

HYDROGEN COOLED TURBOGENERATORS

Hydrogen cooled turbogenerators feature high performance and a long life. The hydrogen provides for low frictional losses and increases performance as well as efficiency.

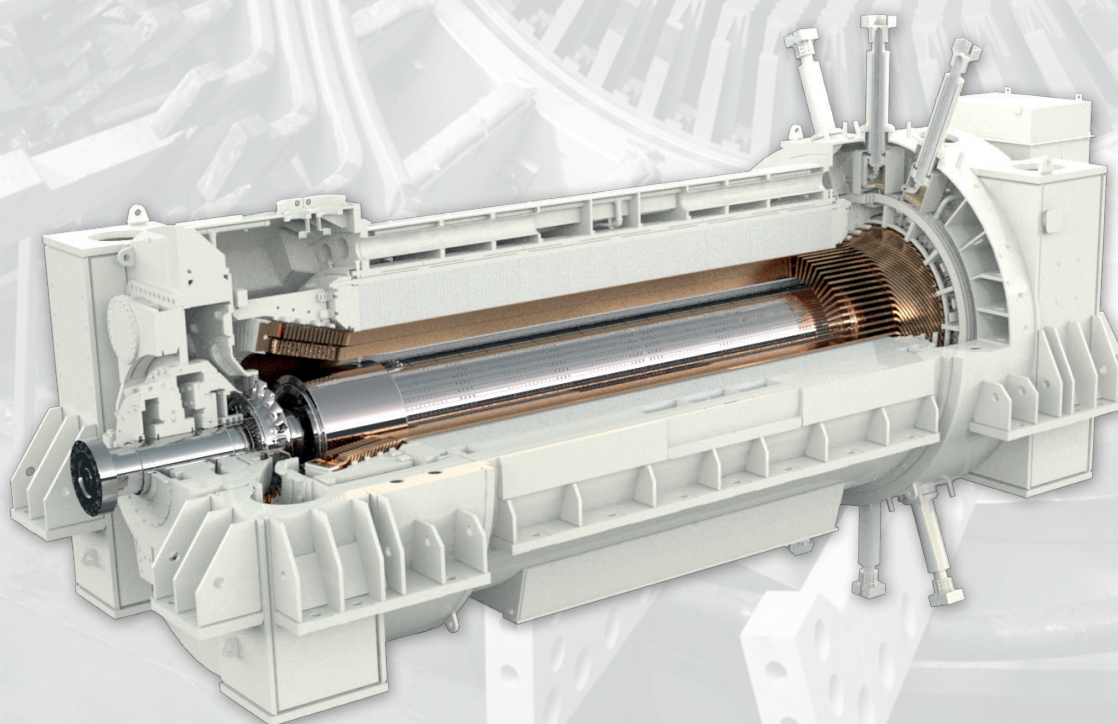
A range of models offering high efficiency, excellent quality and optimum reliability are available to meet turbine requirements. For every project, Ansaldo Energia works closely with each customer to customize generator in order to meet their unique technical specifications and project needs.

Ansaldo Energia hydrogen cooled generator design has been proven to be robust, reliable and maintainable. It is flexible and can be used with gas turbines and steam turbines in single or multi-shaft configurations.

Ansaldo Energia hydrogen cooled turbogenerators, with or without direct cooling of the stator winding, comply with PED and ATEX regulations to ensure safer operation in the presence of H₂ gas, in addition to the other generally applicable regulations. The core is pressed at intervals during stacking and finally consolidated to ensure that individual laminations don't lose during service.

Continuous enhancement

Hydrogen cooled turbogenerators technology is continuously upgraded and enhanced by dedicated R&D activities and new design tools, including finite element 3D analysis of mechanical, electrical and ventilation behavior.



Auxiliary systems

Several auxiliary systems are used to condition and circulate the water and hydrogen used for cooling and keep the shaft seals supplied with oil. The gas plant conditions and monitors the coolant under all operating conditions, it maintains the correct pressure of the hydrogen and performs purging and filling of hydrogen or air by means of an inert gas (CO₂). When hydrogen is used as coolant, shaft seals are implemented by oil flowing into the gap between the shaft and suitable rings.

The seal oil plant comprises the equipment needed to supply oil to the shaft seals at the right temperature, pressure and purity.

Excitation system

To deliver stable power supply when operating on a network and maintain generator voltage constant during no load operation or station servicing, large generators need a fast-response excitation system capable of adapting the air-gap flux rapidly to load conditions: static excitation units are particularly suited to the purpose.

Hydrogen cooled turbogenerator performance

| Performance | | | |
|----------------------|-----|-----------|-----------|
| Frequency | Hz | 50 | 60 |
| Speed | rpm | 3000 | 3600 |
| Power Factor | | 0.8 - 0.9 | 0.8 - 0.9 |
| Rated Voltage | kV | Up to 23 | Up to 23 |
| Power Range | MVA | Up to 740 | Up to 700 |

- Mounting arrangement: IM7305, IM7306, IM1105, IM1106
- Method of cooling: IC 8 (H1) W7
- Protection degree: IP 55 (IEC 60034-5)
- Excitation: static
- Thermal insulation class: F
- Hydrogen pressure: 4 - 7 bar
- Installation: with silencing walls or enclosures for indoor or outdoor application

References

Since 1950 Ansaldo Energia has awarded more than 170 units, with a total capacity which exceeds 30 GVA. More than 38 units has been awarded for gas turbine in open cycle and combined cycle applications.

174 units

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