TYPE APPROVAL CERTIFICATE

Certificate No:
TAP00002ED
Revision No:
0

This is to certify:

That the Plate Heat Exchanger

with type designation(s)
See certificate

Issued to
Sondex A/S
Kolding, Midtjylland, Denmark

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment

Application :

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

Temperature range:	**-40°C to 250°C (see cert.)**
Design pressure:	**See certificate**
Operating media:	**See certificate**

Issued at **Høvik** on **2021-09-06**
This Certificate is valid until **2026-09-05**.
DNV local station: **Fredericia FiS**

for **DNV**

Approval Engineer: **Bosman van der Merwe**

Zeinab Sharifi
Head of Section

Product description

1) Plate and shell heat exchanger with welded end cover in one side and bolted cover on the other side.
Design code: DNVGL-RU-SHIP Pt. 4 Ch.7 and EN 13445-3
Corrosion allowance: 1 mm
Design pressure: 25 bar
Design temperature: -2.5°C / 110°C (SPS 072)
-10°C / 250°C (SPS 179 IS)
DNVGL equipment class: I/II (DNVGL-RU-SHIP Pt. 4 Ch. 7 Sec. 1 Table 2 shall be followed)

Material: Shell, flange, bottom, cover material: P265GH, EN10028-2
Plate materials: 1.4401, EN10028-7

Dimensional data:

Type	Shell outer diameter	Shell thickness	Cover thickness	Bolts for cover	End plate thickness	Flange Rating
SPS072	360 mm	10 mm	40 mm	12 x M20 (8.8)	25 mm	Class 300, ANSI B16.5
SPS 179 IS	559 mm	12 mm	50 mm	12 x M30 (8.8)	40 mm	PN25, EN1092-1

2) Plate Heat Exchangers with tightening bolts (110 types).
Corrosion allowance: 1 mm
DNVGL equipment class: I/II/III (DNVGL-RU-SHIP Pt. 4 Ch. 7 Sec. 1 Table 2 shall be followed)

Material: Frame plates (all types): P355GH, EN10028-2
Frame plate (type S4A IS25) 1.4401 acc. to EN10028-7
Tie bolts (all types): 42CrMo4, EN 10269
Connections: AISI304L/AISI316/AISI316L, EN 10217-7
P235GH, EN 10204

Dimensional and technical data for plate heat exchangers:

Type	Frame thickness with/without holes (mm)	Tie bolt dimensions	Design pressure*	Design temperature (°C)	Design Code
S4/S4a IG	20/20	6xM16	16	-20/180	EN 13445
S4/S4a IS	20/20	6xM16	16	-10/150	AD 2000
S4a IS Covers AISI316	20/20	8xM16	25	-20/150	EN 13445
S7-S7a IG	35/25	6xM24	16	-20/180	EN 13445
S7/S7a IS	25/25	6xM24	16	-20/180	EN 13445
S8a IG	20/20	8xM16	16	-20/180	EN 13445
S8/S8a IS	20/20	8xM16	16	-10/150	AD 2000
S9a IG	30/30	6xM24	16	-25/180	EN 13445
S9a IG	35/30	8xM16	10	-20/180	EN 13345
S14 S14a S15 IG	35/25	8xM24	16	-20/180	EN 13445
S14-S14a-S15 IS	25/25	6xM24	16	-20/180	EN 13445
S19a IG	35/30	12xM16	10	-20/180	EN 13445
S19a/SW19a IG	35/30	8xM24	16	-40/180	EN 13445
S19a/SW19a IG	40/35	12xM24	25	-40/180	EN 13445
S19a/SW19a IG	40/40	14xM24	40	-40/180	EN 13445
S20a IG	35/25	8xM24	16	-20/180	EN 13345
S21 S21a S22 IG	35/25	10xM24	10	-20/180	EN 13445
S21 S21a S22 IG	35/30	10xM24	16	-20/180	EN 13445
S21/S21a/S22 IS	30/30	6xM36	10	-20/180	EN 13445
SW26a IS	40/40	6xM36	16	-40/180	EN 13445
SW26a IS	50/50	8xM36	25	-40/180	EN 13445
SW26a IS	55/55	10xM36	40	-40/180	EN 13445

