

SECTION 26 01 60.13
MAINTENANCE SERVICES FOR ELECTRICAL DISTRIBUTION EQUIPMENT - SCHNEIDER
ELECTRIC ECO CARE

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 26 0160.15 - Transformer Monitoring Services - Schneider Electric EcoStruxure Transformer Expert.
- B. Section 26 01 60.23 - Digital Modeling and Monitoring Services - Schneider Electric Digital Twin.
- C. Section 26 09 13.83 - Condition Monitoring Services - Schneider Electric Square D EcoStruxure Asset Advisor.

1.02 ABBREVIATIONS AND ACRONYMS

- A. LV: Low voltage.
- B. MV: Medium voltage.
- C. SLA: Service Level Agreement.

1.03 DEFINITIONS

- A. Continuous Monitoring: Uninterrupted method of data collection that utilizes permanently mounted counters, sensors, or controllers to measure condition or state.

1.04 REFERENCE STANDARDS

- A. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).
- B. ISO 50001 - Energy Management Systems – Requirements with Guidance for Use; 2018.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 70B - Recommended Practice for Electrical Equipment Maintenance; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate work to provide service-plan-compatible equipment and systems with sensors, interfaces, and other appurtenances required for specified functionality.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Service Level Agreement.

1.07 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70.
- B. Manufacturer/Services Supplier Qualifications:
 - 1. Firm engaged in providing products and services for installation, configuration, and integration for projects with equipment of similar type and scope to specified system for minimum of 4 years.
 - 2. Certified in accordance with ISO 9001 with applicable quality assurance system regularly reviewed and audited by third-party registrar. Develop and control manufacturing, inspection, and testing procedures under guidelines of quality assurance system.
 - 3. Service, repair, and technical support services available 24 hours per day, 7 days per week from manufacturer or their representative.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Warranty Extension (Optional for All Service Plans):
 - 1. Provide warranty extension services as defined by SLA.
 - 2. Warranty extension to apply when included in service plan as mutually agreed between services supplier and Owner, subject to commercial terms and conditions.
 - 3. Warranty extension is deemed concurrent with sale and supply of new equipment. Services supplier must be same as original equipment manufacturer.
 - 4. Services supplier, based on type of asset or category of equipment, to propose warranty extension by up to 4 years. Subject to mutual agreement to terms and conditions, total period of asset under warranty to be up to 5 years inclusive of legal manufacturer's standard warranty, starting from date of shipment or commissioning of equipment, whichever occurs first.
 - 5. Services supplier may perform directly scope deploying their own personnel or with certified partner.
 - 6. Under applicable laws and relevant legal system governing contract, conditions in which extended warranty may be exercised to be clearly detailed in service contract and mutually agreed between services supplier and Owner.
 - 7. During extended warranty period, services supplier is responsible for cost of repair or replacement if product does not comply with intended characteristics stated or described in documents published or agreed between services supplier and Owner when accepting contract, or with standards that product or system is supposed to meet, whether due to:
 - a. Deviation in manufacturing process, supplier origin defect, or design flaw.
 - b. Error in interpretation of specification, choice, installation, implementation, or startup made by services supplier under its scope.
 - 8. Provide warranty extension service for the following categories of equipment:
 - a. Power Distribution Equipment:
 - 1) Primary MV equipment.
 - 2) Secondary MV equipment.
 - 3) Transformers
 - 4) LV equipment.
 - b. Products Integrated in Equipment:
 - 1) Protection relay
 - 2) LV circuit breakers.
 - 3) Relays and meters.
 - 4) Motor control centers.
 - 5) Instrument transformers.

PART 2 PRODUCTS

2.01 MANUFACTURERS/SERVICE SUPPLIERS

- A. Schneider Electric; EcoCare; www.se.com/#sle.
- B. Source Limitations:
 - 1. Where possible, services supplier of asset management solutions to also be original equipment manufacturer (OEM) of installed assets for improved coordination and field data enrichment, performance, and advanced analytics.
 - 2. Proprietary technologies may be allowed if they serve critical system need and do not infringe on system's inherent flexibility to interoperate with third party solutions (e.g., software and hardware).

