

OHT CONDUCTOR AND STATIC WIRE MAINTENANCE BASIS

AM-CE-P034-R2004

Rev. 5

Revisions to this document shall be communicated in accordance with program document AM-EU-P034 R2004 to ensure alignment between maintenance templates and field work procedures.

CONDUCTORS & STATIC WIRE				
Component Classification Categories				
Criticality	I	X	Lines 69 kV and above	
Duty Cycle	Heavy Load	N/A		
	Normal Load	N/A		
Service Condition	In Service	X		
	Spare	N/A		
Condition Monitoring Tasks		Task Frequencies	Failure Codes	Comments
None		N/A		
Time Directed Tasks		Task Frequencies	Failure Codes	Comments
None		N/A		
Failure Finding Tasks		Task Frequencies	Failure Codes	Comments
Visual Inspection - Comprehensive Aerial		4Y	1a, 2a-c	Cycle aligned with FEG schedule
Visual Inspection - Standard Aerial		1Y	1a, 2a-c	
Visual Inspection - Ground Patrol		1Y	1a, 2a-c	Lines/structures not accessible for <i>Visual Inspection - Standard Aerial</i> . inspection of conductors as needed for circuits which engineering has determined to be difficult to identify during the comprehensive aerial visual inspection. Ground patrol inspections shall be on a staggered cycle with respect to the comprehensive aerial inspection. The cycle should be aligned with the vegetation management cycle as much as possible.
Thermography		4Y	1b	Prevalent use/installations of strain clamps
Condition Directed Tasks		Task Frequencies	Failure Codes	Comments
Climbing Inspection		AR	1a, 1b, 2a-c	As Needed

This document is intended to depict maintenance activities for ComEd and are consistent with the North Star maintenance guidelines for Exelon Utilities. It is not intended to be used as "Evidence of Compliance" for regulatory audits or in support of regulatory Readiness Evaluations. Evidence of Compliance documents shall be owned and maintained at the individual OpCo level.

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FAILURE MODE	FAILURE CAUSES	MAINTENANCE TASKS
1 Fails to Provide Continuous Current Path	1a. Broken strands	Visual Inspection - Standard Aerial
1 Fails to Provide Continuous Current Path	1a. Broken strands	Visual Inspection - Comprehensive Aerial
1 Fails to Provide Continuous Current Path	1a. Broken strands	Visual Inspection - Ground Patrol
1 Fails to Provide Continuous Current Path	1b. Hot Spot	Thermography
2. Fails to Perform Design Function	2a. Damaged/Missing Vibration Dampers	Visual Inspection - Standard Aerial
2. Fails to Perform Design Function	2a. Damaged/Missing Vibration Dampers	Visual Inspection - Comprehensive Aerial
2. Fails to Perform Design Function	2a. Damaged/Missing Vibration Dampers	Visual Inspection - Ground Patrol
2. Fails to Perform Design Function	2b. Damaged/Missing Spacer	Visual Inspection - Standard Aerial
2. Fails to Perform Design Function	2b. Damaged/Missing Spacer	Visual Inspection - Comprehensive Aerial
2. Fails to Perform Design Function	2b. Damaged/Missing Spacer	Visual Inspection - Ground Patrol
2. Fails to Perform Design Function	2c. Damaged/Missing Clamp	Visual Inspection - Standard Aerial
2. Fails to Perform Design Function	2c. Damaged/Missing Clamp	Visual Inspection - Comprehensive Aerial
2. Fails to Perform Design Function	2c. Damaged/Missing Clamp	Visual Inspection - Ground Patrol

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TASK	DEFINITION
Visual Inspection - Comprehensive Aerial	<p>Inspection performed aerially where accessible by helicopter. The speed of inspection averages 1.5 mph.</p> <ul style="list-style-type: none">-- Identification of locations with broken wire strands, including number strands broken-- Identification of locations with flash damage which require reinforcement-- Identification of locations with abrasion caused by loose attachment i.e. dampers, spacers-- Identification of locations with damaged, missing or slid dampers-- Identification of locations with damaged or slide spacers
Visual Inspection - Ground Patrol	<p>Inspection performed from ground level due to inaccessibility by helicopter.</p> <ul style="list-style-type: none">-- Identification of locations with broken wire strands, including number strands broken
Visual Inspection- Standard Aerial	<p>Inspection performed aerially where accessible by helicopter. The speed of inspection averages 6 mph. (Reference speed =10-20 knots). [When performed with Thermography, the speed of inspection averages 14 mph. Reference speed = 30-40 knots]. Inspection include:</p> <ul style="list-style-type: none">-- Identification of locations with broken wire strands-- Identification of locations with damaged, missing or slid dampers-- Identification of locations with damaged or slide spacers
Thermography	<p>Inspection performed aerially or from ground level. Inspection should include identification location of the hot spots and the temperature rise exceeding 5F on:</p> <ul style="list-style-type: none">- Identification of Hot Spots on transmission line conductor, static wire & hardware

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OHT CONDUCTOR & SHIELD WIRE Template Summary

The Preventive Maintenance program is documented via maintenance templates. Templates have been developed that address transmission, substation, and distribution equipment that is owned and maintained by Exelon Utilities. Each template documents the program tasks, frequencies, failure modes, and maintenance basis for the associated equipment. Tasks and associated frequencies are designed to address known failure modes of the equipment covered by the template. In general, the tasks included in the maintenance templates are the result of good industry practices, industry experience, and manufacturer recommendations.

