

# Hydro Turbine Driven Generators

Custom designed to Customer Specification and Turbine Manufacturer Requirements



Custom built for various turbine applications, durable WEG Electric Machinery, WEM, generators can be designed to meet individual arrangement requirements.



Vertical Synchronous Generators with TEWAC Enclosures

## Quality Assurance and Testing

WEM is ISO-9001:2000 certified.

All generators are assembled and tested in their own bearings at normal operating speed and voltage.

Routine tests are performed as required per NEMA MG-1 standard.

Bearing temperatures and vibrations are monitored during testing.

Additional tests include efficiency, temperature rise, operation at runaway/ overspeed condition, etc.

All testing is performed in accordance with IEEE procedures.

## Benefits

- Special electrical machine characteristics area available, including reactances, short circuit ratio, etc.
- Each generator is assembled and tested at rated speed and voltage in its own bearings.
- Ratings range from 2,000 to 21,000 kW (depending on speed) from 150 rpm for direct connected units and up to 900 rpm for higher speed gear driven units.
- Available in horizontal or vertical shaft configuration. Shaft extensions can be integral flange half coupling or cylindrical for shrink on coupling as required.
- Bearings arranged to handle radial and axial thrusts in both directions that are imposed on the generator.
- Rotor and bearings are designed to withstand runaway speed conditions specified by the turbine manufacturer.
- Duraguard™ VPI (Vacuum Pressure Impregnation) insulation is fully Class F rated and uses a two part epoxy-mica system which resists chemicals and moisture, and provides long generator life. Global VPI of the complete winding is provided.
- Standard brushless excitation system provides high reliability and reduces maintenance and installation costs. The exciter is ventilated from the main generator and eliminates the need for separate ventilation paths. Alternatively, the generator can be provided with collector rings and brushes suitable for excitation from an outside source.
- Various generator enclosures are available, including drip proof guarded, WP11 and TEWAC.
- Damper winding is continuous as standard, or can be furnished noncontinuous as required by customer specifications to provide smooth operation.

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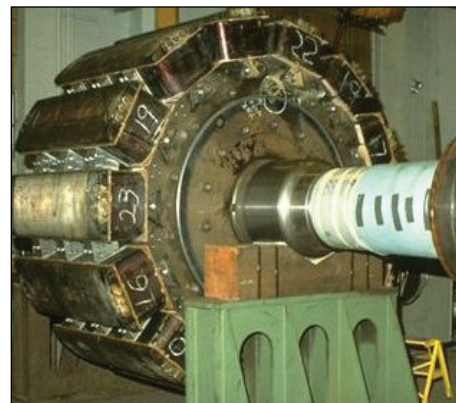
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Generator stator winding in process



Rotor assembly for 200 rpm vertical generator



Shop assembly of rotor for horizontal generator rated 18 MW 514 rpm

## Stator

The frame is welded and machined to withstand stresses exerted by electrical and mechanical forces in the core and provide low vibration levels. The stator is composed of a supporting structure, a core of electrical laminations and insulated windings.

The core is built up with high grade silicon steel laminations that are precision punched from core plated sheets. The laminations are stacked in the support structure and spaced for radial ventilation to ensure even cooling throughout the core. The laminations are pressed and held between end plates.

The windings are Vacuum Pressure Impregnated (VPI) with a global process using a two part epoxy resin. The VPI system provides excellent dielectric properties, superior resistance to moisture and chemicals, and outstanding mechanical integrity and long generator life.

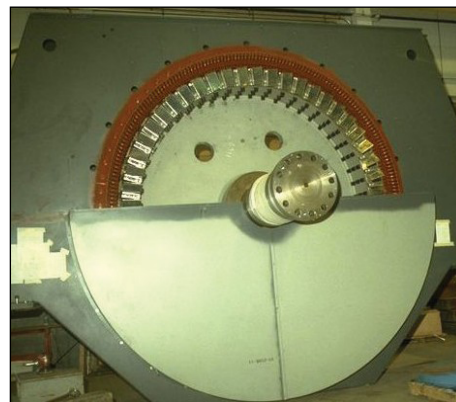
## Industry Standards

The field poles are comprised of steel laminations that are pressed and bolted together to withstand rotational and electrical stresses. Field pole windings can be either rectangular wire or flat copper wound poles.

Individual turns are then bonded layer by layer to hold the windings firmly in position for normal and runaway speed conditions.

Rotor insulation is a full Class F system for long, trouble-free performance.

Rotors are balanced at our factory to reduce vibration, provide smooth operation, and meet the overspeed requirements of the application.



Shop assembly of rotor for horizontal generator rated 2.1 MW 144 rpm

## Rotor

The rotor consists of a spider on which the field poles, amortisseur (damper) windings and exciter armature are mounted. Depending primarily on the runaway speed requirement, the rotor spider may be fabricated steel with field pole anchors using high strength bolts, laminated sheets with dovetails, or forged with tee or dovetail as required.

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