

Distribution Padmount Switchgear and Transformer Inspection Criteria



Note: The following examples are general representations, depending on the circumstances, the inspector reserves the right to increase the Priority of the Corrective Maintenance item, with management approval.

Refer to Distribution Padmount Equipment Inspection Program
AM-CE-P166

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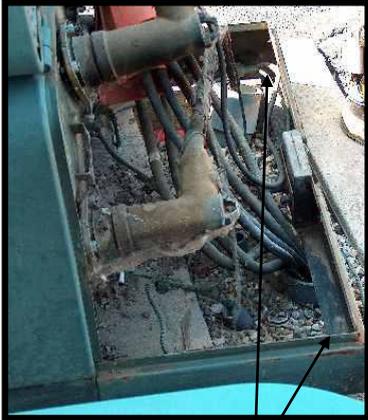
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Alignment on Pad/Tie Downs

Needs Repair Priority 20

Switchgear or transformer is misaligned with pad / foundation.



Tie down cleats needed



Note: if misalignment with pad is severe or an imminent threat to public safety – Then Call In as a P10.

Gap

Alignment on Pad/Tie Downs

Temp Patch-Misalign Priority 30

Temp Patch-Vertical Priority 40

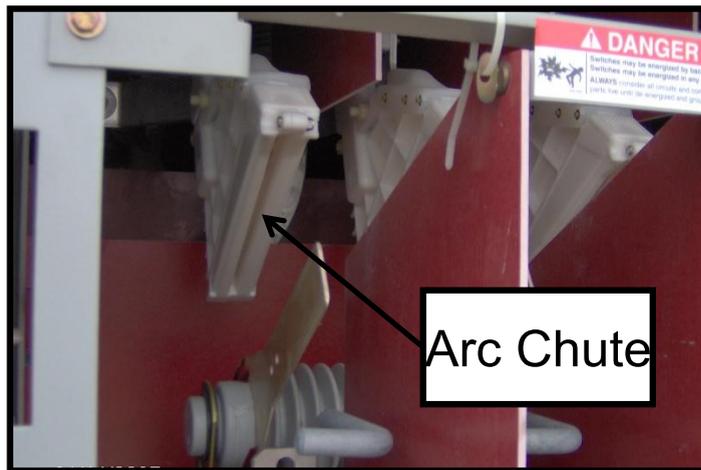
Existing Temp Patch or new Temp Patch installed to correct misalignment or vertical gap.



Arc Chutes

SG - Needs Repair Priority 30

Check for signs of damage such as cracks or burns along side the arc chute.



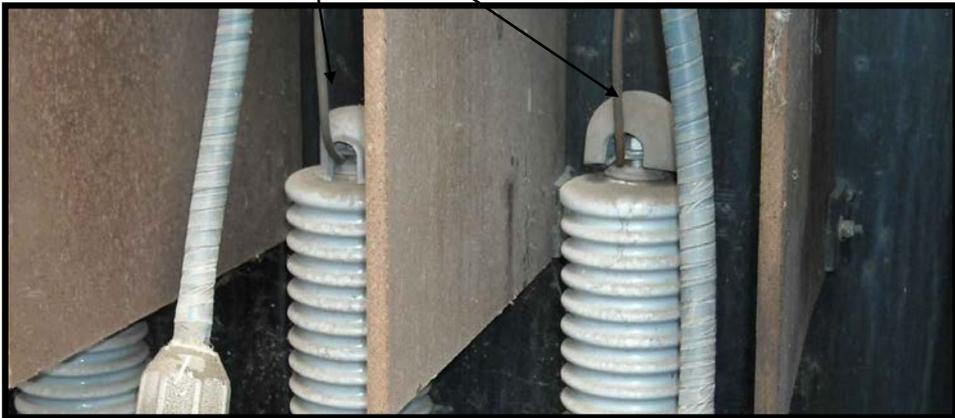
Note: The extent of damage for this Arc Chute is severe enough to cause the switchgear to not operate properly. In this case the Inspector should elevate the Priority level to a P20.

Arrester Caps

Replace#____ Info only

Arrester cap missing or is off the top of arrester.

Image of arrester caps in place



Arrester Drain Wire

SG - Replace#___

Priority 40

TR - Replace #___

Info only

Drain wire is broken, missing, or detached.

