

TYPE APPROVAL CERTIFICATE

This is to certify:**That the CO2 System**

with type designation(s)
HEIEN-LARSEN HIGH PRESSURE CO2 SYSTEM

Issued to
Autronica Fire and Security AS
NØTTERØY, Norway

is found to comply with
DNV GL statutory interpretations DNVGL-SI-0364 – SOLAS interpretations
DNV GL rules for classification – Ships
DNV GL offshore standards

Application :

Approved for use as a total flooding fire extinguishing system for machinery space, pump rooms, cargo holds and similar spaces.

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

This Certificate is valid until **2021-12-04**.

Issued at **Høvik** on **2016-12-05**

DNV GL local station: **Sandefjord**

Approval Engineer: **Fryderyk Hoga**

for **DNV GL**

Petter Langnes
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

"Heien-Larssen high pressure CO₂ system"

is a total flooding system for protection of machinery spaces, cargo holds and similar spaces. Control of system is remote pneumatic and local pneumatic, as applicable.

Only the main system concept is approved by this certificate. Cylinders, valves, pipes, couplings and other systems components are subject to case by case approval. The system is to be designed in accordance with the IMO FSS Code Ch.5 and DNVGL-SI-0364 – SOLAS Interpretations for SOLAS Ch. II-2.

Application/Limitation

This type approval certificate provides a general design acceptance for the components specified under the item "Type Approval Documentation". Each system shall be plan approved on an individual basis and inspected on board by a DNV GL surveyor.

For all applications

1. All CO₂ cylinders are to be certified according to DNVGL-RU-SHIP Pt.4 Ch.7 Sec.1 [5]. Flexible hoses are to be of approved type.
2. All CO₂ piping upstream of master valve is to be certified in accordance with DNVGL-SI-0364 – SOLAS Interpretations. Section valve(s) to be at least PN100.
3. All connections on high pressure side are to be of approved type. Restrictions apply to threaded connections (DNVGL-RU-SHIP Pt.4 Ch.6 Sec.9 [5.2]). Use of section valves with threads will be considered on a case by case basis for valves of sizes up to DN25.
4. An automatic time delay unit, with the possibility to override, is to be installed for spaces that are expected to be manned occasionally.
5. Non-return valves or similar arrangement (ref. CV- 98 valve flexible discharge bend) are to be fitted between the separate bottles and the manifold - in order that a bottle, if necessary, can be disconnected from the battery without putting the whole installation out of action.
6. All systems installed on ships with keel laid on or after 1st July 2010 shall be delivered with a device ensuring sequential release (IMO Res. MSC. 206(81)).
7. The pilot cylinders shall have capacity to operate the system three times even under unfavourable temperature conditions.

The following documentation is to be submitted in each case for plan approval:

1. The system layout showing operation philosophy and assembly of components .
2. Arrangement plan identifying position of nozzles, routing and dimension of piping and location of the release stations.
3. CO₂ capacity calculations for all protected spaces.
4. Time discharge calculations, as applicable. Isometric drawing are required in case the piping layout do not provide sufficient information.
5. Documentation of visual and audible alarms and specification of automatic time delay unit for spaces required to have such devices (spaces expected to be manned occasionally).
6. Specification and details of CO₂ manifold, including connections.
7. Specification of all components in the system, including CO₂ distribution piping and approvals for the flexible hoses.
8. Arrangements for closing of all ventilation and stopping of fans (can be submitted separately by the yard).
9. Each system is to be supplied with a manual for installation, use and maintenance.

Installation testing:

- Alarms inside protected space and at a manned control stations and switchover to emergency power shall be tested.
- Other tests as required by DNVGL-SI-0364 – SOLAS Interpretations for Solas Ch.II-2 (pressure and tightness testing of piping, etc.) and according to maker's manual shall be carried out.

Job Id: **262.1-008187-4**
Certificate No: **TAF00000HB**

Periodical testing:

- A biennial (every 24 months) for passenger ships and at each intermediate, periodical or renewal survey for cargo ships, an inspection is to be carried out by a service supplier acceptable to DNV GL.
- The system should also be tested and inspected as specified by the DNV GL Rules and DNVGL-SI-0364 – SOLAS Interpretations, reference is made IMO MSC/Circ. 850 and IMO MSC.1/Circ. 1318.

Type Approval documentation

Certification in accordance with Class Programme DNVGL-CP-0338, October 2015.

Folder, "CO2 High Pressure Fire Extinguishing System, Pneumatic Operated System, Single Area" and submitted drawings from Autronica Fire and Security AS, with the following drawings:

Drawing no:	Rev.:	Title:
Flexible hoses:		
33165-C3	5	1/2" Flexible discharge hose
33166-C3	5	3/8" Flexible pilot hose
Cylinders:		
33144-C3	A	CO2 Cylinder, pneumatic release
Valves:		
33156-C3	C	CO2 Manifold Check Valve
33157-C3	3	Direction/distribution valve manual operated, threaded
33160-C3	6	DN65-DN150 Distribution Valve, Pneumatic operated
33161-C3	3	Air blowing through/CO2 Shore connection valve
33162-C3	B	Valve relief
33163-C3	E	Non-return valve system
34113-C3	B	1" -2" Distribution valve, Pneumatic operated
Manifold:		
33716-C3	D	Flanged collector manifold
Nozzle:		
33185-C3	1	Axial Nozzle
Misc:		
23043-B3	E	Schematic diagram, central system, pneumatic operated, one release station, one protected space
33153-C3	2	Fastening assembly 67,5L cylinders
33170-C3	5	Release cabinet with time delay
33172-C3	2	Supply cabinet with time delay
33173-C3	D	Valve release cabinet

Marking of product

The product is to be marked with name of manufacturer and type designation.

Periodical assessment

DNV GL's surveyor is to be given permission to perform Periodical Assessments at any time during the validity of this certificate and at least every second year. The arrangement is to be in accordance with procedure described in DNVGL-CP-0338 Section 4.