A Guide To Transformer Maintenance

A Guide To Transformer Maintenance A Guide to Transformer Maintenance Transformers are vital components in electrical power systems, responsible for stepping voltage levels up or down to facilitate efficient power transmission and distribution. Proper maintenance of transformers is essential to ensure their longevity, optimal performance, and safety. This comprehensive guide to transformer maintenance provides valuable insights into best practices, routine inspections, troubleshooting tips, and preventive measures, helping facility managers, electricians, and maintenance teams keep transformers operating reliably. Understanding the Importance of Transformer Maintenance Transformers are complex devices that operate under high electrical loads and environmental conditions. Regular maintenance minimizes the risk of unexpected failures, reduces downtime, and extends the lifespan of these costly assets. Well-maintained transformers also ensure consistent power quality and prevent potential safety hazards such as electrical fires or electrocution. Routine Inspection and Monitoring Regular inspections form the backbone of effective transformer maintenance. They help identify potential issues early before they escalate into major failures. Visual Inspection Check for leaks: Inspect oil-filled transformers for signs of oil leaks around seals, gaskets, and tank joints. Leaks can indicate gasket failure or cracks in the tank. Inspect physical condition: Look for signs of rust, corrosion, or damage to the transformer casing and bushings. Examine bushings: Ensure bushings are free of cracks, chips, or discoloration. Damaged bushings can lead to electrical faults. Assess cooling systems: Check for dust, dirt, or debris buildup on radiators, fans, and cooling fins that could impair heat dissipation. Oil Sampling and Testing Oil serves as an insulator and coolant in many transformers. Monitoring its quality is crucial for preventive maintenance. Regular sampling: Collect oil samples periodically (e.g., annually or semi-annually) for laboratory testing. Key tests include: Dissolved Gas Analysis (DGA), moisture content, dielectric 2 strength, and acidity levels. Interpreting results: Elevated levels of gases like hydrogen or methane may indicate overheating or electrical discharges. Electrical Testing Electrical tests verify the integrity of the transformer’s insulation and winding connections. Insulation Resistance Test: Measures the resistance of winding insulation to detect deterioration. Winding Resistance Test: Checks for abnormalities in winding resistance that could indicate partial discharges or winding faults. Power Factor Testing: Assesses the insulation condition by measuring dielectric losses. Preventive Maintenance Strategies Implementing

preventive maintenance helps avoid unexpected failures and prolongs the lifespan of transformers. Oil Management Oil replacement or regeneration: Replace or treat degraded oil to maintain proper insulation and cooling. Oil filtration: Use filtration systems to remove particulate contaminants and moisture. Cooling System Maintenance Check cooling equipment: Regularly inspect fans, radiators, and pumps for proper operation. Clean cooling fins: Remove dirt and debris to ensure effective heat dissipation. Protection Devices and Control Systems Verify relays and fuses: Test protection devices to confirm they operate correctly during faults. Calibration: Regularly calibrate control and monitoring equipment for accuracy. Advanced Maintenance Techniques For high-value or critical transformers, advanced diagnostic methods can provide deeper insights into the health of the equipment. 3 Dissolved Gas Analysis (DGA) DGA detects gases produced by insulation breakdowns or overheating. Regular DGA testing can pinpoint early signs of faults such as arcing or corona discharge. Partial Discharge Testing This technique detects small electrical discharges within insulation that could lead to failure. Ultrasonic or acoustic sensors are used to identify partial discharge activity. Infrared Thermography Infrared cameras visualize temperature variations on transformer surfaces, highlighting hotspots caused by electrical faults or cooling issues. Transformer Maintenance Safety Precautions Safety is paramount when working with transformers. Always follow proper procedures and wear appropriate personal protective equipment (PPE). De-energize transformers: Ensure the transformer is fully de-energized and grounded before inspection or maintenance. Use insulated tools: Utilize tools rated for electrical work to prevent accidental contact. Follow lockout/tagout procedures: Implement lockout/tagout protocols to prevent accidental energization. Monitor environmental conditions: Be aware of potential hazards such as oil spills, fumes, or electrical arcs. Common Transformer Problems and Troubleshooting Identifying common issues early can prevent costly repairs and outages. Overheating Cause: Poor cooling, overloading, or degraded oil. Solution: Improve cooling, reduce load, or replace oil. Oil Leaks Cause: Damaged gaskets, seals, or tank cracks. Solution: Repair seals, replace damaged components, or consider oil containment measures. 4 Bushing Failures Cause: Cracks, contamination, or electrical stress. Solution: Replace defective bushings and ensure proper installation. Electrical Faults Cause: Insulation deterioration, partial discharges, or winding faults. Solution: Conduct detailed electrical testing and repair or replace faulty components. Maintaining Transformer Records and Documentation Keeping detailed records of inspections, tests, repairs, and maintenance activities is essential for ongoing health assessments. Log all routine inspections and findings. Maintain records of oil test results and analysis reports. Document any repairs, replacements, or upgrades performed. Develop a maintenance schedule based on manufacturer recommendations and operational conditions. Conclusion Effective transformer maintenance combines routine inspections, preventive measures, advanced diagnostics, and safety practices.

