

TÜRK LOYDU



DESIGN, EQUIPMENT AND TESTING OF GAS WELDING INSTALLATIONS ON SEAGOING SHIPS January 2022

This latest edition incorporates all rule changes. The latest revisions are shown with a vertical line. The section title is framed if the section is revised completely. Changes after the publication of the rule are written in red colour.

Unless otherwise specified, these Rules apply to ships for which the date of contract for construction as defined in TL- PR 29 is on or after 1st of January 2022. New rules or amendments entering into force after the date of contract for construction are to be applied if required by those rules. See Rule Change Notices on TL website for details.

"General Terms and Conditions" of the respective latest edition will be applicable (see Rules for Classification and Surveys).

If there is a difference between the rules in English and in Turkish, the rule in English is to be considered as valid. This publication is available in print and electronic pdf version. Once downloaded, this document will become UNCONTROLLED. Please check the website below for the valid version.

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**Design, Equipment And Testing of Gas Welding Installations
On Seagoing Ships**

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A. General

1. Welding installations in the sense of these rules are fixed installed gas welding plants for the use of acetylene (C₂H₂) and Oxygen (O₂) for welding and gas cutting as well as related procedures on board seagoing ships.

2. Design, equipment and testing of gas welding plants shall be in accordance with these rules.

Designs deviating from these rules may be approved if they have been tested by **TL** for their suitability and accepted as being equivalent.

National rules and regulations of the State whose flag the ship is flying, remain unaffected by these rules.

B. Other Rules and Regulations

Beside of these rules the following TL rules apply also :

1. Türk Loydu Rules

Chapter 4 – Machinery

Section 1 - General Rules and Instructions

Section 14 – Pressure Vessels

Section 16 – Pipe Lines, Valves, Fittings and Pumps

Chapter 5 – Electrical Installation

Chapter 28 – Ventilation

2. National rules and regulations of the State whose flag the ship is flying.

C. Documents for Approval

The following documents are to be submitted to **TL** in triplicate for approval:

- Technical drawings of the gas cylinder rooms and/or gas cylinder cabinet with details on position, design (especially ventilation, insulation

and electrical equipment) access and location in relation to other spaces of the ship, as well as details on placing and fastening of the gas cylinders.

- Piping plan for acetylene and oxygen with material specifications including design of the gastight deck penetrations and details on positions and design of valves and fittings.
- Details of the gas cylinder, gas hoses, torch handles with welding/cutting attachments and other appliances.

D. Design and Equipment**1. Structural Design of the Gas Welding Plant**

The gas welding plant with its outlet station facilities and central gas installation systems shall be fixed installed and its structural design shall correspond to Fig. 1.

The gas welding plant shall consist of:

- Gas cylinder rooms / cabinet with gas cylinders for acetylene and oxygen, connecting high pressure pipes, high pressure hoses, non-return valves, manifold valves and pressure regulators with station gauge,
- Low pressure pipes for acetylene and oxygen,
- Outlet station facilities with torch handle, hoses for acetylene and oxygen, safety devices against backfire and gas backflow (flash back arrestors), station pressure regulators with gauges and shut-off valves.

2. Gas Cylinders

Gas cylinders for oxygen and acetylene have to be manufactured in accordance with an approved standard of appropriate materials and shall be equipped in such a way that they will fulfil the operational requirements and not endanger persons. They shall be type-approved by an institution recognized by **TL**.

