SaskPower	Hardware Tightening on Overhead Structures in the Alive State (5kV to 35kV)	Standard Operating Procedure

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1.0 Purpose

This SOP provides:

A standard that confirms the approved methods to follow when performing hardware tightening procedures in the alive state.

2.0 Roles and Prerequisites

Role(s)	Quantity Required	Prerequisites
Powerline Technician(s)	2 PLT's or 1PLT and 1 PLTA	1. Journeyman Powerline Technician Certificate 2. Level III Hotstick Training 3. Pole Top Rescue Training 4. Standard Protection Code Training
Issuing Authority	1	1. Standard Protection Code Training

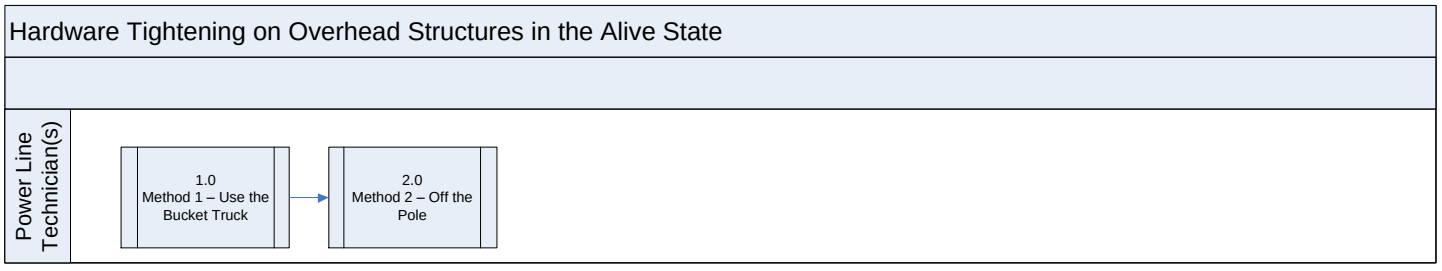
3.0 Tools and Equipment

Minimum Tools and Equipment Required:

- Required Personal Protective Equipment (PPE)
- FR clothing
- Live line tool(s) as required
- Class II Rubber Gloves
- Rigid Protective Covers (Hard cover)
- Insulated cover up
- Face Shield (Where Required)

4.0 Procedure

High Level Flowchart



The Procedure

The following requirements shall be met prior to the start of the procedure:

- Complete Hazard/Aspect and Risk Assessment (HARA)
- Applicable Personal Protective Equipment (PPE) is available and in good condition
- Consider Environmental Best Management Practices
- Weather conditions
- Testing poles for safe climbing
- Ensure test dates on equipment/tools are current
- Obtain SaskPower Standard Protection Code and other related permits

NOTE: HARDWARE TIGHTENING SHALL NOT BE DONE OFF THE POLE ON STRUCTURES WITH APPARATUS, SUCH AS ENERGIZED UNDERGROUND PRIMARY CABLES, OCR STRUCTURES, ETC. IN THE ALIVE STATE

Important: Company practice in the past was to tighten the 991 crossarm pin into the insulator. The cross arm pins used through the late 1980's and into the early 90's, were tapered lead thread. The insulators would only spin on 2 to 3 threads. Therefore at this time, forcing the pin into the insulator could cause it to fracture

If, after visual inspection you determine if the insulator is loose, cracked or any other damage, it must be changed out using the live line method with either a class B truck or with the line is to be de-energized. Personnel tightening hardware shall keep this hazard in mind when working on tightening 991 crossarm pin nuts. If it is determined that the lead on the pins that you are going to work on are not of this type, then they may be tightened into the insulator

If the work cannot be done safely in the energized state, the line shall be de-energized or if safe to do so using live line methods

NOTE: There are two methods to tighten hardware: Method 1 is utilizing a bucket truck and Method 2 is performed off the wood pole

- The worksite supervisor shall facilitate a HARA and determine the work method to be used.
- Rubber Gloves alone shall not be used for tightening hardware on energized facilities or installation of missing hardware (MAD must be maintained by use of hardware tightening sticks.)
- 3' Insulated Hardware Tightening Sticks shall not be used to contact the energized conductor directly(Ex: NOT for Installation of Hard Cover)
- In the situation of any visual electrical tracking being observed, work at that location shall be discontinued and an alternative method of repair be determined.
- Using Class II Rubber gloves in conjunction with 3' Insulated hardware tightening sticks

1.0 Method 1 - Bucket Truck - Preferred method - <u>Medium Risk</u>

1.1 Method 1 - Bucket Truck (Class B or C)

1.1.1 The Powerline Technician(s) shall ensure the steps are followed when utilizing a bucket truck (Class B or C)

- *A detailed HARA is required prior to commencing work (including confirming Minimum Approach Distances, Qualified Observer is required)*
- *Obtain a Standard Protection Code, (Rule 12) - Stand off Permit*
- *All tightening and installation of hardware will be performed using approved electrical insulating protective equipment (Class II Rubber Gloves will be used in conjunction with 3' Insulated Hardware Tightening Stick)*
- *Visual inspection of structure and adjacent structures (broken insulators, ties, rotten cross arms, neighboring apparatus, etc)*
- *Perform pre-operational equipment checks as per the Equipment Inspection SOP*
- *Approved electrical insulating protective equipment must be inspected daily and have a current test date before use (Ex: Rubber Gloves, Live line tools). Insulated Hard Cover is not tested, however shall be visually inspected for damage and cleanliness*
- *Ascend, and perform a second visual check prior to entering the work zone for any hazards such as broken insulators, ties, etc. on structure*
- *Confirm Minimum Approach Distances and avoid any second points of contact at all times*
- *Install insulated hard cover where required*
- *Wrench strokes on carriage bolts will be from below crossarm only, not exceeding center line of crossarm*
- *Aerial device shall not contact pole during procedure to avoid a second point of contact*
- *Once completed remove insulated hard cover and descend*

