

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Heat Exchanger**with type designation(s)
ES/DV/DPK/EPK 219

Issued to

Sperre Coolers AS
Ellingsøy, Norwayis 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 all vessels classed by DNV GL.****Temperature range: 0°C to 220°C****Design pressure: 16 bar****Operating media: Fresh water - Steam - Oil - air - Refrigerants - Ammonia**This Certificate is valid until **2018-12-31**.Issued at **Høvik** on **2016-01-29**DNV GL local station: **Ålesund**Approval Engineer: **Adel Samiei**for **DNV GL**

Marianne Spæren Marveng
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.

Product description

Shell and tube heat exchangers types ES/DV/DPK/EPK 219

Dimensional data:

Shell:	Ø219.1 x 6.3 mm
Tube:	Ø12.7 x 1 mm

Material:

Cylindrical shell:	P235GH according to EN10216-2
Water box:	EN-GJS-400-15 according to EN 1563
Tube:	CuNi10Fe1Mn according to EN12451
Flanges (Steel)	P355NH according to EN10222-4 P275NH according to EN10028-3
Flanges (Iron)	EN-GJS-400-15 according to EN 1563
Nozzle	P235GH according to EN10216-2

Corrosion allowance:	1 mm (for both tube and shell sides – except copper alloy) 0.7 mm (for tube made of copper alloys)
Joint efficiency:	0.85

Application/Limitation

DNV GL Pressure class:

- | | |
|--|----------|
| 1) Medium: Lubricating oils, Ammonia, Refrigerants group 2 | Class I |
| 2) Medium: Steam, air, thermal oils, water, Refrigerants group 1 | Class II |

Certification of materials shall be in accordance with DNV GL ship rules Pt.4 Ch.7 Sec.2 Table 1. Material certificates VL and W shall be issued by an approved material manufacturer of DNV GL for the type, grade and thickness of product being supplied.

Each heat exchanger shall be subject to hydrostatic pressure on completion to 1.5 times the design pressure in the presence of a DNV GL surveyor if the manufacturer does not have an approved MSA (or similar certificate) with DNV GL- Reference to DNV GL ship rules pt.4 Ch.7 Sec.7 clause 4.6.

Extent of Non-destructive testing shall be in accordance with DNV GL ship rules Pt.4 Ch.7 Sec.7 4.1.2.

Each heat exchanger shall be delivered with a DNV GL product certificate.

Type Approval documentation

Marking of product

For traceability to this type approval, each valve is at least to be marked with:

- Manufacturer's name
- Type designation
- Size
- Design pressure

Periodical assessment

For retention of the Type Approval a DNV GL Surveyor shall perform a periodical assessment every second Year. The objective of the periodical assessment is to verify that the conditions for the TA are not altered since the TAC was issued.