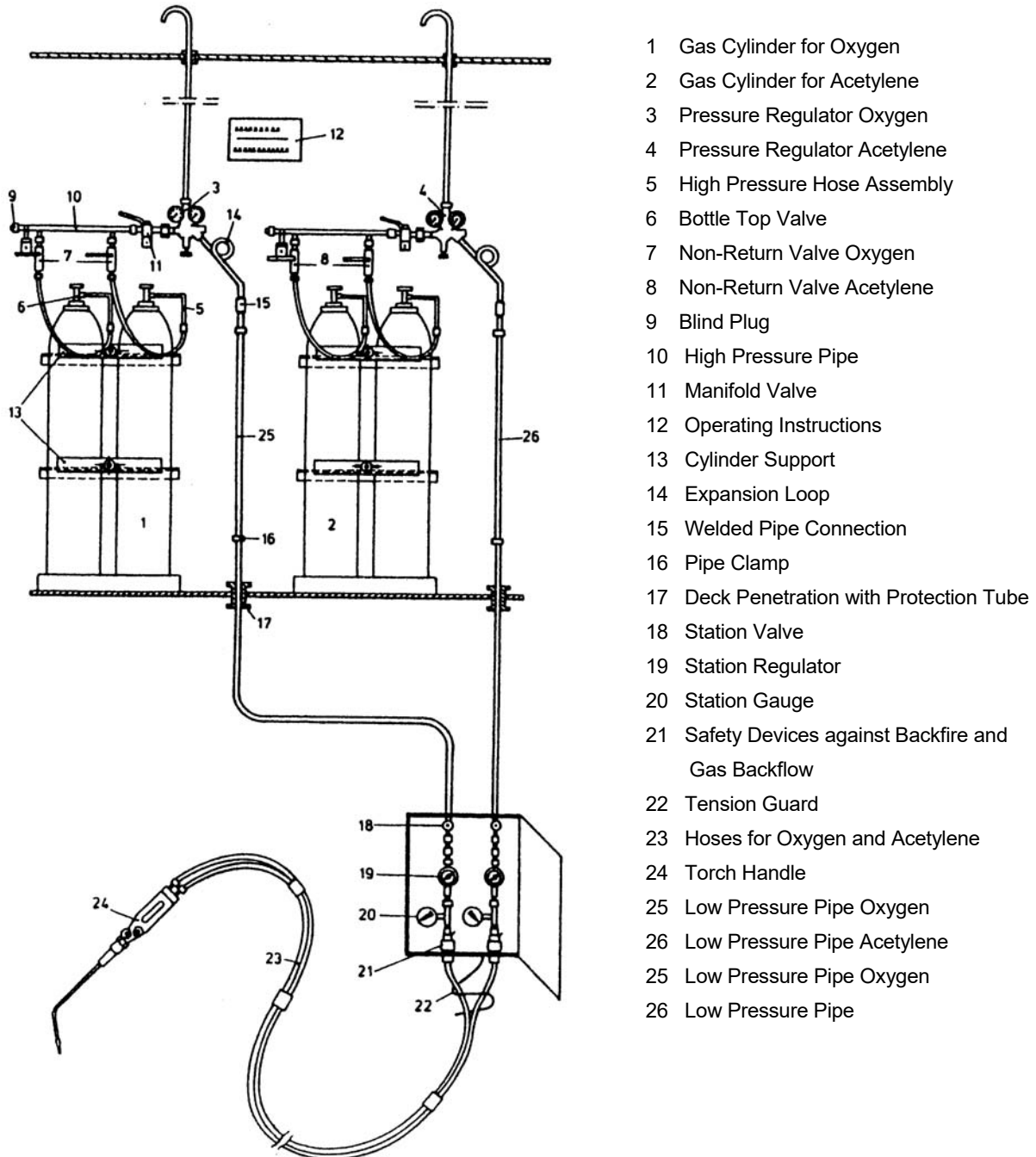


Fig. 1 Structural design of the gas welding plant

The volume of the gas cylinders shall not exceed 50 litres. Each gas cylinder shall be marked at least as follows:

- Name and trademark of the manufacturing works
- Fabrication number
- Gas type

- Capacity
- Empty weight
- Dates of initial inspection and subsequent periodical tests (1).

(1) For the periodical tests the test intervals prescribed by the State whose flag the ship is flying, are applicable.

Colour marking of the gas cylinders shall be as follows:

Oxygen: Blue

Acetylene: Yellow or red (2)

Differentiation is to be made between gas cylinders in use, spare and empty gas cylinders.

3. Placing, Fastening and Number of Gas Cylinders

Gas cylinders in use, spare and empty gas cylinders shall be placed only in the gas cylinder rooms and gas cylinder cabinets provided for that purpose.

Not more than maximum four gas cylinders shall be placed in a gas cylinder cabinet. These four gas cylinders may be gas cylinders in use (oxygen and/or acetylene), spare or empty gas cylinders.

Spare and empty gas cylinders which cannot be stored in gas cylinder cabinets, shall be stored in gas cylinder rooms.

If the gas cylinders are placed in one gas cylinder room, the number of all gas cylinders in use, spare and empty gas cylinders is to be limited to 8

More than 8 oxygen and acetylene gas cylinders, irrespective of size and number of all gas cylinders in use, spare and empty gas cylinders are to be stored separately in 2 rooms, one for oxygen and the other for acetylene.

