



Siemens Hydrogen-Cooled Generators SGen-2000H Series Efficient and Reliable

310 MVA to 600 MVA

Answers for energy.

SIEMENS

Hydrogen-cooled generators

Siemens offers in its Siemens Generator (SGen™) product line hydrogen-cooled, two-pole generators, called SGen-2000H series, with ratings up to 600 MVA for steam and gas turbines.

Cooling performance is improved by a factor of approximately 14 through the use of hydrogen gas in place of air as the coolant. At the same time, frictional losses are significantly lower than those with air, thus improving the overall generator efficiency.

For over 60 years, Siemens has made many detailed improvements to the design of hydrogen-cooled generators:

- Smaller size and therefore reduced space requirements in the turbine building
- Higher efficiency
- Totally enclosed system minimizes the risk of contamination inside the generator

Consistent improvement in the design of hydrogen-cooled generators has brought about operating efficiencies of up to 99%.

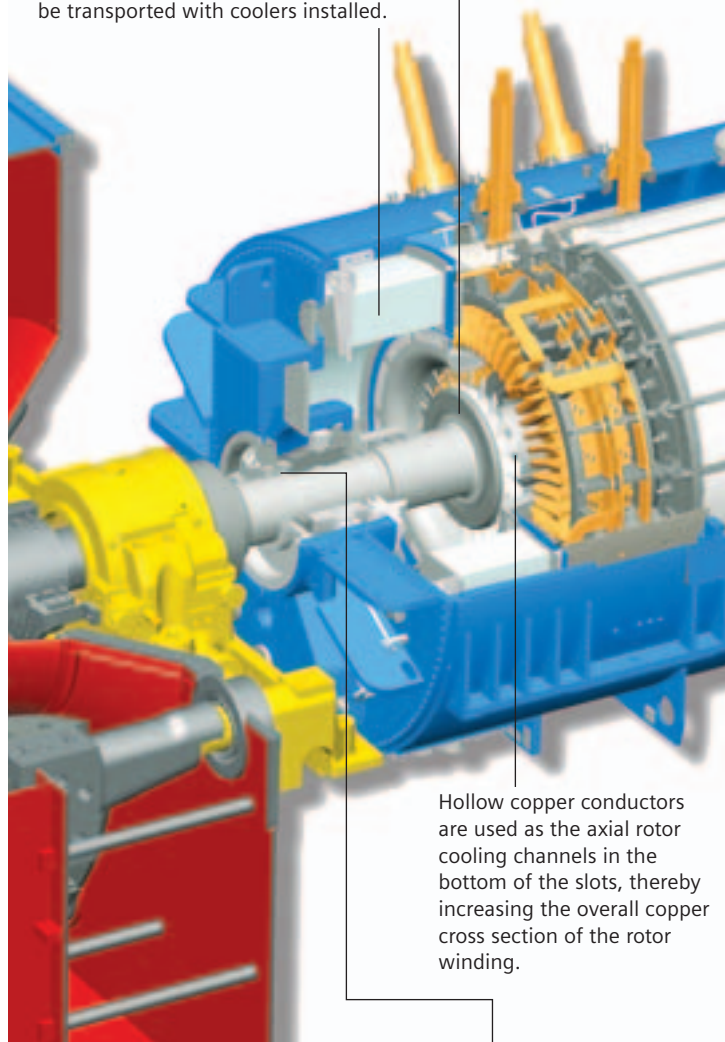
The proven modular system enables the production of a wider range of generators by using rotors with different diameters as well as different active body lengths.

The same active generator components are used in both the air-cooled and hydrogen-cooled generators. This means that customers who choose hydrogen-cooled generators benefit from the manufacturing and operational advances made with respect to air-cooled generators.

A design requiring low maintenance in connection with our worldwide service network guarantees highest availability.

A single-stage fan at each end of the generator results in a uniform thermal load in the generator rotor and stator.

Use of Omega™ coolers at both ends of the generator enables a uniform cooling gas flow and simplifies the required frame configuration. Each cooler has two sections (independent heat exchangers). Simplified frame construction allows the generator to be transported with coolers installed.



