AMIRAJ COLLEGE OF ENGINEERING & TECHNOLOGY

NEAR, TATA NANO PLANT,SANAND,AHMDEDABAD.

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ELECTRICAL | [6TH | January 18, 2018

[INDUSTRIAL VISIT REPORT]
[GUJRAT SOLAR PARK (CHARANKA)]

GUJARAT SOLAR PARK (CHARANKA)

PATAN, GUJARAT.

Gujarat Solar Parks are solar power generating parks being constructed in Gujarat, India. A total of about 1100 MW are commissioned as of March 2016, with individual solar parks ranging from hundreds of kW to 40 MW capacity

❖ **LOCATION: -**

Charanka Solar Park

Location of Gujarat Solar Park

Country	India
Location	Patan district
Coordinates	23°54′N 71°12′E
Status	Operational
Construction began	2010
Commission date	2012
Solar field	
Type	Flat-panel PV
Site area	2,000 ha (4,900 acres)
	Site plan
Power generation	
Units operational	345 MW
Nameplate capacity	500 MW

- Charanka Solar Park is being built on a 2,000-hectare (4,900-acre) plot of land near Charanka village in Patan district, northern Gujarat. This hosts about 19 different projects by different developers. On 19 April 2012, a total of 214 megawatts (287,000 hp) had been commissioned. It also became the world's third largest photo voltaic power station. When fully built out, the Charanka Solar Park will host 500 MW of solar power systems using state-of-the-art film technology. The investment cost for the Charanka solar park amounts to some US$280 million. Construction began on 3 December 2010. 345 MW had been installed by March 2016.

POWER PURCHASE ARRANGEMENTS: -

Rs 15 (about USD 0.29) per kWh for the first 12 years and Rs 5 (about USD 0.10) per kWh from the 13th to 25th year. The national solar policy has fixed tariffs of Rs17 for photovoltaic and Rs15 for solar thermal for 25 years.

About 600 MW were completed prior to the deadline of 28 January 2012 to receive the above tariff.

- **What is solar energy?**

Solar energy is radiant light and heat from the sun that is harnessed using a range of ever evolving technologies such as solar heating, solar thermal energy, solar architecture, solar power plants.

Solar energy is important renewable energy and its technologies are broadly characterized as either passive solar or active solar depending

on that how they capture and distribute solar energy or convert it into the solar power.

Active solar technique includes the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Passive solar technique Include orienting a building to the sun, selecting material with favorable thermal mass and designing spaces that naturally circulate air.

- **What is solar power?**

Solar power is the conversion of solar energy from sunlight to electricity, either directly using photovoltaic indirectly using concentrated solar.

The solar power from solar energy is created by the use of solar panel.

- **What is solar panel / plate?**

Solar panel absorbs the sunlight as a source of energy to generate electricity or heat. A PV module is packaged, connect 6*10 photovoltaic cells. Solar panel is made by the use of solar plates.

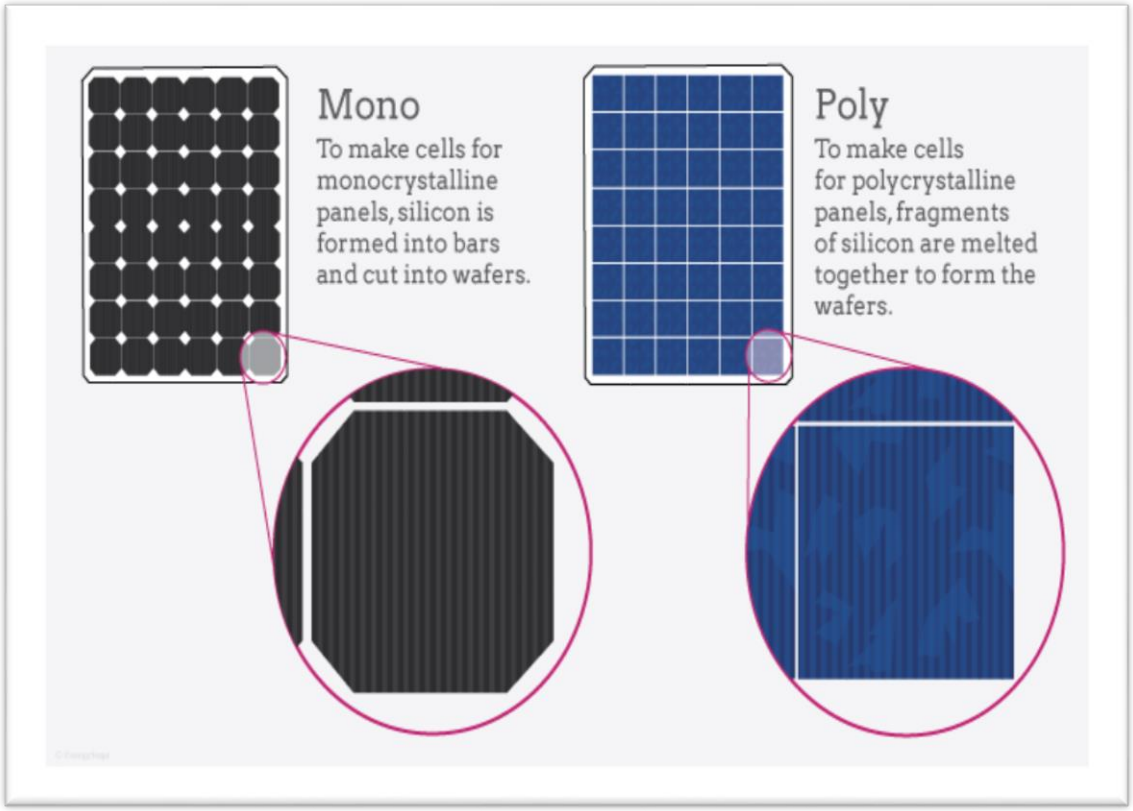
The most of solar plates are made from silicon material.