Drain wire attachment point



Image of improper drain wire attachment. Drain wire needs to connect to internal ground loop (Note, arrester end cap has broken free of elbow arrester)

Base Mounted Arresters

SG - Replace#_____

Priority 30

SG - New#_____

Info only

The arrester has blown or the high side lead is not attached.



Bushing Insert Arresters

TR - Replace # ____ Priority 30

TR - New# ____ Info only

Arrester is damaged or not electrically connected



Image of bushing
insert arresters
installed

Overhead Type Arresters

TR - New # _____ Info only

TR - Replace # _____ Priority 30

Installed overhead arresters that are damaged or not electrically attached

Live front transformer showing arrester installed, but if missing, would need to be called for



Non-MOV Arresters (Porcelain)

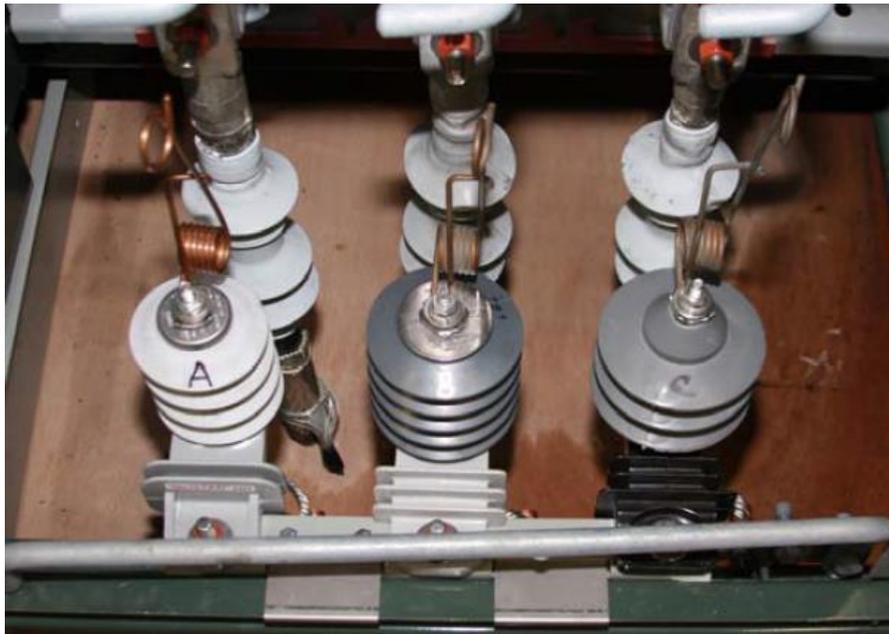
Replace # _____ Info Only

Note if there are Non-MOV Arresters present; if the Non-MOV Arrester is damaged or blown, pick Overhead Arrester Replace #____.

Overhead Arresters(with GLD ISOL)

SG - Replace#_____ Priority 30

The arrester has blown or the high side lead is not attached.



Fuse / Line Bay Removable Barriers

SG - Replace

Priority 30

Missing or Damaged Barriers. Barriers should not be left in the installed position. Barriers should be left hanging.



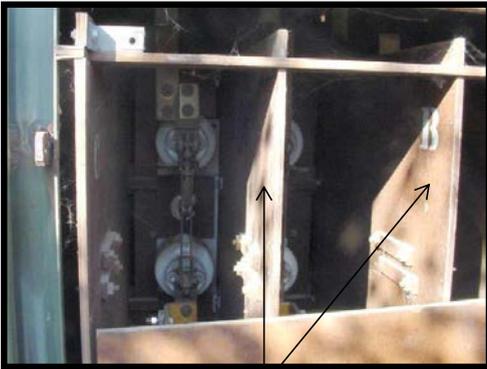
Installed position(left), Hanging(right)

Fuse / Line Bay Rigid Barriers

SG – Replace

Priority 30

Rigid barriers are damaged or present signs of tracking. Maybe due to leaning termination skirts or other components touching barriers.



Inter-phase Rigid Barriers



Tracking and Contamination



Line Bay Rigid Clear Barriers

SG - Replace#_____ Priority 30

Clear barrier is damaged, cracked or contaminated.