By adhering to a structured maintenance plan, facilities can prevent costly failures, optimize transformer performance, and extend asset lifespan. Remember, proactive maintenance not only safeguards your electrical infrastructure but also ensures the safety of personnel and the reliability of power supply systems. Regularly review maintenance procedures and stay updated with technological advancements to keep your transformers in peak condition. QuestionAnswer What are the key components to inspect during transformer maintenance? Key components include the transformer's bushings, oil levels and quality, cooling system, tap changer, and protective relays. Regular inspection ensures early detection of faults and prolongs transformer lifespan. How often should transformer oil be tested and replaced? Transformer oil should typically be tested annually for dielectric strength, moisture content, and dissolved gases. Replacement or filtering is recommended if oil quality deteriorates or if dissolved gas analysis indicates potential issues. 5 What are the common signs of transformer failure to watch out for? Signs include unusual noises, oil leaks, increased temperature, discoloration or odor in oil, and abnormal vibration. Early detection of these signs can prevent major failures. How can thermal imaging assist in transformer maintenance? Thermal imaging helps identify hotspots and uneven temperature distribution on transformer surfaces, indicating potential problems like overloading or cooling system failures before they cause serious damage. What safety precautions should be taken during transformer maintenance? Ensure the transformer is properly de-energized and grounded, wear appropriate personal protective equipment, and follow lockout/tagout procedures. Always adhere to manufacturer guidelines and local safety standards. What is the role of dissolved gas analysis (DGA) in transformer maintenance? DGA detects and analyzes gases dissolved in transformer oil, which can indicate internal faults such as arcing, overheating, or insulation deterioration, enabling proactive maintenance. Are there any preventive maintenance best practices for transformers? Yes, regular visual inspections, oil testing, thermal imaging, cleaning of cooling systems, and timely replacement of worn components are essential preventive measures to ensure reliable transformer operation. When should a transformer be taken out of service for maintenance? Transformers should be taken out of service during scheduled preventive maintenance or immediately if abnormal signs, such as oil leaks or overheating, are detected to prevent catastrophic failure. A Comprehensive Guide to Transformer Maintenance: Ensuring Reliability and Longevity Transformers are the backbone of electrical power systems, facilitating the efficient transmission and distribution of electricity across vast distances. As critical components, transformer maintenance is essential to ensure safe, reliable, and efficient operation. Proper maintenance not only extends the lifespan of transformers but also minimizes costly outages and equipment failures. Whether you're an electrical engineer, maintenance technician, or facility manager, understanding the fundamentals of transformer upkeep is vital for optimal system performance. --- Introduction to Transformer

Maintenance Transformers operate continuously under varying load conditions and environmental factors, making regular maintenance crucial. Neglecting maintenance can lead to insulation deterioration, overheating, oil leaks, or catastrophic failures. A well-structured maintenance program combines routine inspections, testing, and preventive measures to detect potential issues before they escalate. --- Why is Transformer Maintenance Important? - Ensures Safety: Proper maintenance reduces the risk of electrical faults and fires. - Enhances Reliability: Regular checks prevent unexpected outages. - Increases Lifespan: Proper upkeep extends operational life beyond A Guide To Transformer Maintenance 6 the manufacturer's expectations. - Reduces Costs: Preventive maintenance is more cost- effective than emergency repairs or replacements. - Compliance: Meets industry standards and regulatory requirements. --- Types of Transformer Maintenance Transformer maintenance can be broadly categorized into two types: 1. Routine (Preventive) Maintenance Performed regularly based on a schedule, routine maintenance aims to identify early signs of deterioration. It includes visual inspections, oil analysis, and simple tests. 2. Condition-Based (Predictive) Maintenance Uses advanced diagnostic tools and testing to assess the current health of the transformer and predict failures, allowing maintenance to be scheduled proactively. --- Essential Components of Transformer Maintenance Visual Inspection A fundamental step in maintenance, visual inspections help identify obvious issues such as: - Oil leaks or seepage - Signs of overheating (discoloration or burns) - Corrosion or rust on tank surfaces - Damaged or loose bushings - Abnormalities in cooling fins or radiators - Foreign objects or debris around the transformer Oil Testing and Analysis Transformer oil acts as both an insulator and coolant. Regular oil analysis can reveal: - Dissolved gases indicating electrical faults - Water content affecting insulation performance - Particulates or sludge indicating contamination - Dielectric strength reduction Common tests include Dissolved Gas Analysis (DGA), dielectric strength testing, and moisture content measurement. Electrical Testing Electrical tests evaluate the transformer's insulating and winding conditions: - Insulation Resistance Test: Measures the resistance of winding insulation. - Winding Resistance Test: Checks for abnormal resistance indicating winding issues. - Turns Ratio Test: Ensures the voltage ratio matches specifications. - Power Factor / Dissipation Factor Test: Detects insulation deterioration. - Sweep Frequency Response Analysis (SFRA): Detects winding deformation or core issues. Thermal Imaging and Infrared Testing Infrared thermography detects hot spots and uneven temperature distribution, indicating potential problems with connections, cooling systems, or internal components. Mechanical Inspection Inspect physical components such as: - Bushings and connectors for tightness and integrity - Cooling fans and radiators for proper operation - Tank and structural integrity for corrosion or damage --- Step-by-Step Transformer Maintenance Guide Step 1: Establish a Maintenance Schedule Create a detailed plan based on: - Manufacturer recommendations - Operational history - Environmental conditions - Regulatory standards Typically, basic

