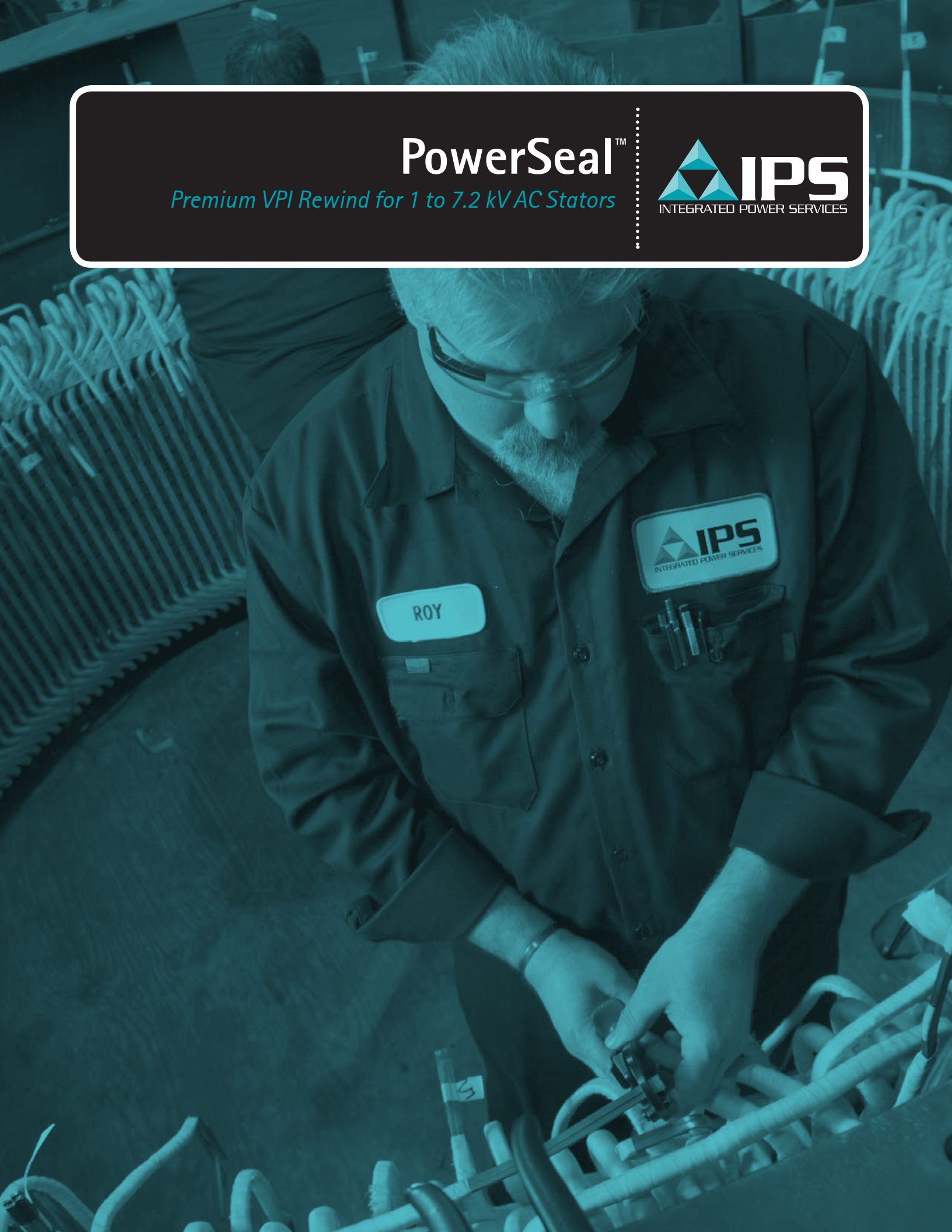


PowerSeal™

Premium VPI Rewind for 1 to 7.2 kV AC Stators



PowerSeal™

OVER FORTY YEARS OF DOCUMENTED EXCELLENCE IN THE MOST EXTREME INDUSTRIAL ENVIRONMENTS

Developed in a research laboratory and proven in forty-plus years of use in motors and generators around the world, this is a sealed stator winding custom engineered for the toughest AC medium-voltage applications. The PowerSeal rewind electrical insulation system is designed to perform in the most severe environments, while offering the following benefits:



Long life

- *During testing, the 100% solids thixotropic epoxy PowerSeal resin demonstrated the highest thermal rating and lowest dissipation factor of multiple insulating materials compared at elevated temperatures.*
- *Mylar free Mica tapes demonstrated superior aging characteristics during endurance stress testing at elevated voltages and temperatures to simulate an accelerated life span calculated using imputed Arrhenius log life aging curves.*
- *PowerSeal's sealed system construction has been verified to simulate a 40-year service life, plus 10% margin with IEEE 1776-2008 underwater immersion AC hi-pot testing completed at the conclusion of accelerated life testing, without failure.*

High electrical strength

- *Voltage breakdown tests for PowerSeal typically range from eight to ten times operating voltage.*
- *In IEEE 1553 voltage endurance testing, a 6.6 kV PowerSeal electrical insulation system endured 400 hours at 14.3 kV, 250 hours at 16.7 kV and 50 hours at 19.5 kV without failure.*
- *During voltage surge testing the PowerSeal electrical insulation system significantly exceeded the IEEE 522 standard by 200% demonstrating superior capabilities to withstand line surges and voltage transients.*

