

FLOWAY® VERTICAL TURBINE PUMPS

GEOTHERMAL APPLICATIONS



THE FLOWAY® VERTICAL TURBINE PUMP IS ENGINEERED TO PERFORM IN THE WORLD'S MOST DEMANDING GEOHERMAL ENVIRONMENTS, WHERE RELIABILITY, MATERIAL INTEGRITY, AND HYDRAULIC PRECISION ARE VITAL TO PRODUCTION.

Floway has been manufacturing vertical turbines for more than 90 years. We are recognized by customers around the world for industry-leading quality and performance and have evolved into an engineered-to-order company that can solve the most complex and demanding of applications. From special materials to custom designs, Floway is dedicated to providing superior quality, top hydraulic performance, and long service life.

- Precision machined, low vibration
- Dedicated project design support
- Reliable aftermarket sales and service
- Whole life-cycle solutions for your needs

OPERATING CONDITIONS

Floway vertical turbine pumps are built to perform under the most demanding geothermal conditions, combining hydraulic performance with mechanical endurance.

- **Pressure and Flow Capability:** Operates efficiently up to 1,500 psi (103 bar) and 35,000 GPM (7,950 m³/hr) in standard form.
- **Multi-Stage Vertical Design:** Optimized for deep-well, high head, and high-flow.
- **Material Flexibility:** Available in iron, bronze, carbon steel, stainless steel, duplex, 12% chrome, and titanium to combat corrosion, scaling, and abrasion.
- **Thermal Performance:** Designed to accommodate thermal expansion and contraction along long column assemblies without misalignment.
- **Axial Displacement Control:** Bowls engineered with precision axial play to compensate for rotor-stator movement at elevated temperatures.
- **Vibration and Balance:** Utilizes dynamically balanced impellers, precision machined motor bases, and jacking posts for low vibration.
- **Deep-Well Endurance:** Proven configurations exceeding 1,500 ft (457 m) with optimized line shaft and bearing systems.
- **Structural Analysis:** Each pump validated through CFD, FEA, and rotor dynamic analysis to ensure stability under mechanical and thermal stress

APPLICATIONS

Geothermal power plants rely on dependable pumping systems for production, reinjection, and fluid transfer. Floway pumps are engineered for these specialized applications, offering stable performance and long service life under extreme operating conditions. Common geothermal applications include:

- Production wells handling high-temperature brine or steam condensate.
- Reinjection systems requiring sustained high head and flow.
- Brine collection and distribution in closed-loop fields.
- Booster and transfer service supporting turbine and separator operation.
- Remote installations where low maintenance and uptime are essential.
- Power station feed and auxiliary water systems exposed to corrosive fluids.

DESIGN CONSIDERATIONS

Geothermal fluids are inherently aggressive—hot, mineral-laden, and often erosive. Floway engineers account for these challenges by customizing each design for site-specific chemistry, depth, and operating temperature. Precision alignment, shaft balancing, and journal bearing configuration minimize thrust loads and extend component life. Specialized metallurgies and coatings resist scaling and corrosion, ensuring reliable output and consistent efficiency across decades of operation.

GEOHERMAL SYSTEM PERFORMANCE

Floway's engineered-to-order approach provides geothermal operators with proven, field-tested assurance:

- Configurable column and shaft designs for extreme well depths.
- Designed for low vibration and stable operation through temperature transients.
- In-house testing up to 5,000 psi (345 bar) and flow verification to 45,000 gpm (10,220 m³/hr).
- Flexible material options matched to fluid chemistry and project longevity goals.



ENGINEERING CAPABILITIES

Floway's in-house team of licensed professional engineers ensures full control over design, testing, and material selection. Every geothermal application benefits from a combination of hydraulic precision, structural integrity, and long service life.

- In-house hydraulic and mechanical design
- 3D solid modeling and computational fluid dynamics (CFD)
- Finite Element Analysis (FEA) for stress and thermal expansion
- Rotor dynamic and vibration spectrum analysis (FFT)
- Designs for variable frequency drive (VFD) operation
- 360° hydraulic balance for smooth, efficient performance
- Material selection tailored to corrosive, scaling, and high-temperature fluids

TESTING & VALIDATION

Each Floway pump undergoes comprehensive testing to confirm performance under geothermal conditions. These tests validate efficiency, mechanical alignment, and vibration control before installation.

- Hydraulic performance verification under simulated operating conditions
- Pressure testing up to 5,000 psi (345 bar)
- NPSH testing up to 30,000 gpm (6,814 m³/hr)
- Three test pits covering flows from 50 gpm to 45,000 gpm (10,220 m³/hr)
- Engine-driven and VFD testing at both 50 Hz and 60 Hz
- Thrust, vibration, and noise testing for high-head configurations
- Impact and structural frequency analysis for stability in deep-well applications
- Equipment calibration in accordance with NIST standards

MANUFACTURING EXCELLENCE

Non-Destructive Testing (NDT)

- Dye Penetrant (LP)
- Magnetic Partial Inspection (MP)
- Radiography Exam (RT)
- Ultrasonic Testing (UT)
- Positive Material Identification (PMI)
- Hardness Testing (Rockwell and Brinell)
- CMTR Upon Request
- AWS Certified Welding Inspection (CWI)

Coatings

- NSF certified coating available upon request
- Two-part epoxy
- Fusion bonded epoxy
- Most coatings available for potable and non-potable services.

Optional Features

- Premium machined and balanced motor
- Specially toleranced motor coupling machined by Floway Pumps
- Jacking posts for precise motor/pump shaft alignment
- Reduced run-out motor base
- Impellers balanced per API 610





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