

April 29, 2022

Gland & Terminate Cable into Live Distribution Panel Up To 600 V

PURPOSE/APPLICATION

To provide guidance on the safe installation and termination of electrical wires into live distribution panels up to a maximum of 600 Volts.

PPE

- Strike Minimum Requirements
- Other specialized PPE as per HIAC (Goggles for Drilling, Hearing Protection, Reflective Coveralls, Face Shield, Fall Protection Equipment, FRC)
- Arc Flash protective layers – based on panel CAL ratings (If ARC Flash ratings are unavailable, consult CSA-Z462)

TRAINING

- Strike and Site-Specific Requirements
- Qualified Electrical Journey Person
- ARC Flash Training

HAZARDS & CONCERNS

- Personal injury
- Electrical shock
- Strain
- Fall to lower level when working at heights
- Concurrent operations
- ARC Flash
- Accidental engagement/release/startup of associated electrical energy/equipment to panel
- Congested Workspace

HAZARD SOURCES



PRIOR ACTIVITIES

1. Obtain Safe Work Permit as required by site Prime Contractor (Operating Authority).
2. Inspect all tools and equipment daily using a pre use inspection form.
3. Inspect the wire and panel being installed to ensure there are no manufacturer defects.
4. Assess work utilizing the HIAC Process.
5. Shrink ground wire using heat shrink, 3 inches from tech connector all the way to the end of ground wire and ensure conductor ends are insulated.
6. Inspect ARC Flash gear and ensure the certification is up-to date.
7. Stage ARC Flash PPE, materials, and tools beside panel.
8. Flag off work area (e.g., red tape).

#	Job Steps	Hazards	Control Measures
1	Stage arc flash PPE, materials, and tools beside panel in work area.	<ul style="list-style-type: none"> ❖ Slips/trips due to poor ground conditions ❖ Miss communication with peers ❖ Misplaced tools/equipment 	<ul style="list-style-type: none"> ▪ Proper PPE including footwear while gathering materials, walking to and from panel location ▪ Inspect PPE for cleanliness, and ensure PPE inspection date is valid

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#	Job Steps	Hazards	Control Measures
			<ul style="list-style-type: none"> ▪ Inspect tools for defects or missing parts
2	Flag off area around electrical panel	<ul style="list-style-type: none"> ❖ Communication error, unlabeled barrier tape ❖ Flagged area too large or too small affecting other workers 	<ul style="list-style-type: none"> ▪ Red flag area, tag flagging and have safety watch standing by as required ▪ Clearly label flagging with task activity, date, and contact person ▪ Communicate task and hazards to anyone working in proximity of the panel
3	Don Arc Flash hood and gloves. Remove cover from electrical panel	<ul style="list-style-type: none"> ❖ Faulty equipment ❖ Arc flash/shock due to panel touching live bus 	<ul style="list-style-type: none"> ▪ Always maintain control of metal cover when removing ▪ Remove cover away from panel and place out of the way, depending on size and weight, an additional worker may be required
4	Identify all live components/bus/terminals Identify existing breaker to be connected	<ul style="list-style-type: none"> ❖ Operations impact from turning wrong breaker off 	<ul style="list-style-type: none"> ▪ Visual inspection only ▪ The verification of drawings to confirm correct breaker location ▪ Ensure breaker is in the off position ▪ Install lock over breaker switch in the off position to identify the cct for termination, if a lock can't be used, install tape over breaker handle ▪ Install non-metallic barrier over components that will not require access
5	Identify if an empty knock out hole with plug is available or if new knock out is to be drilled out, and assess knockout location for potential hazards	<ul style="list-style-type: none"> ❖ Arc flash/shock due to drilling into live conductors ❖ Arc flash/shock from dropping knock out tool in panel ❖ Arcing from metal shavings inside panel 	<ul style="list-style-type: none"> ▪ Inspect area below where hole is to be drilled, move conductors clear of where drill bit will punch through, insert nonmetallic protection plate where bit will penetrate ▪ Always maintain control of punch tool, install cardboard over live parts in case of falling objects ▪ Install non-metallic barrier to collect metal shavings as required

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#	Job Steps	Hazards	Control Measures
6	Route cable through hole into panel and install GRL	<ul style="list-style-type: none"> ❖ Arc flash/shock from ground wire contacting live components ❖ Arc flash/shock from GRL touching live components 	<ul style="list-style-type: none"> ▪ Ensure ground wire is protected with heat shrink before entering cable ▪ Keep cable away from panel bus and always control the GRL until it is installed
7.	Ground GRL and terminate ground wire on ground bar Dress conductors in panel and terminate conductors with wire tags	<ul style="list-style-type: none"> ❖ Arc flash/shock from tools touching live components 	<ul style="list-style-type: none"> ▪ Use insulated screw drivers when tightening GRL ▪ Keep hands and body away from live components in panel
8.	Inspect panel for cleanliness, remove any debris	<ul style="list-style-type: none"> ❖ Arc flash/shock 	<ul style="list-style-type: none"> ▪ Use vacuum if required, wear gloves when removing any loose debris, avoid contact with live components
9.	Re-install front cover on panel	<ul style="list-style-type: none"> ❖ Arc flash/shock from cover contacting live components ❖ Operations impact from cover inadvertently switching off breaker 	<ul style="list-style-type: none"> ▪ Control front cover panel at all times ▪ Line up panel cover over breakers while not contacting any breaker switches. Depending on size and weight, an additional worker may be required
10.	Install breaker locking device and lock/tag	<ul style="list-style-type: none"> ❖ Operational impact from locking off wrong breaker ❖ Arc shock from not isolating the correct breaker creating field hazard 	<ul style="list-style-type: none"> ▪ Confirm with safety watch breaker number, remove tap applied at beginning of procedure and install locking device/lock
11.	Clean up work zone and remove red flagging Surrender permit to operations and closeout	<ul style="list-style-type: none"> ❖ Tripping hazard from debris and tools 	<ul style="list-style-type: none"> ▪ Clean up work area, remove all tools and materials left in work area ▪ Update and provide mark up of drawings to provide final as-builts

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ADDITIONAL PRECAUTIONS

REFERENCES/ADDITIONAL INFORMATION

Strike Documents

- SWP-18 – Tools/Equipment/Machinery
- SWP-22 – Material Handling
- SWP-38 – Arc Flash

REGULATIONS:

Federal CSA Standard

- CSA-Z462

Saskatchewan OH&S Regulation and Code

- Part 7 Personal Protective Equipment

Alberta OH&S Codes

- Part 2 Hazard Assessment, Elimination and Control
- Part 18 Personal Protective Equipment

Manitoba OH&S Code

- Part 4.5 Slipping and Tripping Hazard
- Part 38 Electrical Safety

BC OHS Regulations

- Part 19 Electrical Safety

Developed by:	1.	<u>Jordan Webb</u>	2.	<u>Derek Nolet</u>	Date:	<u> </u>	
		3.	<u>Chad Sewall</u>	4.	<u>Josh Parker</u>	Date:	<u> </u>
		5.	<u>Allen Monk</u>			Date:	<u>March 2022</u>
Revised by	1.	<u>Dustin Moore</u>	2.	<u>Joel Goy</u>	Date:	<u>April 25, 2022</u>	
Approved by:	1.	<u>HSE Committee</u>			Date:	<u>April 29, 2022</u>	