2.0 Method 2 - Off the Wood Pole - <u>High Risk</u>

2.1 Method 2 - Off the Wood Pole

2.1.1 The workers shall ensure the steps below are followed when working off the wood pole:

- *Detailed HARA prior to commencing work (including confirming Minimum Approach Distances, qualified observer is required)*
- *All tightening and installation of hardware will be performed using approved electrical insulating protective equipment (Class II Rubber Gloves will be used in conjunction with 3' Insulated Hardware Tightening Stick)*
- *Obtain a Standard Protection Code Stand Off Permit*
- *Visual inspection of structure and adjacent structures (broken insulators, ties, rotten cross arms, neighboring apparatus, etc)*

- *Approved electrical insulating protective equipment must be inspected daily and have a current test date before use (Ex: Rubber Gloves, Live line tools). Insulated Hard Cover is not tested, however shall be visually inspected for damage and cleanliness*
- *Test pole for safe climbing. Tag pole if bore test was done. Sway test if necessary*
- *Ascend, perform a second visual check prior to entering the work zone for any hazards such as broken insulators, ties, etc. on structure*
- *Be aware of second point of contact and maintain Minimum Approach Distances*
- *Install insulated hard cover where required*
- *Tighten hardware following the detailed job plan using approved electrical insulating protective equipment*
- *Once completed remove insulated hard cover and descend pole*

5.0 Components

The following is a list of components for this SOP which can be accessed through the SOP System:

Component Name	Component Type	Component Description	Location of Component
Procedure for Hardware Tightening on Overhead Structures Flowchart	Flowchart	High level flowchart for the procedure	SOP Online: Hardware Tightening on Overhead Structures

6.0 Acronyms, Definitions and Symbols

Acronyms and Abbreviations

PLT - Powerline Technician

PLTA - Powerline Technician Apprentice

HARA - Hazard/Aspect and Risk Assessment

MAD - Minimum Approach Distances

Definitions

Qualified electrical worker - Occupational Health and Safety Regulation 465 (c)

- *(i) the holder of a journeyperson's certificate in the electrician trade issued pursuant to The Apprenticeship and Trade Certification Act, 1999, and includes an apprentice in the trade while under the supervision of a journeyperson;*

- *(ii) the holder of a journeyperson's certificate in the power lineperson*
- *trade issued pursuant to The Apprenticeship and Trade Certification*
- *Act, 1999, and includes an apprentice in the trade while under the*
- *supervision of a journeyperson; or*
- *(iii) for the purpose of design, calibrating of equipment, inspection,*
- *monitoring, testing, and commissioning of equipment in high voltage*
- *installations, electrical engineers, applied science technologists or certified technicians who have achieved professional certification within an electrical, electronics, industrial or instrumentation discipline*

Personal Protective Equipment - PLT shall ensure the following **Mandatory PPE** is used and in good condition

- **Head Protection** - CSA approved head protection shall be worn by all personnel at the job site, work areas and in posted areas on site
- **Eye Protection** - Approved safety glasses with side shields shall be worn by all personnel at the job site
- **Clothing** - Minimum Class 2 FR/Class 2 High Visibility Clothing shall be worn by all personnel at the job site
- **Footwear** - CSA approved, electric shock resistant footwear with minimum six inch (6") leather uppers for ankle support and a steel or composite toe

Additional PPE Requirements *- To be determined according to the requirements of the task being performed. (Face Shield, rubber gloves, additional FR as determined using the SaskPower Arc Flash Tables) Review the procedure above for additional PPE requirements*

Symbols

N/A

7.0 Policies and Regulatory Requirements

This SOP is a result of the following regulations, policies, industry standards, and corporate directives and standards:

Regulatory Requirement(s)

• Saskatchewan Occupational Health & Safety Act and Regulations, 1996

- *Part XXX, Section 465(c) - Qualified Electrical Worker*
- *Part III, Section 12 (c) - General duties of employers*
- *Part III, Section 13 (b) - General duties of workers*
- *Part III, Section 15 (a) (iii) - Duty of employer or contractor to provide information*

- *Part III, Section 17 (1) (b) - Supervision of work*
- *Part XXX, Section 451 - Electrical workers*
- *Part XXX, Section 452 - Electrical equipment*
- *Table 22- Minimum Distances from Exposed Energized High Voltage Electrical Conductors*

Policies

- Hazard/Aspect and Risk Assessment Policy
- Personal Protective Equipment Policy
- Working Alone Policy

Standards

- Hazard/Aspect and Risk Assessment Standard

Other

- Safety and Environment Rulebook
- Environmental Best Management Practices
- Deviation from Safe Work Procedures Standard

8.0 References

References
Testing Poles for Safe Climbing Training
25kV Rubber Insulating Gloves Testing Procedure
Live Line Stick Work
Field Care for Live Line Hotsticks SOP
Best Practices - Qualified Observer - CAN/ULC-S801-14
Transmission and Distribution Dedicated Observer SOP