There are mainly 2 types of solar plates:

Polycrystalline solar plate: In polycrystalline solar panel fragments of silicon are melted together to form the wafers. Polycrystalline plates are made from different types of silicon

fragments therefore it is also known as multi crystalline plates. It has less efficiency than monocrystalline plates.

Monocrystalline solar plate: Mono plates are made from single fragment of silicon instead of multiple fragments of silicon. This plate has more efficiency than polycrystalline solar plates. In this plates silicon is formed into bars and then cuts into wafers.



- **What is solar cell?**

Solar cell is an electrical device, that converts the energy of light into electrical energy directly.

Efficiency of solar cell used in photovoltaic system, in combination with latitude and climate, determines the annual energy output of the system.

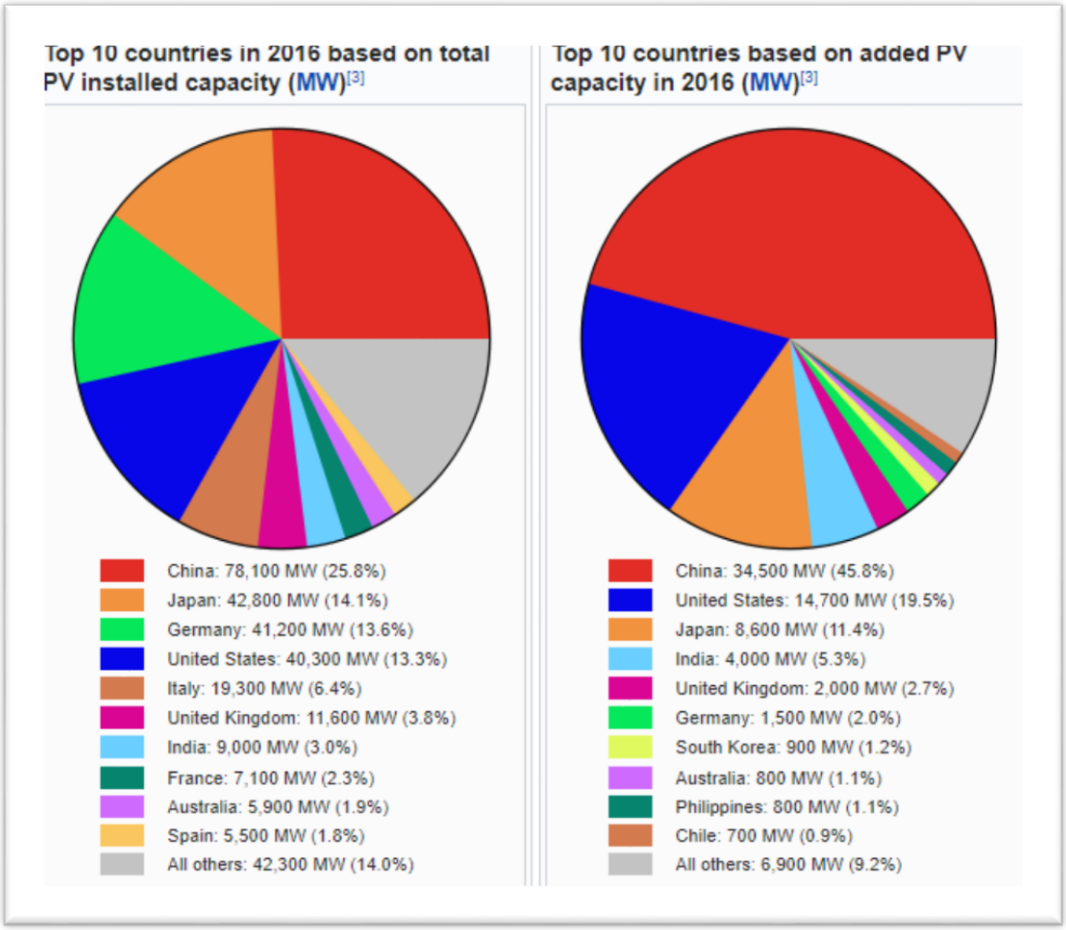
- **WORLD WIDE SOLAR ENRGY PRODUCTION:**

