



Mecburg Engineering & Consultancy

**PIONEERS IN  
UNIPOLAR HYDROGEN GAS  
GENERATORS**



## THE "SEALED UNIPOLAR CELL" FEATURES

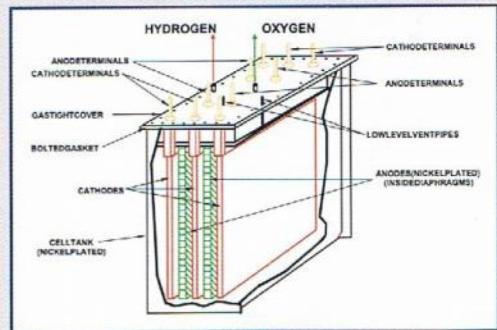
Spirare Energy manufactures Low pressure cells known as the "Sealed Unipolar Cell" in their manufacturing works in Noida (U.P.). A summary of the major advantages of the "Sealed Unipolar Cell" is as follows:

### Design

- No contact of electrolyte with atmosphere. Due to its sealed design, there is no loss of Hydrogen Gas or electrolyte during operation.
- The Gap between the Electrodes (in Unipolar cell) is minimal as the cell is very efficient. Even though cathode and anode are separate plates, Sealed Unipolar cell design makes it possible to reduce space between Anode and Cathode electrode surface similar to Bipolar. This design makes it possible to service Unipolar Cells in the field.

### Modular Construction

- In the event that maintenance is required in the Sealed Unipolar cell, a single cell can be removed from the line and production continued on the balance of the plant.



### Efficiency

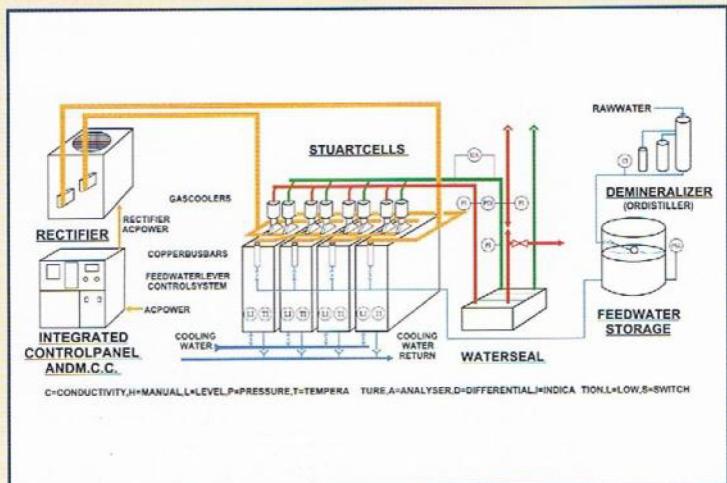
- Even when Sealed Unipolar Cell plant is switched off, no eddy currents flow in the system. This ensures sustained efficiency and no change in power consumption even after several years of use.
- The Sealed Unipolar cell operates at lower current densities of 150 mA/in<sup>2</sup> & thus operates for longer periods of time without overhaul. No auxiliary pumps & filters/electrolyte recirculation system is required.
- Purity is achieved within 5 minutes of start up, even in very cold conditions

## DESCRIPTION & OPERATION OF UNIPOLAR ELECTROLYTIC HYDROGEN GAS GENERATION SYSTEM

The Gas Generation System is designed to meet the following requirements:

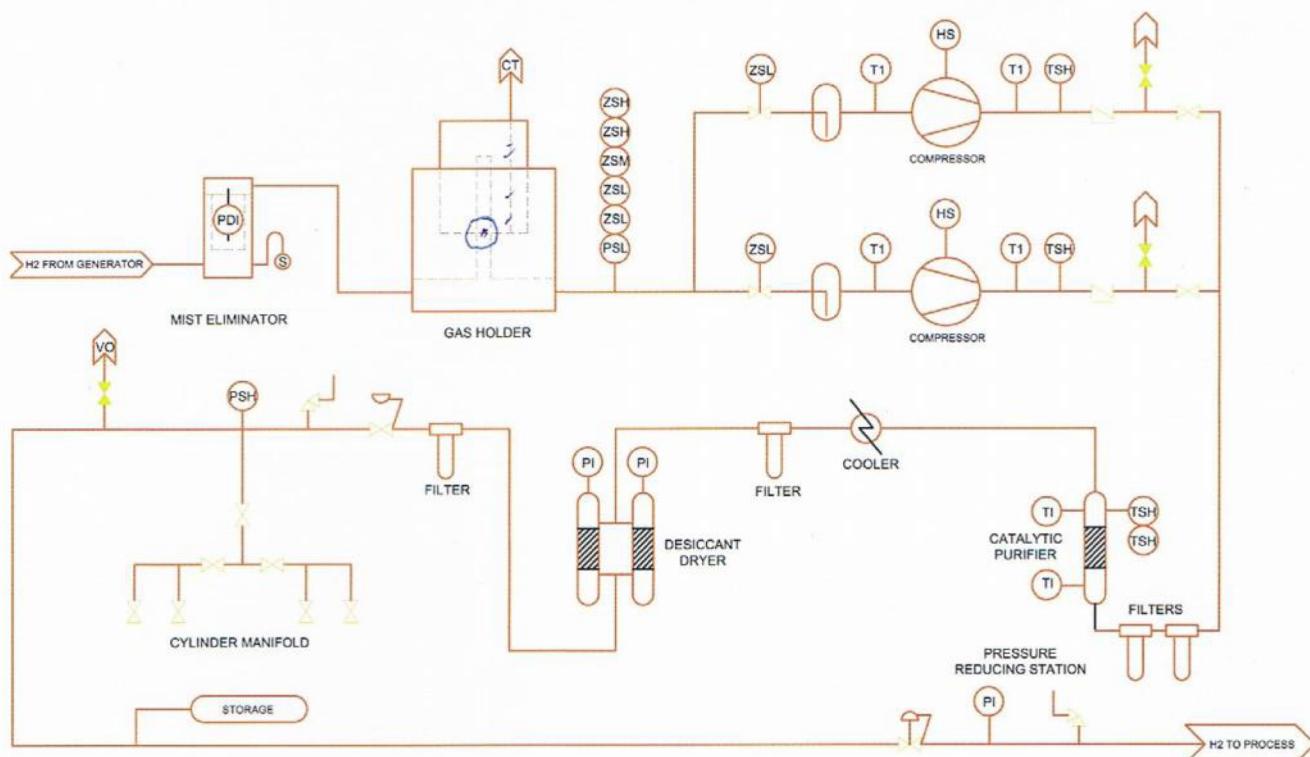
- To deliver continuously the stated flow of electrolytic hydrogen at purity of 99.9%, and of electrolytic oxygen at a purity of 99.7%. The principal impurity in the hydrogen is oxygen. Since purified water only is used for electrolysis, carbon monoxide, sulphur compounds or other deleterious impurities are not present.
- To operate automatically, requiring only periodic inspection.
- AC power is supplied to a silicon rectifier which provides DC power to operate a battery of Unipolar Cells, producing hydrogen and oxygen by electrolysis of water. The rate of gas output is directly proportional to operating current, and therefore may be adjusted as desired by operating the rectifier voltage control. The silicon rectifier is of heavy industrial design for continuous duty and includes complete protective devices.
- Unipolar Cells operate without regular attendance and the Cells are supplied automatically with purified feed water (maximum conductivity 500,000 micro-Seimens/cm) to be provided by the purchaser. The water is stored in tanks sufficient in size to contain approximately ten hours consumption. Feed water purity is checked at intervals by means of a conductivity meter.