References:

Internal reports and operating experience

Interviews with OHT personnel

Transmission Line Reference Book, 345kV and Above, Electric Power Research Institute, second edition.

Annual Book of ASTM Standards, ASTM International; West Conshohocken, PA., B416-98(2002) Standard Specification for Concentric-Lay-Stranded Aluminum-Clad Steel Conductors

PJM -TSDS, PJM Design and Application of Overhead Transmission Lines 69kV and Above, PJM Interconnection, L.L.C. (Transmission and Substation Design Subcommittee), Latest Edition.

Overhead Conductor Manual, Southwire Company One Southwire Drive, Carrollton Georgia, 30119

Boundary Definition

Conductor: All wire spans used to provide continuous current path for transfer of electricity. Also included are "conductor accessories" which include attachment clamp, armor rod, spacers for bundled conductor, vibration dampers, full tension and non-tension splices and attachments.

Static Wire: Wire spans installed above conductor wires to shield conductors from lightning. Also included are "static wire accessories" which include attachment clamp, armor rod, vibration dampers and full tension and non-tension splices.

Failure Experience

Failures are subject to ACE/RCI investigation. Findings/recommended corrective actions are incorporated into the template as required.

Vendor Recommendations

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N/A

Disposition of Vendor Recommendations

N/A

Basis For Template Tasks

Visual Inspection - Comprehensive Aerial: This inspection approximates real-time condition monitoring that can detect developing problems and degradation, and provides condition data used to initiate corrective actions. The comprehensive inspection is performed at a slower fly speed to allow for more detailed visual inspection.

Visual Inspection - Ground Patrol : This inspection approximates real-time condition monitoring that can detect developing problems and degradation, and provides condition data used to initiate corrective actions. This is required annually for lines and structures not accesible for aerial inspection. An additional 5 year patrol frequency is used if each annual Visual Inspection - Standard Aerial is flown at the higher speed of 30-40 knots because of the inclusion of thermography.

Visual Inspection - Standard Aerial: This inspection approximates real-time condition monitoring that can detect developing problems and degradation, and provides condition data used to initiate corrective actions. When Thermography is included in this inspection it is flown at a higher speed of 30-40 knots.

Thermogrpahy: This inspection approximates real-time condition monitoring that can detect developing problems and degradation, and provides condition data used to initiate corrective actions. This inspection focuses on finding hot spots on the conductor and hardware assemblies.

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Revision 0		Date 06/17/2005
Writer	Howard Murray (Transmission Engineering)	
Reviewer(s)	1/28/05 Template Challenge Session Attendees	
Approver(s)	Kathy McHugh (FAM Maintenance Planning)	
Reason Written	To document the maintenance program tasks, frequencies, failure modes, and maintenance basis	

Revision 1		Date 12/01/2006
Writer	Howard Murray (Transmission Engineering)	
Reviewer(s)		
Approver(s)	Kathy McHugh (FAM Maintenance Planning)	
Reason Written	General scrub, task and periodicity review/update	

Revision 2		Date 11/30/2010
Writer	Chuck Priebe	
Reviewer(s)	Ken Wendt (Mgr. Material Condition), Drew Reindel (Mgr. T&S Engineering)	
Approver(s)	Bill Fluhler , Bill Gannon, Nitin Patel, Jim Crane, Bill Sullivan	
Reason Written	Added note to ensure template changes are communicated to affected work groups.	

Revision 3		Date 02/17/2012
Writer	Antoine Morgan	
Reviewer(s)	Drew Reindel	
Approver(s)	Drew Davis	
Reason Written	Updated frequency ground patrol to once every five years for PECO system. Created ComEd and PECO sub sections for Ground Patrol task definitions and maintenance basis.	

Revision 4		Date 11/18/2014
Writer	Robert Munley, Stephen Dasovich, Howard Murray	
Reviewer(s)	George Leinhauser, Ken Wendt, Ken Braerman	
Approver(s)	J. Coffman, Cory Sommerson, Mike Moy	
Reason Written	Updated to align across BGE, ComEd, and PECO with incorporation of best practices.	

Revision 5		Date 2/2/2018
Writer	Howard Murray	
Reviewer(s)	Angelo DeAngelis (Material Condition)	
Approver(s)	Mike Moy (UFAM ComEd)	
Reason Written	3 year review, no content change.	