The rooms shall be separated gastight from each other.

Gas cylinders shall be placed in upright position and secured against tumbling down by clamps or other means which can be opened rapidly without the aid of tools in the case of danger.

The base surface of the gas cylinders in gas cylinder cabinets shall be situated at least 100 mm above deck.

(2) *Colour marking is to be done in accordance with the regulations of the State whose flag the ship is flying.*

Safety valves of pressure regulators are to be fitted with pipes which ensure the safe diversion of escaping gas onto the open deck. The outlets are to be located at a safe place, duly marked and shall be situated at least 3 m above deck.

4. Gas Cylinder Rooms and Gas Cylinder Cabinets

4.1 Arrangement

Gas cylinder rooms (compartments/centrals) shall be located on or above the uppermost continuous deck, separated from the remaining ship spaces by gastight steel bulkheads and accessible from open deck through steel doors. The doors shall open in the direction of escape.

Gas cylinder cabinets (lockers of steel) shall be positioned on or above the uppermost continuous open deck and may not be placed in the immediate vicinity of entrances to ship compartments.

Gas cylinder rooms shall be designed and the gas cylinders arranged in such a way that the gas cylinders can be exchanged and transported without endangering persons.

A gas cylinder trolley is to be provided for the transportation of gas cylinders.

Gas cylinder rooms and cabinets are reserved exclusively for the storage of gas cylinders.

Pipelines carrying flammable liquids or gases may not be led through the gas cylinder centrals or gas cylinder cabinets.

4.2 Marking

Gas cylinder rooms and gas cylinder cabinets shall be provided with warning plates at their entrance doors/access areas marked as follows:

GAS DANGER

Fire, open light and smoking prohibited

NO ADMITTANCE

In the direct vicinity of the central gas installation system a sign-board giving instructions for the use of the installation is to be permanently fixed.

4.3 Ventilation and insulation

Gas cylinder rooms and gas cylinder cabinets shall be protected against excessive heat, particular from sun radiation, and adequately ventilated. A room temperature of 40 °C shall not be exceeded. Insulation shall be of non-combustible material.

Ventilation systems shall be installed in separation from other ventilation systems on board. Exhaust outlets are to be arranged in safe distances from possible sources of ignition. In gas cylinder cabinets ventilation openings are to be arranged in the upper and lower parts.

Gas cylinder rooms shall be fitted with mechanical ventilation of at least 6 air changes per hour based on the gross volume of the room.

4.4 Electrical installations

Electrical installations in gas cylinder centrals and gas cylinder cabinets are to be of explosion prove design. Only such electrical equipment shall be used which complies at least with the requirements of:

Explosion group IIC, and of temperature class T2

5. Low Pressure Piping

The connecting pipelines for acetylene and oxygen between the pressure regulators of the cylinder centrals and the outlet station facilities shall be made of seamless steel tubes E235+N or an equivalent material. Low pressure pipelines shall have a minimum thickness of 2,0 mm. When installed on deck, a minimum wall thickness of 2,5 mm is to be provided.

Pipe connections shall be of welded type only, securely fastened and so arranged as to be protected against mechanical damage. Deck penetrations are to be gastight.

Pipelines carrying acetylene and oxygen shall not be led through accommodation spaces.

Pipelines shall be marked in their overall length in the colour of the appertaining gas cylinders.

6. Pressure Regulators and Other Fittings

6.1 Pressure regulators with pressure gauges

Pressure regulators for acetylene and oxygen shall be manufactured in accordance with a recognized standard and be of approved type. They are to be marked according to the test standard. Colour marking shall be in accordance with D.2.

Pressure regulators shall be fitted with one pressure gauge each for the inlet side and outlet side.

Oxygen gauges shall bear the notice:

“Oxygen! Keep free from oil and grease“

The aperture of the safety valve or the outlet adaptor shall be fitted pointing upwards vertically. The safety valves of the pressure regulators shall be connected to pipelines so that escaping gas can be diverted without danger.

6.2 Safety devices

Safety devices are devices of protection against gas backflow and backfire. They shall be manufactured in accordance with a recognized standard, be of approved type and marked accordingly.