inspections occur monthly, oil tests quarterly or biannually, and comprehensive tests annually. Step 2: Conduct Visual Inspection - Examine the transformer surface for signs of overheating, corrosion, or physical damage. - Check for oil leaks or seepage. - Inspect bushings, connectors, and terminals for tightness and corrosion. - Verify cooling systems are operational and free of obstructions. Step 3: Perform Oil Sampling and Analysis - Collect oil samples following proper procedures. - Send samples to certified laboratories for analysis. - Review gas levels, moisture content, dielectric strength, and particulate presence. - Take corrective actions if abnormal results are detected. Step 4: Electrical A Guide To Transformer Maintenance 7 Testing - Conduct insulation resistance tests using megohmmeters. - Perform winding resistance measurements. - Carry out turns ratio tests. - Use power factor testing to assess insulation condition. - Implement SFRA testing periodically for early detection of winding deformation. Step 5: Thermal Imaging - Use infrared cameras to scan the transformer during operation. - Identify hot spots that may indicate issues such as loose connections or overloaded components. - Document findings and plan remedial actions. Step 6: Mechanical and Structural Checks - Tighten loose connections and inspect bushings. - Verify cooling fans and radiators are functioning properly. - Check for physical damage or deterioration of the tank and supporting structures. Step 7: Record and Analyze Data - Maintain detailed records of all inspections and tests. - Analyze trends over time to predict potential failures. - Use data to plan maintenance activities effectively. --- Preventive Measures to Enhance Transformer Longevity - Proper Cooling: Ensure cooling systems (fans, radiators, pumps) operate efficiently. - Oil Filtration and Regeneration: Regularly filter oil to remove moisture and particulates. - Load Management: Avoid overloading transformers beyond their rated capacity. - Environmental Protection: Shield transformers from harsh weather, dust, and chemicals. - Protective Devices: Install surge arresters, Buchholz relays, and other protective systems. --- Common Problems and Troubleshooting | Issue | Possible Cause | Recommended Action | |---------|-----------------|---- ----------| | Oil leaks | Damaged seals or tank corrosion | Repair or replace seals, address corrosion | | Overheating | Cooling system failure, overloading | Service cooling components, reduce load | | Abnormal gases in oil | Electrical faults, arcing | Perform detailed fault analysis and repair | | Insulation deterioration | Aging, moisture, contamination | Conduct insulation rehabilitation or replacement | | Bushing damage | Mechanical stress, contamination | Replace damaged bushings | --- Industry Standards and Best Practices Adhering to established standards ensures effective maintenance: - IEEE Standards: IEEE C57 series provides guidelines for transformer testing and maintenance. - IEC Standards: IEC 60296, IEC 60076 series specify requirements and testing procedures. - NEMA Standards: NEMA TR-1 offers recommendations for transformer care. Best practices include: - Regularly updating maintenance procedures based on technological advancements. - Training personnel on safety and diagnostic techniques. - Utilizing digital monitoring systems for real-time health assessment. -

Planning for asset replacement based on condition and operational data. --- Conclusion Effective transformer maintenance is a proactive approach that combines routine inspections, testing, and predictive diagnostics to safeguard these vital assets. By implementing comprehensive maintenance strategies, organizations can significantly reduce downtime, extend transformer life, and ensure the safety and reliability of their electrical systems. Remember, consistent monitoring, adherence to standards, and timely interventions are the keys to maintaining transformers in optimal condition for years to come. A Guide To Transformer Maintenance 8 transformer inspection, transformer testing, transformer troubleshooting, transformer repair, transformer upkeep, transformer safety, transformer diagnostics, transformer parts, transformer oil analysis, transformer installation

