ELEVATOR/ESCALATOR TRADE

Musculoskeletal disorders (MSDs), such as chronic back pain or shoulder problems, often take time to develop. Forceful exertion, awkward positions, hand-arm and whole-body vibration, contact stress, and repetitive tasks can add up over time to produce an MSD.

This profile can help you identify and control MSD hazards in your job. We recommend that you add the best practices outlined here to your company's health and safety program. The hazards in a particular job, however, may be different from the ones on this profile, so evaluate the risks of your specific work activities.

When putting MSD controls in place, consider the following ergonomic principles:

1. ***Use handling equipment when possible.*** The best way to prevent an MSD is to eliminate or reduce the frequency of lifting, carrying, pushing, and pulling. Use material-handling equipment such as carts, dollies, pallet jacks, or lift trucks.

2. ***Don't lift a load from the floor.*** Lifting from the floor or from below standing knuckle height can put severe stress on your back and reduce your lifting capacity. To avoid this, store objects above standing knuckle level and below standing shoulder level.

3. ***Avoid working on the floor.*** Constantly working on the floor can result in injuries to your back, hips, and knees because you usually have to kneel and bend forward. When possible, raise the work height by using a workbench.

4. ***Minimize work above your shoulder.*** High lifting or constantly reaching above your shoulders can be harmful. Most of the work is being done by the smaller muscles in your shoulders and arms instead of by the larger muscles in your back and legs. When your arms are raised, the muscles fatigue more quickly because there is less blood flow and there is a greater chance you could drop the object.

5. ***Get help with large loads or split them into smaller loads.*** Get help from a co-worker if a load is too heavy to handle on your own. If possible, split the load into smaller loads. Making more trips with small loads puts less stress on your back than making fewer trips with large loads.

6. ***Practise good housekeeping.*** Pick up debris and garbage to prevent trips, slips, and falls. A clean worksite also allows you to get closer to your work and equipment.

7. ***Conduct a Job Safety Analysis (JSA).*** Actively assess the job tasks and implement MSD controls before starting work to avoid overexertion and awkward positions.

8. ***Perform stretching and warm-up exercises before starting work.*** This not only prevents MSDs but also promotes general good health. Use *Before You Start Work Exercises Card* (V012).

Photocopy this profile and distribute it as widely as possible!

Scope of Work for Elevator/Escalator Constructors

Elevator installers and repairers—also known as elevator mechanics or elevator constructors—are responsible for assembling, installing, and repairing commercial and residential elevators, escalators, and chairlifts for the disabled and the elderly, as well as moving walkways or conveyors in airports. Employed by elevator and escalator contractors, they can also modernize or enhance old elevators and escalators based on manufacturer recommendations.

Installing Mechanical Components and Handling/Process Systems

Tasks	What Can Happen (Hazards/Risks)	Potential Controls
• Assembles, installs, repairs, and maintains elevators, escalators, moving sidewalks, and dumbwaiters, using hand and power tools, and tests devices such as test lamps, ammeters, and voltmeters • Connects car frames to counterweights with cables and assembles elevator cars • Inspects and maintains rigging, hoisting, and lifting equipment • Performs preventive and predictive maintenance • Locates malfunctions in brakes, motors, switches, and signal and control systems, using test equipment • Adjusts safety controls, door mechanisms, counterweights and components such as valves, ratchets, seals, and brake linings	• Overexertion injuries from lifting and carrying heavy equipment or work materials • Back and knee injuries from awkward body postures such as squatting, kneeling, and stooping during installation and maintenance	**Manual materials handling and poor postures** • Assess the MSD hazards of the job tasks and implement controls before starting work to avoid overexertion and awkward positions. • Plan ahead to minimize material handling tasks. • Use mechanical lifting equipment whenever you can, especially when loading or unloading heavy materials. Handling equipment is available in many shapes and sizes and can be customized. Talk to your purchasing department or supervisor about getting the correct one for your needs. • Get help from a co-worker if a load is too much for you to handle on your own. Consider not only the weight of the item but also the lifting location, your body position, and ergonomic principles. • Store heavy materials closer to the work location to reduce the distance you have to carry them. • Use dollies and motorized pallet jacks whenever possible, especially when moving material frequently or over long distances. • Store equipment and materials above ground level. The optimal lifting height is between chest level and knee level. • Move as close as possible to the work area and centre yourself to reduce overreaching and bending at the waist.

