

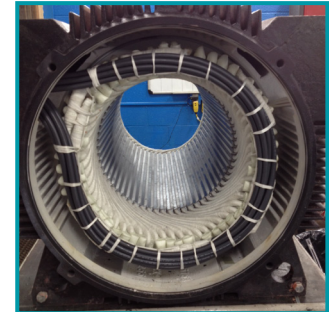
*Lower cost sleeved & non-sealed stator coil leads*

## PowerLok Overview:

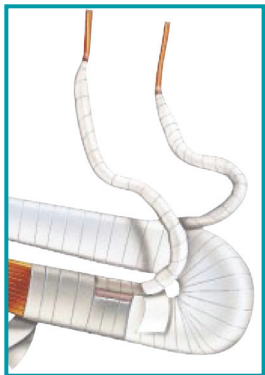
- Price competitive, industry standard rewind up to 4.1 kV
- Meets IEEE, NEMA & EASA standards
- Motor application: General Duty Environments
- Insulation Class (Rating) = Class F (155°C) @ 10 Years?
- Stator coil material & construction defined by coil vendor
- Less in-shop labor hours for winding process
- No winding design qualification testing
- Target winding design life: 10+ Years
- 1 Year – Winding Warranty



*Low cost "Stub" connections & limited blocking, bracing & lashing*



*Low cost lead cable circuit ring construction*



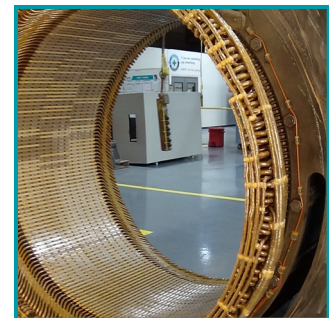
*More reliable hand taped & sealed stator coil leads*

## PowerSeal Overview:

- North America's most reliable rewind up to 7.2 kV
- Exceeds IEEE, NEMA & EASA standards
- Motor application: Harsh / Severe Duty Environments
- Insulation Class (Rating) = Class H (180°C) @ 40+ Years
- Stator coil material & construction per IPS specification
- Extensive in-shop labor hours for winding process
- Complete 3rd party winding design qualification testing
- Target winding design life: 40+ Years
- 5 Year – Winding Warranty



*Reliable "Crossover" connections with extensive blocking, bracing & lashing*



*Reliable hand taped circuit ring construction*

## Additional IPS Advantages:

- Medium Voltage experience: 20,000+ rewinds
- One IPS Quality Management System across all Service Centers
- Service center tools & equipment calibrated annually.
- CIPS – Continuous Improvement of quality, safety & delivery.
- IPS Tracker – Job data available electronically 24/7
- Core Loss Test before & after burnout.
- Temperature Charts on Burn-out & Bake Ovens
- Premium 100% solids epoxy resin – standard in all VPI tanks
- VPI Resin tested monthly to specification
- Comprehensive testing capabilities: IR, PI, Surge, Vibration, Hi-Pot, PdMA MCE, ABB LEAP, 13.8 kV Test Stands
- Engineering, field service, distribution & asset storage capabilities