S31a IG	35/30	16xM16	10	-20/180	EN 13445
S31a IG	35/30	10xM24	16	-30/180	EN 13345
S31a IG oil cooler	35/40	10XM24	16	-20/180	EN 13445
S31a IG	35/35	12xM24	25	-20/180	EN 13445
S36 IG	30/25	12xM24	10	-20/180	EN 13445
S36 IG	35/25	10xM24	10	-20/180	EN 13445
S36 IG cooler	50/40	12xM24	10	-20/180	EN 13445
S36 IG oil cooler	50/40	12xM24	10	-20/180	EN 13445
S37 IG	30/30	8xM24	10	-10/150	AD 2000
S37 IS	30/30	8xM36	10	-20/180	EN 13445
SW40a IS	40/30	8xM36	16	-40/180	EN 13445
SW40a IS	50/40	10xM36	25	-40/180	EN 13445
SW40a IS	55/55	12xM36	40	-40/180	EN 13445
S41/S41a/S42 IS	45/35	8xM36	10	-20/180	EN 13445
S41/S41a/S42 IS	45/45	8xM36	16	-20/185	EN 13445
S41 S41a S42 IS	60/50	10xM36	25	-20/180	EN 13445
S43 IS (S.L)	45/40	8xM24	6	-20/180	EN 13445
S43 IS (H.O)	45/40	8xM24	6	-20/180	EN 13445
S43/S43ad - IS	70/65	10xM36	25	-20/180	EN 13445
S41 S41A S42 IS (H.O)	35/30	8xM24	6	-20/180	EN 13445
S41/S42-IS	35/35	8xM36	10	-20/180	EN 13445
S43 IS	50/40	8xM36	10	-20/180	EN 13445
S43 S43A-IS	50/40	8xM36	10	-20/185	EN 13445
S44a IG	30/30	14xM24	16	-20/180	EN 13445
S47 IG	35/25	14xM24	10	-20/180	EN 13445
S47 IS	30/30	10xM36	10	-20/180	EN 13445
SW54-IS	45/45	8xM36	16	-40/180	EN 13445
SW54-IS	60/55	12xM36	25	-40/180	EN 13445
SW54-IS	65/65	16xM36	40	-40/180	EN 13445
SW59-IS	60/60	10xM36	16	-40/180	EN 13445
SW59-IS	70/70	14xM36	25	-40/180	EN 13445
SW59-IS	85/85	24xM36	40	-40/180	EN 13445
S62/S63 IS	45/45	10xM36	16	-20/180	EN 13445
S62/S63 IS	35/30	10xM24	6	-20/180	EN 13445
S62/S63 IS	45/35	8xM36	10	-20/180	EN 13445
S64-IG	30/25	20xM24	10	-10/150	AD 2000
S65 IS	45/40	12xM24	6	-20/180	EN 13445
S65 IS	50/50	10xM36	10	-20/180	EN 13445
S65 IS	60/50	12xM36	16	-20/180	EN 13445
S145 IS	80/75	18xM36	10	-20/180	EN 13445
S1 IT PN10/16	12/12	6xM12/M16	10/16	-10/150	AD 2000
S80/S81-IS, IPE	50/45	10xM36	6	-20/180	EN 13445
S80/S81 IS, RHS	50/45	10xM36	6	-20/180	EN 13445
S80/S81 IS, IPE	65/60	10xM36	10	-20/185	EN 13445
S80/S81 IS, RHS	65/60	10xM36	10	-20/185	EN 13445