Tasks	What Can Happen (Hazards/Risks)	Potential Controls
		Manual materials handling and poor postures (cont'd) • When using carts or hand trucks: – Select a model that has the type of wheels that are right for the ground conditions. – Select a model with swivel wheels on the rear and fixed wheels on the front so it will be easier to push over long distances. – Maintain the wheels on handling equipment to reduce the force needed for pushing or pulling. – Make sure handles are located at the rear of the cart and at waist level. – Make sure the height of the load on the cart does not block your view. – Keep loads balanced and under the manufacturers' recommended weight limits. – Push a cart instead of pulling it. Pulling causes more bone-on-bone compression in the lower back. • Whenever possible, use overhead cranes to lift and transport heavy items (e.g., install a small-sized crane on a pickup or flatbed truck to help with lifting/lowering heavy objects). When installing an overhead crane on site, ensure that the system/device is rated for the load weight you are going to transport. You will also need to consider movement patterns before installing the crane. • Use elbow pads to protect elbows from contact stress. They are very useful when working in cramped spaces or having to lean on elbows. Elbow pads should fit snugly but should not affect the circulation in your arm. • Use a ramp made of either aluminum or wood when moving materials upstairs or over uneven walkways.

Tasks	What Can Happen (Hazards/Risks)	Potential Controls
		Manual materials handling and poor postures (cont'd) • Use pulley systems attached to tools or equipment to assist in manual handling and positioning. Working this way reduces the force needed to lift, position, or operate tools or equipment. • Provide adequate illumination for the tasks—especially during carrying, pushing, and pulling tasks. Obstruction due to load handling can increase risk for slips/falls when lighting is inadequate. • Store materials in large containers to make them easier to move. Use a lift truck or crane to transport large quantities of materials such as steel pipes, mechanical items, welding units, hoses, and rigging equipment. This will reduce material handling and improve efficiency. Large quantities of material (e.g., cables, welding units, hoses, rigging equipment) can be transported at one time using a forklift or crane. • Use a shelving system that can store materials, tools, or equipment within easy reach and without having to bend or twist. If using a rack system, store items between knee and shoulder height whenever possible. • Always use proper lifting techniques (i.e., lift materials with your legs, do not bend over or lift with your back, and keep the load close to your body). • Work in a comfortable position. Use existing equipment to create a stable workbench that allows you to work while standing upright with your arms close to your sides. Make sure you have easy access to work materials. This will lessen the time spent untangling parts and reduce the forceful exertions required to pull tangled materials apart.

Tasks	What Can Happen (Hazards/Risks)	Potential Controls
		Manual materials handling and poor postures (cont'd) • Use a shoulder pad when carrying heavy objects on your shoulder. This will reduce the strain on your shoulder by spreading the weight over a larger area. • Use tag lines when a load is above shoulder height. • Use a three-point lift method when handling heavy objects or long material by yourself: 1. Squat and lift one end of the object. 2. Walk up the load. 3. Lift the object from the ground
		Working around Vehicles • When purchasing new vehicles, consider the following: – Walk-through height – Higher vehicles will be better for storing and accessing work materials. – Number and location of grab handles at the back of the vehicle – Steering wheel tilt and telescoping adjustments improve comfort and reach – Seats with vertical and horizontal adjustment ranges, lumbar support, back recline, and armrest height and angle adjustments – Suspension in seats to minimize effects of vibration – Adjustable seatbelt shoulder strap height to enhance comfort for smaller or larger drivers – Pedals and steering wheel aligned with centerline of seat – Accessibility of cup holders, gear shifter, and main controls so drivers do not have to extend reach – Visibility of main dashboard displays and easy adjustment of mirrors.