On start-up, hydrogen is vented to atmosphere for approximately five minutes and then is directed by the operator into the gasholder main. The oxygen passes through the water seal and is vented to atmosphere unless it is to be used. The plant may be started and stopped or the rate of output varied as frequently as may be necessary by operation of the rectifier voltage control. Gas output may be maintained at any level between 20% and 100% of capacity. On start-up, hydrogen purity is obtained within five minutes.



## DESCRIPTION & OPERATION OF UNIPOLAR ELECTROLYTIC PLANT HYDROGEN COMPRESSION

- Hydrogen from the Gas Generation System passes to a wet-seal gasholder (pressure <sup>150</sup>~~125~~mm water column maximum). The compressor, which withdraws hydrogen from the gasholder, is stopped and started automatically by limit switches actuated by the gasholder bell. The compressed gas is cooled in an after cooler and condensed moisture is removed.
- A mist eliminator at the compressor inlet removes electrolyte droplets carried over by the gas, thereby reducing maintenance on the compressor.
- After compression, oxygen impurity (approximately 0.1%) is removed by means of a catalytic purifier.
- The hydrogen is then dried to a desired dew point using appropriate dryer.
- To obtain drying effect of compression, pressure is maintained at a pre-set level by means of a backpressure valve.
- The Hydrogen is then passed to a cylinder filling manifold/High Pressure Storage Cylinders (as per customer requirements), arranged with dual sections to permit connection and removal of cylinders without interruption of filling. When the cylinders are full, the compressor is stopped automatically by means of a high-pressure switch.
- Both, Gas Generation and Hydrogen Purification Systems, are shipped as packaged plant mounted on one or more steel bases with complete wiring and piping ready for connection to customer's power and water service line.
- The purity of the hydrogen at the discharge of the compression system will be 99.99%.



## POWER STATION HYDROGEN GENERATORS

Spirare Energy Offers several models of Hydrogen Generators designed specifically for power station use.

A list of typical models is as follows:

Generator	Gas Per Hour		Total Power	Cooling Water Requirement	Demineralized Water Requirement	KOH Requirement
	Hydrogen	Oxygen				
Model No.	m <sup>3</sup>	m <sup>3</sup>	KwAC	(liters/hr)	(liters/hr)	(grams/hr)
SE-50	5	2.5	30	350	5	2.5
SE-100	10	5	60	700	10	5.0
SE-150	15	7.5	90	1050	15	7.5
SE-200	20	10	120	1400	20	10.0
SE-250	25	12.5	150	1750	25	12.5
SE-300	30	15	175	2100	30	15.0

## APPLICATIONS

### Hydrogen Atmosphere

- Annealing of silicon steel.
- Manufacture of lamps and tubes.
- Manufacture of semi-conductors.
- Bright Annealing of stainless steel.
- Sintering of metal powders and compacts.
- Manufacture of synthetic gems.
- Float glass manufacture.

### Hydrogen Reducing Atmosphere

- Reduction of metallic oxides.
- Reduction of uranium oxides.

### Hydrogen in Chemical Processes

- Hydrogenation of edible oils.
- Hydrogenation of fatty acids.
- Production of sorbitol.
- Production of ammonia for fertilizer.
- Synthesis of chemical intermediates.

### Hydrogen Cooling in Thermal Power Stations.

### Supply of Commercial Industrial Gases.

- Argon Purification.
- High purity hydrogen.

### High Temperature Cutting and Welding.

### Inflation of Meteorological Balloons.

## CLIENTELE



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