2.02 COMPREHENSIVE SERVICE PLAN

- A. Basis of Design: Schneider Electric; EcoCare Advanced Plus; www.se.com/#sle.
- B. All Service Plans (EcoCare Essential, EcoCare Advanced, and EcoCare Advanced Plus):
 - 1. Description:

- a. Provide comprehensive service plan as part of subscription-based service agreement to achieve efficient and reliable operations through operational and maintenance optimization of facility life cycle management to meet goals while meeting necessary codes and requirements for facility maintenance.
 - b. Provide condition monitoring, predictive, preventive, and corrective services to drive appropriate level of service activation to optimize and manage identified critical electrical assets.
 - c. Employ Internet of Things (IoT), along with advanced connectivity, sensor technology, and analytics to optimize costs and reduce facility downtime.
2. Service and Setup Costs:
- a. Delivered by electrical equipment manufacturer on service basis with annual fee to cover cost to access service.
 - b. Provide one year(s) of service and initial one-time setup costs under this contract; base yearly service fee on number of assets, type of assets, and options provided.
 - c. Services Included:
 - 1) Remote and on-site emergency support available 24 hours per day, 7 days per week.
 - 2) Access to product-specific training for facility maintenance team from manufacturer's experts.
 - 3) Utilizing predictive techniques for maintenance recommendations.
 - 4) Dedicated point of contact to assist with execution of service contract.
 - 5) Monitoring through integral smart equipment capabilities (e.g., circuit breaker).
 - 6) Thermal monitoring of LV or MV bolted copper connections.
 - 7) Additional sensors or systems (e.g., partial discharge measurements and dissolved gas analyzer).
 - d. Multi-Year Service Contract Proposal: Provide proposal for multi-year service contract for four additional years to include systems provided and integrated under this contract.
 - 1) Breakout pricing for each year to convey yearly price increase based on standard economic indicators and aging equipment risk.
 - 2) Include requirements defined in each integrated system related to extended service within this proposal.
 - 3) Provide one point of contact for system issues and provide listing of service response times for each system.
 - 4) Break out pricing for each year specific to software as a service (SAAS) offerings. Include yearly software licenses required to keep proposed functionality active.
 - e. Flexibility to upgrade to higher tier while maintaining existing contract duration; no termination required.
3. Objectives:
- a. Maintain and improve reliability of critical electrical systems with technical and electrical equipment expertise.
 - b. Efficient and reliable service management to lower total cost of ownership of equipment over its lifetime.
 - c. Planned maintenance schedule and proactive services to sustain peak performance and prevent future failures, downtime disruption, and help user optimize daily management.
 - d. Periodic evaluation and long-term planning.
 - e. Provide recommendations to improve data reliability and power quality of critical electrical equipment.
4. Application:
- a. Structure comprehensive service plan considering potential impact of energy costs, power distribution complexity, and operating personnel's safety concerns on facility's operations.

- b. Establish trustworthy data foundation that enables user to:
 - 1) Turn system data into actionable insights with accurate reporting on energy, carbon footprint, and standards compliance (e.g., ISO 50001).
 - 2) Determine usage patterns via automated anomaly detection that provide root cause determination and reporting.
 - 3) Gain deeper insight into electrical system health and potential vulnerabilities.
 - 4) Gain deeper insight into alarm health to eliminate nuisance alarms and help operation focus on alarms which really matter
 - c. Utilize latest analytics technology to continually optimize system reliability.
 - d. Utilize highly skilled personnel and subject matter experts located within US, supported with analytics to quickly identify issues and provide plan for resolution per Service Level Agreement.
 - e. Maximize power management and electrical system performance while minimizing risk by managing critical asset performance and safety through:
 - 1) Dedicated domain experts based at central hub.
5. Features:
- a. Ensure power system and data reliability across breadth of critical electrical equipment, with advanced technology combined with technical and electrical equipment expertise.
 - b. Support to Operations:
 - 1) Remote Priority Reactive Technical Assistance:
 - (a) Priority telephone, email and remote system access support to be accorded directly to engineer. Contract must be delivered by skilled power management experts. Support may be categorized as below, based on priority and complexity of issue to be resolved.
 - (1) Active: Via telephone, available 24 hours per day, 7 days per week, and within timeline defined in SLA, to resolve problem with customer operator.
 - (2) Alarm Monitoring: Central hub established by services supplier to contact 24 hours per day, 7 days per week user/operator to notify or alarm, within timeline defined in SLA.
 - 2) On-Site Emergency Prioritization (Local SLA):
 - (a) In event of emergency situations, either site or system related, user to receive priority site response by expert to reinstate systems or provide investigation for root-cause analysis. In case of critical emergency and when no resolution is possible by normal support means, engineer to attend site within 4– 8 hours, in accordance with SLA.
 - c. Maintain:
 - 1) Preventative Scheduled Maintenance - System (Optional for EcoCare Essential and EcoCare Advanced, Included for EcoCare Advanced Plus):
 - (a) Conduct onsite maintenance visits to meet maintenance recommendations based on ageing of equipment and environmental factors and proactively ensure optimum system operation.
 - (b) Site reports to be made available. Data quality, alarm health and electrical network health reports from analytics tool to be utilized to prioritize and perform condition-based maintenance.
 - (c) Review status and performance of system from report generated by analytics tool.
 - (d) Use analytics tool to identify specific priority data issues impacting data quality to be addressed during service activity plus onsite engineers to perform checks on selected connected devices, physical random checks on selected meters to ensure they are displaying values correctly.

