

**Note on the Clarification of GIS and Hybrid GIS –Distribution
Switchgear (33 kV, 22 kV & 11kV)**

As per clause 51(2) of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, the 33/11 kV, 33/22 kV and 22/11 kV Sub-stations and Switching Stations shall be either air insulated or gas insulated or hybrid, as the case may be; Provided that in coastal areas substation shall be GIS.

Further, the GIS/ Hybrid GIS shall comply with the requirements as mentioned in IEC 62271-200 for factory-assembled metal-enclosed switchgear and control gear for alternating current of rated voltages above 1 kV and up to and including 52 kV for indoor and outdoor installation. As per the aforementioned IEC, the compartments in GIS may be various types, for example:

- Gas - filled
- Solid - insulation.

Accordingly, GIS and Hybrid GIS may be defined as below:

A. **Gas Insulated Switchgear (GIS):** Switchgears where the primary insulation medium is a gas which is used at certain pressure for phase-to-phase and phase-to-ground insulation of all switchgears including bus-bars. The inter – panel coupling may be inside or out side the gas compartment as per the design of Original Equipment Manufacturers(OEMs). Typically sulphur hexafluoride (SF6) gas is being used for the insulation presently, however, other gas insulating medium (like dry air) is also being used by some manufacturers in place of SF6 gas to reduce the use of SF6 gas.

B. **Hybrid GIS:** Hybrid GIS Switchgear refers to the combination of different insulation technologies within the same switchgear assembly. It typically involves a combination of air-insulated (AIS) or gas-insulated (GIS) or Solidly insulated compartments or modules within a single switchgear arrangement. Generally, Breaker poles may be gas insulated, while the busbar is outside gas compartment in Air with solid insulation in Hybrid GIS. Further, sulphur hexafluoride (SF6) gas is being used for the gas insulation presently, however, other gas insulating medium (like dry air) is also being used by the manufacturers in place of SF6 gas to reduce the use of SF6 gas.

It is important to note that the conducting parts in the switchgear in GIS and Hybrid GIS are touch-proof type under all the circumstances. Even if , any of the compartments are air insulated, the live parts in these compartments should also be solidly insulated to be touch-proof type to minimize the possibility of faults due to inadvertent contacts and to ensure the safety of the operating personnel under all circumstances.

Major Comparison between GIS and Hybrid GIS

Components & its insulation in both type of Switchgear			
Sr no	Components	GIS	Hybrid GIS
1	Bus Bar	Gas compartment	Outside Gas compartment
1A	Inter-panel bus-bar Coupling	Inside / Outside the Gas compartment as per OEM design	Outside the Gas compartment
2	Circuit breaker Module	Gas compartment	Gas compartment
3	Cable termination	Air compartment	Air compartment
4	Low voltage components	Air compartment	Air compartment

Based on the above definitions, Discoms may choose the installation of either AIS or GIS or Hybrid GIS as per their requirement. However, they must ensure the difference between GIS and Hybrid GIS before implementation.