S80/S81-IS, IPE	80/75	20xM36	16	-20/180	EN 13445
S80/S81-IS, RHS	80/75	20xM36	16	-20/180	EN 13445
SC85 IS PN10	55/45	10xM36	10	-20/180	EN 13445
S86a S87 H.O	35/35	10xM36	10	-20/180	EN 13445
S100 IS DN200 H.O	40/40	8xM24/4xM36	6	-20/180	EN 13445
S100 IS PN10	50/50	12xM36	10	-20/180	EN 13445
S100 IS	60/60	12xM36	16	-20/180	EN 13445
SW102 IS	70/70	24xM36	25	-40/180	EN 13445
SW102 IS	60/60	20xM36	16	-40/180	EN 13445
S110 IS PN10	35/35	14xM36	10	-20/180	EN 13445
S110 IS PN10	45/35	14xM36	10	-20/180	EN 13445
S113-IS-PN10	70/50	12xM36	10	-10/150	AD 2000
S120/S121/SW122 IS	60/40	10xM36	6	-10/150	AD 2000
S120/S121/SW122 IS	80/75	22xM42	16	-40/180	EN 13445
S120/S121/SW122 IS	100/90	22xM42	25	-40/180	EN 13445
S62-S62a-S63 IS	35/35	8xM36	10	-20/180	EN 13445
S130 IS	50/40	10xM24/4xM36	6	-10/150	AD 2000
S130 IS	75/50	14xM36	16	-10/150	AD 2000
S130 IS	75/70	20xM36	25	-20/180	EN 13445
S152 IS	60/50	16xM36	10	-10/150	AD 2000
S152 IS	60/60	18xM36	16	-20/180	EN 13445
S152 IS	100/70	20xM36	25	-10/150	AD 2000
S187/S188/SW189 IS	75/60	14xM36	10	-10/150	AD 2000
S187 S188 SW189 IS	80/75	26xM36	16	-40/180	EN 13445
S187 S188 SW189 IS	100/90	30xM36	25	-40/180	EN 13445
S67 IS DN300	50/50	8xM36	10	-10/150	EN 13445
S79 IS	40/40	10xM24	10	-20/180	EN 13445
S310 IS DN500/DN700	110/100	30xM36	10	-20/180	EN 13445
S310 IS Spec	110/110	30xM36	10	-20/180	EN 13445
SG56 IS	40/40	8XM24	10	-20/180	EN 13445
S62 S63 IS oil cooler	50/40	8xM36	10	-20/180	EN 13445
S100 IS DN200, IPE, S.L	50/50	12xM36	10	-20/180	EN 13445
S16 IG PN10/16	25/25	6xM24	10/16	-20/180	EN 13445
S36 IS	30/30	8xM36	10	-20/180	EN 13445
S36 IS	35/35	8xM36	16	-20/180	EN 13445
S47a IS	30/30	10xM36	10	-20/180	EN 13445
S65/65a IS	50/50	10xM36	10	-20/180	EN 13445
S86 S87 IS, S.L	35/35	10xM36	10	-20/180	EN 13445
S100 IS DN200, RHS, S.L	50/50	12xM36	10	-20/180	EN 13445
SDN352 IS	70/70	14xM36	10	-20/180	EN 13445
S120 S121 IS	65/60	12xM36	10	-20/180	EN 13445
S62 S63 IS Cooler	45/35	8xM30	10	-10/150	EN 13445
S100/S100A IS IPE, H.O	50/50	12xM36	10	-20/180	EN 13445

* Flange rating shall follow design pressure

Manufacturing locations:

SONDEX A/S Marsvej 5 & Jernet 9, 6000 Kolding, Denmark & Ravnhavevej 6-8 6070 Christiansfeld Denmark	SONDEX Deutschland GmbH Robert-Koch Str. 3 21423 Winsen(Luhe) Germany
Sondex B.V. Netwerk 144 1446WR Purmerend Netherlands	Sondex Poland Sp. z o.o. ul. Młyńska 2a 84-207 Koleczkowo Poland
Sondex Heat Exchangers India Pvt Ltd. E-1, GIDC Estate P.O.-Manjusar Taluka-Savli Vadodara-391775 Gujrat India	SONDEX HEAT EXCHANGER(TAICANG) Co., Ltd No.3 Weixin Road, Wenzhou Industrial Park, Shuangfeng Town, Taicang City, Suzhou, Jiangsu China
Danfoss S.r.l. Heating Segment Strada Provinciale 23, n.° 10 26010 Salvirola (CR), Italy	

Application/Limitation

If any welding (including brazing) is performed at any stage on the pressure containing body of a Class I and/or II heat exchanger by a manufacturer, that manufacturer shall have a valid AoM certificate, as per Pt.4 Ch.7 Sec.7 [1.1.1].

