
NAVY PUBLIC WORKS CENTER
NORFOLK, VIRGINIA
UTILITIES DEPARTMENT

STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS

TITLE

ELECTRICAL VAULT/BUILDING PM INSPECTION

PROCEDURE NUMBER

WC 624 HVE 015

DISTR:
601A
610
620
WC 624

SIGNED:_____
(DATE)

APPROVED:_____
(DATE)

SAFETY PROFESSIONAL:_____
(DATE)

MANAGEMENT OFFICIAL:_____
(DATE)

DATE:_____ **REVISION DATE:**_____

ELECTRICAL VAULT/BUILDING PM INSPECTION

Purpose:
Procedure for PM inspection of electrical distribution vaults, rooms, and buildings. All these sites house distribution equipment servicing one or more buildings.

Potential Energy Sources:
1. Transformer primary switches
2. Transformers
3. Secondary distribution equipment

Tools and PPE:
Tools: flashlight, step ladder, small hand tools, broom, fox tail, dust pan, vacuum cleaner, oil dry, sweeping compound, and rags. PPE: Insulating rubber gloves, insulating rubber sleeves, Nomex coveralls, Nomex hood, hard hat, safety glasses, safety shoes, and back brace if required by back injury prevention and control program. The class of rubber gloves and sleeves will depend on the exposure voltage as per the following: Class 0 - up to 1,000 volts, Class 1 - up to 7,500 volts, Class 2 - up to 17,000 volts, Class 3 - up to 26,500 volts, Class 4 - up to 36,000 volts.

References:
1. PWC Occupational Safety and Health Program Manual, PWCNORVAINST 5100.E
2. SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger Truck
3. Occupational Safety and Health Standards for General Industry (29 CFR PART 1910): Subpart I, Personnel Protective Equipment; Subpart R, Electrical Power Generation / Transmission / Distribution; Subpart S, Electrical
4. NFPA 70 E, Approach Distances To Exposed Energized Electrical Conductors and Circuit Parts
5. ANSI C2-1987, National Electrical Safety Code
6. US Army Corps Of Engineers Safety and Health Requirements Manual
7. PWCNORVAINST 11300.10F, Utilities Responsibilities

Procedures:
1. Observe the following general rules when performing a vault/building PM:
   - The inspection team should be familiar with PWCNORVAINST 11300.10F, Utilities Responsibilities. This document defines what equipment Utilities owns.
   - Two man rule is in effect. Two people will participate in PM.
   - Observe OSHA minimum clearance distances from exposed, energized, parts.

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The clearance distances are

Volts(kv)	Phase to ground Exposure	Phase to Phase Exposure
.05 to 1.0	Avoid Contact	Avoid Contact
1.1 to 15	2'-1"	2'-2"
15.1 to 36	2'-4"	2'-7"

Inside these distances insulation between part and person is required or
insulating tools such as shot gun sticks are required.
. Log all deficiencies requiring follow up work and note all corrective
work done during PM.
. Any remedial work which will take less than one hour will be done by
the PM personnel.

2. Prior to entering electrical vault or electrical building housing electrical distribution equipment personnel will have on the following PPE:

Nomex Coveralls
Electrical Safety Shoes
Work Gloves

3. Open the room or building door and visually check the entrance area for tripping hazards, or any indication there is an immediate electrical problem which would preclude personnel from entering the facility. Also there could be mechanical system problems, such as steam leaks, which could prevent facility entry. If such hazards, electrical or mechanical, exist notify supervisor immediately.

4. Enter the room/building and turn on the lights. Note, some small buildings do not have lights, so the door must be blocked open for light. If the lights do not work, troubleshoot the problem and correct it. The lights are to be working when the PM is over and the room/building is exited.

While repairing the lights personnel will wear Nomex coveralls, electrical safety shoes, work gloves, and hard hats if a ladder is used. If a step ladder is required observe the following safety rules:

a) the ladder will have non-conductive siderails if the ladder or person
could contact energized parts
b) place the ladder with secure footing
c) do not place in front of door unless door is blocked open
d) do not use a ladder if any part of the ladder is broken
e) do not use the top as a step
f) the ladder should have slip resistant feet

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5. Inspect the facility's condition, inside and, if applicable, outside. The following is a partial list of items to be checked:

. door condition
. locking hasps and locks
. walls inside and, if applicable, outside
. roof
. ceiling
. floor
. cable trench covers, put covers back in place if pulled away
. fences

There are a few installations where Utility equipment is located in a joint mechanical and electrical room. At these sites Utilities claims ownership to the transformer and related equipment, the pad the equipment is on, and any fences around the

equipment. Inspect only Utility owned items but report any deficiencies which, if not corrected, could adversely affect Utility equipment.