Low losses

- *Dissipation factor (power factor) tests that measure relative dielectric loss in the insulation system show PowerSeal losses are less than 0.5%.*



Abrasion resistance

- *Sample coils were blasted with glass beads and fly ash, with PowerSeal demonstrating greater abrasion resistance than all other VPI insulation systems tested.*

Thermal capability

- *PowerSeal testing, including thermal aging, mechanical stress, humidity and water immersion, produced results greater than Class H (180°C) at 40 years.*
- *Thermal shock resistance testing subjected PowerSeal stator coils to accelerated, rapid thermal cycling, followed by voltage endurance testing and subsequent dissection of the coils to verify the integrity of the inter turn and ground wall insulation systems.*

Chemical resistance

PowerSeal coils have been immersed in concentrated solutions of the following chemicals with no degradation of the insulation system.

- Sulfuric acid
- Hydrochloric acid
- Sodium hydroxide
- Sodium chloride
- Black liquor (paper mill caustic)
- Detergent
- Refrigerants: R-11, R-12, R-114, R-123, R-134a, R-500...



PowerSeal Coil Manufacturing

Coil Wire—IPS manufactures all coils with the highest grade of copper wire per NEMA MW-1000, with heavy enamel film and Dacron® glass wire insulation to prevent turn-to-turn shorts. The coils are designed and manufactured to withstand the stress of harsh and severe duty applications.

Mylar free Tape Connections—we hand tape all conductor leads, and use a treated felt mat seal to keep each lead connection individually sealed.

Armor Insulation Tape—an outer layer of glass tape protects the coil extension from airborne abrasives, such as fly ash and rock dust. We use **conductive tape on windings above 5,000 volts to provide corona and ozone protection.** After final taping and insertion in the core, we surge test and DC Hi-pot each coil individually, using the IEEE 522 and IEEE 95 standard process, to ensure no turn-to-turn shorts or ground wall impairments.

Ground Wall Insulation Tape—the heart of the PowerSeal system. We use multiple layers of half-lapped **Mylar free Mica** tape, achieving the highest ground wall mica densities and dielectrics in the industry, engineered for your specific voltage requirements.

Coil head bracing for a fixed position

With the coils in the stator slots and polymer glass laminate top sticks in place, we lash each coil individually using a patented butterfly knot to a surge ring along with a bracer rope inside the knuckle of coil. This two-part retention system coupled with multiple rows of blocking in the coil heads using treated felts and polyester laminate ensures coil movement is negligible in severe-duty applications—even during plug reversals and two pole across-the-line startups.

Lead cable construction for Class H requirements

We use oil-resistant, high-strand count leads designed to resist heat (up to 200°C), moisture, fire, mechanical fatigue and exposure to ozone, harsh oils and chemicals.

Sealing the deal with VPI

Every stator is subjected to a strictly controlled Vacuum Pressure Impregnation (VPI) cycle that penetrates and saturates

all stator coil insulating materials homogeneously with resin. This multi-step process along with bake curing transforms the completed winding into a solid, rugged and protective mass—free of voids, coil movement and with excellent heat dissipation capability.

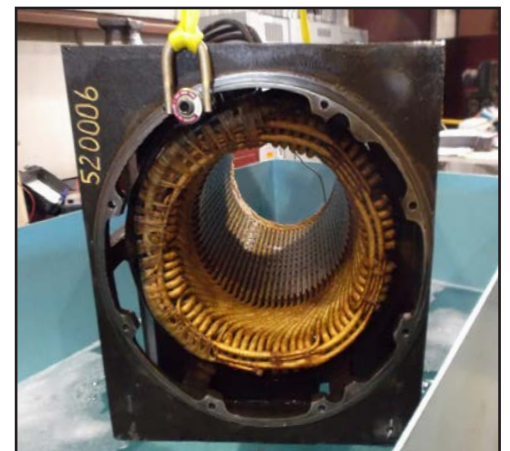
We developed our exclusive patent pending PowerSeal electrical insulation system based on maximum resin penetration, retention and cross linking with the ground wall tapes to achieve industry leading dielectrics, mechanical bond strength and thermal transfer rates. Our unique capacitance monitoring system and the "wet" checking of sacrificial coils reaffirms that the stator coils have been completely filled with resin, for confirmation of a void-free insulation system.

Comprehensive testing

All PowerSeal rewinds undergo multiple in-process tests including Megger, Surge and DC Hi-Pot which are performed according to

applicable IEEE, UL and NEMA MG1 guidelines. Depending on your requirements, we can also perform the following optional tests:

- AC Hi-pot
- Doble® testing
- Partial discharge testing
- PdMA Motor Circuit Evaluation (MCEmax)
- Voltage Endurance per IEEE 1043
- Rapid Thermal Cycling per IEEE 1310
- Water immersion test per IEEE 1776-2008



Underwater AC Hi-Pot per IEEE 1776-2008

Beaumont, TX
 888.868.9475
Birmingham, AL
 800.978.2212
Chicago, IL
 800.978.4559
Cincinnati, OH
 800.998.8447
Cleveland, OH
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Corpus Christi, TX
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Denver, CO
 800.448.0899
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