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Guide for Automotive Lifts

June 2013

Manitoba 

Guide

For

Automotive Lifts

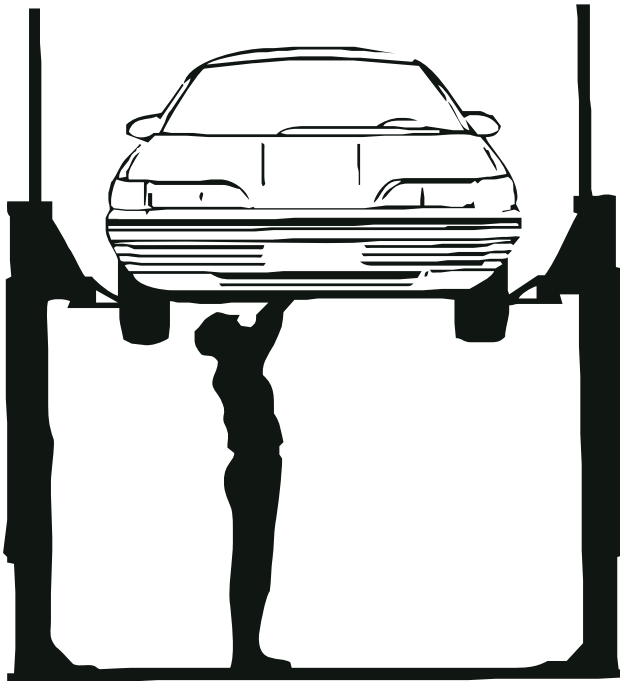
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Guide for Automotive Lifts

Table of Contents

ACKNOWLEDGEMENT	1
INTRODUCTION	2
CLASSIFICATION OF AUTOMOTIVE LIFTS	3
In-Ground Lifts	3
Surface-Mounted Lifts	4
WHAT TO DO BEFORE LIFTING	7
Lift Capacity	7
Centre of Gravity	8
Lifting Points	9
TYPES OF LIFTS	10
Frame Engaging Lifts	10
Contact Pads	10
Extenders	11
Asymmetrical Lift Arms	11
Centre of Gravity	11
Axle-Engaging Lifts	12
Runway (Drive-on) Lifts	13
Roll-off Protection	13
Centre of Gravity	13
Free-wheeling Jacks	13
Rocker Panel (Pad) Lifts	14
LIFTING THE VEHICLE	15
MAINTAINING LOAD STABILITY	16
Removing Components	16
Using Cheaters	16
Stored Energy	17
Unequal Loads	17
LOWERING THE VEHICLE	18
LIFT MAINTENANCE	19
Telescoping Lift Arms	19
CHAINS AND CABLES	20
Air/Oil Systems	21
Soil Conditions	22
SURFACE-MOUNTED SYSTEMS	23
Special Load-Bearing Components	23
Floor Quality	24
PERSONAL PROTECTIVE EQUIPMENT	25

INTRODUCTION

Introduction

Manitoba's automotive repair industry members use several types of vehicle lifts. This guide discusses the in-ground and surface-mounted lifts most common in our province.

Employers are responsible for making sure workers have proper training and follow safe work procedures. They must also see that lifts receive regular maintenance.

Workplace Safety and Health Regulation Requirements

Workplace Safety and Health Regulation M.R. 217/2006, Part 23.38 (1) states that Manitoba employers must ensure vehicle lifts meet requirements contained in the following standards:

- ANSI Standard ANSI/ALI ALCTV, Automotive Lifts – Safety Requirements for Construction, Testing and Validation
- ANSI Standard ANSI/ALI ALOIM, Automotive Lifts – Safety Requirements for Operation, Inspection and Maintenance
- ANSI Standard ANSI/ALI ALIS, Automotive Lifts – Safety Requirements for Installation and Service

This guide provides general information and minimum requirements for the safe operation of vehicle lifts at your workplace. It promotes and supports safety and health training programs for workers involved in the automotive industry.