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this practical guide provides comprehensive and up to date information on the testing and maintenance of electrical power systems equipment and apparatus found in utility industrial commercial and institutional facilities demonstrating when and how to perform the appropriate tests to ensure maximum operational reliability integrating basic principles theory and practice the book discusses routine and preoperational testing and maintenance procedures for assessing equipment reliability and dependability and shows how to inspect and test equipment and apparatus insulation integrity and other operating characteristics affecting performance

transformers and motors is an in depth technical reference which was originally written for the national joint apprenticeship training committee to train apprentice and journeymen electricians this book provides detailed information for equipment installation and covers equipment maintenance and repair the book also includes troubleshooting and replacement guidelines and it contains a minimum of theory and math in this easy to understand practical sourcebook you ll discover explanations of the fundamental concepts of transformers and motors transformer connections and distribution systems installation information for transformers and motors preventive maintenance troubleshooting and repair tips and techniques helpful illustrations glossary and appendices end of chapter quizzes to test your progress and understanding in depth source for installation maintenance troubleshooting repairing and replacing transformers and motors reviewed by the national joint apprenticeship and training committee for the electrical industry designed to train apprentice and journeyman electricians

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including optional kits dod model mep007bwf winterization kit fuel burning and mep007bwe winterization kit electric to 35c2 3 442 14 navfac p 8 628 24p sl 4 07464b 057268 lo 5 6115 600 12 generator set diesel engine driven tactical skid mtd 100 kw phase 4 wire 120 208 and 240 416 v dod model mep007b class utility 50 60 hz nsn 6115 01 036 6374 057513 lo 5 6115 604 12 generator set diesel engine driven air transportable skid mt 750 kw 3 phase 4 wire 2400 4160 and 2200 3800 volts dod mod mep208a class prime utility hz 50 60 nsn 6115 00 450 5881 li 6115 12 9 060183 tm 5 6115 612 24p 6 generator set aviation gas turbine engine driven integra trailer mounted 10kw 28 volts model mep 362a precise dc nsn 6115 01 161 3992 tm 6115 24p 1 ag 320b0 ipe 000 to 35c2 3 471 4 060188 tm 5 6115 612 34 4 generator set aviation gas turbine eng driven integral trailer mounted 10kw 28 volts dod model mep 36 precise dc nsn 6115 01 161 3992 ag 320bo mme ooo tm 6115 to 35c2 3 471 2 060645 lo 5 6115 612 12 aviation generator set gas turbine engine driven integral tr mounted 10kw 28 volts dc dod model mep 362a class precise nsn 6115 01 161 3992 060921 tm 55 1730 229 34 5 power unit aviation multi output gted electrical hydraulic pneumatic agpu wheel mounted self propelled towa ac 400hz 3ph 0 8 pf 115 200v 30 kw dc 28vdc 700 amps pneumatic 60 lbs min at 40 psig hydraulic 15 gpm at 3300 ps dod model mep 360a class precise 400 hertz nsn 1730 01 144 ag 320a0 mme 000 to 35c2 3 473 2 tm 1730 34 1 060922 tm 55 1730 229 12 8 power unit aviation multi output gted electrical hydraulic pneumatic agpu wheel mounted self propelled towable ac 400hz 3ph 0 8 pf 115 200v 30 kw dc 28 vdc 700 amps pneumatic 60 lbs m at 40 psig hydraulic 15 gpm at 3300 psig dod model mep 360a class precise hertz 400 nsn 1730 01 144 1897 ag 320a0 omm ooo to 35c2 3 473 1 tm 1730 12 1 061758 lo 5 6115 614 12 generator set diesel engine driven tactical skid mtd 200 kw 3 phase 4 wire 120 208 and 240 416 volts model mep009b utili 50 60 hertz nsn 6115 01 021 4096 061772 lo 5 6115 622 12 generator set diesel engine driven wheel mounted 750 kw 3 ph 4 wire 2200 3800 and 2400 4160 volts cummins engine company in model kta 2300g 2 dod model mep 012a class utility hertz 062762 lo 5 6115 615 12 generator set diesel engine driven tactical skid mounted 3 k model 016b class utility mode 50 60 hz nsn 6115 01 150 4140 dod model mep 021b class utility mode 400 hz 6115 01 151 812 dod model mep 026b class utility mode 28 vdc 6115 01 150 036 li 05926b 06509b 12 5 p 8 646 lo 064310 tm 5 6115 626 14 p 2 power unit pu 406b m nsn 6115 00 394 9576 mep 005a 30 kw 60 hz generator set m200a1 2 wheel4 tire modified trailer 064390 tm 5 6115 632 14 p 5 power unit pu 753 m nsn 6115 00 033 1 mep 003a 10 kw 60 hz generator set m116a2 2 wheel 2 tire modi trailer 064392 tm 5 6115 629 14 p 3 power plant an amjq 12a nsn 6115 00 257 1602 2 mep 006a 60hz generator sets 2 m200a1 2 wheel 4 tire modified trail 064443 tm 5 6115 625 14 p 2 power unit pu 405a m nsn 6115 00 394 9577 mep 004a 15 kw 60 hz generator set m200a1 2 wheel 4 tire modified trailer this item is included on em 0086 em 0087 064445 tm 5 6115 633 14 p 4 power plant an mjq 18 nsn 6115 00 033 1398 2 mep 003a 1 60 hz generator sets m103a3 2 wheel 1 1 2 ton modified trailer 064446 tm 5 6115 628 14 p 4 power plant an mjq 15 nsn 6115 00 400 7591 2 mep 113a 1

