

Frontline Automation

Subject – Electrical Testing Capabilities

Frontline Automation, LLC (FLA) will furnish all labor and materials to perform these services in accordance with the International Electrical Testing Association, Inc., Maintenance or Acceptance Testing Specifications, as well as national and manufacturer's standards. Our offer is detailed below.

Pricing will be based on performing work during **normal** business hours (7:00am - 4:00pm Monday – Friday for the first (8) hours)

Pricing will be based on performing work during **overtime** or after hours (4:00pm - 7:00am Monday – Friday. First (4) hours after an (8) hour shift and first (8) hours on Saturday's)

Price will be based on performing work during **premium** hours. (All hours on Sundays & Holidays and any hours exceeding a (12) hour shift.

1. Medium Voltage Switchgear
 - Visual and mechanical inspection
 - Insulation resistance test
 - Over potential test
 - Contact resistance test
2. Liquid Filled Transformers
 - Visual and mechanical inspection
 - Doble power factor/watts loss test
 - Doble excitation test
 - Insulation resistance test
 - Winding resistance on nominal tap
 - Turns ratio measurement on nominal tap
 - Insulating oil evaluation (6 part screen)
 - Specific gravity ASTM D-1298
 - Moisture ASTM D-1533B
 - Interfacial tension ASTM D-971
 - Acid number ASTM D-974
 - Color and visual examination ASTM D-1524
 - Dielectric breakdown ASTM D-877
 - Power factor @ 25°C ASTM D-924
 - Dissolved gas analysis ASTM D-3612
3. Medium/High Voltage Circuit Breakers
 - Visual and mechanical inspection
 - Doble power factor/watts loss test
 - Over potential test
 - Insulation resistance test
 - Contact resistance test
 - Cleaning and lubrication
 - Functional trip test
4. Sets of Medium Voltage Cables (3/C)
 - Visual and mechanical inspection



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- Over potential test
 - Insulation resistance test
5. Current Transformers
 - Visual and mechanical inspection
 - Turns ratio measurement
 - Polarity verification
 6. MV Metal Enclosed Disconnect Switches
 - Visual and mechanical inspection
 - Insulation resistance test
 - Contact resistance test
 - Over potential test
 - Cleaning and lubrication
 7. Batteries and Charger
 - Visual and mechanical inspection.
 - Cell voltage measurements.
 - Cell resistance measurements.
 - Intercell resistance measurements.
 - Specific gravity measurements.
 - Charger Operational tests.
 8. Protective Relays
 - Visual and mechanical inspection.
 - Check condition of spiral spring, disk, and contacts.
 - Current and/or voltage injection to verify unit performance versus manufacturer's tolerances.
 - Any other special tests recommended by the manufacturer's instruction book.
 9. Capacitors
 - Visual and mechanical inspection
 - Insulation resistance
 - Fuse continuity
 - Operational checks
 10. Dry Transformers (Medium Voltage)
 - Visual and mechanical inspection
 - Insulation resistance test
 - Winding resistance on nominal tap
 - Turns ratio measurement on nominal tap
 11. Oil Filled Circuit Breakers
 - Visual and mechanical inspection
 - Doble power factor/watts loss test
 - Insulation resistance test
 - Contact resistance test
 - Cleaning and lubrication



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- Functional trip test
 - Insulating oil evaluation (6 part screen)
 - Visual and mechanical inspection
12. Sets of Low Voltage Cables (3/C)
- Visual and mechanical inspection
 - Insulation resistance test
13. Potential Transformers
- Visual and mechanical inspection
 - Doble power factor/watts loss
 - Over potential test
 - Turns ratio measurement
14. Arresters
- Visual and mechanical inspection
 - Doble power factor/watts loss
 - Insulation resistance
15. Ground Grid
- Visual and mechanical inspection
 - Two point tests
 - Three point tests acceptance only
16. Low Voltage Power Circuit Breaker
- Visual and mechanical inspection
 - Insulation resistance test
 - Contact resistance test
 - Primary injection
 - Secondary injection
 - Cleaning and lubrication
17. Low Voltage Disconnect Switches
- Visual and mechanical inspection
 - Insulation resistance tests
 - Contact resistance tests
 - Cleaning and lubrication
18. Electrical Motors
- Visual and mechanical inspection
 - Polarization index test
19. Molded case breaker
- Visual and mechanical inspection
 - Insulation resistance test
 - Cleaning and lubrication



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20. Low Voltage Switchgear
 - Visual and mechanical inspection
 - Contact resistance tests
 - Insulation resistance tests
21. Motor Control Centers
 - Visual and mechanical inspection
 - Insulation resistance tests
22. Power Quality Meter
 - Visual and mechanical inspection
 - Voltage and current disturbances, distortion, harmonic content and summaries
 - Voltage, current and impedance vectors
 - Frequency summaries
 - Voltage events
 - Power summaries
 - Full report with findings and recommendations.
23. Infrared Scanning
 - Visual and mechanical inspection
 - Equipment scan list
 - Digital and thermograms of anomalies found
 - Report with recommended action based of NETA 100.18 Table

