



Physical Demands Analysis



Commercial Electrician

Task 9: Installing Switch Gear

VIDEO CLIP

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

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

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 the 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

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

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

Seldom/Rare/Occasional/ Frequent/Constant

A. Understanding and memory:

Remember locations and routine procedures	Constant
Understand and remember short and simple instructions	Constant
Understand and remember detailed instructions	Constant

B. Sustained concentration and persistence:

Carry out short and simple instructions	Constant
Carry out detailed instructions	Constant
Maintain attention and concentration for extended periods	Constant
Perform activities within a schedule	Constant
Sustain an ordinary routine without supervision	Constant
Make simple decisions	Constant
Solve simple straightforward problems	Constant
Solve complex problems	Occasional

C. Social interaction:

Interact with the general public	Seldom
Ask questions or request assistance	Occasional
Accept instructions and feedback	Occasional
Get along well with others without distracting them	Constant
Get along well with others without being distracted by them	Constant

D. Adaptation:

Respond to changes in the environment or tasks	Constant
Aware of normal hazards and take appropriate precautions	Constant
Travel in unfamiliar places or use public transportation	Seldom
Set realistic goals or make plans independently of others	Occasional
Juggle tasks and prioritize	Occasional

Yes/No

E. Responsibility and accountability:

Is work place without the pressure of deadlines?	No
Does the work involve occasional pressure to meet deadlines?	Yes
Does the work involve significant pressures?	Yes

F. Language Requirements:

Is English required for safety purposes?	Yes
Is English required for professional purposes?	Yes

G. Educational Requirements:

Is grade 12 diploma required?	Yes
Is post-secondary required?	Yes
Is additional skill training required?	No

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 posture.
2. Warm-up exercises are recommended before undertaking manual handling tasks to reduce the chance of soft tissue injuries neck, back, upper and lower extremity
3. Incorporate proper manual handling techniques at all times to help prevent low back strain/sprain from incorrect manual handling techniques –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 and 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