Siemens Energy
MICALASTIC®
Global Vacuum Pressure Impregnation (GVPI)

Applicable for all generator products up to 22 kV
The MICALASTIC® insulation system developed by Siemens Energy uses Global Vacuum Pressure Impregnation technology to provide excellent electrical, mechanical and thermal properties. Our GVPI system has a proven track record of industry-leading reliability since 1988.

GVPI track record

- > 1,700 stator windings in GVPI technology in turbine generators with a total output of > 240,000 MVA
- > 25,5 million operating hours and more than 322,000 start/stop cycles at a reliability rate exceeding 99.9%
- Fleet leaders with > 150,000 operating hours (OH) and 3,320 start/stop cycles

GVPI design benefits

- Designed for more than 30 years of operation (electrical lifetime >100 years)
- Complies with all international standards (EN, IEC, IEEE, KEMA, API, etc.)
- Excellent and tight consolidation with axial flexibility allows for thermal expansion
- Soft coils enable lower stress installation and assembly process
- Low shrinkage insulation system and patented Outer Corona Protection (OCP)-System reduce vibration sparking and slot discharge

Key Benefits

- > 99.9% reliability
- > 30 years operation life
- Industry-leading shrinkage control
- Allows for axial thermal expansion
- Robust coil and winding assembly
- Reduces or eliminates vibration sparking and slot discharge
- No re-wedging or re-tightening of end winding structure
- No re-tightening of stator core
GVPI manufacturing excellence

Stator bar layering

1. **Copper strand**: insulated, stranded copper, roebelled for performance benefits

2. **Inner Corona Protection (ICP) system**: provides an equipotential sleeve to evenly distribute electrical field strength across the main insulation

3. **Main insulation**: high performance class F Micalastic® insulation system with high-purity epoxy and discharge-resistant mica paper

4. **Outer Corona Protection (OCP) system**: ensures constant electrical contact of the main insulation with the stator core

- Three-layer patented external mica protection system in slot area: designed for permanent electrical contact with grounded stator core
- Mica tape insulation across entire length of the stator bars: continuous computer-automated and controlled application
- Semiconducting mica protection tapes at the slot ends: designed for discharge-free voltage depression at slot ends

Wound stator core assembly

- Pre-pressing of insulation before placement in the slot enables stress-relieved coil assembly
- Soft coils enable low stress assembly in the end winding region
- Significantly reduced stress on the coil insulation during installation of the bracing in the end winding region

GVPI process

- Drying of the pre-heated wound core in the GVPI tank by evacuation prior to impregnation process
- Fully automated computer-controlled and monitored impregnation process to maintain uniform product quality
- Proprietary curing and cool down process ensures manufacturing robustness and highest level of quality
- Quality assurance in all phases of production with numerous mechanical and electrical tests