



A Guide to Industrial Scissor Lifts and Tilters



LMPS is a Product Section of the Material Handling Industry of America

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I. INTRODUCTION

Lift Manufacturers Product Section

In 1990, a group of visionary industry leaders, each a major manufacturer of industrial scissor lifts, came together to form the **Lift Manufacturers Product Section (LMPS)** of The Material Handling Industry of America (MHIA).

The LMPS was chartered to address the challenges and opportunities facing this industry and to benefit the growing community of end users who utilize industrial scissor lifts to raise, lower, and position material.

An objective of the LMPS, along with creating recognition of the industry within the market place, is to develop and promote codes and standards in accordance with MHIA guidelines for the manufacture of industrial scissor lifts with the best interest of the user in mind.

The goals of LMPS are achieved through a variety of structured programs and activities. Publications like "A Guide to Industrial Scissor Lifts" is just one example of the educational materials designed to assist end users and specifiers of industrial scissor lifts.

In addition to educational materials, LMPS is also actively involved in developing minimum industry standards and is Secretariat of ANSI Standard MH29.1 (Safety Requirements for Industrial Scissor Lifts) and ANSI Standard MH 29.2 (Safety Requirements for Industrial Tilters).

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II. STANDARDS

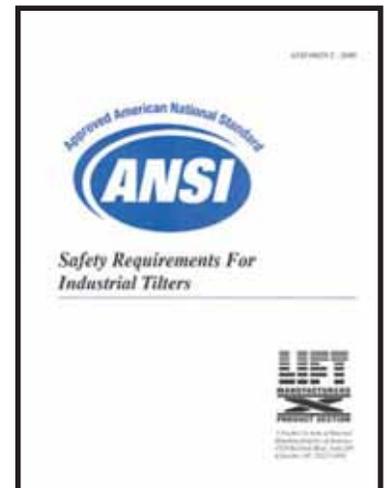
ANSI MH29.1 - Safety Requirements for Industrial Scissor Lifts ANSI MH 29.2 - Safety Requirements for Industrial Tilters

Industrial scissor lifts and tilters have been in use for many years. While their safety record has been excellent, there were no definitive standards regarding their design, manufacture and performance.

Lack of specific standards for industrial scissor lifts and tilters caused confusion with manufacturers, users and various governing bodies. Due to the lack of specific standards, existing standards for non-related equipment were applied to industrial scissor lifts and tilters.

The requirements of MH29.1 & MH 29.2 were developed to ensure minimum standards for the safety and protection of users/operators and to eliminate confusion for governing bodies.

A copy of MH29.1 and MH 29.2 can be ordered by contacting the MHIA Literature Department at 1-800-345-1815, faxing your request to 704-676-1199 or via email at info@mhia.org. Copies are available for \$15.00 each.



III. Ergonomic Principles for Manual Handling Tasks

I. MINIMIZE SIGNIFICANT BODY MOTIONS

1. Reduce Bending Motions

A. Eliminate the need to bend by:

- Using lift tables, work dispensers and similar mechanical aids.
- Raising the work level to an appropriate height.
- Raising or Lowering the worker.
- Providing all material at work level.
- Keeping materials at work level (e.g., don't lower anything to the floor that must be lifted later).



2. Reduce Twisting Motions

A. Eliminate the need to twist by:

- Providing all materials and tools in front of the worker.
- Using conveyors, chutes, slides, lifts or turntables to change direction of material flow.
- Providing adjustable swivel chairs for seated workers.
- Providing sufficient workspace for the whole body to turn.
- Improving the layout of the work area.



3. Reduce Reaching Out Motions

A. Eliminate the need to reach by:

- Providing tools and machine controls close to the worker, to eliminate horizontal reaches over 16 inches.
- Placing materials, workplaces and other heavy objects as close to the worker as possible.
- Reducing the size of cartons or pallets being loaded, or allowing the worker to walk around them; rotate, raise or lower them.
- Reducing the size of the object being handled.
- Allowing the object to be kept close to the body (i.e. Scissor Lifts).

II. REDUCE OBJECT WEIGHTS/FORCES

1. Reduce Lifting and Lowering Forces

A. Eliminate the need to lift or lower manually by:

- Using lift tables, lift trucks, cranes, hoists, balancers, industrial manipulators, drum and barrel dumpers, elevating conveyors, and similar mechanical aids.
- Raising the work level. Lowering the operator. Using gravity dumps and chutes.