Single Bay Bus Side Barrier

SG – Missing Priority 30

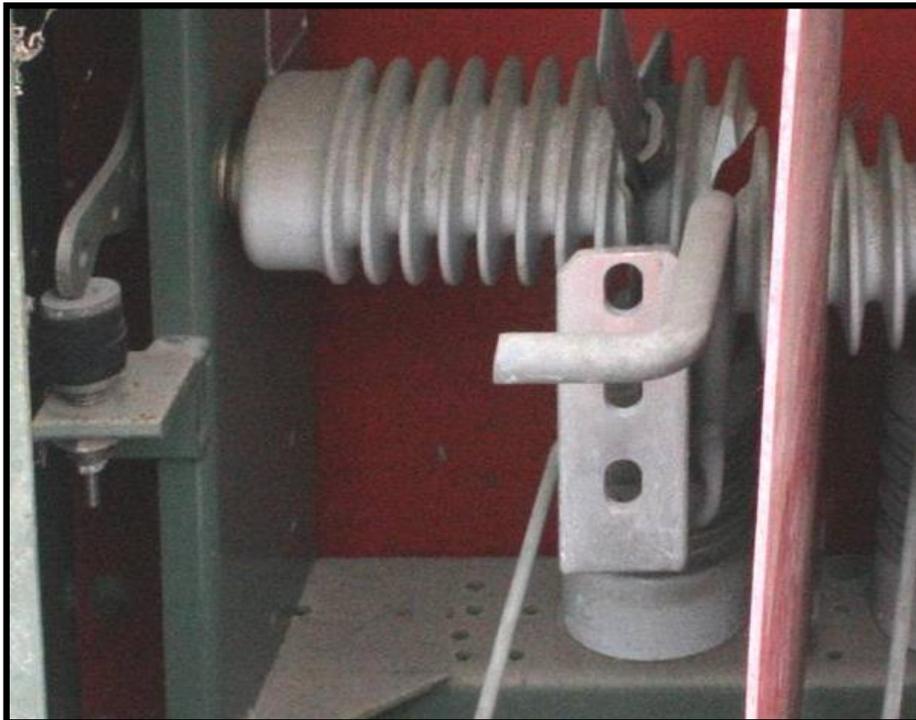
Single Bay Bus Side barrier is damaged, cracked or missing.

Blades

SG - Needs Repair

Priority 30

Blades which show signs of arcing,
misalignment or damage

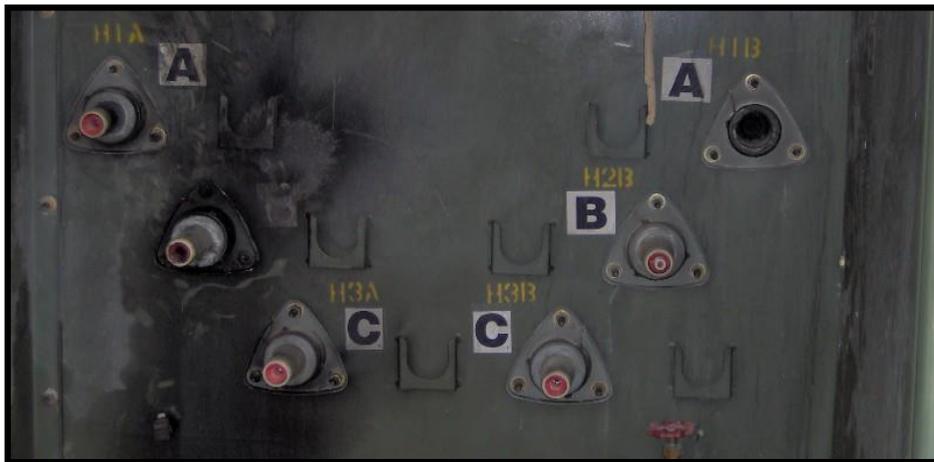


Transformer Bushings

TR - Replace Transformer Priority 30

TR - Replace#_____ Priority 30

Transformer bushing(s) are damaged such that the transformer needs replacing.



Swollen elbow terminations indicate bushing is damaged and leaking into elbow



Feed through Bushing

TR - Left behind Info only

Feed through bushing is left behind, used to stabilize elbows when disconnected.



Non-Replaceable Bushing Inserts

TR - Yes Info only

Identify Non-Replaceable Bushings.



Photo of replaceable bushing insert. Replaceable bushing inserts are identifiable by the drain wire attached to the keeper plate. Non-replaceable bushings have no grounding wire.