- (e) Review known fault/issue log with onsite representatives and where time allows investigate/diagnose problem and note work completed and further actions required. Troubleshoot to correct persistent issues.
 - (f) Perform full database backup, which will help to prevent potential catastrophic system failure from losing essential data, potentially being used for reporting or billing purposes, and used for disaster recovery.
 - 2) Software Assurance:
 - (a) Include access to latest software releases as part of services contract.
 - (b) Make new versions of software being released available for customer.
 - (c) Software to only be installed by services supplier directly and cost of installing upgrades to be quoted separately.
- d. Monitor:
 - 1) Asset Monitoring and Alarming:
 - (a) Perform maintenance activity to validate power metering devices are connected and ensure communications are optimized.
 - 2) Environmental Monitoring and Alarming (e.g., Thermal, Humidity):
 - (a) Maintenance activity to validate intelligent thermal, environment and cable overheating detection sensors installed in switchgear and other equipment are connected and communications are optimized.
 - 3) Power Management System Health Monitoring:
 - (a) Continually monitor critical electrical equipment health to enhance reliability of system with dedicated service experts proactively notifying next business day of site issues impacting data loss or system failure.
 - (b) Data transmission to be secure, one-way encrypted based around SMTP or equivalent.
 - (c) Power Management Software Diagnostics:
 - (1) Remote monitoring to ensure necessary software services are running.
 - (2) Detect device communication issues and diagnose corruption in database logs.
 - (3) Interpret and notify on critical system log messages over various time ranges.
 - (d) Server and Operating System Diagnostics:
 - (1) Detect low disk space and memory, excessive CPU usage and evaluate database size compared to thresholds.
- e. Optimize:
 - 1) Analytics engine, backed up by services supplier's domain expertise, to acquire and prioritize data quality, electrical network, and alarm health issues anywhere in connected system.
 - 2) Alarm Health Optimization:
 - (a) Identify alarm trends and patterns by applying analytics based around industry standard ISA-18.2/IEC62682, enabling user to reduce sheer volume of troublesome/nuisance alarms to levels that can be managed effectively, reducing risk to facility operations.
 - (b) Enable management and prioritization and focus on alarm management.
- 6. Offer NFPA 70B Section 6 compliance with intelligent single line diagram (iSLD) and digital twin along with recommendations and study using data analytics from digital twin (Optional for All Service Plans).
- 7. Analytics and Reporting Tool for Power Management:
 - a. For digitally connected assets, see Section 26 09 13.83.
- 8. Cybersecurity:
 - a. Data Collection and Storage:
 - 1) System to support two methods of data collection:

