - 14				2.2 – 14			
Delivery head, [mlc]	78	150	225	20 - 300	372	445	519	20 - 595
Min. design temperature, [°C]	-196				-196			
Min. operating temperature, [°C]	-165				-165			
Differential pressure, [bar] (*)				1-8				30
Power cons. nominal, [kW]	4.8	9.1	12.1	16.2	20	25	28	32
Motor Size, [kW] (**)				20				34.5
Casing, shaft and impeller materials					Austenitic stainless steel (type 304)			
Notes: (*) – calculated for LNG density 500 kg/m3, (**) – calculated for LNG, 3x440V 60 Hz (4300 rpm)								

For performance and technical data see manufacturers data sheet & capacity curves.

Type EFP 24	**-1**	**-2**	**-3**	**-4**	**-5**	**-6**	**-7**	**-8**
Volume rate of flow [m3/hr]	3.1 - 39				3.1 – 39			
Delivery head, [mlc]	-	144	212	20 - 290	363	436	509	20 - 583
Min. temperature, [°C]	-196				-196			
Min. operating temperature, [°C]	-165				-165			
Differential pressure, [bar] (*)	-			1-8				30
Power cons. nominal, [kW]	-	11.3	16.9	19.9	28.3	32.6	33	33.3
Motor Size, [kW] (**)				20				34.5
Casing, shaft and impeller materials								
Notes: (*) – calculated for LNG density 500 kg/m3, (**) – calculated for LNG, 3x440V 60 Hz (4300 rpm)								

For performance and technical data see manufacturers data sheet & capacity curves.

Type Approval documentation

Drw No	**Rev**	**Title**
-	09.07.2021	Quality system certification
-	12.05.2021	Fuel pump Reference List
-	14.12.2015	Report, 1. spin test of prototype EFP-11-4
B20180005	01	INSPECTION TEST PLAN
1000-1700-01	A1	System Manual - Control switchboards for DW fuel pumps
XAAA194242	18.04.2016	General description of materials for fuel pumps type EFP
51173-01	05	Svanehøj ECA Fuel Pump (pump manual)
XAAA194725	4.8.2016	General description of materials for fuel pumps type EFP
XAAA194163	4.8.2016	General description of materials for fuel pumps type EFP
XAAA194308	29.01.2016	General description of materials for fuel pumps type EFP
XAAA194724	26.01.2016	General description of materials for fuel pumps type EFP
25210-01	00	MID-support EFP Ø343/273 ADJUSTABLE
1000-5102	00	Fittings and sensors EFP HP Caisson pipe
1000-4170	01	Fittings and sensors EFP
XAAA224155	C	Internal support, intermediate support/caisson, EFP
XAAB382797	-	Support for shipping. set intermediate pipe/caisson, EFP
1000-8024	00	Complete foot valve EFP sectional drawing.
XAAB278168	D	Caisson EFP sect.dwg
XAAA229013	D	Caisson pipe for EFP
XAAA238214	B	Drain pipe arrangement EFP pump

1001-1412	00	Pump cylinder EFP 24HP
1001-1095	00	Pump cylinder EFP 11HP
XAAB471862	A	Intermediate pipe section for pump type EFP adjustable 20mm
XAAA216984	F	Intermediate piping arrangement EFP for sect.dwg.
12755-02	A	Base arrangement EFP
12755-01	R	Base arrangement EFP
-	-	DW fuel Pump description

Tests carried out
Satisfactory in-service experience as an alternative to prototype testing was taken into consideration ref. 2022 edition DNV-RU-SHIP Pt.5 Ch.7 Sec.5 §13.5.1 (applicable rules set at the date of original certificate issuance).

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

Product certification
Each individual pump is subject to certification at manufacturer facility according to 2024 Classification Rules DNV-RU-SHIP Pt.5 Ch.7 Sec.5 [§13.5.2(3)].

Periodical assessment
The pump is subject to periodical surveys in service according to 2024 Classification Rules DNV-RU-SHIP Pt.7 Ch.3 Sec.5 [§5] and Pt.7 Ch.4 Sec.5 [§5].
Certificate validity is 5 years and shall be renewed by expiration of its validity, renewal assessment will be performed at the certificate renewal.
In case when the type-approved product is manufactured at other companies, 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.

Manufactured by:
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