



Star International

Worldwide marine and offshore services

Gas distribution systems (GDS)

Star International is approved to test oxygen and acetylene gas systems.



Most vessels have a fixed GDS onboard, where the cylinders are stored for easy access on the upper deck, and oxygen and acetylene pipe lines run down to the workshop in the engine room, which is connected to the outlet station.

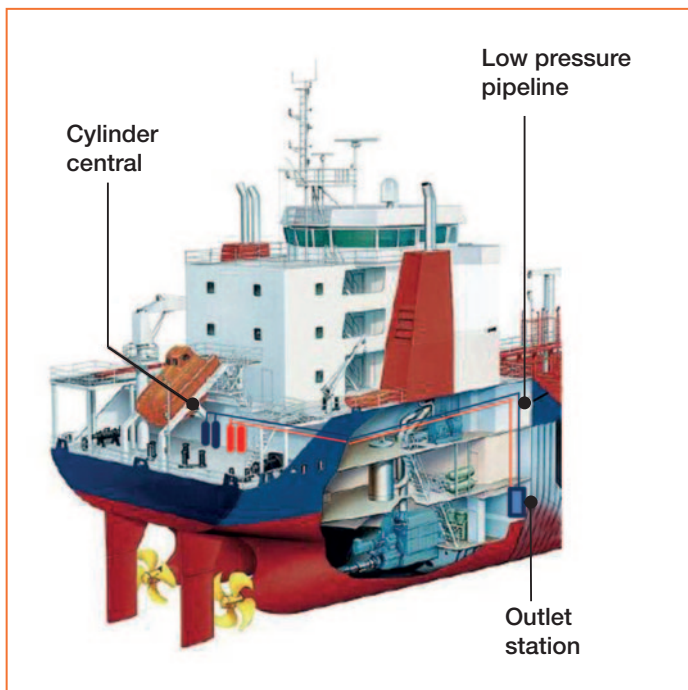
In accordance with the Maritime Directorate's Regulations concerning welding equipment in ships and mobile offshore units, the installation should be tested, and a renewal installation certificate issued every 5 years. In addition, the chief engineer must check the installation annually for non-leakage.

Star Engineering (trading as Star International) is authorised by DNV-GL to carry out this work.

The gas distribution system (GDS)

High-pressure gas cylinders inside the ship's hull are a safety risk to both crew and vessel and should always be avoided. A full oxygen cylinder has a pressure of 150 bar, acetylene 18 bar and filled with a highly flammable acetylene gas dissolved in acetone.

The GDS was specifically developed to improve safety and efficiency. Placing the cylinders on the uppermost deck and piping the gas to outlet stations means, if a dangerous situation develops the cylinders can be removed and be thrown overboard, if necessary.



Most classification societies and class flags have legislation covering the onboard use of gas welding systems and equipment. A certain standard of consistency regarding supply and installation is required in order to maximise results in terms of operational efficiency and safety at all times.

The GDS system was developed in close cooperation with the Norwegian Maritime Authorities, and today forms part of rules and regulations for handling gases on-board ships.

The system is ideal for use on-board most vessels and rigs with a certain consumption of welding gases such as oxygen, acetylene and shielding gases.

