Residential Electrician

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 Physical Demands 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 electrical components 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 certain tasks for several days/weeks before rotating to other tasks

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 Tasks

- Materials handling items handled may range in weight from a few ounces (electrical hardware) up to 80 lbs (generator)
- Prepping wooden wall studs for wire installation
- Pulling wire
- Pulling wire through metallic/non-metallic conduits
- Assembling/installing light fixtures (rough-in/finishing phases)
- Installing wall plugs (rough-in/finishing phases)
- Installing breaker box panels (rough-in/finishing phases)
- Splicing wires (rough-in phase)
- Terminating wires (finishing phase)
- Connecting Residential Services – Conduit and Junction Box Installation
- Clean-up (Sweeping, picking up waste materials)

Equipment used to perform the job may include, but not limited to the following:

Tools

- **Up to 20 lbs:** Drills (cordless/electric), pliers, wire cutters, knives, hammers, levels, screwdrivers, wrenches, saws (hand/electric), measuring tape, vacuum, flashlight, crowbar, knock-out sets (foot/hydraulic/mechanical), sledgehammer, grinder, Allen keys, stapler gun, shovel, powder-actuated tools, steel fish tape
- **20-49 lbs:** Tool box/belt
- **50-99 lbs:** Portable generators

Electrical Equipment

- **20-49 lbs:** Floodlight, ladders (up to 12 feet), vacuum
- **50-99 lbs:** Ladders (12^{+} feet)

Electrical hardware

- **Up to 20 lbs:** Electrical panels, breakers, small light fixtures, plugs/sockets (boxes of hardware-screws, bolts, nuts, collars), metallic/non-metallic conduit, TV/telephone termination box
- **20-49 lbs:** Large light fixtures
- **50-99 lbs:** Electrical splitter box

Personal Protective Equipment Recommended

- ✓ Safety Glasses
- ✓ Hearing Protection
- ✓ Hard Hat
- ✓ Steel Toed Boots
- ✓ Gloves
- ✓ Overalls (Optional)
- ✓ Knee Pads (Optional)
- ✓ Fall Protection Equipment (Task-specific)
- ✓ Respiratory Protection Equipment (Where required)
- ✓ Face shield (Task-specific)

Environmental Conditions

Inside/Outside Work:
Inside 90%; Outside 10%

Working Temperature:
Depending on which phase of construction the building is in, this task may involve exposure to hot or cold weather conditions

Walking Surfaces:
Inside - OSB/Plywood, carpet, linoleum, tile
Outside - Mud, wood, snow, ice, grass (terrain may be uneven)

Dust:
Saw dust – Mild; can be Moderate if power saw is being utilized nearby

Lighting:
Adequate indoor lighting in most areas. Natural lighting may vary with season and/or weather conditions.

Vapour/Fumes:
Mild – Exhaust fumes from portable generator, mobile equipment
Mild-Moderate – solvent vapours from PVC glue and other trades

Noise Levels (measured with Audiometer):
Can exceed 100 dBA if portable generators, mobile equipment, power tools or hammers are being utilized nearby

Vibration:
Mild-Moderate: Drills, saws, hammers

Moving Objects:
Mobile equipment, work trucks

Risks/Hazards:
Slips/Trips/Falls, skin punctures, muscle strains/soreness, pinch points, cuts/abrasions, electric shock

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:
Occasional – 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:
Task-dependent: Generally required to work independently for the majority of the shift, although he/she may be asked to assist a co-worker or request assistance for him-/herself 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:
Aerial work platform

