

INDUSTRIAL COMMISSION OF WISCONSIN

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GENERAL ORDERS
FOR THE
MANUFACTURE AND COMPRESSION
INTO CYLINDERS
OF
ACETYLENE GAS
FOR SALE OR TRANSPORTATION TO USERS
OTHER THAN THE MANUFACTURERS

Effective December 11, 1919
With Amendments (to Order 4635)
Effective June 4, 1931

GENERAL ORDERS ON GAS HAZARDS

Part I

Manufacture and Compressing of Acetylene into Cylinders
for Sale or Transportation to Users Other Than
the Manufacturers.

Definitions

Order 4600. "Compressed". The word "compressed" is meant to indicate gas pressure in excess of that produced by a head or column of 20 lineal inches of water.

Order 4601. "Incombustible". For the purpose of these orders the term "incombustible" wherever used shall be understood to indicate materials or construction which will not ignite when subjected to ordinary fire.

Layout and Location

Order 4610. Buildings for acetylene compressing plants hereafter constructed, shall be considered in two sections:

- (a) Generation, purification, compression, storage, shipping and executive.
- (b) Cylinder charging.

Order 4611. Buildings in group (a) may be in one block. Rooms used for generation, purification and compression shall be separated from each other and from other rooms by standard unpierced fire walls; except as provided in Order 4621.

Order 4612. The proposed site for location of all buildings of the plant shall be approved by the Industrial Commission and the charging building shall not be less than thirty feet from any other building of the plant.

1 - While present types of construction and methods of operation prevail, the Industrial Commission will approve a proposed site for the location of a plant for the manufacture and compression of acetylene into cylinders for sale or transportation to users other than the manufacturers, under Order 4612, only when the charging plant is located not less than the following distances from the places named, which distances have been unanimously recommended by the advisory committee on gas hazards:

- 1,000 feet from nearest schoolhouse
- 300 feet from nearest residence, place of employment or city street
- 150 feet from any railway carrying passengers, or any country road

Order 4613. The main storage tank or gasometer may be placed in the open but provision shall be made to prevent freezing, and if housed, the building shall be properly ventilated and constructed of incombustible material.

Order 4614. Fence. The buildings of the plant shall be entirely enclosed with a suitable fence at least six feet high.

Construction and Operation

Order 4621. Height. (a) The charging building shall be only one story in height, without basement.

(b) The operations of generation, purification, and compression may be carried out in buildings or sections, not exceeding two stories in height without basement.

(c) Other plant operations such as shipping, repair and executive shall be carried on in one story buildings or sections, without basement, provided, however, that a fireproof boiler room and coal storage space, with outside entrance only may be located under the rooms devoted to repairs and executive.

(d) Boilers, if not located as provided for in the foregoing section shall be located in a separate, detached building of incombustible material.

Order 4622. Construction. The charging building and the generation, purification and compression sections shall be constructed of incombustible materials.

Order 4623. Floors and Filling Racks. The floors of the runway in the charging room shall be of a material not liable to produce sparks when tanks or other metal objects come in contact with it.

When two or more filling racks are located in one charging building, they shall be separated from each other by a reinforced concrete wall five feet high and not less than twelve inches thick.

Order 4624. Exits. The charging buildings shall be provided with at least two exits with double doors swinging outward.

All other sections shall be provided with at least one exit with doors opening outward.

Order 4625. Heating. The heating apparatus shall be of the steam or hot water type.

Order 4626. Lighting. Buildings shall not be artificially lighted except by electric lights, having air-tight bulbs, globes or tubes.

Electric light switches shall be located on the outside of buildings, excepting office building.

All electric wires shall be run in conduit.

Order 4627. Ventilation. Each building shall be properly ventilated.

Order 4628. Fire Extinguishers. Each building or section shall contain at least two approved fire extinguishers.

Every workman shall be instructed as to the nature and hazard of the business and in the proper use of fire extinguishers.

Order 4629. Flames and Sparks. No open flame of any description and no grinding tools shall be employed in any section of the plant except in the repair room and boiler room.

All practices or methods of doing work that are liable to produce shocks, sparks, or excessive heating are prohibited.

All causes of static electricity, such as running belts, etc. shall be avoided in buildings containing acetylene in process of manufacture, storage or shipment, but when absolutely necessary they shall be properly grounded to avoid sparks.

Order 4630. Containers for Calcium Carbide. Calcium carbide shall be stored in air and water tight cans, drums, or containers constructed of tin, iron or steel without the use of solder, and shall be marked: "CARBIDE - DANGEROUS IF NOT KEPT DRY".

