

PADMOUNT SOLID DIELECTRIC, INDEPENDENT POLE OPERATED RECLOSER

PART 1- GENERAL

1.1 DESCRIPTION

This specification covers the requirements for a padmount, electronically controlled, solid dielectric vacuum recloser with independent pole operation capabilities for use on distribution systems through 38 kV.

1.2 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The chosen manufacturer shall have at least 10 years experience in manufacturing solid dielectric reclosers. The manufacturer of the reclosers shall be completely and solely responsible for the performance of the reclosers well as the complete integrated assembly as rated.
- B. The manufacturer shall furnish certification of ratings of the reclosers upon request.
- C. The recloser shall comply with requirements of the latest revisions of applicable industry standards, including:
 - (a) IEEE C37.60
 - (b) IEEE 386
- D. The recloser manufacturer shall be ISO 9001 and 14001 certified.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Reclosers shall be shipped preassembled at the factory. No field assembly shall be required.

PART 2- PRODUCTS

2.1 RECLOSER CONFIGURATION

Recloser configuration shall be padmount

2.2 RECLOSER CONSTRUCTION

- A. Mechanism Enclosure
The magnetic actuator and corresponding linkage assembly shall be housed within a high impact, UV stable, air insulated, poly-carbonate enclosure. A contact position indicator and air vent shall be provided.
- B. Operating Mechanism
Each of the three phases shall have their own magnetic actuator to achieve independent pole operation capabilities. The operating mechanism shall utilize a single coil magnetic actuator for opening and closing of the vacuum interrupter. The magnetic actuator shall be powered by capacitors located in the control enclosure. The manual trip and lockout handle shall be made of aluminum for maximum corrosion resistance. A mechanical block device shall further prohibit accidental closing when the manual trip handle is used. Vacuum interrupter contact position indication shall be accomplished using green (open) and red (closed) indicators located on the

bottom of each mechanism enclosure and through LEDs located in the control.

C. Vacuum Interrupters

Interruption of the fault or load current shall be accomplished through vacuum interrupters located inside the solid dielectric modules.

D. Solid Dielectric Modules

The solid dielectric modules shall utilize a time proven epoxy solid dielectric insulation to fully encapsulate each of the three vacuum interrupters. The solid dielectric modules shall be fully shielded. The modules shall be dead front technology and shall conduct a fault to ground through their external surface in case of a flash over. The operating temperature range shall be -60° to +65°C. A dual-ratio current transformer shall be encapsulated within each module. The current transformer ratio shall be field changeable. CT accuracy shall be +/-1%. Available ratios are 500/1000:1 or optional 400/200:1 current transformer. Voltage sensor(s) shall be integrally molded into each module. Modules shall be molded with IEEE 386 bushing interfaces.

E. Smart Grid / Distribution Automation

The recloser shall be automation ready simplifying conversion for any future automation requirements. The recloser shall have an option for up to six (6) integral LEA (Low Energy Analog) capacitive voltage sensors that are encapsulated within each recloser module, permitting voltage sensing for network reconfiguration. The integral voltage sensing accuracy shall be +/-2% at -20°C through +40°C and +/-4% at -60°C through +65°C when tested as a system. The phase angle accuracy of the integral voltage sensors shall be +/-1°. The recloser shall have an option for external voltage sensors with 0.5 accuracy class ($\pm 0.5\%$ Magnitude, $\pm 0.344^\circ$ Phase) at -40°C to +65°C temperature range. These external voltage sensors shall have a 5000:1 ratio and Low Energy Analog (LEA) outputs. A dual-ratio current transformer shall be encapsulated within the module. The current transformer ratio shall be field changeable. CT accuracy shall be +/-1%. Integrated communications options can be provided.