CLASSIFICATION OF AUTOMOTIVE LIFTS

In-Ground Lifts

In-ground lifts have their lifting assemblies located below the floor. The number of pistons they feature depends on the types of vehicles and the weights they need to lift. Many one or two-piston lifts are used to hoist standard compacts, mid-sized and full-sized passenger vehicles. Lifts with three or more pistons are usually for larger vehicles such as transit coaches and fire engines.

In-ground lifts usually feature one of three power systems:

- self-contained air/oil reservoir (semi-hydraulic)
- separate air/oil reservoir (full hydraulic)
- electric oil-pumping unit that supplies oil under pressure without air pressure



In-ground lifts adjust to conform to many types of vehicles.

Most **drive-through** lifts allow vehicles to be driven between the lift arms, allowing lift arm adjustment without the need to reach under the vehicle. The lift arms on **drive-over** lifts are situated closer together, allowing vehicles to be positioned for lifting without contacting any components but requiring workers to reach under the vehicle to position the arms for lifting.

Lifts with pads that contact vehicle rocker panels or a perimeter frame are generally used to allow unobstructed access to the undersides of passenger cars.



Drive-over type lift



Drive-through type lift

Lifts with two pistons, one at the front and one at the back (axle engaging), are used on vehicles equipped with a rear axle or support rail. Larger lifts of this type are also used on heavy-duty trucks, since these vehicles have a rear axle and differential.

In many cases, a piston at the rear of the lift is fixed in place and used to lift the rear axle while a moveable piston at the front is positioned beneath the front control arms or frame of the vehicle.

Surface-mounted Lifts

Until about 1970, in-ground lifts were most common in Manitoba automotive service facilities. Today, surface-mounted lifts are more widely used.

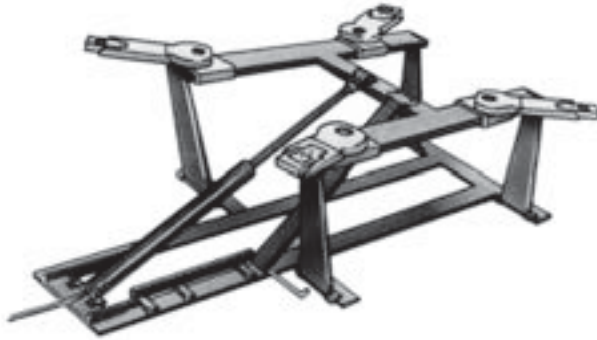
Surface-mounted lifts are bolted to the floor of the service facility. An electric motor drives a screw-type lifting device or operates a pump that provides pressure for a hydraulic lift.



The most popular surface-mounted lift is the two-column, drive-through, frame-engaging lift. The lift arms ride up each column, usually synchronized by a steel roller chain or cable assembly. A hydraulic pump and cylinder(s), sometimes using leaf chain or cable systems, provide lifting power. Screw lifts use rotating screw pillars that move the lift arms.



The four-column surface mounted lift is the primary lift for many muffler replacement, oil change, wheel alignment and transmission repair facilities. It allows a vehicle to be driven onto two runways and lifted by its tires, allowing easy access to its underside.



Short-rise service lifts are also powered by an electric motor driven hydraulic power unit. These lifts are mainly used for tire and brake service or auto body repair. They usually engage a vehicle's frame or rocker panels.

WHAT TO DO BEFORE LIFTING

A vehicle lift is **not** a crane. It is **not** a jack or a mechanical ladder. Vehicle lifts are engineered to hoist and support vehicles... nothing else.

Vehicle lifts must be operated by trained workers only.

Before service employees drive a vehicle into the shop for maintenance or repair, be sure the lift area is free of:

- grease and oil
- tools
- cords and hoses
- trash and other debris

Customers and bystanders must not be in the lift area or inside the vehicle being lifted. People not familiar with the hazards in the shop could easily be injured.

The lift should be fully lowered before driving the vehicle into the work bay. Be sure the lift areas, adapters, and supports are positioned out of the way of the vehicle's tires before driving the vehicle into the bay.

Lift Capacity

Never overload the lift. The manufacturer's rated capacity is displayed on the nameplate attached to the lift. If the nameplate is missing, or the information is not legible due to wear, check the rated capacity with the manufacturer's representative **before** using the lift.