Many industrialized nations have installed significant solar power capacity into their electrical grids to supplement or provide an alternative to conventional energysources while an increasing number of less developed nations have turned to solar to reduce dependence on expensive imported fuels. Long distance transmission allows remote renewable energy resources to displace fossil fuel consumption. Solar power plants use one of two technologies.

Photovoltaic(PV) systems use solar panels, either on rooftops or in ground-mounted solar farms, converting sunlight directly into electric power.

Concentrated solar power(CSP, also known as "concentrated solar thermal") plants use solar thermal energy to make steam that

is thereafter converted into electricity by a turbine.

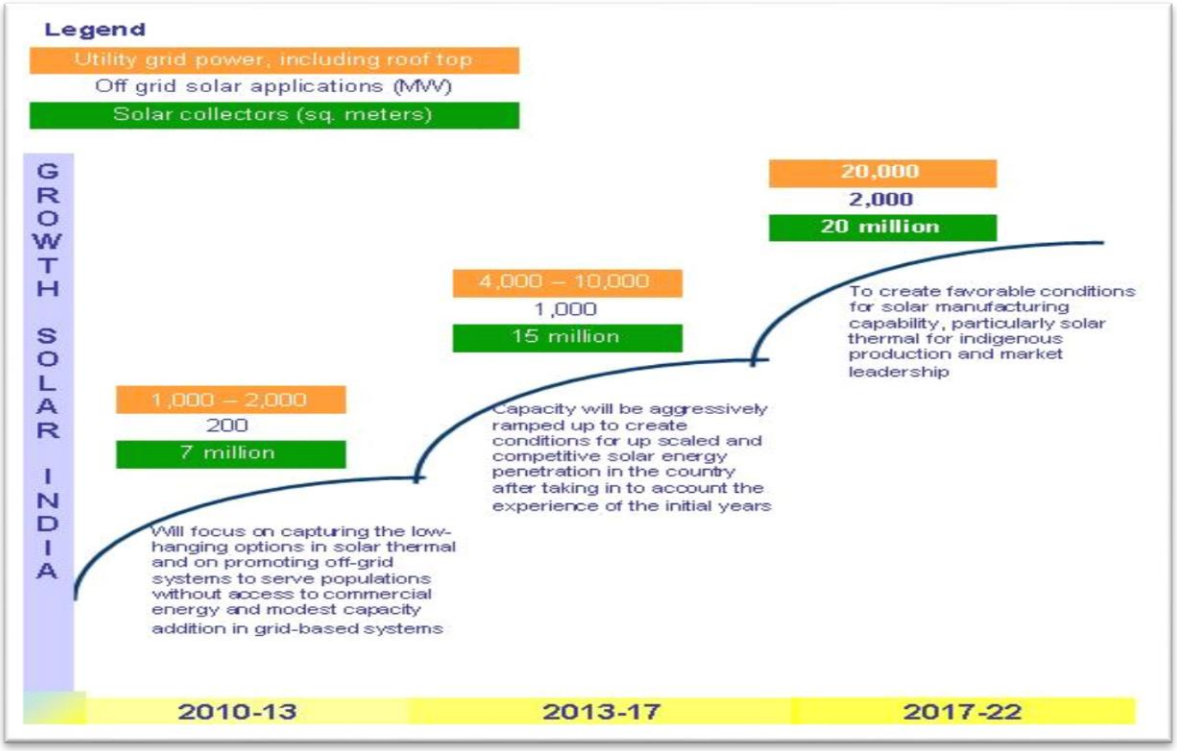


➢ INDIA IN PRODUCTION/UTILIZATION OF SOLAR ENERGY:

In July 2009, India unveiled a US$19bn plan to install 20 GW of solar power capacity by 2020. Under the plan, the use of solar-powered equipment and applications would be made compulsory in all government buildings, as well as hospitals and hotels. India launched its **National Solar Mission** in 2010 under the National Action Plan on Climate Change, with plans to generate 20 GW by 2022. This was later revised to a target of 100 GW by the same time frame.