Cable Condition

Needs Repair

Priority 30

Cable concentrics, semi-con, or conductor is damaged or broken.



Semi-con
damaged

Cable Training

SG - Needs Repair, Priority 30

TR - Needs Repair, Info only

Cable is trained in a manner which may lead to flashing



Contamination/Debris

SG - Needs Cleaning Priority 20

SG - Needs Cleaning Priority 30

TR - Needs Cleaning Info only

Contamination or debris, shows signs of tracking or interferes with ability to operate the equipment. Look for contamination and tracking on terminations, bus insulators, arrestors, barriers and strut insulators. Priority 20 if actively tracking or heavy build up of contaminants, otherwise Priority 30.



Note swiped area

Note Tracking



Corrosion-Holes

Needs Repair

Priority 20



Excessive Corrosion cannot be patched, equipment needs immediate replacement.

Temp Patch

Priority 20



New or existing Temp Patches installed, equipment needs immediate replacement.

SG – Temp Patch

Priority 30

TR - Temp Patch

Info Only



New or existing Temp Patches installed adequately, extent of condition does not warrant immediate replacement.

Elbow Arresters

Replace# _____ Priority 30

Existing arrester is damaged or not electrically connected.

New # _____ Info only

Arresters missing at an end of line radial installation or normal open points.



Ground Cap is detached from elbow arrester



Elbow Terminations

Replace# _____ Priority 30

Damaged elbow terminations.



Elbow
termination
pulling eye
broken



Gen Condition-Equipment (20)

SG - Needs Repair

Priority 20

General Condition of equipment is severely deteriorated and requires replacement.

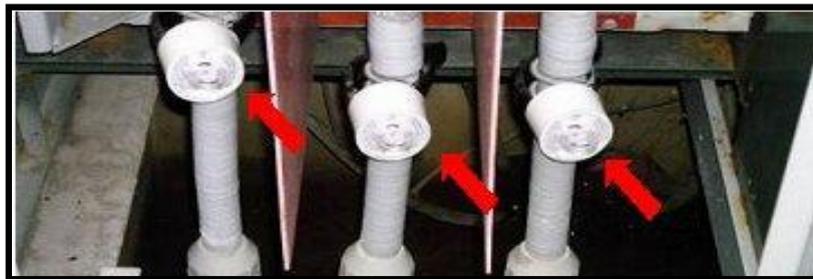


Check Fault Indicator

Replace Per C-Standard Info only

Note: for 1% Switchgear Inspections - Priority 40 CM

Fault Indicator is the correct type but is broken/damaged or not the correct type and needs to be replaced with one that conforms to the current Construction Standard



The photo above shows overhead fault indicators incorrectly installed in a switchgear.

Check Fault Indicator

Needs Repair Info only

Note: For 1% Switchgear Inspections – Priority 40

New# _____ Info only

Note: For 1% Switchgear Inspections – Priority 40

Fault Indicator is the correct type for URD application but is installed incorrectly.



Proper FI but not installed correctly. Should be installed over concentrics that have been double backed or directly on semi-con

Proper FI installed correctly over semi-con directly



Fuse Holder-Live Front

Replace# _____ Priority 30

Fuse holder damaged on live front transformer, not supporting fuse.



Images of in tact fuse holders

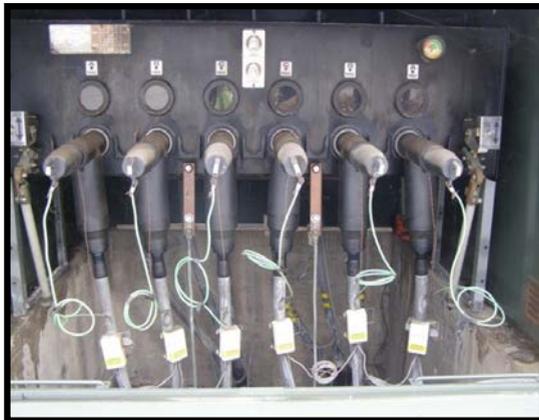
Gas Pressure SF6 Gear

SG - High Pressure Priority 30

SG - Low Pressure Priority 20

SG - Mis-Match Pressure Priority 30

Check to see if the pressure is above, below or mismatched with the rated value. If the pressure is not adjusted to the rated value, the equipment could fail disruptively if left in service.