F. Electronic Control

The recloser shall be controlled using the Schweitzer model SEL-651R control or optional VRC configurations:

- Beckwith 7679
- SEL 351R3 (Falcon)
- SEL351R4
- SEL751A
- GE DGCR

2.3 DESIGN RATINGS

A. Reclosers

The recloser shall be rated:

SELECTION OF RATINGS	IEEE/IEC		
Maximum Design Voltage, kV	15.5	27	38
Impulse Level (BIL) Voltage, kV	110	125	150
Continuous and Load Break Current, Amperes	800	800	800
8-hour Overload, Amperes	960	960	960
60 Hz Withstand, kV rms: One minute (dry)	35	40	50
Withstand, kV DC: 15 minute	53	78	103
Interrupting Current, kA rms sym.	12.5/16**	12.5/16**	12.5
Making Current: RMS, asym, kA	20/25.6**	20/25.6**	20
Making Current: Peak, asym, kA	32.5/41.6**	32.5/41.6**	32.5
Short Circuit Current, kA sym. , 3 seconds	12.5/16**	12.5/16**	12.5
Mechanical Endurance, Operations	10k	10k	10k

**16kA Interrupting Current rating available.

B. IEEE C37.60 Fault Interrupting Duty

Percent of Maximum: Interrupting Rating	Approx. Interrupting: Current Amps	No. of Fault: Interruptions
15-20%	2000	44
45-55%	6000	56
90-100%	12000	16
Total Number of Fault Interruptions: 116		

2.4 BUSHINGS

Bushings shall be 600amp Deadbreak Apparatus or 200amp Deepwell Bushings.

2.5 FACTORY PRODUCTION TESTS

Each individual recloser shall undergo a mechanical operation check verifying contact trip/close velocity, travel profile, timing and phase synchronicity. The recloser shall be AC hi-pot tested one minute phase-to-phase and across the open contacts. Circuit resistance shall be checked on all phases. Timing tests shall be conducted to verify TCC performance. All routine tests shall be performed per the IEEE C37.60 standard.

2.6 STANDARD COMPONENTS

The following shall be included as standard:

- Lifting provisions
- Grounding provisions
- Operations counter for each phase located in the control
- Manual trip and lockout handle(s) with mechanical block
- SEL-651R control and associated control cable
- Independent pole operation capabilities
- Solid dielectric epoxy modules with internal voltage sensors and dual ratio CT's

2.7 ENCLOSURE

Enclosures shall be made of 12 gauge galvanized steel or optional 304 stainless steel and manufactured to ANSI C37.72 and C57.12.28 standards. The enclosure shall be designed to be independent of the recloser, allowing removal for ease of cable installation or future replacement if required. Enclosures shall be tamper-resistant incorporating hinged access doors with pentahead locking bolts and provisions for padlocking. The enclosure shall be provided with lifting provisions and painted with a Munsell 7.0GY3.29/1.5 green finish.

2.7 OPTIONS

The following options shall be supplied: (check as appropriate):

- 4/0 brass eyebolt style ground lug
- 304 Stainless steel enclosure
- External 0.75 KVA solid dielectric transformer for 120 VAC supply power mounted within enclosure
- External CTs for current monitoring
- Junction box with all twist connections
- Six (6) integral voltage sensors
- Dual ratio 400/200:1 current transformer
- 42 pin cable with 52B and cable disconnect alarm

2.8 LABELING

A. Hazard Alerting Signs

Appropriate hazard signs shall be applied to each unit, frame or enclosure (if applicable). A Danger sign shall warn of hazardous voltage and the need for qualified operating personnel. Warning signs shall warn against product misapplication in excess of fault ratings and the hazards when accessing moving components inside the mechanism housing. Caution signs shall warn of harmful X-ray potential.

B. Nameplates, Ratings Labels, and Connection Diagrams

Each recloser shall be provided with a nameplate label indicating the manufacturer's name, catalog number, date of manufacture, serial number, and ratings. Ratings listed on nameplate shall indicate the following: voltage rating, BIL, continuous current, interrupting current and short circuit duration.