6. Check facility vent fan(s) and controls. Verify the fan(s) and any controls work. The fans should run, louvers should open, controls should turn the fan on and off. If the fan(s) does not work, troubleshoot the problem. If the deficiency can be corrected in less than one hour, fix it. If the repair will take more than one hour or no parts are available, report the problem for follow up work. While repairing the lights personnel will wear Nomex coveralls, electrical safety shoes, work gloves, and hard hats if a ladder is used. If a ladder is used, observe safety rules per Step 4.

7. For each transformer or transformer bank in the vault/building:

INSPECT PRIMARY SWITCH

Fused Oil Switch

. oil leaks
. oil level
. cable terminations
. case condition
. case ground
. operating handle present
. condition of interlocks if present

Fused Air Switch

. case condition
. case ground
. condition of interlocks if present
. operating handle condition, and if present
. take off back panel and check switch condition and cable terminations

Prior to removing panel personnel will have on Nomex coveralls, Nomex hood,
insulating rubber gloves, work gloves, safety glasses, and safety shoes. Do not
reach into switch while inspecting. Once inspection is over, replace back cover.

Once the rear cover is back in place personnel may wear only Nomex coveralls,
safety shoes, and work gloves.

Oil Fuse Cut Outs

. case condition
. case ground
. remove front cover and check box for oil leaks and cable condition

Air Circuit Breaker

. enclosure condition
. enclosure ground
. record ammeter/voltmeter reading if ammeter/voltmeter present
. protective relays condition
. open door and check breaker and operating mechanism condition

When inspecting breaker, personnel will wear Nomex coveralls, Nomex
hoods, safety glasses, and work gloves

. enclosure lights, heaters

Oil Circuit Breaker

. enclosure condition
. enclosure ground
. record ammeter/voltmeter reading if ammeter/voltmeter present
. protective relays condition
. open door and check breaker and operating mechanism condition
When inspecting breaker, personnel will wear Nomex coveralls, Nomex
hoods, safety glasses, and work gloves
. enclosure lights, heaters
. oil leaks
. oil level

Fuse Cut Outs
. observe clearance distances per Step 1
. switch condition
. insulator condition and cleanliness
. cable terminations

INSPECT TRANSFORMER

Oil Filled
. case condition
. case ground
. oil level
. oil leaks
. if visible, primary bushings and terminations
observe minimum clearances per Step 1
. if visible, secondary bushings and terminations
observe minimum clearances per Step 1
. read and record all gauges on transformer
. note tap changer position if visible

Dry
. case condition
. case ground
. look in air vents and, using flashlight, check interior cleanliness
. note unusual noises, or excessively loud operation

. read and record all gauges on transformer
. note tap changer position if visible

INSPECT SECONDARY EQUIPMENT

Unit Substation
. condition of enclosure
. enclosure ground
. visually inspect breaker for obvious problems
When breaker doors are opened, personnel will wear Nomex coveralls, Nomex
hoods, safety glasses, and work gloves
. read voltmeter and ammeter if present
. control transformers condition
. CTs and PTs if visible
. operating transformer if can see it
. wiring
. thermostats and heaters
. KWH meter

Rest Note: these usually are not Utilities owned
. covers off, replace if present
observe minimum clearances per Step 1
. condition
. wiring

INSPECT PAD TRANSFORMER IN VAULT/BUILDING

Exterior
- . case condition
- . lock and handle
- . oil leaks
- . KWH meter

Secondary Compartment Observe minimum clearances per Step 1
- . condition of interior
- . cleanliness
- . ground
- . oil leaks
- . secondary bushings and cable terminations
- . meter CTs and wiring
- . secondary breakers in compartment
- . read and record all gauges

Primary Compartment Observe minimum clearances per Step 1
- . condition of interior
- . cleanliness
- . ground
- . oil leaks
- . primary bushings and terminations
- . surge arresters
- . fuse/tap changer interlock in place
- . tap changer position

Note: there is no need to reach into primary cabinet during inspection.

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8. Dust all transformers, switches, and switchgear. Be aware of exposed energized parts and maintain minimum clearances per Step 1.

9. Pick up all trash located in vault. Report to supervisor if vault/building is being used as a storage room by activity and ask for clearance to remove the material. Electrical distribution vaults/buildings are not storage sites. All stored material and trash is to be removed if possible.

10. Put down sweeping compound and sweep/vacuum floor. Apply oil dry where needed.

11. Exit vault/building. Make one last visual inspection. Remove all tools and cleaning material. Turn off lights, close and lock door.