Category	Item	Motor Shop Competitor	IPS PowerLok	IPS PowerSeal
Experience	Years	?	30+	30+
	Completed Rewinds (Qty.)	?	10,000+	10,000+
Product Design	Rewind Technology	Global VPI	Global VPI	Global VPI
	Max. Voltage Rating	?	4.1 kV	7.2 kV
	Product Design Strategy	Cost Competitiveness	Cost Competitiveness	Reliability
	Motor & Generator – Application / Environment	General Purpose	General Purpose	Harsh & Severe Duty
	Insulation Class (Rating)	Class F (155°C)	Class F (155°C)	Class H (180°C)
	Insulation Class – Design Life	?	10+ Years	40+ Years
	Industry Design Standards (e.g. IEEE, NEMA & EASA)	Meet	Meet	Exceed
	- IEEE 43 – Insulation Resistance (IR)	100 MΩ	100 MΩ	> 1 GΩ
	- IEEE 43 – Polarization Index (PI) Ratio	2	2	> 4
	- IEEE 512 Surge Test (Turn Insulation)	2.0 p.u. @ 0.2 μs	2.0 p.u. @ 0.2 μs	> 5.0 p.u. @ 0.1 μs
	- IEEE 95 – AC Hi-Pot Test (Ground Insulation)	(2 x VAC) + 1,000	(2 x VAC) + 1,000	(> 6 x VAC) + 1,000
- IEEE 1776-2008 Sealed Insulation Test	N/A	N/A	Pass	
Qualification Testing	Available 3rd Party Design Qualification Testing	No	No	Yes <sup>1</sup>
	- Passed IEEE 1043 Voltage Endurance Test	No	No	Yes
	- Passed IEEE 1310 Thermal Cycling Test	No	No	Yes
	- Passed IEEE 1776-2008 Sealed Insulation Test	N/A	N/A	Yes
	Available Arrhenius Log Life Aging Curve	No	No	Yes <sup>1</sup>
	- Insulation Class @ 10 Years	Class F (155°C)?	Class F (155°C)?	Class N (200°C)
	- Insulation Class @ 20 Years	?	?	Class N (200°C)
	- Insulation Class @ 30 Years	?	?	Class H (180°C)
- Insulation Class @ 40 Years	?	?	Class H (180°C)	
Stator Coil Construction	Stator Coil Specification Type	Performance Only	Performance Only	Material & Process
	Stator Coil Lead Construction	Sleeved & Non-Sealed	Sleeved & Non-Sealed	Taped & Sealed
	Surge Test Completed Coils	?	As necessary	100% of Sample
	Hi-Pot Test Completed Coils	?	As necessary	> 5% of Sample
	Sacrificial Stator Coils per Job for in-process testing	Qty. 0	Qty. 0	Qty. 2+
Rewind Process	Rewind Specification on Quality Management System?	?	Yes	Yes
	Shop Equipment & Tools – Calibrated Annually?	?	Yes	Yes
	Core Loss Test w/ Thermography – Before Burnout?	?	Yes	Yes
	Controlled Burnout Oven with Temperature Charts?	?	Yes	Yes
	Core Loss Test w/ Thermography – After Burnout?	?	Yes	Yes
	Full Weld of all Finger Plates?	No	No	Optional
	Series, Pole & Jumper Connection Type	Stubbed	Stubbed	Crossover
	Rows of Blocking (Qty.)	?	As Necessary	Per Specification
	Surge Rings (Qty.)	?	As Necessary	Per Specification
	Winding Materials (e.g. Wedges, Separators...)	?	Equivalent	G-11
	Circuit Ring Construction	Lead Cable	Lead Cable	Hand Taped
	Lead Cable – Connection per IPS 18 step spec.?	No	As Necessary	Yes
	Lead Cable – Thermal Rating (°C)	?	As Necessary	200°C
	Lead Cable – Oil & Chemical Resistance?	?	As Necessary	Yes
	VPI Resin – Within specification & tested monthly?	?	Yes	Yes
	VPI Resin – 100% Solids Epoxy?	?	Yes	Yes
	Inspection of VPI sacrificial stator coils?	N/A	N/A	Yes
Controlled Bake Oven with Temperature Charts?	?	Yes	Yes	
In-Process Testing	Surge & DC Hi-Pot – During Winding	?	No	Yes
	Surge & DC Hi-Pot – Pre-VPI Impregnation	?	Yes	Yes
	Surge & DC Hi-Pot – Post-VPI Impregnation	?	Yes	Yes
	No-Load Testing of Assembled Motor up to 7.2 kV?	?	As Necessary	Yes
	OPTIONAL: AC Hi-Pot Test @ (2 x VAC) + 1,000	?	No	Yes
OPTIONAL: Underwater AC-Hipot @ (1.15 x VAC)	?	No	Yes	
Commercial	Price Quote	\$	\$	\$ +35%
	Available Delivery	?	7 Days	7 – 10 Days
	Standard Winding Warranty	1 Year	1 Year	5 Years