

## **Industrial Electrician**

### **Task 9: Installing Switch Gear**

#### **Acknowledgement**

*The Alberta Construction Safety Association (ACSA) with the cooperation of member companies and their electrical contractors/workers, the Electrical Contractors Association of Alberta and Jason Shepherd Physical Therapy Inc. developed this electrical industry Physical Demands Analysis.*

#### **Disclaimer**

*The job tasks described in this report & related video footage may vary, please contact the company directly to confirm this job description is accurate.*

#### **Purpose of Task Analysis**

Job demands information that can be utilized for assistance in selecting suitable job candidates, developing proactive injury prevention interventions and effective, sustainable disability management programs.

#### **General Description**

The electrician is responsible for the installation of Switch Gear as per the building's electrical blueprints

#### **Work Organization**

Journeyman and Apprentice Electrician numbers vary by work site and company  
Depending on the construction phase/type, an Electrician may be part of a crew performing this task for several weeks before rotating to another task

#### **Work Schedule**

8+ hour shifts  
Regular breaks spaced throughout workday: Usually two 15-minute coffee breaks and one 30-minute lunch break per shift

## **Essential Job Functions**

- Installing switch gear:
  - Drilling holes in concrete;
  - Erecting switch gear cabinets;
  - Installing switch gear components.
- Clean-up (Sweeping, picking up waste materials)
- Materials handling

## **Assessment Criteria Used**

<b>Frequency Key</b>		
<b>FREQUENCY</b>	<b>% OF WORKDAY</b>	<b>HOURS OF 8-HOUR WORKDAY</b>
<b>Not required (N/R)</b>	<b>0%</b>	<b>0</b>
<b>Seldom (S)</b>	<b>0 - 5%</b>	<b>Not performed on a daily basis</b>
<b>Rare (R)</b>	<b>1 – 5%</b>	<b>&lt; 29 min/day</b>
<b>Occasional (O)</b>	<b>6 - 33%</b>	<b>29 min to 2 hours 42 min per day or 1 rep/30 min</b>
<b>Frequent (F)</b>	<b>34 - 66%</b>	<b>2 hours 43 min to 5 hours 21 min per day or 1 rep/2 min</b>
<b>Constant (C)</b>	<b>67 – 100%</b>	<b>5 hours 22 min to 8 hours per day or 1 rep/30 sec</b>

## **Equipment used to perform the job & Frequency of Use:** **(May include, but not exclusive to the following)**

### **Frequent**

- Tool box
- Tools (Ratchet sets, drills, hammers)

### **Occasional**

- Knock-out sets
- Floodlight

### **Rare**

- Broom
- Ladder
- Tool belt

## **Personal Protective Equipment Recommended**

- ✓ Safety Glasses
- ✓ Hearing Protection (Task-specific)
- ✓ Hard Hat
- ✓ Steel Toed Boots
- ✓ Gloves
- ✓ Overalls (Optional)
- ✓ Respiratory Protection Equipment (Task-specific)

## **Environment Conditions**

### **Inside/Outside Work:**

Inside 100%

### **Working Temperature:**

Although the temperature varies, the installation of switch gear is generally completed within the confines of a temperature-regulated facility, however depending on what phase of construction the project is in, this task may involve exposure to hot or cold weather conditions

### **Walking Surfaces:**

Concrete

### **Dust:**

Concrete dust – High when drilling holes into concrete floors

### **Lighting:**

Adequate, indoor lighting in most areas. Natural lighting may vary with season &/or weather conditions.

### **Vapour/Fumes:**

Mild – Diesel fumes from mobile equipment

### **Noise Levels (measured with Audiometer):**

Can exceed 100 dBA if heavy equipment, portable generators, power tools or hammers are being utilized nearby

### **Vibration:**

Mild: Power tools

Moderate: Concrete (hammer) drills

### **Moving Objects:**

Cranes, mobile equipment

### **Risks/Hazards:**

Slips/Trips/Falls, skin punctures, muscle strains/soreness, pinch points, cuts/abrasions

### **Size of Work Space:**

Usually adequate, although the worker may have to maneuver into tight spots in order to complete task on the rare occasion

## **Sensory Requirements**

The following are required to complete essential job functions and remain safe at all times:

**Hearing** (Conversation or Sounds)

**Vision** (Near/Far, Colour, and Depth)

**Feeling** (Tactile sensory discrimination)

**Reading** (English)

**Speech/Comprehension** (English)

## **Other Work Factors**

### **Traveling:**

Seldom – Leaving work site for materials/supplies

### **Working Alone:**

Worker may have to perform task at a work site without colleagues or other trades people, on a rare basis

### **Working Independently / in Group:**

Required to work as part of a 2-person or multi-person team for the majority of the shift, although he/she may work independently for short time periods when required