Centre of Gravity

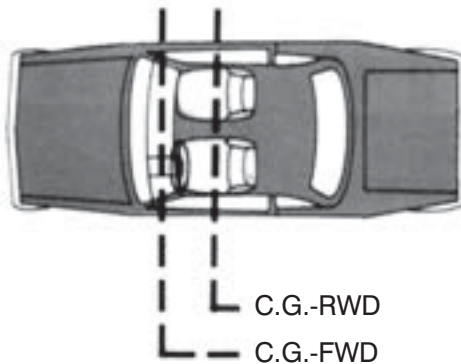
The centre of gravity is the point between the front and the rear of the vehicle where the weight is distributed equally. Workers must know where a vehicle's centre of gravity is located **before** lifting the vehicle.

Each vehicle has a different centre of gravity, due to:

- weight distribution
- wheel base
- location of drive train
- other factors

In most cases, the centre of gravity on rear-wheel drive passenger cars is below the driver's seat. On front wheel drive passenger cars, the centre of gravity is generally slightly in front of the driver's seat.

Position the centre of gravity according to the vehicle manufacturer's recommended lifting points.



Centre of gravity for rear-wheel and front-wheel drive cars

Lifting Points

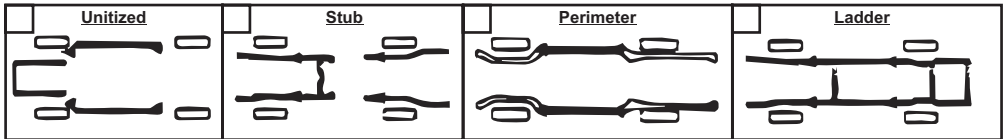
Before lifting the vehicle, check the vehicle manufacturer's recommended lifting points. In most cases, these lifting points can be found in the vehicle's shop manual. The contact pads should be positioned only according to these specifications.

Check the condition of the vehicle's lifting surfaces.

Are the vehicle's lifting points:

- damaged
- rusted
- covered with oil, dirt, undercoating, or anything else that may cause slippage

Types of Lifting Points



Remember - before you lift the vehicle, check the vehicle manufacturer's recommended lifting points.

TYPES OF LIFTS

1) Frame Engaging Lifts

A) Contact pads

Frame-engaging lifts use flip-up or threaded contact (foot) pads that are located on the end of each lift arm. These contact pads adjust to several positions. Be sure the flip-up pads are secured in position before spotting them under the vehicle. If a pad is not secured, it could flip back and cause the vehicle to become unstable.

Many lifts are equipped with rotating threaded contact pads that are adjustable to reach the vehicle. Before lifting the vehicle, be sure all four contact pads are adjusted appropriately. Be aware that uneven adjustment of these pads may make the load unstable. Check the lift manufacturer's recommendations for information on how to use this type of contact pad. If the lift uses contact pads with non-metallic coatings, the coatings should not be damaged or loose. If they are damaged, they should be replaced. Also be



aware that oil and grease can make these surfaces slippery. Inspect each lift arm and contact pad for cracks or other signs of damage before placing the lift arms under the vehicle. If any part of the lift is not operating appropriately, **do not use** the lift or attempt to fix it. Notify your supervisor immediately. Qualified lift service personnel must do the repairs.

b) Extenders

Even though contact pads are adjustable to accommodate most vehicles, extenders may be necessary for lifting vehicles such as pickup trucks and vans. Extenders provided by the manufacturer of the lift must be used. **Do not use** wood, concrete blocks or other homemade extenders in their place.

c) Asymmetrical lift arms

An asymmetrical lift has front lift arms that differ in length from its rear lift arms. When using asymmetrical lift arms, always position the arms according to the manufacturer's recommendations.

d) Centre of gravity

Vehicle lifting points can be different for different types of frame engaging lifts:

- When hoisting with a single-piston, in-ground lift, place the vehicle's centre of gravity directly over the piston.
- When using a two-piston, in-ground lift, place the vehicle's centre of gravity on the centre line between the two pistons.
- When hoisting with a two-column, drive-through, surface-mounted lift, place the vehicle's centre of gravity between the two columns.
- If the lift is equipped with asymmetrical lift arms, check the manufacturer's specifications for spotting the vehicle's centre of gravity.