India's installed PV generation has been expanding at a very rapid pace in recent years, with the total capacity increasing from 10 MW in 2010 to over 16,200 MW as of September 2017. The falling price of PV panels, mostly from China but also from the United States, has coincided with the growing cost of grid power in India. Government support and ample solar resources have also helped to increase solar adoption, but perhaps the biggest factor has been need. India, "as a growing economy with a surging middle class, is now facing a severe electricity deficit that often runs between 10 and 13 percent of daily need".

Several large grid-scale solar parks are in operation. Among them, the 214 MW **Charanka Solar Park**, commissioned on April 19, 2012, and the Gujarat solar parks with a combined **capacity of 605 MW.**



IN GUJRAT SOLAR PARK

(OUR VISIT)

In G.S.P first of all we visited GOD Watch tower which is 5 story building. Visitors can take overview of the G.S.P by reaching at the top floor of the tower. Visitors can see different companies from the top floor.

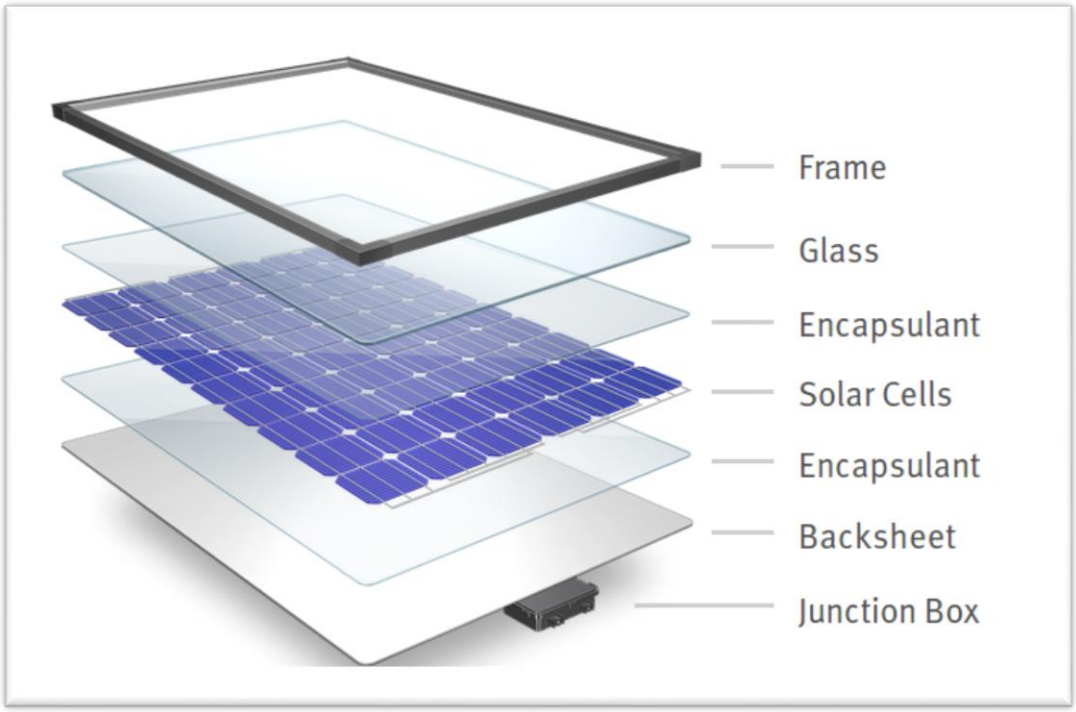
ROHA DYECHEM PVT. LTD.

In G.S.P we visited **ROHA DYECHEM PVT. LTD.** Which is developed in 2012.

At that place Mr. Jaysinh Gohil gave us the information about solar plant and how they produce solar power from solar energy.

Roha Dyechem Pvt. Ltd. is hovering in 200 acres. There are 1,72,800 solar panels are installed which produces 25 MW solar power

by the use of monocrystalline thin film plate which have efficiency of 17 to 18%. This thin film plates are made from glass material.



