Certificate No:
TAP00002HD

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pumps

with type designation(s)
EFP 11-4, EFP 11-8, EFP 24-4, EFP 24-8

Issued to
Svanehøj Danmark A/S
Svenstrup J, Nordjylland, Denmark

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:
EFP 11-4	19 bar	LNG, LPG	from -163°C to +50°C
EFP 11-8	38 bar	LNG, LPG	from -163°C to +50°C
EFP 24-4	18.5 bar	LNG, LPG	from -163°C to +50°C
EFP 24-8	37 bar	LNG, LPG	from -163°C to +50°C

Issued at **Høvik** on **2022-05-31**
This Certificate is valid until **2027-05-30**.
DNV local station: **Denmark CMC**

Approval Engineer: **Yury Ilchenko**

for **DNV**

Monika Johannessen
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 EFP 11-4, EFP 11-8, EFP 24-2 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 pump 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 (LNG and LPG) on board ships and have following operating range:

Type	EFP 11-4	EFP 11-8	EFP 24-4	EFP 24-8
Volume rate of flow [m3/hr]	0.6 - 13	0.8 - 13	0.8 - 30	0.8 – 30
Delivery head, [mlc]	20 - 190	20 – 380	20 - 185	20 – 370
Min. temperature, [degrees C]	-163	-163	-163	-163
Differential pressure, [bar] (*)	1 - 8	1 - 16	1 - 8	1 – 16
Power cons. nominal, [kW]	8	16	13	24
Motor Size, [kW] (**)	10	34.5	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				

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. 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.1140(31)). A renewal assessment will be performed at renewal of this certificate.

In case where 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.

Other conditions

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.