2) Axle-engaging Lifts

The lift should be fully lowered before driving the vehicle into the work bay. Anything that strikes the pistons or posts could damage components.

Follow the vehicle manufacturer's specifications for pick-up points and be sure the lift makes secure contact with these areas. The pick-up points must be undamaged and free of grease or other substances that may cause slippage.

Some front-wheel drive cars have a support rail in place of a rear axle. This rail allows the use of axle-engaging lifts on these vehicles. Automobiles with stub axles require wheel-engaging adapters.



3) Runway (Drive-on) Lifts

Unlike frame and axle-engaging lifts, drive-on lifts raise the vehicle by its wheels. Some drive-on lifts are not wide enough to accommodate pick-up trucks with dual wheels. Check the lift manufacturer's load capacity and runway width specifications **before** placing a vehicle on the lift.

a) Roll-off protection

All runway lifts should be equipped with accidental roll-off protection or chocks. Some approach ramps rise and act as chocks when the lift is raised. On lifts where automatic chocks are not provided, use appropriate manual chocks. All vehicle wheels on a runway lift must be chocked while the vehicle is on the lift.

b) Centre of gravity

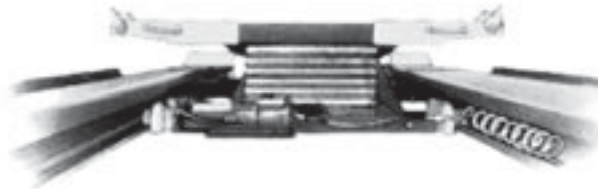
Appropriate spotting points for vehicles on runway lifts vary depending on the type of lift:

- When hoisting with a single-piston in-ground lift, place the vehicle's centre of gravity directly over the piston
- When using a two-piston in-ground lift, place the load's centre of gravity on the centre line between the two pistons
- When hoisting with a two-column surface-mounted lift, place the vehicle's centre of gravity between the two columns
- On four-column lifts, the centre of gravity should be placed at the midpoint of the runway.

The use of wheel-alignment ramps presents an exception to these instructions. In this case, the front wheels must be located on the swivel plates, and the rear wheels on slip plates, if provided.

c) Free-wheeling jacks

Some manufacturers offer optional air-operated or hydraulic jacks that ride along the inner rails of the two-runways. If the lift has this feature, be sure each jack is fully lowered before driving a vehicle on or off the runway. Ensure the contact surfaces are free from corrosion or obstructions and provide a solid lifting surface. Use the vehicle manufacturer's recommended lifting points.



4) Rocker Panel (Pad) Lifts

Rocker panel lifts are used on passenger cars with unibody construction and perimeter frames. This type of lift uses padded rubber supports that adjust to different body widths and wheelbases.

When using the rocker panel lift, the car is driven through or over two support members that must be correctly located to engage the car, either directly or by using special spacer blocks.



When using rocker panel lifts, appropriate spotting points for automobiles vary, depending on the application. Ensure the pads make firm contact with the vehicle manufacturer's recommended lifting points before raising the vehicle.

LIFTING THE VEHICLE

A worker must not be under a suspended load unless:

- the load is supported by a vehicle lift designed for that purpose
- properly rated and maintained stands or blocks designed to support the load are placed on firm foundations

After the vehicle is appropriately spotted, raise the lift until the pads or other supports contact the vehicle. **Never** override or block the controls on the lift. The operator **must** use constant manual pressure to operate the controls and **must** remain at the controls while the vehicle lift is in motion, either raising or lowering a vehicle.

Remember that no one should be in or near the vehicle. Once the lift is in contact with the vehicle, visually check to ensure the supports are properly positioned on the recommended lifting points. Raise the vehicle approximately one foot off the ground and visually check the lifting points again. If the supports appear to be slipping or are not contacting a flat surface, a lift arm or other support has been incorrectly positioned. Carefully lower the lift and reposition each support. Keep in mind that unequal weight distribution may cause the vehicle to fall.