The plate heat exchangers covered by this certificate are approved for the medium according to limitations referred in DNV GL ship rules Pt.4 Ch.7 Sec.1 Table 2 to specify the class for the heat exchanger.

Heat exchanger plates and gaskets shall withstand and meet the requirements of the operating media and temperature.

Traditional types of stainless steels, including types like 304, 304L, 316, 316L, etc., shall not be used in direct contact with seawater. Refer DNVGL Pt.4 Ch.7 Sec.2 [1.1.1].

Nozzle loads are not evaluated as part of scope, only the internal pressure is considered.

Design temperature limited by used gaskets:

Rubber type	Temperature min/max [ºC]
NBR	-15 / 150
NBR HT	-15 / 150
H-NBR	-5 / 150
NBR soft	-25 / 130
EPDM	-30 / 140
EPDM-HT	-30 / 160
EPDM UHT	-30/ 180
VITON industri	-15 / 200
VITON FOOD	-15 / 200 FDA
VITON DAMP	-10 / 200
VITON GF	-15 / 200
CHLOROPREN	-40 / 100
BUTYL	-40 / 120
HYPALON	-40 / 120

EPDM may not be used in vessels intended for lubrication oil.

Impact testing:

- Material for the frame plates (P355GH, EN 10028-2) with design temperature between -20 deg.C to -40 deg.C shall be subjected to impact testing at -40 deg.C with minimum 27 J for thickness up to and including 70 mm.

For thickness above 70 mm frame plates (P355GH, EN 10028-2) with design temperature between -20 deg.C to -40 deg.C shall be impact testing according to the requirements in EN 13445-2 Annex B, Figure B.2-3. As an alternative suitable material grade, e.g. P355NL/NL1/NL2, may be used.
- Material for the frame plates (P355GH, EN 10028-2) with design temperature -20 deg.C and above shall be subjected to impact testing at -20 deg. C with minimum 27 J or alternatively follow the requirement in EN 10028-2 latest edition.
- Material for tie-bolts (42CrMo4, EN 10269) shall be subjected to impact testing at -40 deg. C with minimum 40 J.
- All impact test results shall be affirmed by the material (mill) manufacturer and documented in the form of material certificates.

Type Approval documentation
Main GA-drawings- and gaskets:
Calculation reports for each type.

Production Testing
Each heat exchanger is to be hydraulic pressure tested to minimum 1.5 x design pressure. The hydrostatic test pressure shall be applied separately to the hot side and to the cold side with atmospheric pressure on the other side.

Certification
Materials for pressure retaining parts are to be delivered with material certificates according to DNVGL-RU-SHIP Pt. 4 Ch. 7 Sec. 1 Tables 5, 6 or 7, and shall meet the requirements of relevant parts of DNVGL-RU-SHIP Pt. 2 Ch. 2.

Each heat exchanger shall be certified by a DNV surveyor and to be delivered with a DNV product certificate when it is required by DNV Rules or by purchaser.

Marking of product
Each heat exchanger shall be permanently and legibly marked on the pressure part or on a nameplate permanently attached to a principal pressure part to show its identity and origin.
The marking of the heat exchanger shall show at least the following particulars:
- manufacturer's name and address
- type designation and serial number
- year of manufacture
- maximum allowable working pressure
- maximum and minimum allowable working temperature
- hydrostatic test pressure.

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 DNVGL-CP-0338.