### **Work Pace (self or machine):**

Self-Motivated – Moderate to Fast pace, depending on complexity

### **Interacting with Others:**

Required to work with colleagues and other trades people

### **Operation of Mobile Equipment:**

N/R

**Assessment Criteria Used**

<b>Frequency Key</b>		
<b>FREQUENCY</b>	<b>% OF WORKDAY</b>	<b>HOURS OF 8-HOUR WORKDAY</b>
<b>Not required (N/R)</b>	<b>0%</b>	<b>0</b>
<b>Seldom (S)</b>	<b>0 - 5%</b>	<b>Not performed on a daily basis</b>
<b>Rare (R)</b>	<b>1 – 5%</b>	<b>&lt; 29 min/day</b>
<b>Occasional (O)</b>	<b>6 - 33%</b>	<b>29 min to 2 hours 42 min per day or 1 rep/30 min</b>
<b>Frequent (F)</b>	<b>34 - 66%</b>	<b>2 hours 43 min to 5 hours 21 min per day or 1 rep/2 min</b>
<b>Constant (C)</b>	<b>67 – 100%</b>	<b>5 hours 22 min to 8 hours per day or 1 rep/30 sec</b>

<b>FORCE LEVEL</b>	<b>WEIGHT HANDLED</b>
<b>Light</b>	<b>Less than 20 lbs.</b>
<b>Medium</b>	<b>20-49 lbs.</b>
<b>Heavy</b>	<b>50-99 lbs.</b>
<b>Very-Heavy</b>	<b>100+ lbs.</b>

## Critical Job Demands

MANUAL HANDLING	Comments	FREQUENCY OF WORKDAY					
		N/R	S	R	O	F	C
Lift: Floor to Waist	Light force: Tools, switch gear components; Medium force: Switch gear components, ladder (up to 12 foot), tool box; Heavy force: Switch gear cabinets (2-3 person task)				X		
Lift: Waist to Waist	Light force: Tools, switch gear components; Medium force: Switch gear components, ladder (up to 12 foot), tool box; Heavy force: Switch gear cabinets (2-3 person task)				X		
Lift: Waist to Chest	Light force: Tools, switch gear components; Medium force: Switch gear components, ladder (up to 12 foot); Heavy force: Switch gear cabinets (2-3 person task)			X			
Lift: Waist to Overhead	Light force: Tools, switch gear components; Medium force: Switch gear components, ladder (up to 12 foot); Heavy force: Switch gear cabinets (2-3 person task)				X		
Front carry	Medium force: Switch gear components, ladder (up to 12 foot); Heavy force: Switch gear cabinets (2-3 person task)			X			
Right side carry	Light force: Tools, tool box; Medium force: Switch gear components, ladder (up to 12 foot); Heavy force: Switch gear cabinets (2-3 person task)				X		
Left side carry	Light force: Tools, tool box; Medium force: Switch gear components, ladder (up to 12 foot); Heavy force: Switch gear cabinets (2-3 person task)				X		
Static push	Medium force: Installing switch gear components, drilling holes in concrete; Heavy force: Switch gear cabinets (2-3 person task)				X		
Static pull	N/R	X					
Dynamic push	Medium force: Installing switch gear components, drilling holes in concrete; Heavy force: Switch gear cabinets (2-3 person task)				X		
Dynamic pull	Medium force: Installing switch gear components, drilling holes in concrete; Heavy force: Switch gear cabinets (2-3 person task)			X			

GRIP STRENGTH /COORDINATION	Comments	FREQUENCY OF WORKDAY					
		N/R	S	R	O	F	C
Bilateral repetitive use of hands	Utilizing tools to install switch gear components					X	
Repetitive use of dominant hand	Utilizing tools to install switch gear components						X
Repetitive use of non-dominant hand	Utilizing tools to install switch gear components				X		
Bilateral power grip	Light force: Tools, switch gear components; Medium force: Switch gear components, ladder (up to 12 foot), utilizing hammer drill; Heavy force: Switch gear cabinets (2-3 person task)				X		
Power grip with dominant hand	Light force: Tools, switch gear components; Medium force: Tool box, switch gear components, ladder (up to 12 foot)					X	
Power grip with non-dominant hand	Light force: Tools, switch gear components; Medium force: Tool box, switch gear components, ladder (up to 12 foot)				X		
Bilateral fine dexterity skills	Handling switch gear components					X	
Fine dexterity with dominant hand	Utilizing tools, handling switch gear components					X	
Fine dexterity with non-dominant hand	Utilizing tools, handling switch gear components				X		
Bilateral manual handling	Light force: Tools, switch gear components; Medium force: Switch gear components, ladder (up to 12 foot); Heavy force: Switch gear cabinets (2-3 person task)				X		
Manual handling with dominant hand	Light force: Tools, switch gear components; Medium force: Switch gear components, ladder (up to 12 foot)				X		
Manual handling with non-dominant hand	Light force: Tools, switch gear components; Medium force: Switch gear components, ladder (up to 12 foot), drill				X		
Tool usage bilaterally	Light force: Sweeping; Medium force: Utilizing hammer drill				X		
Tool usage with dominant hand	Light force: Tools						X
Tool usage with non-dominant hand	Light force: Tools				X		