After ensuring the load is secure, lift the vehicle to the desired height and visually check the contact points again before going under the vehicle. Ensure the lift's locking device is engaged and operating properly. If it is not, carefully lower the vehicle, inform the supervisor, and have the lift serviced.

If working under a lift that does not have a locking device or is below the point when the locking device engages, place four jack stands of rated capacity under the vehicle's frame or suspension for support.



Certain features have been installed on the lift to help use the lift safely. Do not override or remove them, and maintain these features so they work as designed.

MAINTAINING LOAD STABILITY

Sudden shifts in the centre of gravity may cause the vehicle to become unstable and fall. Possible causes of this change in the centre of gravity are listed below.

Removing Components

Removing major components from front or rear-wheel drive vehicles may cause a radical change in the vehicle's centre of gravity. For example, automatic transmission work may require a new torque converter and a set of clutches. To service the transmission, it must be removed. This means that approximately 70-79 kilograms of bulk is being removed from the vehicle, which will cause a sudden change in the centre of gravity.

In addition to transmissions, other major components may cause a shift in the centre of gravity if removed, including:

- engines
- suspension components
- rear axles and differentials
- body and frame components

Be sure to use four jack stands of rated capacity to support the vehicle and stabilize (equalize) the load when removing any of these components. When using jack stands, always adjust stand supports to ensure secure contact with the vehicle. **Do not attempt** to lower the vehicle onto the jack stands. Doing this disengages the lift's locking devices. If the lift is lowered too far or too quickly, the jack stands may move and cause the vehicle to fall.

Check the vehicle manufacturer's service manual for recommended procedures when removing the vehicle components mentioned above.

Never use engine or transmission supports or stands in the place of appropriately rated jack stands. These supports are not capable of supporting the vehicle.

Using Cheaters

Tightening or loosening fasteners with a cheater or breaker bar may also cause a sudden shift in the vehicle's centre of gravity. The sudden pushing or pulling force could cause a vehicle to slip from the lift's supports. The best way to avoid this risk is to tighten and loosen fasteners with an impact wrench.

Stored Energy

An unexpected release of stored energy, such as removal of a loaded spring or load-supporting bolt, may also cause components to shift position suddenly and alter the centre of gravity.

Unequal Loads

The centre of gravity may change dramatically depending on the load the vehicle is carrying (ex: equipment or luggage in the trunk). Use four jack stands to support the unequal load. Be sure the cargo does not exceed the capacity of the lift or will not shift while the vehicle is lifted. If the cargo is unstable, do not lift the vehicle.

LOWERING THE VEHICLE

Before lowering the lift, make sure the area is clear of people and check that all obstructions (ex: tool trays, jack, engine and transmission stands) have been removed from under the vehicle.

Never override the instant stop controls on the lift. The vehicle lift controls must be operated by constant manual pressure. The operator must remain at the controls while the vehicle lift is in motion and not block the controls while lowering the vehicle.

Before removing the vehicle from the work bay, ensure that the position of lift arms and supports provide a safe, unobstructed exit. Contact pads should be in their lowest position.



If more than one of the facility's lift controls is situated along the same wall, each control should be clearly numbered or marked to identify the unit it controls.

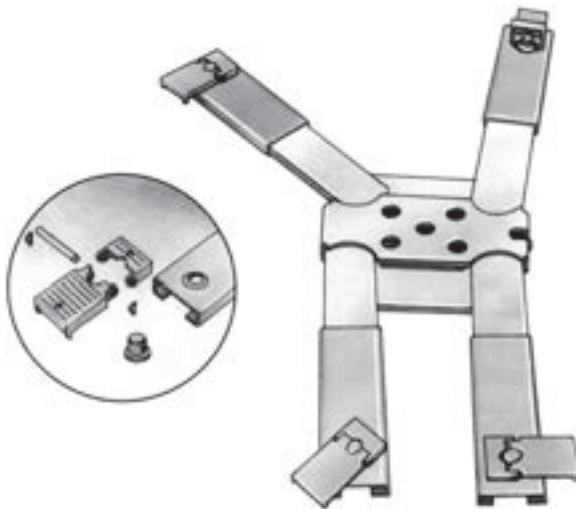
LIFT MAINTENANCE

Vehicle lifts should be inspected on a daily basis and a record of the inspection kept in a logbook. If the lift malfunctions or is damaged, **do not use** it. Qualified lift service personnel must make necessary repairs.