400 hz generator sets 2 m200a1 2 wheel 4 tire modified tra this item is included on em 0086 064542 tm 5 6115 631 14 p 4 power plant an mjq 16 nsn 61 15 00 033 1395 2 mep 002a 5 kw 60 hz generator sets m103a3 2 wheel 2 tire modified trai 065071 tm 55 1730 229 24p 6 power aviation multi output gted electrical hydaulic pneumatic ag wheel mounted self propelled towable ac 400 hz 3 ph 0 8 pf 115 200v 30 kw dc 28 vdc 700 amps pneumatic 60 lbs min at 40 hydraulic 15 gpm at 3300 psig dod model mep 360a class precise 400 hertz nsn 1730 01 144 1897 to 35c2 3 473 4 tm 1730 24p ag 320a0 ipb 000 065603 tb 5 6115 593 24 warranty program for generator set dod model mep 029a housing k dod model mep 029ahk 066727 tm 5 6115 640 14 p 2 power an mjq 32 nsn 6115 01 280 2300 an mjq 33 6115 01 280 2301 mep 701a 3kw 60 hz acoustic suppression kit generator sets m116 2 wheel 2 tire 3 4 ton modified trailers 066808 tm 5 6115 627 14 p 2 power plant an mjq 10a nsn 6115 00 394 9582 2 mep 005a 30 kw 60 hz gen sets 2 m200a1 2 wheel 4 tire modified trailers 066809 tm 5 6115 630 14 p 4 power unit pu 751 m nsn 6115 00 033 1373 mep 002a 5 kw 60 hz generator set m116a1 2 wheel 2 tire modified trailer 066824 tm 5 6115 465 10 hr 1 hand receipt manual covering end item components of end item c basic issue items bii and additional authorization list aal generator set diesel engine driven tactical skid mounted 30k 4 wire 120 208 and 240 416 volts mep 005a utility 50 60 he nsn 6115 00 118 1240 mep 104a precise 50 60 hertz 6115 00 118 1247 mep 114a precise 400 hertz 6115 00 118 including auxiliary equipment mep 005awf winterization kit fue burning 6115 00 463 9083 mep 005awe winterization kit elec 6115 00 067310 tm 9 6115 650 14 p 1 power plan an mjq 25 nsn 6115 01 153 7742 2 mep 112a 10 kw 400 hz gene sets m103a3 2 wheel 2 tire modified trailer 067311 tm 9 6115 653 14 p 2 power unit pu 732 m nsn 6115 00 260 3082 mep 113a 15 kw 400 hz generator set m200 2 wheel 4 tire modified trailer 067544 tm 9 6115 652 14 p 1 power unit pu 760 m nsn 6115 00 394 9581 mep 114a 30 kw 400 hz generator m200a1 2 wheel 4 tire modified trailer 067632 tm 9 6115 648 14 p power unit pu 650b g nsn 6115 00 258 1622 mep 006a 60 kw 60 hz generator m200a1 2 wheel 4 tire modified trailer 067744 tm 9 6115 646 14 p 1 power unit pu 495a g nsn 6115 00 394 9575 and pu 495b g 6115 01 134 0 mep 007a 100 kw 60 hz or mep 007b 100 kw 60 hz generator set m353 2 wheel 2 tire modified trailer 067746 tm 9 6115 651 14 p power unit 707a m nsn 6115 00 394 9573 mep 115a 60 kw 400 hz generator m200a1 2 wheel 4 tire modified trailer 067879 tm 9 6115 647 14 p 1 power unit pu 789 m nsn 6115 01 208 9827 mep 114a 30 kw 400 hz generator set m353 2 wheel 2 tire modified trailer 069601 tm 9 6115 464 10 hr hand receipt manual covering the end items components of end it coei basic issue items bii and additional authorization l aal for generator set diesel engine driven tactical skid mo 15 kw 3 phase 4 wire 120 208 and 240 416 volts dod model mep utility class 50 60 hertz nsn 6115 00 118 1241 dod model mep precise class 50 60 hertz 6115 00 118 1245 dod model mep 113 precise class 400 hertz 6115 00 118 1244 069602 lo 9 6115 464 12 generator set diesel engine driven tactical skid mtd 15kw 4 wire 120 208 and 240 416 volts dod model mep 004a nsn 6115 00 118 1241 dod model mep 104a 6115 00 118 1245 dod model