This type of solar plates 1 solar plate generates maximum 145 W solar power at 2.26 amp. And 25 MW setup of this plates generates 24 MW solar power.

The power generated from solar plates is stored into the junction box. This stores the power and send it to the inverter.

The power generation is done according to season and according to particular season tilting of solar panels is done.

- **TILTING: -**

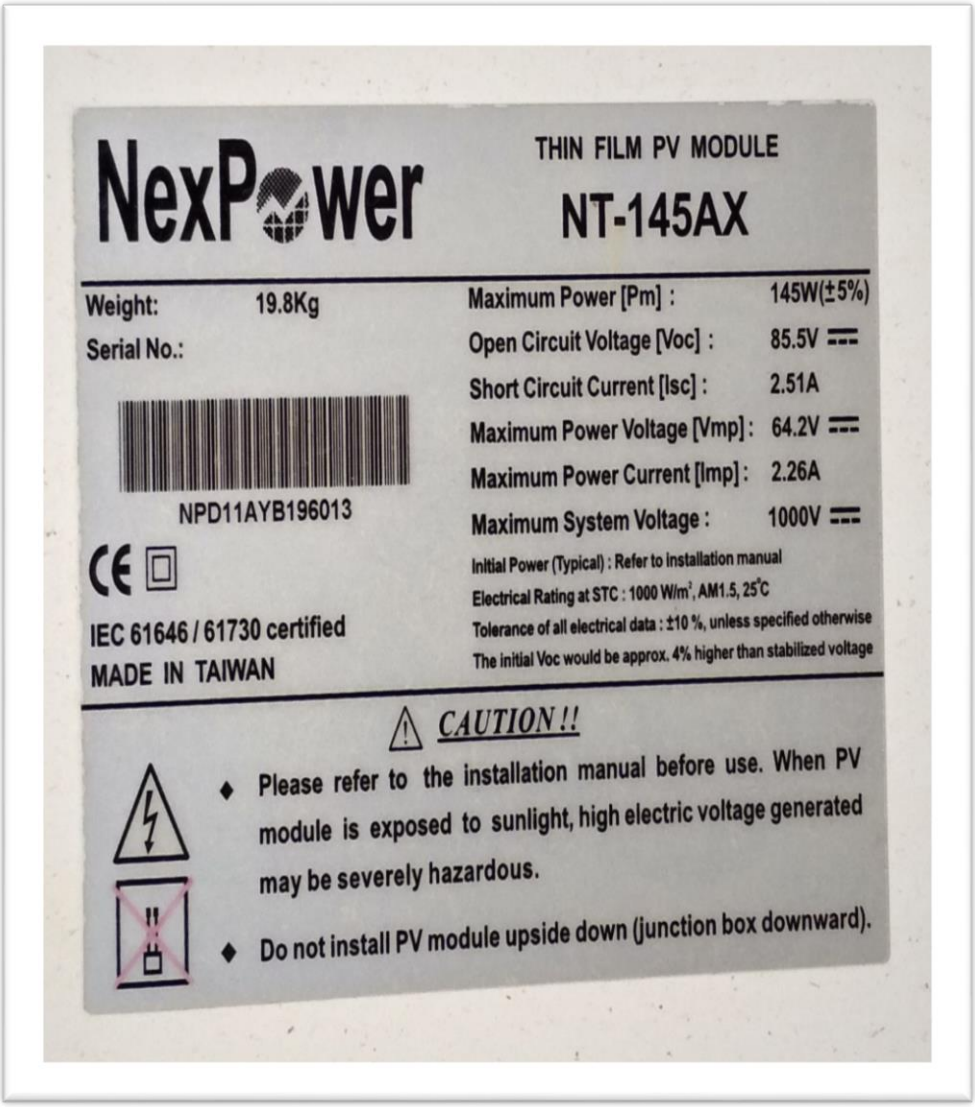
Tilting angle of solar panel are: 5 degrees – Summer Season

35 degrees – Winter Season

5 to 13 degree – Monsoon Season

In fix angled solar panel there is only 24-degree angle is fixed to get solar power.

Capacity of solar plate to generate solar power:



- **INVERTER:** -Roha Dyechem Pvt. Ltd. have 1 inverter room which contains 8 inverters. Each inverter generates 500 KW power (output – 420 MW) 270 V/ 5000 mV per year. Inverter controlled by DPCB (Digital power Control Board) to eliminate errors.