POSITIONAL/ MOBILITY	Comments	FREQUENCY OF WORKDAY					
		N/R	S	R	O	F	C
Sitting	N/R	X					
Standing	Installing switch gear components, drilling holes into concrete					X	
Walking: Level surfaces	Clean up, materials handling				X		
Rough surfaces	Construction materials			X			
Slopes	Work site terrain		X				
Climbing: Regular stairs	Accessing designated work areas			X			
Ladders	Installing switch gear components				X		
Other climbing	N/R	X					
Jumping	N/R	X					
Running	N/R	X					
Balancing	Installing switch gear components					X	
Static bending	Installing switch gear components				X		
Variable bending	Installing switch gear components				X		
Static twisting	Installing switch gear components				X		
Variable twisting	Installing switch gear components				X		
Kneeling	Installing switch gear components				X		
Crouching	Installing switch gear components			X			
Crawling	N/R	X					
Repetitive squatting	N/R	X					
Reaching: Above shoulder	Installing switch gear components					X	
Reaching: Below shoulder	Installing switch gear components, drilling into concrete, handling materials, clean-up				X		
Neck Postures/Movements	All neck positions required (180°, up, down, side-to-side)						X
Throwing	N/R	X					
Foot Action	N/R	X					
Forceful/Jerky movements	Drilling holes into concrete			X			



## Psychosocial Demands

	<u>Seldom/Rare/Occasional/ Frequent/Constant</u>
<b>A. Understanding and memory:</b>	
Remember locations and routine procedures	<b>Constant</b>
Understand and remember short and simple instructions	<b>Constant</b>
Understand and remember detailed instructions	<b>Constant</b>
<b>B. Sustained concentration and persistence:</b>	
Carry out short and simple instructions	<b>Constant</b>
Carry out detailed instructions	<b>Constant</b>
Maintain attention and concentration for extended periods	<b>Constant</b>
Perform activities within a schedule	<b>Constant</b>
Sustain an ordinary routine without supervision	<b>Constant</b>
Make simple decisions	<b>Constant</b>
Solve simple straightforward problems	<b>Constant</b>
Solve complex problems	<b>Occasional</b>
<b>C. Social interaction:</b>	
Interact with the general public	<b>Seldom</b>
Ask questions or request assistance	<b>Occasional</b>
Accept instructions and feedback	<b>Occasional</b>
Get along well with others without distracting them	<b>Constant</b>
Get along well with others without being distracted by them	<b>Constant</b>
<b>D. Adaptation:</b>	
Respond to changes in the environment or tasks	<b>Constant</b>
Aware of normal hazards and take appropriate precautions	<b>Constant</b>
Travel in unfamiliar places or use public transportation	<b>Seldom</b>
Set realistic goals or make plans independently of others	<b>Occasional</b>
Juggle tasks and prioritize	<b>Occasional</b>
	<b>Yes/No</b>
<b>E. Responsibility and accountability:</b>	
Is work place without the pressure of deadlines?	<b>No</b>
Does the work involve occasional pressure to meet deadlines?	<b>Yes</b>
Does the work involve significant pressures?	<b>Yes</b>
<b>F. Language Requirements:</b>	
Is English required for safety purposes?	<b>Yes</b>
Is English required for professional purposes?	<b>Yes</b>
<b>G. Educational Requirements:</b>	
Is grade 12 diploma required?	<b>Yes</b>
Is post-secondary required?	<b>Yes</b>
Is additional skill training required?	<b>No</b>

## Injury Prevention Recommendations

1. Stretch regularly-used muscles throughout the shift – neck, shoulders, chest, elbows, forearms, wrists, hands, lower back, thighs and calves/ankles – paying particular attention to the postural muscles (low back and neck) to prevent risk of soft tissue injuries related to prolonged bending/twisting postures
2. Neck, back, upper and lower extremity warm-up exercises recommended before undertaking manual handling tasks to reduce the chance of soft tissue injuries
3. To help prevent low back strain/sprain from incorrect manual handling techniques – incorporate proper manual handling techniques at all times; utilize dolly, cart, hoist or forklift for all items over 50 lbs or of awkward shape whenever possible; maintain physical conditioning to a **Medium-Heavy** manual handling level
4. To help prevent lower extremity joint/muscle pain due to general deconditioning, poor cushioning in footwear and spending extended periods weightbearing on concrete surfaces – ensure proper fitting footwear with adequate cushioning; take regular stretch breaks hourly
5. When wearing a tool belt, it is recommended that workers utilize tool belts with shoulder straps/suspenders to better distribute/carry the weight
6. To prevent knee injuries, knee pads should be utilized when kneeling on hard &/or rough surfaces