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**

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, breaker panels, smaller light fixtures, hardware, conduit, moving wire reels; Medium force: Floodlight, tool belt, ladder (up to 12 feet), termination boxes, larger light fixtures, tool box, portable generator (2-person task); Heavy force: 12^{+} foot ladder, portable generator (2-person task)				X		
Lift: Waist to Waist	Light force: Tools, breaker panels, smaller light fixtures, hardware, conduit, moving wire reels; Medium force: Floodlight, tool belt, ladder (up to 12 feet), termination boxes, larger light fixtures, tool box; Heavy force: 12^{+} foot ladder, portable generator (2-person task)				X		
Lift: Waist to Chest	Light force: Tools, breaker panels, smaller light fixture, plugs/sockets, moving wire reels; Medium force: Floodlight, tool belt, ladder (up to 12 feet), termination boxes, larger light fixtures; Heavy force: 12^{+} foot ladder, portable generator (2-person task)			X			
Lift: Waist to Overhead	Light force: Tools, smaller light fixtures; Medium force: Larger light fixtures			X			
Front carry	Light force: Tools, breaker panels, smaller light fixture, hardware, conduit; Medium force: Floodlight, tool belt, ladder (up to 12 feet), termination boxes, larger light fixtures; Heavy force: 12^{+} foot ladder, portable generators ((2-person task)				X		
Right side carry	Light force: Tools, electrical panels, breakers, smaller light fixtures, hardware, conduit/metallic pipe, moving wire reels; Medium force: Floodlight, tool belt, ladder (up to 12 feet), tool box; Heavy force: 12^{+} foot ladder				X		
Left side carry	Light force: Tools, electrical panels, breakers, smaller light fixtures, hardware, conduit/metallic pipe, moving wire reels; Medium force: Floodlight, tool belt, ladder (up to 12 feet), tool box; Heavy force: 12^{+} foot ladder				X		
Static push	Light force: Installing conduit/breaker panels/light fixtures; Medium force: Drilling holes into wood/concrete				X		
Static pull	Light force: Splicing/terminating wires; **Medium to** Heavy force: Bending various sizes of metallic pipe/conduit				X		
Dynamic push	Light force: Materials handling, installing electrical conduit**,** threading wire through conduits; Medium force: Materials handling, bending pipe, prepping wooden wall studs, drilling into concrete				X		
Dynamic pull	Light force: Starting portable generator, materials handling, pulling wire; Medium force: Materials handling, prepping wooden wall studs; **Medium to** Heavy force: Bending various sizes of metallic pipe/conduit				X		

GRIP STRENGTH /COORDINATION	Comments	FREQUENCY OF WORKDAY					
		N/R	S	R	O	F	C
Bilateral repetitive use of hands	Installing conduit/breaker panels/wall plugs/light fixtures/electrical conduit, pulling wire/cable, drilling holes					X	
Repetitive use of dominant hand	Installing conduit/breaker panels/wall plugs/light fixtures/electrical conduit, pulling wire, drilling holes					X	
Repetitive use of non-dominant hand	Installing conduit/breaker panels/wall plugs/light fixtures/electrical conduit, pulling wire, drilling holes					X	
Bilateral power grip	Light force: Materials handling, pulling wire, installing light fixtures/breaker panels; Medium force: Materials handling, prepping wooden wall studs; **Medium to** Heavy force: Bending various sizes of metallic pipe/conduit, carrying ladder				X		
Power grip with dominant hand	Light force: Materials handling, pulling wire, installing light fixtures/breaker panels, moving wire reels; Medium force: Materials handling, prepping wooden wall studs; Heavy force: Ladders (12^{+} feet)					X	
Power grip with non-dominant hand	Light force: Materials handling, pulling wire, installing light fixtures/breaker panels, moving wire reels; Medium force: Materials handling, prepping wooden wall studs; Heavy force: Ladders (12^{+} feet)				X		
Bilateral fine dexterity skills	Removing packaging from materials, changing drill bits, splicing/terminating wires, assembling/installing light fixtures			X			
Fine dexterity with dominant hand	Removing packaging from materials, changing drill bits, splicing/terminating wires, assembling/installing light fixtures				X		
Fine dexterity with non-dominant hand	Removing packaging from materials, changing drill bits, splicing/terminating wires, assembling/installing light fixtures			X			
Bilateral manual handling	Light force: Materials handling, pulling wire, installing light fixtures/breaker panels; Medium force: Materials handling, prepping wooden wall studs; **Medium to** Heavy force: Bending various sizes of metallic pipe/conduit, carrying ladder, pulling service cable				X		
Manual handling with dominant hand	Light force: Materials handling, pulling wire, installing light fixtures/breaker panels, moving wire reels; Medium force: Materials handling, prepping wooden wall studs; Heavy force: Ladders					X	
Manual handling with non-dominant hand	Light force: Materials handling, pulling wire, installing light fixtures/breaker panels, moving wire reels; Medium force: Materials handling, prepping wooden wall studs; Heavy force: Ladders (12^{+} feet)				X		
Tool usage bilaterally	Light force: Clean-up duties, steel fish tape; Medium force: Digging trenches, prepping wooden wall studs; **Medium to** Heavy force: Bending various sizes of metallic pipe			X			
Tool usage with dominant hand	Light force: Installing breaker panels/light fixtures/wall plugs/electrical conduit, vacuum				X		
Tool usage with non-dominant hand	Light force: Installing breaker panels/light fixtures/wall plugs/electrical conduit, vacuum			X			