Telescoping Lift Arms

Telescoping lift arms are used mainly on frame-contact lifts. They adjust to handle different vehicle types and sizes. To maintain the lift arms, follow the manufacturer's recommended maintenance program, including:

- check the over-travel stops for wear
- watch for stress cracks or breaks in welds and castings
- examine arms for permanent bending
- lubricate swivel points
- never weld cracks, heat or re-bend damaged arms
- do not modify the lift with unapproved components
- inspect all lift adapters and extenders before using them
- replace defective parts with those approved by the manufacturer



CHAINS AND CABLES

Chains and cables are used mostly on surface-mounted lifts as a means of lifting and synchronization. Chains and cables are also used to synchronize the movement of pistons on some in-ground lifts.

Recommended maintenance tips:

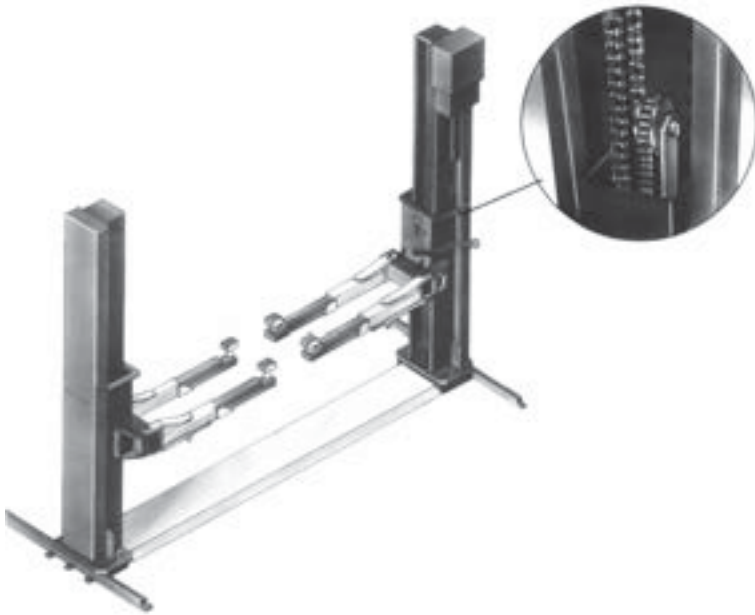
- check chains and/or cables for unusual stretch or wear
- lubricate chains and cables
- inspect end connections for corrosion or fatigue, excessive wear, connection hole elongation or deformation
- check sprockets and pulleys for wear and damage. They must roll freely. Keep them lubricated
- examine coatings and sheaths on cables for wear
- if there are slack sensors, be sure they are working correctly
- keep salt, sand, water, dirt and other debris away from the lift. Rust can work its way onto piston housings, lift columns, chains and cables, and bearings and obstruct the lift
- all worn or damaged parts must be replaced with the manufacturer's approved equipment by qualified lift service personnel

Have the chain system serviced if:

- there is excessive wear on links, pins, guides, sprocket sides
- there is an increase in slack
- end connections are suspected of damage or wear
- chains are deformed, bent, rusted or broken
- chains are contaminated with foreign materials

Have the cables replaced if:

- the cable is deformed, kinked, corroded or excessively worn
- there are any broken cut, bent, or crushed wires
- the cable strands become separated
- the cable is contaminated with foreign materials
- the end connections are damaged or worn
- there is a sudden increase in slack



Air/Oil Systems

Pressurized air can be dangerous. When working with air/oil (full or semi-hydraulic) lift systems, it is important to remember the following:

- do not "tie down" or override the air or control valves
- always be at the controls when the lift is in motion
- always exhaust pressure valves completely before inspecting or maintaining a lift
- perform maintenance using appropriate lock out procedures. All stored energy must be exhausted before starting. Refer to Workplace Safety and Health Regulation M.R. 217/2006, Part 16.14, for lock out requirements
- comply with the manufacturer's recommendations for checking and adding hydraulic oil to a unit. If the lift vibrates or operates erratically while in motion, it may be an indication of an oil leak
- before removing the fill plug, re-check to ensure the air valve is in the exhaust position and all air from the tank is released. Remove fill plugs slowly and carefully with a manual wrench. **Do not** use impact tools to remove fill plugs. Removing a plug too quickly could cause an explosive release of pressure, particularly if a pressure release system has failed

If the lift is equipped with a low oil control, be sure it is operating effectively. If it is not, or there is reason to believe it is not functioning effectively, stop using the lift until it is serviced.