- (a) Non-Connected Method: Use extraction tool to collect monthly data to be uploaded by services supplier or authorized system integrator through website using secure HTTP connection.
 - (b) Connected Method: Require explicit opt-in and consistent connection. Automatically transmit data at frequent intervals through secure encrypted connection. Provide full transparency on what data is collected, and certain data may be omitted upon user's request.
 - 2) Store data for each customer site securely in encrypted form. Encrypt sensitive data pertaining to user and operations, stored, and transmitted by application.
- b. User Access and Data Privacy:
 - 1) Do not collect personally identifiable information (PII) about users.
 - 2) Secure each instance of site data with unique credentials – no authorizations to be shared.
 - 3) Only authorized service experts and users to be able to access information on central analytics platform.
 - 4) Strictly control access for only using secure identity management and include multiple levels of user security and SAML-based authentication framework.
- c. Physical and Network Security:
 - 1) Remote application to run in highly secure data center, operated by reputed web infrastructure company with proven credentials.
 - 2) Use SSL certificates with centralized certificate handling.
 - 3) Use protection mechanisms to filter unauthorized users and traffic.
 - 4) Continuously monitor network intrusions.
 - 5) Frequently update attack signatures to mitigate current and future exploits.
- d. Audits and Controls:
 - 1) Continuously monitor system for detection of security threats.
 - 2) Intrusion detection systems to monitor data traffic.
 - 3) Continuously monitor and log inbound and outbound activity.
 - 4) Perform penetration testing on regular basis and conduct regular security reviews by services supplier and nominated security experts.
- 9. Condition-Based Connected Asset Management:
 - a. Central hub established by services supplier capable of contacting user/operator 24 hours per day, 7 days per week to notify or alarm, within timelines defined in SLA.
 - b. Central hub may proactively contact user for further investigation or actionable recommendations.
 - c. In cases of abnormal situations, experts to investigate and analyze various factors deemed relevant to technical assessment. Provide insights and recommendations to help mitigate risks of unplanned downtime.
 - d. 24/7 Support:
 - 1) Hotline Technical Assistance:
 - (a) For assets covered by service plan, provide on-demand technical support to user remotely over phone within initial response time of 2 hours.
 - (b) Following discussion with user, service supplier's technical team to provide either technical solution or organize on-site intervention to address issues.
 - e. Maintain:
 - 1) On-Site Corrective Maintenance:
 - (a) If recommended by hotline technical assistance team, provide on-site emergency intervention with preferable response-to-site time of less than 24 hours.
 - (b) Dispatch trained and certified service engineers to user's location to diagnose system and fix potential equipment issues.
 - (c) Based on diagnosis done during intervention, services supplier to quote required parts and associated labor costs to user and upon acceptance,

- commence work to replace parts concerned, repair, and test system as required.
- (d) Submit report describing issues found, corrective action taken, and results of tests performed.
- 2) On-Site Scheduled Maintenance (Optional for EcoCare Essential and EcoCare Advanced, Included for EcoCare Advanced Plus):
 - (a) Perform on-site scheduled maintenance services during periodic site visits by qualified service engineers trained in maintenance and diagnosis techniques.
 - (b) Submit schedule defining servicing conditions and performance intervals according to type of equipment.
- 3) Preventive Maintenance (Optional for EcoCare Essential and EcoCare Advanced, Included for EcoCare Advanced Plus):
 - (a) Include detailed maintenance program to maintain compliance with NFPA 70B Section 9. Base frequency of proposed maintenance on manufacturer's recommendations or accepted industry practice.
 - (b) Critical assets to be visually inspected, checked for condition prior to intervention, tested for functionality and performance, and finally rechecked post intervention, before energizing and putting equipment back into service.
 - (c) Deliver reports on preventive maintenance operations to user.
- 4) Equipment Diagnostics (Optional for All Service Plans):
 - (a) Partial Discharge: To monitor partial discharge phenomena inside medium voltage cubicles, dry transformer units and provide dynamic assessment of dielectric health of insulation.
- f. Monitor:
 - 1) Provide mobile application allowing access to monitoring service.
 - 2) Web Portal Access
 - (a) Provide web portal access to user, giving near real-time information on installed base, including service visit schedule and intervention reports.
 - (b) Enable user to check obsolescence and service coverage status for registered products, alerts on warranty and contract expirations, service visits and contracts.
 - (c) Restrict access to user's company profile in portal.
 - (d) Include two user accesses within service plan.
- g. Optimize:
 - 1) Support auto generation of monthly asset data report listing events by priority and status.
 - 2) Support alarms, critical events, and identification of possible failure modes through evaluation of fire index.
 - 3) To help in training personnel on installation, offer platform with augmented reality features to enable operators to visualize, in front of equipment, any type of information needed (e.g., access to documentation, live data, and single line diagrams) (Optional for All Service Plans).
 - 4) Propose spare parts and components for equipment, software upgrades, requisite training of facility owner/user representatives and warranty extensions as mutually agreed between user and services supplier (Optional for All Service Plans).
 - 5) Offer design services for mission critical areas of facility's electrical distribution system (Optional for All Service Plans).
- 10. Critical Technical Services:
 - a. Provide critical technical services (CTS) with expertise in domains of electrical technology, IoT digitalization, and data-driven predictive analytics.