POSITIONAL/ MOBILITY	Comments	FREQUENCY OF WORKDAY					
		N/R	S	R	O	F	C
Sitting	Driving vehicle to warehouse for materials; installing wall plugs, pulling wire, prepping wooden wall studs while seated on crate or floor surface				X		
Standing	Materials handling, installing wall plugs/light fixtures/electrical conduit/breaker panels, prepping wooden wall studs, pulling wire					X	
Walking: Level surfaces	Moving supplies/materials to work areas				X		
Rough surfaces	Construction debris/materials			X			
Slopes	Work site terrain			X			
Climbing: Regular stairs	Accessing designated work areas				X		
Ladders	Installing conduit/breaker panels/wall plugs/light fixtures, pulling wire, drilling holes				X		
Other climbing	N/R	X					
Jumping	N/R	X					
Running	N/R	X					
Balancing	Work site terrain, environmental conditions, working on ladders				X		
Static bending	Installing wall plugs, prepping wooden wall studs, pulling wire			X			
Variable bending	Materials handling, installing wall plugs/light fixtures/electrical conduit/breaker panels, prepping wooden wall studs, pulling wire					X	
Static twisting	Installing wall plugs, prepping wooden wall studs, pulling wire			X			
Variable twisting	Materials handling, installing wall plugs/light fixtures/electrical conduit/breaker panels, prepping wooden wall studs, pulling wire					X	
Kneeling	Installing wall plugs, prepping wooden wall studs, pulling wire				X		
Crouching	Installing wall plugs, prepping wooden wall studs, pulling wire				X		
Crawling	Installing wall plugs, prepping wooden wall studs, pulling wire			X			
Repetitive squatting	Materials handling, installing wall plugs/electrical conduit, prepping wooden wall studs			X			
Reaching: Above shoulder	Materials handling, installing light fixtures/electrical conduit/breaker panels, prepping wooden wall studs, pulling wire				X		
Reaching: Below shoulder	Materials handling, installing wall plugs/light fixtures/electrical conduit/breaker panels, prepping wooden wall studs, pulling wire					X	
Neck Postures/Movements	All neck positions required (180^0, up, down, side-to-side)						X
Throwing	N/R	X					
Foot Action	Light force: Operating vehicle pedals; **Medium to** Heavy force: Bending various sizes of metallic pipe/conduit				X		
Forceful/Jerky movements	Starting portable generator, prepping wooden wall studs, pulling wire			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	**Occasional**
B. Sustained concentration and persistence:	
Carry out short and simple instructions	**Constant**
Carry out detailed instructions	**Occasional**
Maintain attention and concentration for extended periods Perform	**Constant**
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	**Rare**
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	**Occasional**
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?	**Yes***

***(Fall Protection, Aerial Work Platform, Powder-Actuated Tools)**

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 for prolonged periods, 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

7. Keep large drills close to the body, use correct body mechanics and keep the body out of harm's way

8. Powder-actuated tools are to be utilized by competent (educated, skilled & experienced) workers only