Gauge representing low pressure.



Gasket (Inline Switchgear)

SG – Damaged **Priority 20**



Gasket is severely degraded, gasket has fallen from channel and is likely to cause an outage.

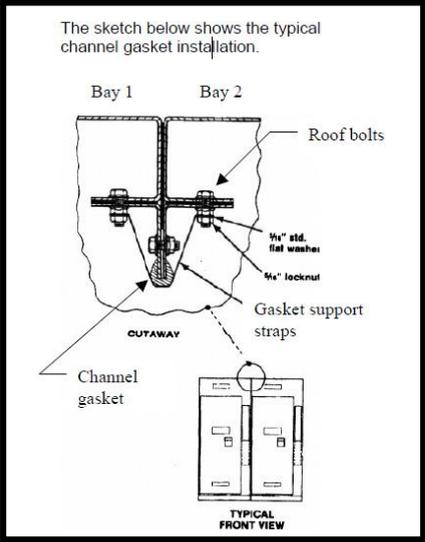
Failed Channel Gasket Installation

SG - Replace# _____ **Priority 40**

Gasket is showing signs of degradation, gasket is loose from channel.



Image of in tact gasket



External Ground Rod/Grid

SG - Needs Repair

Priority 40

TR - Needs Repair

Priority 30

External ground is broken, detached from ground rods or is exposed.



External
ground
exposed,
needs to be
buried

Check Internal Grounding

SG - Needs Repair Priority 20

SG - Needs Repair Priority 40

TR - Needs Repair Priority 30

Internal grounding is damaged or broken.



Door Handle

TR - Needs Repair **Info only**

Door handle is damaged, prevents worker from accessing transformer.



Operation Handle

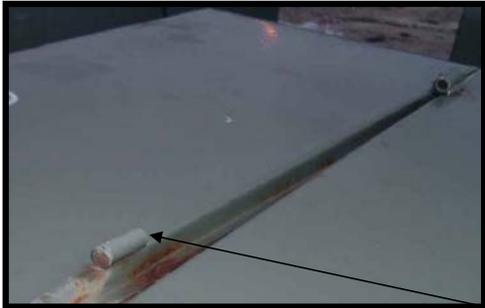
SG - Needs Repair **Priority 40**

Switchgear Operating Handle is broken or damaged such that it cannot be operated.



Gen Condition – Hinges (20)

Needs Repair Priority 20



Hinges that are broken or missing such that the door could be moved without unlocking it or damaged such that the door cannot be opened or causes a safety issue.

Example of a hinge pin sheared

Example of hinge mounts that have broke free from one side



Keeper Pin Missing Info Only



Current Standard Hinge Keeper - Roll Pin Type

Insulated Protective Caps

SG - Replace#_____

Priority 30

TR - Replace #_____

Info only

Insulated protective caps installed but damaged.

Picture represents
the proper installation
of protective caps
and their drain wires

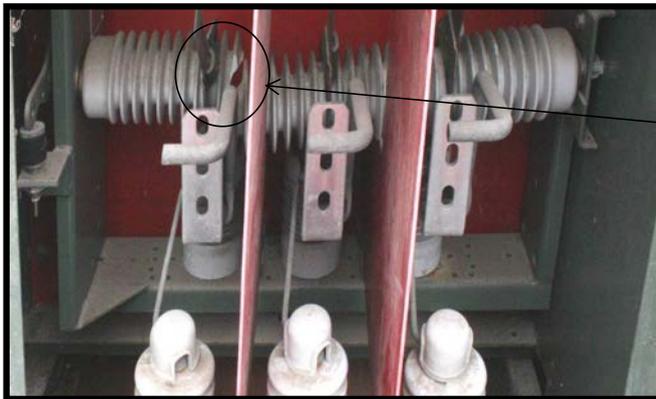


Insulator

SG – Broken

Priority 30

Broken or damaged insulators.

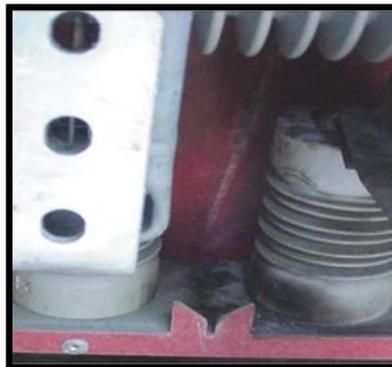


Fracture

SG – Tracking

Priority 30

Insulators which show signs of tracking.



