

## **Residential Electrician**

### **Task 4: Pulling Wire Inside Conduits**

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 wiring inside conduits as per the building's electrical blueprints

#### **Work Organization**

Journeyman and Apprentice Electrician numbers vary by worksite 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**

- Pulling wire through metallic/non-metallic conduits
- 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 limited to the following:**

#### **Frequent**

- Steel fish tape
- String

#### **Occasional**

- Ladders
- Tape measures
- Knives
- Wire cutters
- Pliers
- Vacuum

#### **Rare**

- Broom

### **Personal Protective Equipment Recommended**

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

## **Environment Conditions**

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

Inside 99%; Outside 1%

### **Working Temperature:**

Although the temperature varies, pulling wire inside conduits is generally completed within the confines of a temperature-regulated facility, although depending on which phase of construction the building is in, this task may involve exposure to hot or cold weather conditions

### **Walking Surfaces:**

Concrete with slippery areas (water puddles, mud, construction debris) - terrain may be uneven

### **Dust:**

Concrete dust – Mild; can be high during blow down or if jackhammer is being utilized nearby

### **Lighting:**

Adequate, indoor lighting in most areas; dark spots in basements/parkades

### **Vapour/Fumes:**

Mild – Diesel fumes from mobile equipment

Mild-Moderate - solvent vapours from other trades

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

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

### **Vibration:**

Not applicable

### **Moving Objects:**

Mobile equipment, work trucks

### **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**

All of 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 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:**

Aerial work platform

**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	<b>Light force:</b> Moving wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)			X			
Lift: Waist to Waist	<b>Light force:</b> Moving wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)			X			
Lift: Waist to Chest	<b>Light force:</b> Moving wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)			X			
Lift: Waist to Overhead	<b>Light force:</b> Wire			X			
Front carry	<b>Light force:</b> Moving wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)			X			
Right side carry	<b>Light force:</b> Wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)			X			
Left side carry	<b>Light force:</b> Wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)			X			
Static push	N/R	X					
Static pull	N/R	X					
Dynamic push	<b>Light force:</b> Threading wire through conduits			X			
Dynamic pull	<b>Light force:</b> Moving smaller wire reels, pulling wire through conduits, pulling wire off reel				X		

GRIP STRENGTH /COORDINATION	Comments	FREQUENCY OF WORKDAY					
		N/R	S	R	O	F	C
Bilateral repetitive use of hands	Pulling wire				X		
Repetitive use of dominant hand	Pulling wire				X		
Repetitive use of non-dominant hand	Pulling wire				X		
Bilateral power grip	<b>Light force:</b> Pulling wire, moving wire reels; <b>Medium force:</b> Pulling wire, ladder (Up to 12-foot)				X		
Power grip with dominant hand	<b>Light force:</b> Pulling wire, moving wire reels; <b>Medium force:</b> Pulling wire, ladder (Up to 12-foot)					X	
Power grip with non-dominant hand	<b>Light force:</b> Pulling wire, moving wire reels; <b>Medium force:</b> Pulling wire, ladder (Up to 12-foot)					X	
Bilateral fine dexterity skills	Handling small gauge wire			X			
Fine dexterity with dominant hand	Handling small gauge wire			X			
Fine dexterity with non-dominant hand	Handling small gauge wire			X			
Bilateral manual handling	<b>Light force:</b> Moving wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)				X		
Manual handling with dominant hand	<b>Light force:</b> Moving wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)				X		
Manual handling with non-dominant hand	<b>Light force:</b> Moving wire reels; <b>Medium force:</b> Ladder (Up to 12-foot)				X		
Tool usage bilaterally	<b>Light force:</b> Sweeping broom, steel fish tape			X			
Tool usage with dominant hand	<b>Light force:</b> Vacuum, string, tape measure, wire cutters, utility knife					X	
Tool usage with non-dominant hand	<b>Light force:</b> Vacuum, string, tape measure, wire cutters, utility knife				X		

POSITIONAL/ MOBILITY	Comments	FREQUENCY OF WORKDAY					
		N/R	S	R	O	F	C
Sitting (on ground)	Pulling wire		X				
Standing	Pulling wire, clean-up duties					X	
<b>Walking:</b> Level surfaces	Pulling wire, clean-up duties				X		
Rough surfaces	Construction debris			X			
Slopes	Work site terrain		X				
<b>Climbing:</b> Regular stairs	Accessing designated work areas				X		
Ladders	Pulling wire				X		
Other climbing	N/R	X					
Jumping	N/R	X					
Running	N/R	X					
Balancing	Pulling wire while on a ladder				X		
Static bending	Pulling wire			X			
Variable bending	Pulling wire				X		
Static twisting	Pulling wire			X			
Variable twisting	Pulling wire				X		
Kneeling	Pulling wire		X				
Crouching	Pulling wire		X				
Crawling	Pulling wire		X				
Repetitive squatting	Pulling wire			X			
<b>Reaching:</b> Above shoulder	Pulling wire					X	
<b>Reaching:</b> Below shoulder	Pulling wire				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	Pulling wire (may become wedged inside conduit)				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 **Frequent**

### **B. Sustained concentration and persistence:**

Carry out short and simple instructions **Constant**  
Carry out detailed instructions **Frequent**  
Maintain attention and concentration for extended periods 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? **Yes\***

**\* (Fall Protection, Aerial Work Platform)**

## 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** 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. To prevent knee injuries, knee pads should be utilized when kneeling on hard surfaces
6. 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