mep 113a 6115 00 118 1244 069954 tm 9 6115 465 24p 2 generator set diesel engine drive tactical skid mtd 30kw 3 phase 4 wire 120 208 and 240 416 v models mep 005a utility 50 60 hz nsn 6115 00 118 1240 mep 104a precise 50 60 hz 6115 00 118 1247 mep 114a precise 400 h 6115 00 118 1248 including optional kits dod models mep 00 winterization kit fuel burning 6115 00 463 9083 mep 005 aw winterization kit electric 6115 00 463 9085 mep 002 alm l bank kit 6115 00 463 9088 mep 005 awm wheel mounting kit 6115 00 463 9094 to 35c2 3 070096 tm 9 6115 464 24p 1 generator s diesel engine driven tactical skid mtd 15kw 3 phase 4 wire 120 208 and 240 416 volts dod model mep 004a utility class 50 60 hertz nsn 6115 00 118 1241 dod model mep 103a precise class 50 60 hertz 6115 00 118 1245 dod model mep 113a preci class 400 hertz 6115 00 118 1244 including optional kits dod model mep 005 awf winterization kit fuel burning 6115 00 463 dod model mep 005 awe winterization kit electric 6615 00 46 dod model mep 004 alm load bank kit 6115 00 191 9201 071025 tm 9 6115 641 10 2 generator set skid mounted tactical quiet 5 kw 60 and 400 hz mep 802a 60 hz nsn 6115 01 274 7387 mep 812a 400 hz 6115 01 274 7391 to 35c2 3 456 11 071026 tm 9 6115 642 10 2 generator set skid mounted tactical quie 10 kw 60 and 400 hz mep 803a 60 hz nsn 6115 01 275 5061 mep 813a 400 hz 6115 01 274 7392 to 35c2 3 455 11 tm 09247a 09248a 10 1 071028 tm 9 6115 643 10 3 generator set skid mounted tactical qui 15 kw 50 60 and 400 hz mep 804a 50 60 hz nsn 6115 01 274 73 mep 814a 400 hz 6115 01 274 7393 to 35c2 3 445 21 071029 tm 9 6115 644 10 2 generator set skid mounted tactical quiet 30 kw 50 60 and 400 hz mep 805a 50 60 hz nsn 6115 01 274 7389 mep 815a 400 hz 6115 01 274 7394 to 35c2 3 446 11 tm 09249a 09246a 10 1 071030 tm 9 6115 645 10 2 generator set skid mounted tactical quiet 60 kw 50 60 and 400 hz mep 806a 50 60 hz nsn 6115 01 274 7390 mep 816a 400 hz 6115 01 274 7395 to 35c2 3 444 11 tm 09244a 09245a 10 1 071031 lo 9 6115 641 12 generator set skid mounted tactical quiet 5 kw 60 and 400 hz mep 802a tactical quiet 60 hz nsn 6115 01 274 7387 mep 812a tactical quiet 400 hz 6115 01 274 7391 071032 lo 9 6115 642 12 generator set skid mounted tactical quiet 10 kw 60 and 400 h mep 803a tactical quiet 60 hz nsn 6115 01 275 5061 mep 813a tactical quiet 400 hz 6115 01 274 7392 071033 lo 9 6115 643 12 generator set skid mounted tactical quiet 15 kw 50 60 400 hz mep 804a tactical quiet 50 60 hz nsn 6115 01 274 7388 mep 814 tactical quiet 400 hz 6115 01 274 7393 071034 lo 9 6115 644 12 generator set skid mounted tactical quiet 30 kw 50 60 and 40 mep 805a tactical quiet 50 60 hz nsn 6115 01 274 7389 mep 815 tactical quiet 400 hz 6115 01 274 7394 li 09249a 09246a 12 071035 lo 9 6115 645 12 generator set skid mounted tactical quiet 60 kw 50 60 and 40 mep 806a tactical quiet 50 60 hz nsn 6115 01 274 7390 mep 816 tactical quiet 400 hz 6115 01 274 7395 li 09244a 09245a 12 071036 tb 9 6115 641 24 warranty program for generator set tactical quiet 5 kw 60 and 400 hz mep 802a and mep 812a 071037 tb 9 6115 642 24 warranty program for generator set tactical quiet 10 kw 60 and 400 hz mep 803a and mep 813a si 09247a 09248a 24 071038 tb 9 6115 643 24 warranty program for generator set tactical quiet 15 kw 50 60 and 400 hz mep 804a and mep 814a 071039 tb 9 6115 644 24 warranty program for generator set tactical quiet 30 kw 50