Use caution when removing other plugs, fittings, and connections. Follow the lift manufacturer's instructions for bleeding pressure valves and fittings and for checking hydraulic oil. If air is escaping or liquid is seeping around the plug, **stop** and immediately release the stored pressure in the system.

Remember to:

- keep filters and magnets clean
- check seals, packing and wipers periodically
- make sure the return lines to the reservoir are tightly connected and not leaking or damaged
- watch for blow-by and oil leaks in the cylinder housing, and check for damage in the piston rod or plunger
- have qualified lift service personnel install and repair air and oil lines

Soil Conditions

Certain conditions need to be monitored if the facility uses in-ground lifts. Because water and various soils have the potential to corrode metal, the integrity of the pistons and other components require inspection on a regular basis. If any defects are found, the lift must not be operated until repaired.

Corrosion may also affect underground hydraulic oil tanks and oil lines. It is important to check the lift's oil level regularly to help prevent contamination of local soils and ground water supplies. If oil needs to be added to the lift, a leak may exist.

SURFACE-MOUNTED SYSTEMS

Most surface-mounted lifts use electrically powered hydraulic cylinder(s) or screw type drives. The main concerns when operating these systems include:

- not overloading the motor's rated load capacity. The manufacturer's rated load capacity is displayed on the nameplate attached to the lift. If the nameplate is missing, check the manufacturer's service manual. **Do not operate the lift without this vital information**
- maintaining gearboxes, v-belt or timing belt drives, if any
- checking, cleaning, maintaining, and lubricating drive screws and nuts systems on screw-type lifts
- making sure the safety (follower) nut is working appropriately on screw-type lifts. Check the manufacturer's maintenance and operations manuals for appropriate use
- maintaining hydraulic oil level in the unit. It should be checked periodically to comply with the manufacturer's specific maintenance schedules
- having a qualified lift service company replace components

Special Load-Bearing Components

Follow the manufacturer's instructions for checking and lubricating load bearings, rollers and slide blocks. Refer also to the manufacturer's recommendations for checking and tightening floor bolts and superstructure connectors.

Floor Quality

Most surface-mounted lifts require special concrete foundations. Check the lift area daily for cracks or loose concrete around the mounting bolts. If flaws are found, do not use the lift. Notify the supervisor immediately. Do not allow anyone to use the lift until the condition is repaired.

Mounting bolts must also be checked for tightness. If the bolts are loose, tighten them (with the lift in its fully lowered position) to the manufacturer's specifications.



PERSONAL PROTECTIVE EQUIPMENT

In many cases, employers are required to equip workers with appropriate personal protective equipment. In some cases, workers must provide their own protective equipment.

In the automotive repair industry, safety eyewear and face protection must be worn to protect the eyes from rust, sparks, engine coolant and other substances that may fall from the bottom of a vehicle or become airborne as work proceeds.

Canadian Standards Association (CSA) approved safety footwear with slip-resistant soles must be worn to protect the feet from falling objects or slip and trip hazards caused by lubricants or other liquids that may spill or leak from equipment under repair.

Automotive service technicians should also use headwear to protect them from falling objects and protruding objects like sharp body seams and bolt ends. Appropriate gloves should be worn to protect the hands against heat and flying torch sparks, sharp edges and rusted or broken parts. Hearing protection is needed if a job involves using air-powered tools like chisels and impact wrenches.

Manitoba Workplace Safety and Health Regulation 217/2006 contains specific requirements and Guides concerning equipment such as eye and face protection, headwear, footwear, hearing protection and other protective clothing.

This information is available in alternate formats upon request.

Ces renseignements sont offerts dans de multiples formats sur demande.

