

Submersible Switches							
Component Classification Categories							
Criticality	I	X				Oil Switch	
	II		X			Oil Fused Cut Outs (OFCO)	
	III			X		SF6 Gas Switch	
	IV				X	Molded Vacuum Interrupter (MVI) Switch	
Duty Cycle	Heavy Load	N/A	N/A	N/A	N/A		
	Normal Load	N/A	N/A	N/A	N/A		
Service Condition	In Service	N/A	N/A	N/A	N/A		
	Spare	N/A	N/A	N/A	N/A		
Condition Monitoring Tasks							
		Task Frequencies			Failure Codes		Comments
Visual Inspection	N/A	N/A	3Y	3Y	1a-b, 2a, 3a-e, 4a-h, 5a-c, 6a		SF6 Switches near airports (2-years)
Check Pressure	N/A	N/A	3Y	N/A	3e, 4d-g		SF6 Switches near airports (2-years)
Failure Finding Tasks							
		Task Frequencies			Failure Codes		Comments
None	N/A	N/A	N/A	N/A			
Time Directed Tasks							
		Task Frequencies			Failure Codes		Comments
Relay Test	N/A	N/A	N/A	2Y	6b		
Condition Directed Tasks							
		Task Frequencies			Failure Codes		Comments
None	N/A	N/A	N/A	N/A			

FAILURE MODES	FAILURE CAUSES	MAINTENANCE TASKS
1. Fails to Close/Open	1a. Lack of Lubrication	Visual Inspection
1. Fails to Close/Open	1b. Mechanical/Linkage Failure	Visual Inspection
2. Fails to Provide Adequate Conduction Path	2a. Cable Connection Failure	Visual Inspection
3. Fails to Provide Adequate Insulation Level	3a. Surface Contamination	Visual Inspection
3. Fails to Provide Adequate Insulation Level	3b. Conductor/Equipment Fatigue (From Support Failure)	Visual Inspection
3. Fails to Provide Adequate Insulation Level	3c. Mechanical Damage	Visual Inspection
3. Fails to Provide Adequate Insulation Level	3d. Cracked/Broken Wiping Nipple	Visual Inspection
3. Fails to Provide Adequate Insulation Level	3e. Low Pressure/Lack of Fluid	Visual Inspection
3. Fails to Provide Adequate Insulation Level	3e. Low Pressure/Lack of Fluid	Check Pressure
4. Fails to Maintain Boundary Integrity	4a. Tank Weld Failure	Visual Inspection
4. Fails to Maintain Boundary Integrity	4b. Corrosion	Visual Inspection
4. Fails to Maintain Boundary Integrity	4c. Loose Connections	Visual inspection
4. Fails to Maintain Boundary Integrity	4d. Cracked Bushing/Gaskets	Visual Inspection
4. Fails to Maintain Boundary Integrity	4d. Cracked Bushing/Gaskets	Check Pressure
4. Fails to Maintain Boundary Integrity	4e. Cracked Shaft / Shaft Seal	Visual Inspection
4. Fails to Maintain Boundary Integrity	4e. Cracked Shaft / Shaft Seal	Check Pressure
4. Fails to Maintain Boundary Integrity	4f. Cracked Viewing Window/Gaskets	Visual Inspection
4. Fails to Maintain Boundary Integrity	4f. Cracked Viewing Window/Gaskets	Check Pressure
4. Fails to Maintain Boundary Integrity	4g. Defective Press. Gauge/Schrader Valve/ Cap	Visual Inspection
4. Fails to Maintain Boundary Integrity	4g. Defective Press. Gauge/Schrader Valve/ Cap	Check Pressure
4. Fails to Maintain Boundary Integrity	4h. Leaking Plug	Visual Inspection
5. Fails to Maintain Structural Support	5a. Corrosion	Visual Inspection
5. Fails to Maintain Structural Support	5b. Metal Fatigue	Visual Inspection
5. Fails to Maintain Structural Support	5c. Mounting Surface Deterioration	Visual Inspection
6. Fails to Interrupt/Operate	6a. Fuse Deterioration	Visual Inspection
6. Fails to Interrupt/Operate	6b. Faulty Relay	Relay Test

TASK**DEFINITION**

Check Pressure
Visual Inspection

Visually check the SF6 pressure gauge for proper gas pressure.
Verify the accuracy of labeling.
Inspect area around equipment for excessive vegetation, debris or other obstructions.
Inspect for paint integrity, corrosion, and physical damage.
Inspect for oil leaks.
Visually check the structural integrity of the foundation.
Visually check elbows and/or terminations for deterioration.

Relay Test

Perform Current Injection for Overcurrent and Simulate LOP to assure transfer

Submersible Switches 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

Boundary Definition

The boundary of submersible switches is the structure and accessible functional parts within the structure

Failure Experiences

N/A

Vendor Recommendations

N/A

Disposition of Vendor Recommendations

N/A

Basis For Template Tasks

Revision 0 (ED)		Date 07/22/2005
Writer	Larry Griess (Strategic Programs)	
Reviewer(s)	07/21/05 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 (ED)		Date 01/26/2007
Writer	Larry Griess (Strategic Programs)	
Reviewer(s)		
Approver(s)	Kathy McHugh (FAM Maintenance Planning)	
Reason Written	General scrub, task and periodicity review/update	

Revision 2 (CE)		Date 11/30/2010
Writer	Chris Stefanski	
Reviewer(s)	Ken Wendt (Mgr. Material Condition)	
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 (CE)		Date 01/27/2014
Writer	Suneetha Parupalli, Sr Engineer, Material Condition	
Reviewer(s)	Ken Wendt (Mgr. Material Condition)	
Approver(s)	Mike Moy (UFAM)	
Reason Written	3 year review, reformat document, No content change	

Revision 4 (CE)		Date 03/02/2015
Writer	Daniel Kurtz	
Reviewer(s)	Larry Burley (BGE), Pete Yan (ComEd), Jim Bezila (PECO)	
Approver(s)	Cory Summerson (UFAM BGE), Mike Moy (UFAM ComEd) , J. Coffman (UFAM PECO)	
Reason Written	EU PM Template Alignment (BGE, ComEd, PECO)	

Revision 5 (CE)		Date 03/27/2018
Writer	Jimi Conway (ComEd)	
Reviewer(s)	Keith Frost (ComEd), Ed Smykowski (ComEd)	
Approver(s)	Mike Moy (UFAM ComEd)	
Reason Written	Reviewed as part of 3-year cycle review. Updated Criticality I and Criticality II to 'N/A'. These are N/A for ComEd. Updated 'Modular' to 'Molded' to correct typo.	