6.3 High pressure piping, hoses and accessories

The cylinder top valves and pressure regulators are to be connected by high pressure pipes, manifold valve and high pressure hose assembly. The piping and high pressure hose assemblies including the accessories shall be proven to be suitable for acetylene or oxygen respectively and for the rated working pressure.

The high pressure hoses shall be in accordance with a recognized standard, of approved type and marked accordingly.

If two or more gas cylinders containing acetylene or

oxygen are connected to a high pressure pipe, a non-return valve shall be provided for each supply line.

6.4 Arrangement and number of pressure regulators, station regulators and safety devices

Pressure regulators with pressure gauges shall be provided for acetylene and oxygen on the gas cylinder installations in the gas cylinder cabinet or gas cylinder room respectively and station regulators for acetylene and oxygen shall be provided on the outlet station facilities. Safety devices according to 6.2 shall be installed for acetylene and oxygen on the outlet station facilities.

The connection to the gas cylinders is effected by high pressure hose assembly and bottle top valve adaptor pipe.

The gas cylinder installation with pressure regulator, high pressure pipeline and manifold valves shall be firmly fitted to the bulkhead.

7. Gas Hoses

Gas hoses shall be in accordance with a recognized standard, of approved type and marked accordingly.

8. Torch Handles with Welding / Cutting Arrangements

Torch handles with welding/cutting attachments shall be in accordance with a recognized standard, of approved type and marked accordingly.

9. Outlet Stations

9.1 General

Outlet stations are, generally, only permitted in the engine room and/or the workshop. Outlet station facilities are to be arranged in such a way that they are as far as possible protected against mechanical damage. Adequate room ventilation is to be provided.

In special cases outlet stations are allowed on open deck. They shall be arranged in lockable cabinets.

9.2 Safety instructions

Outlet stations shall have notice boards with instructions for proper completion of welding work, as follows:

1. Close top valve of gas cylinders in use
2. Open valves at the torch handles to release acetylene and oxygen
3. Close valves at the torch handles
4. Close station valves

E. Tests and Inspections

1. General

All tests and inspections on the gas welding plant are to be carried out by the company or person responsible for the installation or by another approved specialist in the presence of the TL Surveyor. Deviations from this may be admitted for the annual tightness tests according to 2.2.

2. First and Extraordinary Tests and Inspections

Prior to initial operation or after maintenance work has been done, the gas welding plant is to be inspected for confirmation of compliance with these rules and to be subjected to the following tests:

2.1 Strength test

The acetylene and oxygen systems are to be tested hydraulically with:

300 bar on the high pressure side

25 bar on the low pressure side

The high pressure side includes:

High pressure hose assemblies, high pressure pipeline and high pressure valves up to the pressure regulator.

The low pressure side includes:

Pipeline between the pressure regulator in the gas cylinder cabinet, the outlet station valve in the workshop.

The test of the high pressure side is not required if the hydraulic test has already been performed at the manufacturer's works and tested components have been marked accordingly.

2.2 Tightness test

The acetylene and oxygen systems are to be cleaned thoroughly of oil and grease, blown through with nitrogen and tested at maximum allowable working pressure + 10 bar.

For this tightness test the gas cylinder top valves and the station valves in the workshop are to be closed on pressurizing the complete system. All valves and pipe connections are to be tested for tightness with soap water.

If the test pressures of the high pressure and low pressure side -to be read from the pressure gauges- remain unchanged over the period of one hour, the systems are considered to be tight.

On the occasion of every tightness test the safety devices at the outlet stations are to be tested for assurance that gas backflow does not occur.

3. Periodical Tests

3.1 Annual tightness test

Annual tightness tests are to be carried out at the working pressure. The tests may be carried out by the Chief engineer or by his deputy.

For the tightness test the gas cylinder top valves and the station valves at the outlet stations are to be closed on pressurizing of the complete system. If the working pressures on the high pressure and low pressure side -to be read from the pressure gauges- remain unchanged over the period of one hour **(3)**, the systems are considered to be tight.

When maintenance work on the oxygen and/or acetylene pipes of the gas welding plant becomes necessary, this is to be performed by a specialist. On completion of the maintenance work, tests in accordance with 2.1 and 2.2, as far as applicable, are to be carried out.

3.2 Test at five year intervals **(3)**

The gas welding plant is to be tightness tested in accordance with 2.2 and the compliance of the plant with these rules is to be confirmed.

(3) *Deviating national regulations are to be observed.*