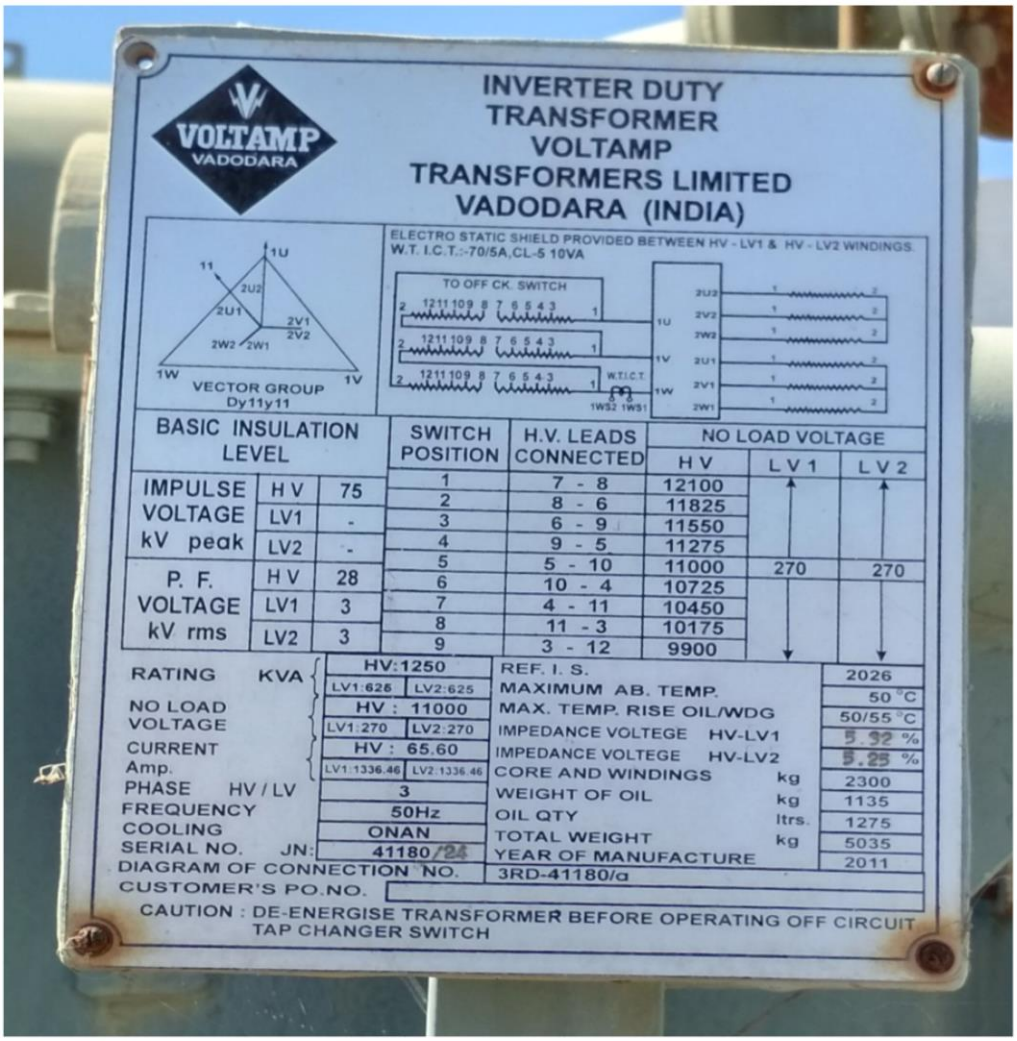
There is vacuum circuit breaker is installed in inverter.

The maximum generation is done is 2000- 2500 MW in monsoon when there is clear atmosphere after rain. It is for very small time period.

- **TRANSFORMER: -**

The power generated in inverter is in AC. This power of 270 W sends to the transformer. Transformer converts 270 KV into 11 KW.


1U
1V
1W
125 MVA 11/270 kV
TRAFO-4 D



From transformer 11KW power is sent to the substation which controls the power generation and convert it into the 66 KW power.

There is one control station for each inverter. There are 8 control station for 8 inverters.

➢ CONTROL ROOM: -

control station the power of 400 KW send to the GETCO which is converted from 66 KW power from control station.

GETCO is GUJARAT ENERGY TRANSMISSION CORPORATION. It is Gujarat based electrical transmission company which is set up in May 1999, and registered under the companies act of 1956. Roha dunemech pvt. Ltd. is coming under the GETCO and supplies all over in Gujarat.

ELECTRICAL 6th semester

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