

## RECOMMENDED DISTRIBUTION SYSTEM MAINTENANCE

Systematic maintenance of electrical power distribution systems minimizes the risk of interruptions or failures. The Field Services group tailors maintenance programs to optimize system performance while enhancing overall reliability. Maintenance activities like the following, conducted on a routine basis, keep a power distribution system from becoming a liability rather than an asset.

- *Liquid-filled Transformers*
  - Doble power-factor test
  - Doble excitation test
  - Insulation resistance test
  - Turn-to-turn ratio test
  - Dielectric fluid quality test (six parameters according to ASTM standards)
  - Dissolved gas analysis (ASTM D3612)
- *Dry Transformers (over 1,000 kVA)*
  - Doble power-factor test (medium voltage units)
  - Doble tip-up test (medium voltage units)
  - Doble excitation test (medium voltage units)
  - Insulation resistance test
  - Turn-to-turn ratio test
  - Core, coil, and vent cleaning and vacuuming
- *Oil-filled Circuit Breakers*
  - Doble power-factor test
  - Insulation resistance test
  - Contact resistance test
  - Breaker cleaning and lubrication
  - Mechanical and electrical function check
  - Six-part oil integrity test (according to ASTM standards)
- *Medium Voltage Circuit Breakers*
  - Doble power-factor test
  - Insulation resistance test
  - Contact resistance test
  - Breaker cleaning and lubrication
  - Mechanical and electrical function check
- *Medium Voltage Cables*
  - DC high-potential test
  - Doble power-factor test
  - Doble tip-up test
  - Connection inspection and tightening
  - Termination inspection
- *Medium Voltage Metal-enclosed Switches*
  - Insulation resistance test
  - Contact resistance test
  - Connection cleaning, inspection, and tightening
  - Space heater check for proper operation (if applicable)
  - Mechanical operational test
- *Medium Voltage Motor Starters*
  - Insulation resistance test
  - Contact resistance test
  - Connection cleaning, inspection, and tightening
  - Space heater check for proper operation (if applicable)
  - Mechanical/electrical operational tests

- *Medium Voltage Motors*
  - Polarization index test
  - Winding resistance test
  - Insulation resistance test
- *Arresters*
  - Doble power-factor test
  - Porcelain/polymer surface cleaning
  - Connection tightening
- *Substation Batteries and Chargers*
  - Specific gravity test
  - Battery load test
  - Connection cleaning and inspection
  - Battery charger operational test
- *Capacitor Banks*
  - Porcelain surface inspection and cleaning
  - Connection cleaning and inspection
  - Fuse and fuse holder cleaning and inspection
  - Operational checks (if applicable)
- *Ground Resistance*
  - Three-point fall-of-potential test
  - Ground connection inspection
- *Protective Relays*
  - Relay cleaning and inspection
  - Connection tightening
  - Contact cleaning and inspection
  - Injection test and calibration according to manufacturer's recommendations
- *Indicating Meters: Voltage/Current*
  - Meter cleaning and inspection
  - Connection tightening
  - Injection test and calibration according to manufacturer's recommendations
- *Watt-hour Meters*
  - Meter cleaning and inspection
  - Connection tightening
  - Injection test and calibration according to manufacturer's recommendations
- *Low Voltage Power Circuit Breakers*
  - Primary/secondary injection test
  - Contact resistance test
  - Insulation resistance test
  - Contact assembly cleaning and inspection
  - Mechanical component cleaning, inspection, and lubrication
- *Low Voltage Molded-case, Bolted-in Circuit Breakers*
  - Visual inspection
  - Cleaning, inspection, and exercise
- *Low Voltage Switchgear*
  - Insulation resistance test
  - Cleaning and visual inspection
  - Bolted connection inspection and check for signs of overheating
  - Verification of operational functions (if applicable)
  - Indicating-lamp check
- *Low Voltage Switches*
  - Insulation resistance test
  - Contact resistance test
  - Connection cleaning, inspection, and tightening
  - Mechanical operational test
- *Low Voltage Motor Control Centers*
  - Insulation resistance test
  - Cleaning and visual inspection
  - Bolted connection inspection and check for signs of overheating
  - Verification of operational functions (if applicable)
  - Indicating-lamp check
- *Aerial Switches*
  - Porcelain surface cleaning and inspection
  - Connection cleaning and inspection
  - Contact surface cleaning and inspection
  - Mechanical operational checks
- *Aerial Buswork*
  - Porcelain surface cleaning and inspection
  - Bus connection cleaning and inspection
  - Fuse holder cleaning and inspection
- *Power Distribution System*
  - Thermographic infrared inspection while electrical system is energized and under full load; results provided in pictorial report, including both infrared and digital pictures