Insulator

Pad-mounted Switchgear Contamination on the push rod insulator is a common problem with EEI (Electrical Equipment Inc) equipment. Insulators are molded from a cycloaliphatic epoxy.

**Insulator
SG- Tracking
Priority 30**

Insulator beginning to track
Select P30 - Insulator Tracking

**Gen Condition Eq
SG - Needs repair
Priority 20**

Push rod Insulator has Failed
Select P20 – Gen Condition
Equipment Need repair



Check External Labeling

Needs Repair Info only

External Labeling is faded, peeling or missing.
Maintenance Inspector should repair / replace labeling
when possible



Check Internal Labeling

Needs Repair Info only

Internal labeling is damaged, incomplete, or cannot be read.



Alternative labeling method was used which included writing the identification number.

No Labeling



Lead Term/Sleeve

SG – Damaged Priority 40

TR – Damaged Info only

A lead cable termination that is melted, burned, or is visibly damaged in some other way.



Live Front

TR – Yes Info Only

Note if the padmount transformer is a live front transformer.



Live Front Transformer Barrier

TR - Needs Repair

Priority 20

TR - Needs Repair

Priority 30

Live front barriers are not in place or damaged.
For Missing Barriers – Call In to OCC as P10



Image of live front transformer barriers out of place

Image of live front transformer barriers in place



Operating Access-Buried

SG - Needs Repair

Priority 40

TR - Needs Repair

Info only

The Switchgear or Transformer is buried such that the door is inaccessible and the equipment cannot be operated.



Operating Access-Obstructed

SG - Needs Repair

Priority 40

TR - Needs Repair

Info only

The Switchgear or transformer is obstructed such that the door is inaccessible and the equipment cannot be operated.



Operating Access-Vegetation

Needs Repair

Info only

The Switchgear or Transformer is obstructed with vegetation such that the door is difficult to access and the equipment cannot be safely operated.



Gen Condition – Oil Leak

TR - Needs Repair Priority 20

Transformer shows signs of recent active leak. For Oil leaks near a waterway or drain – Priority 10 Call-In to OCC. Contact Regional Environmental Coordinator.



General Condition-Pad

SG - Needs Repair **Priority 20**



Pad is severely damaged, causing equipment to sit unstable or presents a public safety issue.

SG - Needs Repair **Priority 30**

Pad is damaged which may causing equipment to sit unstable.



Pad damage

TR - Needs Repair **Info Only**

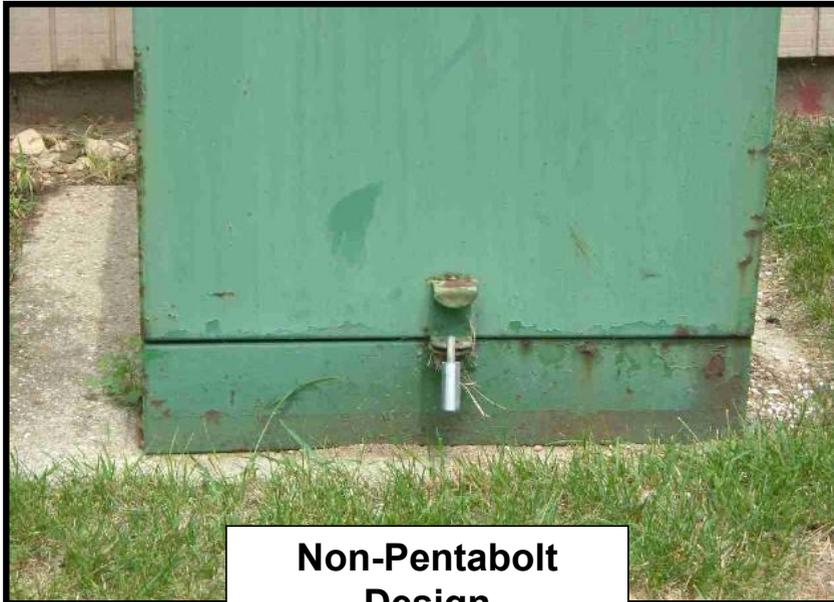
Pad is damaged causing equipment to sit unstable.

