

WATER HYDROGEN COOLED TURBOGENERATORS

Turbogenerators with water-cooled stators and hydrogen-cooled rotors are the optimal solution for the highest output ranges. Their compact design combined with water-cooled stator winding means they are suitable for large power plants. Ansaldo Energia water cooled turbogenerators comply with PED and ATEX regulations to ensure safer operation in the presence of H₂ gas, in addition to the other generally applicable regulations.

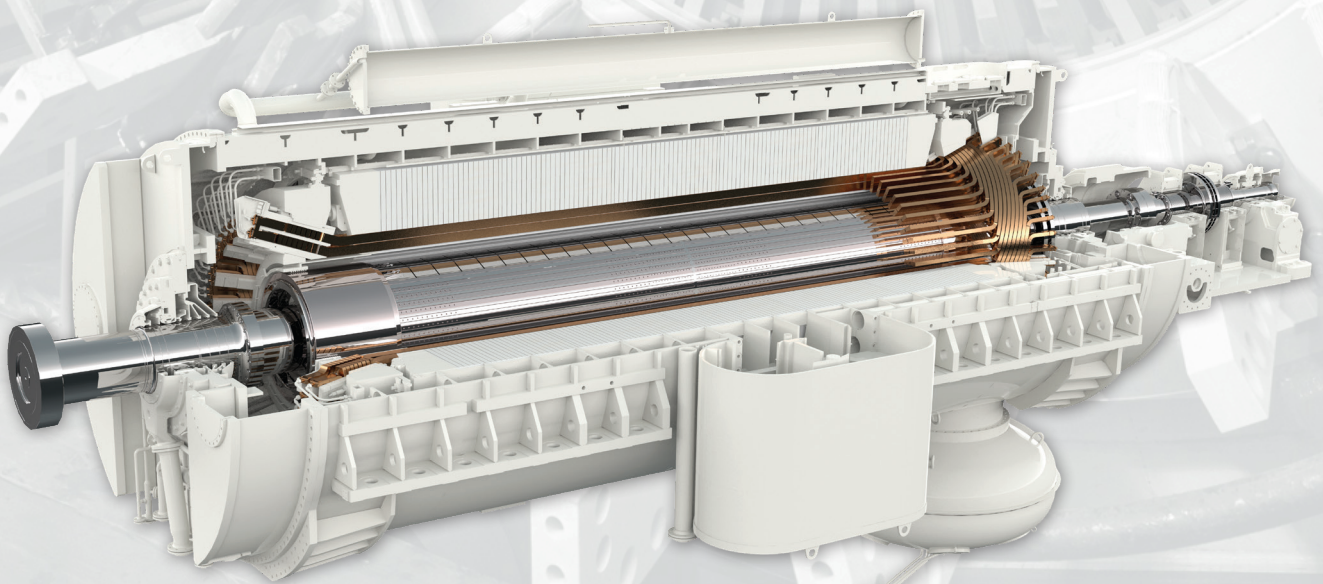
The core is pressed at intervals during stacking and finally consolidated to ensure that individual laminations don't lose during service. All generators with water-cooled stator windings are fitted with laminated pressplates to reduce losses and eliminate hotspots. Standard, high efficiency machines with excellent quality and optimum reliability 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.

Continuous enhancement

Ansaldo Energia hydrogen cooled generator 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).



The stator cooling-water plant conditions, circulates and monitors the cooling water (neutral water with very low oxygen content and electrical conductivity). It is therefore provided with oxygen removal and deionization equipment plus all the necessary pumps and filters.

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.

Since 1950 Ansaldo Energia has awarded more than 60 units, with a total capacity which is higher than 30 GVA.

Hydrogen - stator water cooled turbogenerators performances

Performance					
Frequency	Hz	50	60	50	60
Speed	rpm	3000	3600	1500	1800
Poles		2	2	4	4
Power Factor		0,8-0,9	0,8-0,9	0,9	0,9
Rated Voltage	kV	18-27	18-27	Up to 26	Up to 26
Power Range	MVA	400-1100	30-420	Up to 1200	Up to 1200

- Mounting arrangement: IM7305
- Method of cooling: IC 8 (H1) W7 - IC 9 (W7) stat. winding
- 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

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62 units

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