60 and 400 hz mep 805a and mep 815a si 09249a 09246a 24 071040 tb 9 6115 645 24 warranty program for generator set tactical quiet 60 kw 50 60 and 400 hz mep 806a and mep 816a si 09244a 09245a 24 071541 tm 9 6115 464 12 2 generator set diesel engine driven tactical skid mtd 15 kw 3 phase 4 wire 120 2 and 240 416 volts dod model med 004a utility class 50 60 hertz nsn 6115 00 118 1241 dod model mep 103a precise class 50 60 hertz 6115 00 118 1245 dod model mep 113a precise class 400 hertz 6115 00 118 1244 including optional kits dod model mep 005 awf winterization kit fuel burning 6115 00 463 9083 dod model mep 005 awe winterization kit electric 6115 00 463 9085 dod model mep 004 alm load bank kit 6115 00 291 071604 tm 9 6115 645 24p generator set tactical quiet 60kw 50 60 400 hz nsn 6115 01 274 7390 mep 806a 6115 01 274 7395 mep 816a to 35c2 3 444 14 tm 09244a 09245a 24p 3 071605 tm 9 6115 642 24p generator set tactical quiet 10 kw 60 400 hz nsn 6115 01 275 5061 mep 803a 6115 01 274 7392 mep 813a to 35c2 3 455 14 tm 09247a 09248a 24p 3 071610 tm 9 6115 643 24p generator set tactical quiet 15kw 50 60 400 hz nsn 6115 01 274 7388 mep 804a 6115 01 274 7393 mep 814a to 35c2 3 445 24 071611 tm 9 6115 644 24p generator set tactical quiet 30kw 50 60 400 hz nsn 6115 01 274 7389 mep 805a 6115 01 274 7394 mep 815a to 35c2 3 446 14 tm 09249a 09246a 24p 3 071613 tm 9 6115 641 24p generator set tactical quiet 5 kw 60 400 hz nsn 6115 01 274 7387 mep 802a 6115 01 274 7391 mep 812a to 35c2 3 456 14 071713 tm 9 6115 645 24 4 generator set skid mounted tactical quiet 60kw 50 60 and 400 hz mep 806a 50 60 hz nsn 6115 01 274 7390 mep 816a 400 hz 6115 01 274 7395 to 35c2 3 444 12 tm 09244a 09245a 24 2 071748 tm 9 6115 644 24 1 generator set skid mounted tactical quiet 30 kw 50 60 and 400 hz mep 805a 50 60 hz nsn 6115 01 274 7389 mep 815a 400 hz 6115 01 274 7394 to 35c2 3 446 12 tm 09249a 09246a 24 2 071749 tm 9 6115 643 24 4 generator set skid mounted tactical quiet 15 kw 50 60 and 400 hz mep 804a 50 60 hz nsn 6115 01 274 7388 mep 814a 400 hz 6115 01 274 7393 to 35c2 3 445 22 071750 tm 9 6115 642 24 4 generator set skid mounted tactical quiet 10 kw 60 and 400 hz mep 803a 60 hz nsn 6115 01 275 5061 mep 813a 400 hz 6115 01 274 7392 to 35c2 3 455 12 tm 09247a 09248a 24 2 071751 tm 9 6115 641 24 3 generator set skid mounted tactical quiet 5 kw 60 and 400 hz mep 802a 60 hz nsn 6115 01 274 7387 mep 812a 400 hz 6115 01 274 7391 to 35c2 3 456 12 072239 tm 9 6115 464 34 1 generator set diesel engine driven tactical skid mtd 15 kw 3 phase 4 wire 120 208 and 240 416 volts dod model mep 004a utility class 50 60 hertz nsn 6115 00 118 1241 dod model mep 103a precise class 50 60 hertz 6115 00 118 1245 dod model mep 113a precise class 400 hertz 6115 00 118 1244 including optional kits dod model mep 005awf winterization kit fuel burning 6115 00 463 9083 dod model mep 005awe winterizat kit electric 6115 00 463 9085 dod model mep 004alm load bank kit 6115 00 291 920 073744 tm 9 6115 604 24p 1 generator set diesel engine driven air transportable skid mounted 750kw 3 phase 4 wire 2400 4160 and 2200 3800 volts dod model mep208a prime utility class 50 60 herts nsn 6115 00 450 5881 dod model 80 1466 remote control module class 6115 01 150 5284 dod model 80 7320 site requirements module class 6115 01 150 5 navfac p 8 633 24p 074040 tm 9 6115 545 24p