- b. In context of electrical asset management, critical technical service is defined as that service which is essential to improvement of safety of installation and personnel and reduction/avoidance of unscheduled power system downtime.
- c. Service plan to further enable optimization of facility operations.
- d. The following services are deemed CTS within perimeter of comprehensive service plan. Services supplier may propose additional services that qualify under definition of CTS and submit detailed service plans.
- e. Partial Discharge Monitoring Service (Optional for All Service Plans):
 - 1) Equip MV switchgear with necessary sensors and other hardware as required for accurate detection and monitoring of three major types of partial discharge (corona, surface, internal) continuously.
 - 2) Detection device to use capacitive coupling technology for measuring partial discharge and preferably be fully incorporated within switchgear without cables and wires outside of switchgear envelope.
 - 3) Direct partial discharges measurement to comply with IEC 60270.
 - 4) For purpose of continuous monitoring, methods of detection of partial discharge involving acoustic or optical technologies or chemical analysis, or combinations are not permitted. Methods utilizing TEV/UHF/VHF electromagnetic technology for detection and measurement of partial discharge may form part of services supplier's periodic routine maintenance program but must not substitute for specified system.
 - 5) Data of partial discharge measurements to be communicated by device wirelessly to local data concentrator/gateway on site for onward communication to asset management application such as cloud-based software application hosted by services supplier for detailed analysis.
 - 6) Software application to evaluate risk level based on trend of measured data and extrapolated with environment data to form assessment of system and enable operator's plan for corrective actions, if necessary.
 - 7) Detection and monitoring systems to discard false alarms.
 - 8) Asset management application to be capable of providing historical trending information on measurements and calculated health indices.
 - 9) Deploy subject matter experts at central location to review analytics of data presented by asset management application, remotely and periodically, of partial discharge measurements to form holistic assessment of health of installation and make recommendations to users as required.
- f. Advanced Condition Monitoring Services for Mineral Oil Transformer (Optional for All Service Plans): See Section 26 0160.15.
- 11. Spare Parts (Optional for All Service Plans):
 - a. Include spare parts management plan to incorporate life cycle of equipment.
 - b. New or refurbished spare parts provided under this contract to be under original equipment manufacturer (OEM)'s warranty for period of 12 months from date of delivery.
 - c. Provide spare parts replacements in case of new failures during warranty period.
 - d. Provide the following information in service plan:
 - 1) Commercial information on critical spares parts listed in plan, limited to assets covered.
 - 2) Process for spare parts procurement.
- 12. Preventive Maintenance Services (Optional for EcoCare Essential and EcoCare Advanced, Included for EcoCare Advanced Plus):
 - a. Provide preventative maintenance services as defined by SLA.
 - b. Perform preventive maintenance at each site in accordance with manufacturer's recommendations to maintain compliance with NFPA 70B Section 9.
 - c. Propose plan to leverage data for continuous monitoring and predictive techniques to be used as consideration when determining maintenance intervals.