How it works

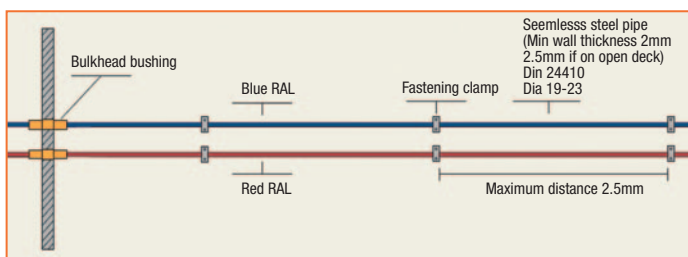
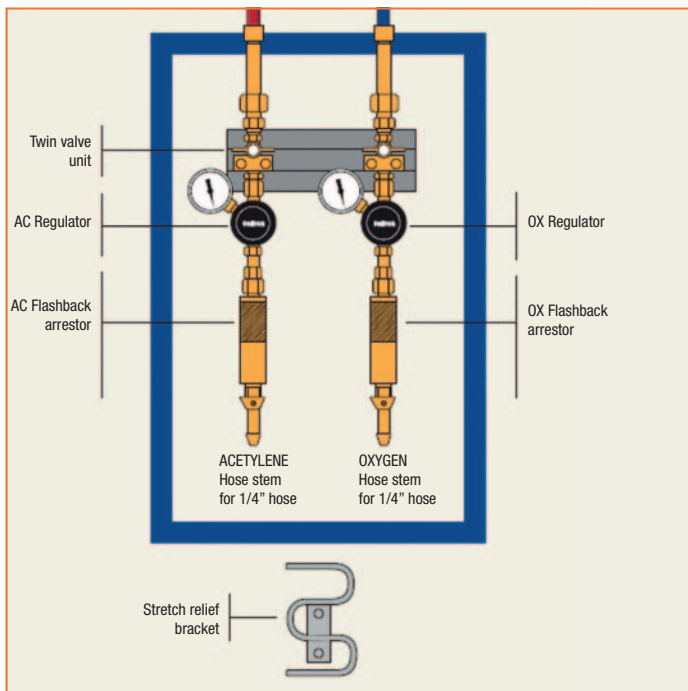
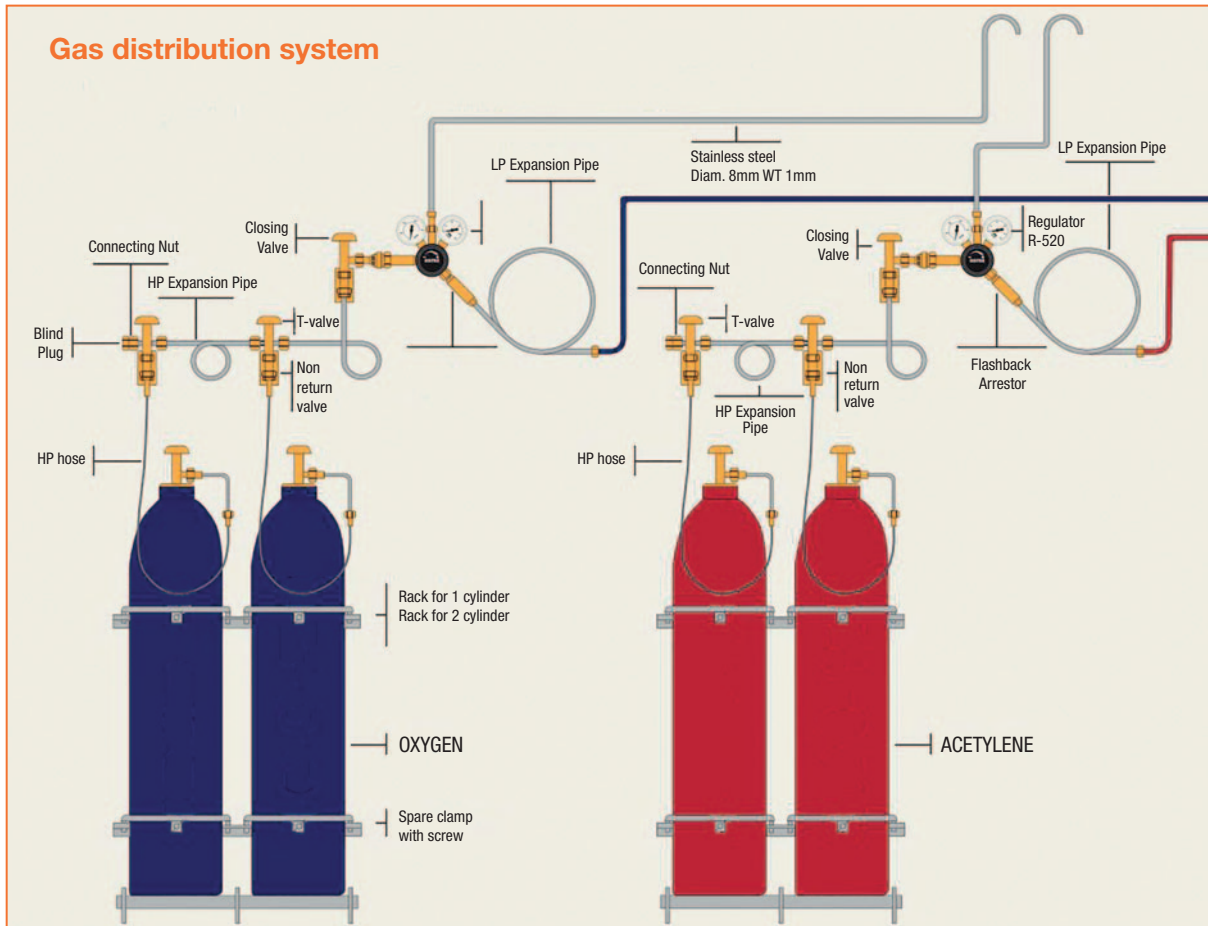
The system consists of the cylinder central on an upper deck. The cylinders are manifolded together, and the pressure reduced from 'cylinder pressure' to 'low pressure' pipeline pressure.