Tasks	What Can Happen (Hazards/Risks)	Potential Controls
		Working around Vehicles (cont'd) • Install a hydraulic ladder rack to help load and unload ladders from vehicles. • Install a grasp bar on top of service vans to make it easier to enter the back of the van. • Install an extra step at the back of service vans to reduce the step distance between the ground and the bumper of the van.
• Performs specialized testing and analysis • Connects electrical wiring to control panels and electric motors • Disassembles defective units and repairs or replaces parts such as locks, gears, cables, and electric wiring • Tests newly installed equipment to make sure that it meets specifications, such as stopping at floors for a set amount of time	• Injuries of the arm, hand, and finger, such as rotator cuff syndrome, hand/arm vibration syndrome, and carpal tunnel syndrome from vibrations and repetitive forceful exertion when using hand tools (e.g., hammer, power tools) • Stress on the knees from prolonged kneeling • Stress on the shoulders from carrying objects on shoulders	**Forceful exertion of arms and hands** • Use hand tools that have: – Low vibration and weight – A comfortable handle that provides a good grip (e.g., a rubber or spongy-type grip) – A grip that is the correct size and is designed to be used by either hand – A handle that lets you keep your wrist straight or in a neutral position when operating it – A torque reduction and/or low kickback features • If you do a lot of cutting, use a powered cutting tool. • Rotate to other tasks when possible to give your muscles a break from repetitive movements. • When drilling overhead, consider attaching the drill gun to a telescopic arm extension. This will help support the weight of the heavy tool and reduce stress on the arms and shoulders. • Wear anti-vibration gloves to reduce the vibration from powered hand tools going to your hands and arms. • Use a shoulder pad when carrying heavy objects. It will reduce the strain on your shoulder by spreading the weight over a larger area.

Tasks	What Can Happen (Hazards/Risks)	Potential Controls
		Forceful exertion of arms and hands (cont'd) • Use high-quality kneepads. (Note: kneepads distribute force over a larger area of the knee's surface, but don't reduce the force on the knee joint itself.) • Use kneepads with rollers. They will allow you to move around easily by reducing the amount of friction between the kneepads and the floor. • Use a large, thick, soft mat to reduce contact stress when lying on the ground.
Welds steel rails to the walls of shafts to guide elevators	• Awkward postures such as squatting, kneeling, or stooping from working in confined or tight locations • Holding a bent-neck position or keeping your shoulders raised for a long time • Supporting the weight of your hard hat and welding mask with your neck	• Use auto-darkening lenses on your welding helmet. They darken as soon as the arc is struck, eliminating the need to open and close your helmet repeatedly. This reduces strain on your neck. • Choose a welding set that you can push or pull comfortably over uneven surfaces. • Choose a welding set that has comfortable, well-positioned handles. Protruding controls or vents can make it more difficult to carry. • Put your welding leads on pulleys. • Use welding cables that are lightweight and flexible. • Use a work stool or knee creeper when welding material that is low to the ground. A knee creeper can support your upper body, reduce contact stress on your knees, and make it easier to move around. • Use a work table or bench to avoid working in an awkward position (on the floor and on your knees with your back bent). • Use welding guns that have swivels and can be used in either hand. • Use overhead hoists whenever possible.

Tasks	What Can Happen (Hazards/Risks)	Potential Controls
		• Pre-assemble material and use material-handling equipment to reduce unnecessary lifting. • Use a wheeled device when moving a pipe-threading machine. • Use a rotational clamp or a sawhorse with a clamp to help reduce awkward positions of the neck, shoulders, and arms when welding pipes. • When possible, use equipment such as lift trucks, power buggies, or power carts to transport pipes. • Use lightweight hand tools with low vibration. Look for tools with low kickback and torque reduction. • Use a lifting and turning welding table with wheels when welding or moving material. • Look out for pinch points near your feet. • Rotate to other tasks when you can to give your muscles a break from doing the same thing over and over again. • Select hand tools that do not require a lot of force to operate. • Hand tools should have: – A comfortable handle with a good grip (e.g., a rubber or spongy-type grip) – The correct size grip designed to be used by either hand – A handle that lets you keep your wrist straight or in a neutral position.

Don't forget about other hazards at your workplace. For more information, visit ihsa.ca

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