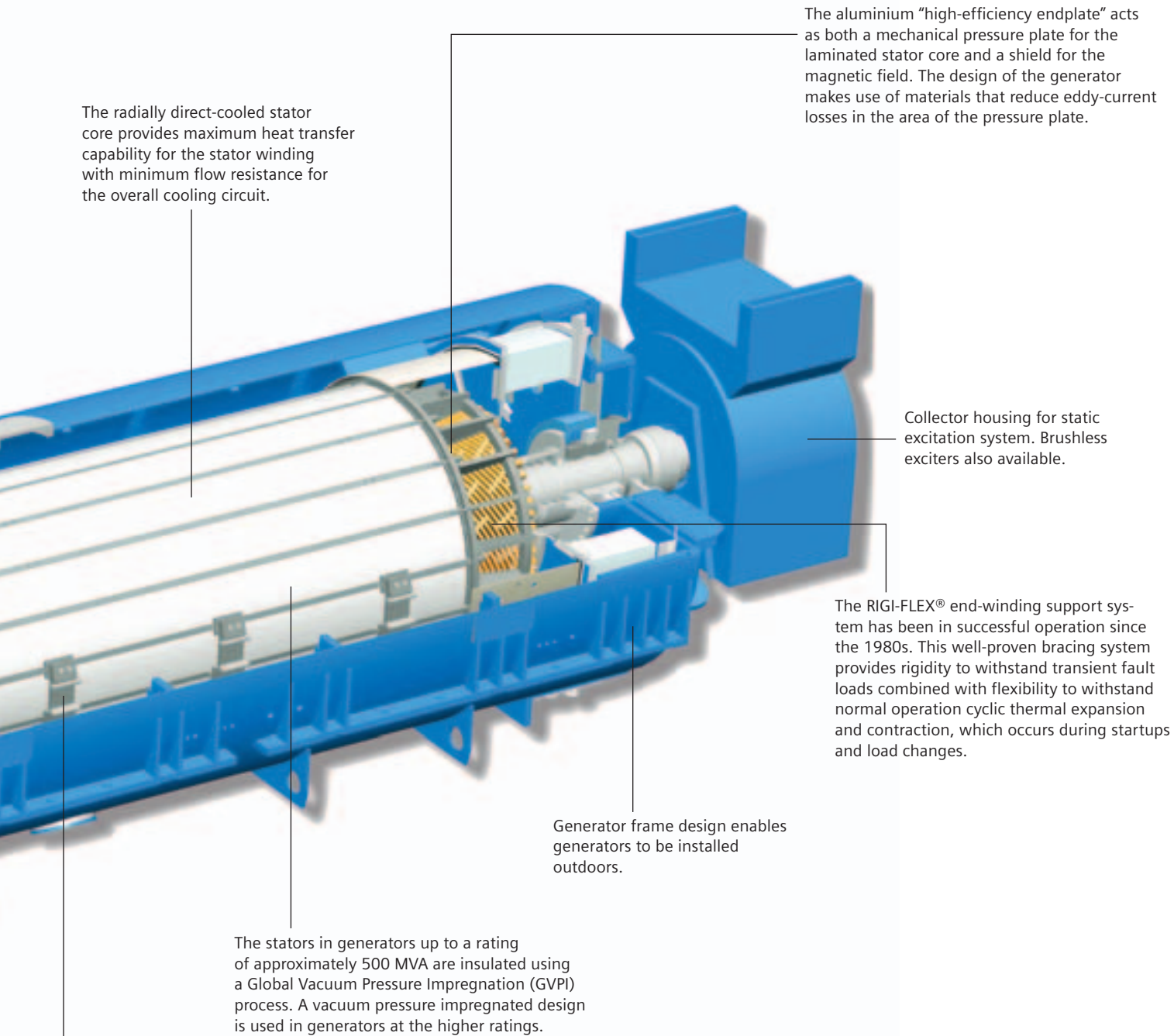
Hollow copper conductors are used as the axial rotor cooling channels in the bottom of the slots, thereby increasing the overall copper cross section of the rotor winding.

Technical data

Frequency	Model	Power factor	Apparent power	Efficiency	Terminal voltage
50 Hz	SGen5-2000H	0.85	350 MVA to 600 MVA	up to 99%	15.0 kV to 24 kV
60 Hz	SGen6-2000H	0.85	310 MVA to 570 MVA	up to 99%	15.0 kV to 24 kV

Coolant:	Hydrogen gas at 4 to 5 bar
Design:	In accordance with IEC and ANSI standards
Thermal classification:	Class F insulation system
Type of enclosure:	IP64 (IEC34-5); suitable for outdoor installation
Excitation:	Static or brushless
Transport dimensions:	Suitable for rail transport in most countries

An innovative hydrogen system based on carbon capture technology a revolutionary steam turbine which requires much less space than the required capacity and the innovative technology greatly reduces the volume of hydrogen gas and operating characteristics.



The radially direct-cooled stator core provides maximum heat transfer capability for the stator winding with minimum flow resistance for the overall cooling circuit.

The aluminium "high-efficiency endplate" acts as both a mechanical pressure plate for the laminated stator core and a shield for the magnetic field. The design of the generator makes use of materials that reduce eddy-current losses in the area of the pressure plate.

Collector housing for static excitation system. Brushless exciters also available.

The RIGI-FLEX® end-winding support system has been in successful operation since the 1980s. This well-proven bracing system provides rigidity to withstand transient fault loads combined with flexibility to withstand normal operation cyclic thermal expansion and contraction, which occurs during startups and load changes.

Generator frame design enables generators to be installed outdoors.

The stators in generators up to a rating of approximately 500 MVA are insulated using a Global Vacuum Pressure Impregnation (GVPI) process. A vacuum pressure impregnated design is used in generators at the higher ratings.

Radial path rotor cooling with flow path that provides a uniform flow and temperature distribution and reduces field current requirements.

seal design – Performance Plus™ elements - has moved seal tech up forward. A carbon seal ring, seal oil, significantly reduces size of the seal oil system. This greatly reduces seal oil contamination and improves emergency seal

Customer benefits

- Efficiency of up to 99%
- Hydrogen seal with carbon elements requires minimal seal oil and has improved emergency operating characteristics
- Uniform temperature profile promotes reliability
- Suitable for outdoor installation
- Simplified installation
- Transport dimensions suitable for rail transport in most countries
- Design based on field-proven generator component designs

Published by and copyright © 2008:
Siemens AG
Energy Sector
Freyeslebenstrasse 1
91058 Erlangen, Germany

Siemens Power Generation, Inc.
4400 Alafaya Trail
Orlando, FL 32826-2399, USA

For more information, contact our
Customer Support Center.
Phone: +49 180/524 70 00
Fax: +49 180/524 24 71
(Charges depending on provider)
e-mail: support.energy@siemens.com

Fossil Power Generation Division
Order No. A96001-S90-A133-V3-4A00
Printed in Germany
Dispo 05400, c4bs No. 1362, 813
107960M WS 05083.

Printed on elementary chlorine-free bleached paper.

All rights reserved.
Trademarks mentioned in this document are
the property of Siemens AG, its affiliates, or their
respective owners.

Subject to change without prior notice.
The information in this document contains general
descriptions of the technical options available, which
may not apply in all cases. The required technical
options should therefore be specified in the contract.