Order 4631. Storage of Calcium Carbide - Small Lots. A day's supply of calcium carbide may be stored in the generator house in a place that is dry, waterproof and well ventilated.

All containers shall be kept sealed until one in use is empty.

Order 4632. Storage of Calcium Carbide - Large Lots. Calcium carbide in excess of one day's supply for the plant may be stored in the open if contained in waterproof drums in good condition.

A building used for the storage of calcium carbide shall be isolated, constructed of incombustible materials, well ventilated and dry and shall have a sign conspicuously displayed on the outside, above the entrance, bearing in letters at least twelve inches high the words: "CALCIUM CARBIDE - USE NO WATER".

Order 4633. Acetone. Acetone shall be stored in underground tanks or may be stored in the open in the original shipping containers provided they are protected from the sun.

The filling or replenishing of acetone into cylinders may be carried on only in the open, in the shipping room or in the charging room.

Acetone for one day's supply, not exceeding ten gallons may be located in the shipping room, or charging building or both, but shall not be left there when the plant is not in operation.

The containers used for this purpose shall be of a type approved by the Industrial Commission.

Order 4634. Machinery. All machinery used in the generation, storing and compression of acetylene shall be set on a firm foundation, in a level position with no undue stress on any of its parts or connections.

Order 4635. The carbide to water type of generator shall be used.

Generators shall be provided with liquid seal safety devices which will prevent an undue pressure in the generator.

Generators having a gas receiving bell as an integral part thereof shall not be used.

The water seal shall be designed to provide a normal working pressure not to exceed twenty lineal inches of water column.

Every generator shall be plainly marked with the maximum number of cubic feet of gas it is designed to supply per hour. The manufacturer's name and address and the trade name or designating marking of the machine.

When carbide dust is used, the generator shall be supplied with an agitator which will keep the water in constant circulation in the generating chamber while carbide is being introduced in order to avoid the settling or the formulation of large quantities of "islands" of carbide dust. The carbide feeding device shall be so arranged that it will be inoperative when the internal agitating apparatus is not in motion.

The sludge or discharge valves of the generator shall be piped to the outside of the building, and no open troughs for conveying the residue inside the building shall be permitted.

All electric motors inside the building shall be of the alternating current induction type. When direct current motors are used, they shall be located on the outside of the building in a small separate building, used for that purpose only.

Switches controlling motors shall be of the non-sparking type or shall be located outside the building.

Order 4636. Storage of Gas. A separate gas holder for storing gas after generating shall be provided and shall be constructed on the gasometer principle.

The bell shall move freely without tendency to bind, and shall have a clearance of at least two inches from each side of the tank.

The gas holder shall be of standard construction, the bell being provided with guide wheels operating on guides supported from the tank.

Order 4637. Scrubbing and Drying. All gas before compression shall be properly treated to remove moisture and lime dust.

Order 4638. Pressure Limit. Acetylene cylinders shall be so charged that the final or settled pressure will not exceed 250 pounds per square inch at 70 degrees Fahr., and at no time shall a compressor operate at a pressure in excess of 300 pounds per square inch.

An automatic safety stop device shall be located on the main high pressure delivery pipe to stop the compressor, shall the pressure exceed 300 pounds.

Order 4639. Compression. When the gas is to be compressed to a pressure in excess of 15 pounds per square inch, three or more stage compressors shall be employed to reduce compression temperature.

The compressor shall be so constructed that the gas is cooled at each stage of compression.

The compressor shall be operated so that at no time does the piston travel exceed 175 lineal feet per minute.

Each cylinder of a compressor shall be equipped with a safety release of ample size designed to blow if the pressure in any cylinder exceeds by 30 pounds the proper maximum working pressure of that cylinder. All such safety releases must be piped to the outside of the building.

Each stage of the compressor shall be fitted with a pressure gauge, graduated to at least one-third greater than the maximum pressure of the stage to which it is fitted.

Order 4640. Pipe, Fittings and Valves. All pipes and fittings in the system on the discharge side of the compressor shall be of extra heavy steel and shall be painted in distinctive colors.

Connections between the cylinders and charging manifold may be of seamless drawn steel.

All valves on the discharge side of the compressor shall be of brass, bronze or other non-sparking material.

Order 4641. Oil Separators. Oil Separators shall be installed between the compressor and the charging manifold to remove all oil from the gas.

Order 4642. Cylinders. No cylinders shall be used for acetylene under pressure except such as are acceptable for interstate commerce.