

**INTERNATIONAL
INDUSTRIAL GASES LTD**

ACETYLENE PLANT

146 ANDUL ROAD, HOWRAH-711103, INDIA
+91(33)26681066 +91(33)26684724
+91(33)26684725

WWW.IIGAS.COM



ABOUT THE PLANT

Our acetylene plants are carefully designed and inspected by experienced engineers before assembly to assure our customers an efficient and dependable D.A plant.

99.8%

plant efficiency
The highest efficiency attained
in the world!

FULLY AUTOMATED PLANT WITH TWIN HOPPERS

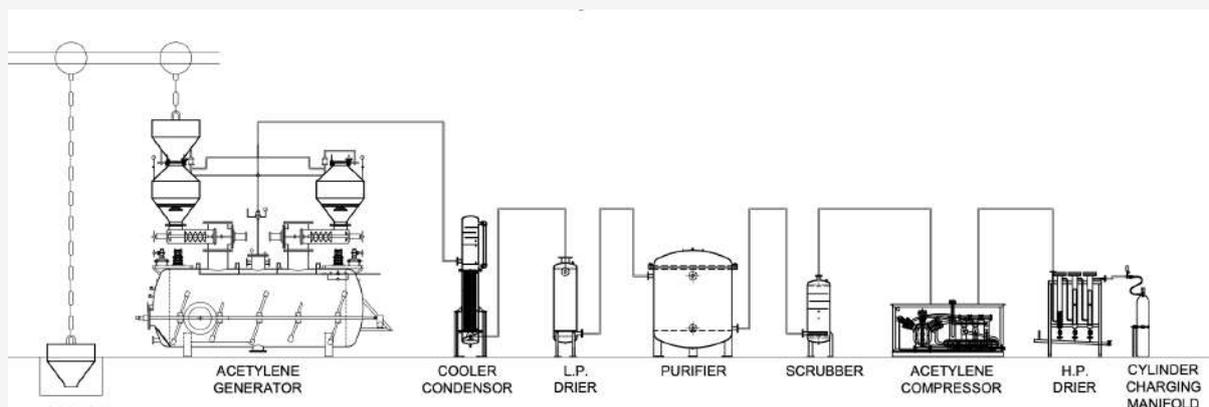
needs only 10 minutes of the
operator's attention in an hour

FEATURES

- Automatic controls for safety features
- Automatic Screw Feed mechanism
- Gas holder not required
- Continuous or intermittent customer service
- No venting of acetylene from the tank to the atmosphere
- Residue is suspended automatically
- Automatic thermostatic water inlet residue outlet
- Easy to operate and maintain

ACETYLENE PLANT DIAGRAM

All operations are performed by pneumatically controlled valves, assisted by highly sensitive sensors with the temperature control instruments.



ACETYLENE GENERATOR SPECIFICATIONS

Specially designed high-pressure generator, to be operated with dust or lump size carbide at efficiency of more than 98%. The generator is manufactured in accordance with Section 8 of the ASME Code and produces acetylene gas at less than 0.6 bar (8 PSIG) pressure. Hoppers are used to provide an uninterrupted flow. The simplicity of operation allows the generator to be run only when acetylene is required.

Specifications	KIGL-DA-25	KIGL-DA-45	KIGL-DA-100	KIGL-DA-200
Capacity	15 to 30 cubic meter/hr of Acetylene	31-50 cubic meter/hr of Acetylene	51-100 cubic meter/hr of Acetylene	101 to 200 cubic meter/hr of Acetylene
Cylinders filled per batch	60 Cylinders	60 Cylinders	120 Cylinders	120 Cylinders
Carbide Size	4-50 mm	4-80 mm	4-80 mm	4-80 mm
Maximum Operating Pressure	1.5 kg/cm ²	1.5 kg/cm ²	1.5 kg/cm ²	1.5 kg/cm ²
Hopper Capacity	250 Kg	400 Kg	500 Kg	900 Kg
Minimum Guaranteed Efficiency	92%	92%	92%	92%
Water required	6 to10 litres. Per kg of Calcium Carbide used	6 to10 litres. Per kg of Calcium Carbide used	6 to10 litres. Per kg of Calcium Carbide used	6 to10 litres. Per kg of Calcium Carbide used
Connected load	8 KW	8 KW	18 KW	18 KW
Start-up time	15 minutes	15 minutes	15 minutes	15 minutes
Conforming specifications	IS 8471 UL-408T RAC-203 NFPA-51A	IS 8471 UL-408T RAC-203 NFPA-51A	IS 8471 UL-408T RAC-203 NFPA-51A	IS 8471 UL-408T RAC-203 NFPA-51A
Power Supply	380 ~ 440 Volts / 3 phase / 50 hertz (if your supply is different from this please specify to enable us quote accordingly)	380 ~ 440 Volts / 3 phase / 50 hertz (if your supply is different from this please specify to enable us quote accordingly)	380 ~ 440 Volts / 3 phase / 50 hertz (if your supply is different from this please specify to enable us quote accordingly)	380 ~ 440 Volts / 3 phase / 50 hertz (if your supply is different from this please specify to enable us quote accordingly)



ACETYLENE PLANT

SAFETY FIRST!

- Flash Back Arrestors
- Auto Controls
- High Pressure Reverse Flow Check Values
- Safety Valves
- Auto-Vent Values
- Non-return Values
- Visual and audible signals to alert operator in case of failure

****Only flame proof lights and electrical fittings according to IS2148-68 (Group II) or BSS-229 may be used in an acetylene plant building.**

PROCESS DESCRIPTION

In Stationary Carbide to Water type Automatic Acetylene Generator acetylene is produced by reaction of calcium carbide with water. Adequate quantity of water is held in the generator shell to which calcium carbide is fed from top.