generator set diesel engine driven tac skid mtd 60 kw 3 phase 4 wire 120 208 and 240 416 volts d models mep 006a utility class 50 60 h z nsn 6115 00 118 124 mep 105a precise class 50 60 h z 6115 00 118 1252 mep 115 precise class 400 h z 6115 00 118 1253 including optional k dod models mep 006awf winterization fuel burning 6115 00 407 mep 006awe winterization kit electric 6115 00 455 7693 me load bank kit 6115 00 407 8322 and mep 006awm wheel mounti 6115 00 463 9092 to 074212 tm 9 6115 604 12 generator set diesel driven air transortable skid mtd 750 kw 3 phase 4 wire 24 and 2200 3800 v dod model mep 208a class prime utility hz 50 nsn 6115 00 450 5881 navfac p 8 633 12 074896 tm 9 6115 604 34 generator set diesel engine driven air transportable skid mtd 750 kw 3 phase 4 wire 2400 4160 and 2200 3800 volts dod model mep 208a prime utility class 50 60 hertz nsn 6115 00 450 5881 navfac p 8 633 34 075027 tm 9 6115 584 24p 1 generator set diesel e driven tactical skid mtd 5 kw 1 phase 2 wire 1 phase 3 wir 3 phase 4 wire 120 120 240 and 120 208 volts dod model mep utility class 60 hz nsn 6115 00 465 1044 navfac p 8 622 24p to 35c2 3 456 4 077581 tm 9 6115 673 13 p 2kw military tactical generator set 120 vac 60 hz nsn 6115 01 435 1565 mep 531a eic lka nsn 6115 21 912 0393 mechron 28 vdc nsn 6115 01 435 1567 mep 501a eic lkd nsn 6115 21 912 0392 mechron 078167 tm 9 6115 672 14 generator set skid mounted tactical quiet 60kw 50 60 and 400 hz mep 806b 50 60 hz nsn 6115 01 462 0291 eic ggw mep 816b 400 hz nsn 6115 01 462 0292 eic ggx 078443 tm 9 6115 639 13 1 3kw tactical quiet generator set mep 831a 60 hz nsn 6115 01 285 3012 eic vg6 mep 832a 400 hz nsn 6115 01 287 2431 eic vn7 078490 tm 9 6115 671 14 operator unit generator set skid mounted tactical quiet 30 kw 50 60 and 400 hz mep 805b 50 60 hz nsn 6115 01 461 9335 eic ggu mep 815b 400 hz 6115 01 462 0290 eic ggv 078503 tm 9 6115 671 24p generator set skid mounted tactical quiet 30 kw 50 60 and 400 hz mep 805b 50 60 hz nsn 6115 01 461 9335 eic ggu mep 815b 400 hz nsn 6115 01 462 0290 eic ggv 078504 tm 9 6115 672 24p generator set skid mounted tactical quiet 60 kw 50 60 and 400 hz mep 806b 50 60 hz nsn 6115 01 462 0291 eic ggw mep 816b 400 hz nsn 6115 01 462 0292 eic ggx 078505 tb 9 6115 671 24 warranty program for generator set tactical quiet 30kw 50 60 and 400 hz mep 805b and mep 815b procured under contract daak01 96 d 00620with mcii inc 078506 tb 9 6115 672 24 warranty program for generator set tactical quiet 30kw 50 60 and 400 hz mep 806b and mep 816b procured under contract daak01 96 d 00620with mcii inc 078523 tm 9 6115 664 13 p 5kw 28vdc auxiliary power unit apu mep 952b nsn 6115 01 452 6513 eic n a 078878 tm 9 6115 639 23p 3kw tactical quiet generator set mep 831a 60 hz nsn 6115 01 285 3012 eic vg6 mep 832a 400 hz nsn 6115 01 287 2431 eic vn7 079379 tb 9 6115 641 13 winterization kit nsn 6115 01 476 8973 installed on generator set skid mounted tactical quiet 5kw 60 and 400 hz mep 802a 600hz 6115 01 274 7387 mep 812a 400hz 6115 01 274 7391 079460 tb 9 6115 642 13 winterization kit nsn 6115 01 477 0564 eic n a installed on generator kit skid mounted tactical quiet 10kw 60 and 400 hz mep 803a 60hz 6115 01 275 0561 mep 813a 400hz 6115 01 274 7392 079461 tb 9 6115 643 13 winterization kit nsn 6115 477 0566 installed on generator set skid mounted tactical quiet 15kw 50 60 and 400 hz mep 804a 50 60hz 6115

01 274 7388 mep 814a 400hz 6115 01 274 7393 079462 tb 9 6115 644 13 winterization kit nsn 6115 01 474 8354 eic n a installed on generator set skid mounted 30kw 50 60 and 400 hz mep 805a 50 60hz nsn 6115 01 274 7389 mep 815a 400hz nsn 611501 274 7394 079463 tb 9 6115 645 13 winterization kit nsn 6115 01 474 8344 eic n a installed on generator set skid mounted tactical quiet 60kw 50 60 and 400 hz mep 806a 50 60hz 6115 01 274 7390 mep 816a 400hz 6115 01 274 7395 080214 tm 9 6115 670 14 p auxiliary power unit 20kw 120 240 vac 60 hz model no mep 903a sicps nsn 6115 01 431 3062 model number mep 903b jtacs nsn 6115 01 431 3063 model no mep 903c9win t nsn 6115 01 458 5329 eic n a

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