Padlock

Needs Repair

Priority 30

Pad lock is in place but inoperable.



**Non-Pentabolt
Design**

Check Pentabolt

Needs Repair Info only

Pentabolt is missing, damaged or does not latch.



Pedestal

TR - Needs Repair

Priority 20

Pedestal is not physically stable, may have been hit by vehicle.
Wires are exposed due to physical damage.



Leaning pedestal

Exposed Wires



Primary Plug Connections

TR - Needs Repair Priority 30

Primary plug connection is damaged or loose.



Primary Lug Connections

Needs Repair Priority 30

Primary lug connections are damaged or loose.



Protective Cap Drain Wire

SG - Replace#_____ Priority 40

TR - Replace #_____ Info only

Protective cap drain wires are missing, broken or not attached.



Secondary Connections

TR - Needs Repair

Priority 30

Secondary connections are damaged or loose.



Secondary Covers

TR - Replace # Info only

Secondary cover is damaged, missing, or out of place.



Shipping Hanger Brackets

TR - Removed

Shipping hanger brackets are to be removed



Sign of Standing Water

Needs Repair **Info only**

Note any signs of standing water.



Checked Stray Voltage

Yes + # ____ PED(s) Info only

Perform stray voltage check on all transformers, service pedestals and switchgear. Select YES from the checklist to indicate the stray voltage test was performed. If stray voltage is detected, contact your supervisor.



Skirted Terminations

Replace# _____ Priority 30

Damaged skirted terminations.



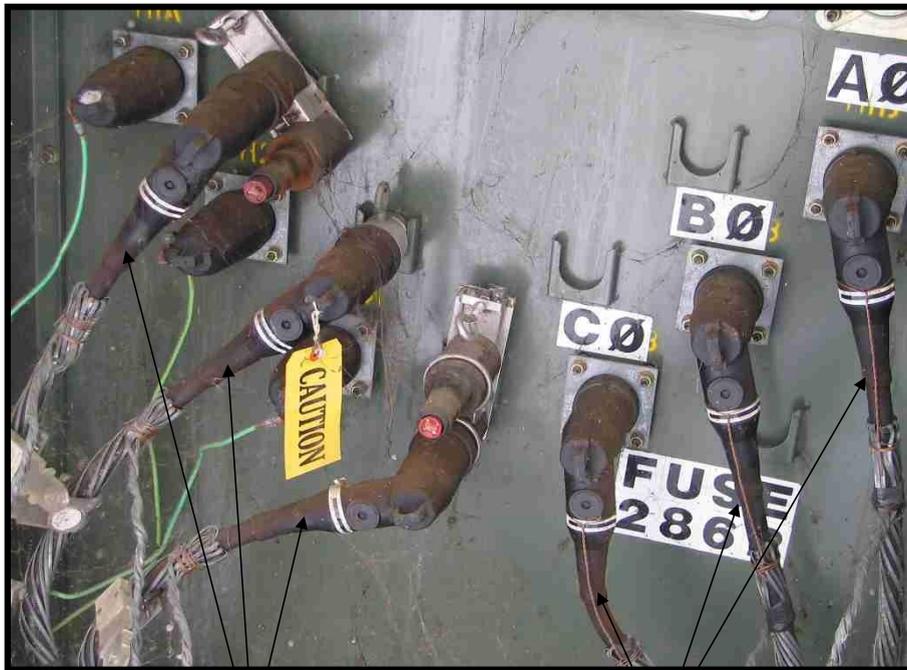
Image of intact
skirted
terminations

Termination Drain Wire

SG - Replace#_____ Priority 40

TR - Replace #_____ Info only

Termination drains wires broken, damaged or missing.



Elbow
termination
drain wires
missing

Elbow
termination
drain wires in
tact

Tie Downs

Needs Repair

Info only

Tie downs are not present or improperly installed.



Vehicle Barriers

SG - Replace#_____

Priority 40

TR - Need # _____

Info Only

Severely bent, broken, or missing vehicle barriers in areas where collision is possible.



Wildlife Infestation

SG - Needs Repair

Priority 20

SG - Needs Repair

Priority 40

TR - Needs Repair

Info only

Evidence or existence of wildlife in any internal/external area, which can make equipment difficult to operate or have a likelihood of failing.