The generated acetylene gas occupies the free volume inside the generator shell over the water level and pressure of gas goes up till it reaches the set pressure level when by action of the pressure controller carbide feed motor is cut-off. If the acetylene gas is taken out from the generator, the pressure inside the generator shell will go down and by action of the pressure controller carbide feed motor will start and feed further carbide through the screw feed mechanism from the hopper into the shell and further acetylene shall be generated. Thus, the process shall continue till the carbide filled in the hopper under operation is exhausted. At that stage change over takes place and second hopper which was filled with carbide when first hopper was under operation now starts feeding carbide into the generator shell and first hopper is filled with carbide.

As the process of acetylene generation is exothermic, there is a temperature rise of the generator. The generator temperature cannot be allowed to go high because acetylene can catch fire. Moreover, generation of acetylene is optimum at a particular temperature around 60°C. Hence it is necessary to keep the generator temperature around 60°C. This is done automatically by the temperature controller, which is pre-set at a temperature of 60°C. Since the generator has a tendency of increased temperature, the temperature controller acts on the water inlet valve and opens the valve to bring in fresh process water, which reduces temperature of the generator, and thus the generator temperature is kept at about a particular predetermined set point.

With inlet of fresh water to bring down the generator temperature the water level inside the generator goes up and this water level is maintained between a high and low set point by pneumatically operated level controller. Slurry discharge valve is made to open automatically by the level controller to discharge some quantity of slurry to lower the water level inside the generator when the water level tends to rise above the maximum level. As soon as the level of water goes down the slurry discharge valve automatically closes. Thus, only minimum quantity of slurry is discharged at a time. Water inside the generator absorbs certain quantity of acetylene and hence this water already saturated with acetylene should not be discharged continuously or in large volume but should be retained inside the generator and thus prevent loss of acetylene with the slurry. The Agitator is continuously driven when the carbide feed motor is running. However, when the generator is in dormant state and there is no carbide feed, there is a tendency of the slurry to settle down and jam the agitator. A timer controlled electric motor drive keeps the agitator under operation when the generator is in dormant state. Thus, slurry is always kept mixed with water without sedimentation. Agitator is a very important part of the generator as it keeps the carbide and water intimately mixed for total reaction of the carbide and thus prevents loss of carbide in the form of solids with the slurry.

Passage of acetylene gas from the generator to the carbide chamber (hopper) under filling is kept shut off by hydraulically operated shut off device which operates automatically when the carbide in the hopper is exhausted and screw feed motor is stopped.



The generated Acetylene passes from the generator chamber through Wet Type Flash Back Arrestors and then reaches Low Pressure Condenser where cooling water lowers the temperature of gas and part of the moisture in the acetylene gas is taken out in the form of water by condensation. Gas then passes through low pressure dryer filled with calcium chloride to remove further quantities of moisture from acetylene gas before the gas reaches purifying chamber. Gas then passes into purifying chamber with optimum quantity of moisture in the gas (gas is not completely dry). Purifying chamber is filled with purifying chemicals to remove Phosphorus and Sulphur compounds from the gas and if necessary, to remove acidic fumes also. Thereafter gas passes to water filled scrubber where acetylene gas is washed with water to remove particles of purifying chemicals, which may be carried over with the gas from purifying chamber. The wet gas then enters suction of acetylene compressor, compressed and passed to high pressure dryer filled with mechanical devices and chemicals to remove lube oil vapor and moisture from the gas. Gas after passing through the High-Pressure Dryer is arrested by Back Pressure Valve on the pipeline leading to the manifold. Back Pressure Valve is set at a pressure between 12 to 14 kg/cm²g so that no gas till the pressure rises above the set pressure is allowed to pass on to the manifold. This ensures efficient drying of acetylene gas in the high-pressure dryer. Thereafter gas passes through Dry type Flash Back Arrestor to manifold and then passes to the cylinders hooked on the manifold through Static Free Uniflow Valves meant for each cylinder.

The Acetylene gas generated can be filled in gas cylinders by using a compressor or directly piped to the desired point of consumption.

Before hooking the cylinders on the manifold for filling they are weighed on a balance, loss of acetone if any ascertained, loss is made up by filling acetone preferably by hand pump directly from acetone drum and then only cylinders are made ready for connecting to the manifold for filling.

During filling continuous spray of cooling water is kept on the cylinders as there is a temperature rise of cylinder during filling operation and absorption of gas in acetone is better when the gas is at a lower temperature. When the cylinders are filled to the desired pressure as per temperature chart, filling is stopped and acetylene gas is allowed to settle inside cylinders. There will be some drop in pressure and a second or 3rd filling may be necessary to achieve the desired cylinder pressure. After filling cylinders are taken out by disconnecting the pigtailed, cylinders weighed on weighing machine and quantity of acetylene filled in the cylinders is ascertained from the weight of the cylinders. Cylinders are tested for leaks and stored for distribution.

It is advised to have A small bank of 4 to 6 Nos. 6 M³ Nitrogen cylinders are kept in manifold with piping to various points for flushing the various parts of the plant and inter-connecting pipelines.

Electrical lines are to be provided by customer from MCC located at a safe distance to feed carbide screw feed motors, compressor motor controls and instrumentation.

Instrument Air Compressor is provided (pipeline is to be provided by customer) for operating the Pneumatic Instruments. Apart from the instruments mounted on the generator, some of the control instruments are located on a panel, which is installed at a safe distance along with MCC