The system is protected by non-return valves and flashback arrestors to provide utmost safety.

The regulators are fitted with safety valves. In case of opening, the gas will ventilate out of the cylinder central. When the total numbers of cylinders exceeds eight, the oxygen and acetylene need to be kept in separate compartments.

The gases then pass through the low-pressure piping to the outlet station(s). When going through bulk heads and deck, they are shielded in bulk-head bushings and supported by special fastening brackets.

Gas distribution system



The benefits of a GDS

Safety

- Easy access to cylinders. The cylinders are stored safely in ventilated spaces.
- No need to move cylinders around.
- Easier to remove cylinders in event of fire on-board.

Economy

- Equipment is less exposed to damage.
- More economical use of gases. A GDS with multiple cylinders ensures sufficient gas flow for all welding, cutting and heating purposes. A large flow of oxygen is needed, for example, when cutting thick steel plates.

Note: an acetylene gas cylinder has a limited discharge rate! Acetylene drawn from a single cylinder may register as empty even if the cylinder is half-full due to the slow process of acetone to release acetylene gas. By drawing from two or more cylinders at the same time, the gas will have more time to form and be ready for continual use.

The regulations

Norwegian Maritime Authority (Previously Norwegian Maritime Directorate) state:

Regulation of 25 April 2002 No. 422 concerning welding, welding equipment, hot work and storage of gas cylinders on board ship

Definitions

For the purpose of this Regulation the following definitions shall apply:

- Acetylene:** C_2H_2 for storage on special gas cylinders (15 to 19 bar at 15°C)
- Recognised classification society:**
 - American Bureau of Shipping (ABS).
 - Bureau Veritas (BV).
 - Det Norske Veritas (DNV).
 - Germanischer Lloyd (GL).
 - Lloyd's Register of Shipping (LRS).
- Existing central plant:** Central plant installed before 1 July 2000.
New central plant: Central plant installed before 1 July 2000.

Central Plant

- Central plants shall be installed when the number of gas cylinders on board containing acetylene and/or oxygen exceeds 4.
This requirement applies regardless of cylinder size.

- Some Class Societies have own design rules to be followed and shall then (except for NOR & NIS ships) approve the system and endorse the testing.
- When Star International are issuing installation certificates for NOR and NIS flagged ships, a Star International Installation Certificate is issued (Service Chart #32).

