



Alberta Construction
Safety Association

Physical Demands Analysis

Development Partners



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Industrial Electrician

Task 4: Pulling Wire inside Conduits

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 plastic/metallic conduits
- 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 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)

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:

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

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 work site for materials/supplies

Working Alone:

Worker may have to perform task at 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 platforms

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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: Moving wire reels; Medium force: Ladder (Up to 12-foot), moving wire reels; Heavy force: Ladder (12 ⁺ foot), moving wire reels			X			
Lift: Waist to Waist	Light force: Moving wire reels; Medium force: Ladder (Up to 12-foot), moving wire reels; Heavy force: Ladder (12 ⁺ foot), moving wire reels			X			
Lift: Waist to Chest	Light force: Moving wire reels; Medium force: Ladder (Up to 12-foot), moving wire reels; Heavy force: Ladder (12 ⁺ foot), moving wire reels			X			
Lift: Waist to Overhead	Light force: Wire			X			
Front carry	Light force: Moving wire reels; Medium force: Ladder (Up to 12-foot), moving wire reels; Heavy force: Ladder (12 ⁺ foot), moving wire reels			X			
Right side carry	Light force: Wire reels; Medium force: Ladder (Up to 12-foot), wire reels			X			
Left side carry	Light force: Wire reels; Medium force: Ladder (Up to 12-foot), wire reels			X			
Static push	Light force: Moving smaller wire reels; Medium force: Moving larger wire reels			X			
Static pull	Light force: Moving smaller wire reels; Medium force: Moving larger wire reels			X			
Dynamic push	Light force: Moving smaller wire reels, threading wire through conduits; Medium force: Moving larger wire reels			X			
Dynamic pull	Light force: Moving smaller wire reels, pulling wire through conduits, pulling wire off reel; Medium force: Moving larger wire reels					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	Light force: Pulling wire, moving wire reels; Medium force: Pulling wire, ladder (Up to 12-foot), moving wire reels; Heavy force: Ladder (12+ foot), moving wire reels				X		
Power grip with dominant hand	Light force: Pulling wire, moving wire reels; Medium force: Pulling wire, ladder (Up to 12-foot), moving wire reels; Heavy force: Ladder (12+ foot), moving wire reels					X	
Power grip with non-dominant hand	Light force: Pulling wire, moving wire reels; Medium force: Pulling wire, ladder (Up to 12-foot), moving wire reels; Heavy force: Ladder (12+ foot), moving wire reels					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	Light force: Moving wire reels; Medium force: Ladder (Up to 12-foot), moving wire reels; Heavy force: Ladder (12+ foot), moving wire reels				X		
Manual handling with dominant hand	Light force: Moving wire reels; Medium force: Ladder (Up to 12-foot), moving wire reels				X		
Manual handling with non-dominant hand	Light force: Moving wire reels; Medium force: Ladder (Up to 12-foot), moving wire reels				X		
Tool usage bilaterally	Light force: Sweeping broom, steel fish tape			X			
Tool usage with dominant hand	Light force: Vacuum, string, tape measure, wire cutters, utility knife					X	
Tool usage with non-dominant hand	Light force: 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	
Walking: Level surfaces	Pulling wire, clean-up duties				X		
Rough surfaces	Construction debris			X			
Slopes	Work site terrain		X				
Climbing: 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			
Reaching: Above shoulder	Pulling wire					X	
Reaching: 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	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?	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
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** 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. 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