- d. Continue to propose necessary upgrades/maintenance to improve life expectancy of equipment.
 - e. For digitally connected assets, leverage data collected to provide either proactive or condition-based maintenance plan and schedule for future maintenance activities.
 - f. Submit detailed technical report to user on nature of work carried out upon completion of routine preventive maintenance visits.
13. Emergency Breakdown and Call-Out Service:
- a. Provide emergency breakdown and call-out service for requests as defined by SLA.
 - b. Send qualified and experienced maintenance personnel to sites on request from designated user representative, to perform remedial maintenance to restore major faults or breakdown of systems.
 - c. Ensure availability of qualified and experienced service personnel to visit affected sites at all times (Optional for All Service Plans).
 - d. Services supplier to be capable of mobilizing outstation specialist engineer(s) for remedial maintenance if agreed upon, when approved by user in advance (Optional for All Service Plans).
14. Training and Skill Development (Optional for All Service Plans):
- a. Propose structured training program to facility maintenance teams and other nominated personnel in accordance with SLA. Program may deliver, through different methods, competency in technical domains relevant to operation and maintenance, safety, and management of electrical distribution systems.
 - b. Topics Covered:
 - 1) Electrical Management:
 - (a) Enable users to acquire skills of choice.
 - (b) Comprehensive e-learning programs may be made available in preferred language options.
 - (c) In-class training may cover mission critical subjects (e.g., safety, networks, transformers, and automated protection relays).
 - 2) Electrical Safety:
 - (a) Focus learning outcomes on protection of personnel and mitigation of risks of accident.
 - (b) Aim to be toward achieving zero-accident O&M environment through mitigation of major electrical safety risks at site.
 - (c) Services supplier's experts to design safety training programs based on practical scenarios.
 - 3) Operation and Management:
 - (a) Align training to enhance facility team's knowledge and help installation's reliability.
 - (b) Tailor course material to include equipment training for practical scenarios.
 - (c) Training modules to enable operations and maintenance teams to be better equipped to perform their job, avoid downtime and damages, and save time and costs.
 - c. Equip user with technical training catalog and course guidance in selection of appropriate training modules for subscription.
15. Engineering Support:
- a. Render necessary engineering support on technical matters, prioritizing user engagement through online web portal. Provide remote subject matter experts with qualified experience in domains of electrical power distribution (installation, operation, protection, and safety), information and communications technology (ICT) as relevant to application to electrical installations, and cloud-based services (Optional for All Service Plans).
 - b. Submit routine updates on present and future upgrades related to relays, breakers hardware, electronic circuitry, and firmware on switchgears/modules. Preference is to

- communicate updates digitally as email notifications or alerts to designated users as identified in subscribed service plan/contract.
 - c. Furnish routine updates on technology and module developments with respect to systems under implementation or installation as covered by service contract.
 - d. Provide necessary remote advisory services for investigation, technical advice, and normal support requested by user, for issues related to switchgear. Include review of operational and testing procedures, analyzing problems, and supporting user in resolution.
16. Online Web Portal:
- a. Furnish, host, and maintain central online web portal as part of digital ecosystem for service contract management, user engagement, and asset database management.
 - b. Enable users to subscribe to portal and access the following resources provided by services supplier:
 - 1) Contracts list and warranty/contract status by asset
 - 2) Installed base with asset list across sites, asset registration and obsolescence.
 - 3) Dashboard with overview of current services and obsolescence forecast.
 - 4) Trainings: Access to services supplier's training portal.
 - 5) Service visits list, with work orders, historical maintenance reports, visit summary, and recommendations.
 - c. Provide the following features to enhance user experience for effective digital engagement:
 - 1) Access Management:
 - (a) Support site-based access across features for users spread across multiple sites based on their roles as mapped in service contract.
 - (b) Include provision for dedicated user ID and password authentication for designated representatives of user organization.
 - 2) Online Case Management:
 - (a) Enable registered users to create, edit, and manage cases through portal.
 - (b) Provide access to online support requests 24 hours per day, 7 days per week for all passive support channels.
 - 3) Appointment Booking:
 - (a) Enable registered users, through personalized portal or customer support, to schedule in advance remote support session with service supplier's customer support expert.
 - 4) Chat Sessions:
 - (a) Provide live chat function with premium access to service supplier's qualified experts during business hours to enable interactive user experience in real time for technical support through effective consultations, issue resolution, and personalized case support.
 - 5) Notifications:
 - (a) Support generation of email and in-app notifications, including upcoming service visits, expiring services contract(s), and visit reports.
 - 6) User Search:
 - (a) Support contextual search, filtering based on relevant fields to narrow search to subject of interest to user.
 - (b) Provide section on frequently asked questions (FAQ) to enable quick access to documentation and help improve user knowledge.
 - d. Enable user to acquire assessment of condition and performance of assets to help plan for self-service actions, where possible.
 - e. Enable designated users to view insights generated by artificial intelligence (AI) for sites and locations covered by service contract.
- C. EcoCare Advanced and EcoCare Advanced Plus Service Plans Only:
- 1. Application:

- a. Address identified critical electrical assets through brand-agnostic approach pivoted on digitized and connected environment, backed by manufacturer's insights and expertise with thermal and environmental monitoring.
 - b. Identify assets at risk with continuous monitoring of asset data and analysis of performance based on environmental conditions, operational loading, usage, and aging.
 - c. Enrich data acquired from installed base of electrical assets, based on operational conditions, functional performance, and system interdependencies.
 - d. Condition monitoring may include diagnostics and data such as thermal, contact resistance, operational analytics, insulation testing and measurement, humidity, power quality, and optional asset performance simulation using additional services including facility audit using digital twin and intelligent single line diagram (iSLD) (With Option of EDTS).
 - e. Maximize power management and electrical system performance while minimizing risk by managing critical asset performance and safety through:
 - 1) Customized insights, reports, and summary with recommendations.
2. Features:
- a. Include proactive services highlighting data quality, electrical health, and alarm activity to sustain system performance, prevent future failures and downtime disruption, and help optimize management.
 - b. Incorporate remote application to provide in-depth analytics based on operational data directly acquired from cloud-based application. Use periodic snapshots of system configuration and operational data to check for chronic issues that may result in poor data quality or indicate issue with electrical distribution network.
 - c. Optimize:
 - 1) Analytics and reporting tools to enable proactive issues resolution and drive operational efficiency and cost improvement through analysis of data quality, electrical network and alarm health.
 - 2) Electrical Network Health and Power Quality:
 - (a) Gain operational insight into power quality issues that incur additional utility charges, reducing operational capacity or potentially cause unplanned downtime and reduce asset longevity.
 - (b) Electrical network analysis to define and prioritize issues for correction via remote and onsite condition-based services.
 - 3) Data Quality and System Health Optimization:
 - (a) Identify asset and system issues adversely affecting decisions based on data quality.
 - (b) Asset monitoring to reflect evolution of electrical infrastructure due to modernization and expansions.
 - (c) Data quality analysis to help establish data foundation for ongoing electrical network optimization and decision-making.
3. Condition-Based Connected Asset Management:
- a. Provide central service hub to serve as center of expertise in subjects (e.g., electrical power distribution, protection, and safety).
 - b. Remote experts from central hub to deliver periodic reports with specialist recommendations and provide feedback during annual consultations.
 - c. Monitor:
 - 1) Digital Services for Connected Assets:
 - (a) Continuously monitor current operating conditions to verify health of equipment, electrical connections, insulation, performance, probability, and risk of failure, considering data related to electrical equipment (smart devices) or provided by external sensors. Enable user to take preventive measures if abnormality is detected, to avoid breakdowns.

- (b) Provide computed electrical health score considering electrical health issues at site and periodically report lists of electrical issues relevant to system health. In case of low score, support data quality overview. Consequently, generate data quality score considering data quality issues to serve as confidence metric of electrical health score. Low data quality score points to poor data quality as cause for low electrical health score.
 - (c) Provide and maintain online dashboard of asset health and furnish risk assessment data through criticality matrix for management reviews. Dashboard to provide computed equipment health index, helping maintenance teams identify equipment that needs prompt corrective action. Provide expertise in suggesting corrective actions to eliminate impending failures.
 - (d) Provide event report for each event. Event report, at minimum, to include acquired data relevant to event, their interpretation, recommended course of action along with timelines for completion. Events with potential to cause fire hazard to be highlighted and composite fire index evaluated for indication on online dashboard to enable user in electrical fire risk mitigation plans.
 - d. Optimize:
 - 1) Domain experts and subject matter specialists from central hub to include recommendations as part of periodic summary reports to provide insights on connected assets and help establish optimal condition-based maintenance strategy.
 - 2) Recommendations from experts at central hub to draw from experience in operation and maintenance of electrical distribution systems.
 - 3) Central hub to leverage advanced analytics on data acquired from equipment's operational parameters and environmental conditions.
 - 4) Each summary report to be accompanied by detailed asset report showing asset analysis and asset key findings, as well as network analysis over period.
- D. EcoCare Advanced Plus Service Plan Only:
 - 1. Application:
 - a. Optimize maintenance requirements based on asset condition and predictive analytics (i.e., analytics, algorithms, or software that interpret and analyze data from input sources and provide recommendations to address identified problems).
 - b. Maximize power management and electrical system performance while minimizing risk by managing critical asset performance and safety through:
 - 1) Condition-based maintenance and predictive analytics.
 - 2. Features:
 - a. Maintain:
 - 1) Preventative Scheduled Maintenance - System:
 - (a) Condition-Based Maintenance on Electrical Assets:
 - (1) Conduct onsite condition-based and dynamic maintenance, enabled by analytics. By default, use continuous monitoring or predictive techniques as consideration when determining maintenance intervals, based on manufacturer's recommendations or accepted industry practice, to comply with NFPA 70B Section 9 maintenance requirements. Specific index to leverage ageing models and field data to detect possible need of earlier maintenance on asset.
 - (2) Onsite maintenance to be complemented with advanced diagnostics performed by services supplier using manufacturer tools, measuring values of electrical and mechanical components inside equipment, and benchmarking these values with manufacturer trends and models.
 - 3. Condition-Based Connected Asset Management:

- a. Enable predictive maintenance approach with advanced technology which improves personnel safety, mitigates risk exposure, and achieves maintenance optimization by extending service intervals up to 5 years in total based on continual thermal and environmental monitoring and actionable insights from services supplier's team of domain experts.
- b. Submit digital service plan leveraging IoT technologies to provide analysis of electrical assets and to identify potential issues prior to impending failure to decrease unscheduled downtime.
- c. Maintenance practices to rely on condition-based maintenance approach to make operations more efficient and safer, and business more resilient and sustainable.
- d. Provide user access to online customer portal/web portal with equipment condition/performance dashboards, summary reports, and maintenance recommendations based on analytics and data acquired in real time.
- e. Maintain:
 - 1) Equipment Diagnostics:
 - (a) Leverage diagnostic tools and digital platform for evaluation of connected equipment based on site assessment and/or dynamic condition monitoring.
 - (b) Transformers: Provide indication of predicted temperatures on locations indicated in connected liquid cooled and dry transformers that are equipped with thermal and current sensors.
 - (1) Dry Transformers: LV connection, MV connection, winding temperature.
 - (2) Liquid-Cooled Transformers: LV connection, MV connection, LV neutral.
 - (c) Fuses: To evaluate external condition of fuse, its internal resistance, and condition of MV switchgear compartment.
 - (d) MV Relay/IED: To examine MV protection chain between relay tripping order and opening of breaker main contacts.
 - (e) LV Breaker Trip Units: To analyze condition of trip unit based on protection settings, discrimination, breaking capacity, trip unit battery health and historical data.
 - (f) Breakers: To assess kinematic and electrical parameters of device related to opening, closing, and charging functions. Quantify health of individual components and sub-assemblies that are critical to functioning of breaker, aiding in assessment of overall equipment health.
 - (g) Low Voltage Variable Frequency Drives (VFDs): To assess health of VFD by analyzing ageing of power fan, cubicle fan and settings (e.g., last and next maintenance dates, usage, and ambient environmental pollution levels).
 - (h) Medium Voltage Drive Systems: To assess health of medium voltage drive system by analyzing condition of cubicle fans and settings (e.g., last and next maintenance dates and usage).
 - (i) Rotating Equipment: To assess health of rotating equipment comprising electric motor, load, process, mechanical components (e.g., shaft train and transmission) and provide holistic evaluation of equipment health by aggregating data from dynamic condition monitoring.
- f. Monitor:
 - 1) Digital Services for Connected Assets:
 - (a) Adopt predictive maintenance strategy based on near real-time asset condition and enable asset management decisions to be made based on accurate understanding of asset condition and facilitate maintain, repair or replace decisions. Online dashboard to provide connected equipment maintenance index.

- (b) Maintenance index to be composite metric aggregating individual statistical weights or partial maintenance indices assigned to critical components and sub-assemblies comprising connected equipment. Maintenance logs from onsite reports of services supplier's service personnel to integrate maintenance history of equipment into assessment leading to computation of maintenance index.

PART 3 EXECUTION - NOT USED

END OF SECTION 26 01 60.13