Service chart 32

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Service Chart # 32
Gas Distribution Systems

Year	Month	Day	Vessel	Flag	Certificate #	
System # System Inspection ☐ Pressure Test lines ☐						
Technical Description of System:						
Manufacturer of System:			No. of outlet stations			
No. of OX cylinder			Location of gas cylinder			
No. of AC cylinder			Position of outlet station(s)			
No. of connected cylinder			Date of test Certificate			
System Location for Welding/Running						
Description of Tests: Any Remarks/Recommendations are noted by "x" in the add remarks field- see chart # 28						
Item	Description of Test Completed	Carried Out	Not Carried Out	Not Applicable	Not used to system	Add Remarks
1	Location of cylinder inspected ventilation arrangement and access to open deck					
2	Location of cylinder inspected electrical installation of explosion proof type					
3	Inspected safety valves ventilation to appropriate location on open deck					
4	Inspected that ventilation is clearly marked with instruction and safety signs					
5	Inspected of tethering arrangement has quick disconnection type					
6	Inspected accessories dimensioned to 300 kg/cm ²					
7	Inspected accessories Acetylene max 65% copper					
8	Inspected material pipes for seamless and stainless steel					
9	Inspected supply hoses, connections, stop valves and ACOG regs					
10	Inspected manifold pipes, T- and non-return valves					
11	Inspected safety valve outlet pipes for appropriate material and fastening					
12	Clear system: inspected pipes made of seamless steel 30.38 or more					
13	Clear system: inspected pipes freely laid and welded to and end					
14	Clear system: inspected pipes freely laid and socket welded					
15	Inspected expansion loops/buoying/ramps (max 2.5 m) where required					
16	Inspected pipes not laid through accommodation/non-ventilated rooms					
17	Inspected that all pipes are clearly painted with correct colour code					
18	Outlet station: inspected stop valve regulation gauges flashback arresters					
19	removed pipeline filter if not 1st time installation					
20	Non-leakage test: high press AC pipes and accessories 25 bar					
21	Non-leakage test: high press OX pipes and accessories 200 bar					
22	Non-leakage test: low press AC pipes and stop valves 12 bar					
23	Non-leakage test: low press OX pipes and stop valves 12 bar					
24	Non-leakage test: regulators, gauges, flashback arresters to max WOP					
25	Non-leakage test: hoses and connections to max WOP					
26	System Reconnected and set @ day - 8 bar, sat - 0.8 bar					
27	Certificate Completed and Left with Vessel					
28	Ships Staff informed System is fully Functional					

Signature of Technician: _____

Revision 07 Date: 18/10/2013

- The Class Societies that all have the requirement for leak testing every 5 years are: ABS, BV, DNV, GL, LR, RINA.
- The original installation certificate should be posted in the GDS central, and a copy should be kept for at least 6 years by the person who issued it.

Complete standard central

The standard centrals for acetylene and oxygen include all items necessary for the gas central room, including signs, racks, equipment and brackets to be screwed or welded to deck and bulkhead.

Central installation for 1 Acetylene + 1 Oxygen
Central installation for 1 Acetylene + 2 Oxygen
Central installation for 2 Acetylene + 2 Oxygen
Central installation for 2 Acetylene + 4 Oxygen

Expansion kit:

Expansion set for 1 acetylene Product
Expansion set for 1 oxygen Product
Outlet station 700 complete w/SG-5 steel cabinet
For further details, please refer to the GDS chart

What maintenance is needed on a GDS?

Service of the GDS is an important task. Every 5 years, the system should be fully checked, tested and certified by a qualified person.

Why maintenance is important – a cautionary tale

Safe maritime companies must be proactive and take preventative measures, including regular maintenance and repairs. The danger was illustrated when a captain on board the cargo ship Ocean Harmony was killed in the explosion of an oxygen cylinder in September 2022.

The ship was in port in Incheon, South Korea. A fire broke out afterwards, but the remainder of the crew were able to escape from the vessel.

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