B. Reduce the weight of the object by:

- Reducing the size of the object (specify size to suppliers).
- Reducing the capacity of the containers. Reducing the weight of the container itself.
- Reducing the load in the containers (administrative control).
- Reducing the number of objects lifted or lowered at one time (administrative controls).



C. Increase the weight of the object so that it must be handled mechanically:

- Use the unit load concept (such as bins or containers, preferably with fold down sides rather than smaller totes and boxes).
- Use palletized loads.



D. Reduce the hand distance by:

- Changing the shape of the object.
- Providing the grips or handles
- Providing better access to object (i.e. scissor lifts, turntables or tilters).
- Improving layout of work area.

2. Reduce Pushing and Pulling Forces

A. Eliminate the need to push or pull by:

- Using powered conveyors.
- Using powered trucks.
- Using powered scissor lifts or turntables.

B. Reduce the required force by:

- Reducing the weight of the load.
- Using non-powered conveyors, air bearings, ball caster tables, monorails, and similar aids.
- Providing good maintenance of floor surfaces, hand trucks, etc.
- Treating surfaces to reduce friction.
- Using powered scissor lifts.



C. Reduce the distance of push or pull by:

- Improving layout of work area.
- Relocating production or storage area.

3. Reduce carrying forces

A. Eliminate the need to carry by converting to pushing or pulling.

- Use conveyors, air bearings, ball caster tables, monorails, slides, chutes and similar aids.
- Use lift trucks, two wheel hand trucks, four wheel hand trucks, dollies and similar aids.

B. Reduce the weight of the object by:

- Reducing the size of the object (specify size to suppliers).
- Reducing the capacity of containers.
- Reducing the weight of the container itself.
- Reducing the load in the container (administrative control).
- Reducing the number of objects lifted or lowered at one time (administrative control).



C. Reduce the distance by:

- Improving the layout of the work area.
- Relocating production or storage areas.

Ergonomics Toolbox™ multimedia tool for identifying, analyzing and implementing ergonomic solutions for material handling problems available from MHIA 1-800-345-1815

IV. Categories

Industrial scissor lifts and tilters are used for a wide variety of applications in many industries which include manufacturing, warehousing, schools, grocery distribution, printing, hospitals, and military. Additional types of lifts can also incorporate a variety of ergonomic applications to position materials, with the use of a scissor or pantograph leg section. Types of industrial lifts are defined below.

Lift Table



Lift Table

A lift table is defined as a scissor lift device used to raise, lower, stack, convey and/or transfer material between two or more elevations. Lift tables can incorporate rotating platforms (manual or powered), tilt platforms, conveyors, etc., as part of their design.

Auto Leveler



Auto Leveler

The auto leveler is a device designed to assist operators when they are manually loading or unloading a palletized load. As the load weight increases or decreases, the auto leveler gradually lowers or raises to position the top of the load at a comfortable working height. A rotating top can be incorporated to minimize reaching movements. This reduces operator strain caused by bending and stretching.

Dock Lift



Dock Lift

A dock lift, sometimes referred to as an elevating dock, is defined in ANSI MH29.1 as a lift whose travel is generally 5 feet or less and which is used at the loading dock to load/unload material to the ground or a dock.

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IV. Categories (Continued)

Different material handling situations require different ergonomic solutions. Necessity has encouraged the industry to develop more unique devices to meet specialized needs. The industrial tilter, turntable and personnel lift are primary examples.

Industrial Tilter

An industrial tilter is defined as a device that positions the containers/material at an angle not greater than 110° .



Industrial Tilter

Turntable

A turntable is defined as a device (manual or powered) that rotates a container/material on a horizontal plane up to 360° . Tilt platforms can also be incorporated as part of the rotating top.



Turntable

Personnel Lift

A personnel lift changes the elevation of the operator to the correct ergonomic working height.



Personnel Lift

V. Lift Types

Industrial scissor lifts and tilters are available in a variety of standard platform sizes, capacities, travels and configurations. In addition, custom designs are available to meet specific applications. Many different options are available to suit particular requirements for mobility, power and platform. Common configurations are shown below.

Single Leg Set



Multiple Height



Multiple Width



Multiple Length



Single Leg Set

The *single leg set* is the most commonly used lift type. It offers stability and can handle heavy, evenly distributed loads.

Multiple Height

A *multiple height* lift is made up of two or more leg sets. These types of lifts are used to achieve a high travel with a relatively short platform.

Multiple Width

A *multiple width* lift is made up of two or more single leg sets, side by side, with a common top and base frame. It is used for loads with large plan view dimensions.

Multiple Length

A *multiple length* is made up of two or more single leg sets, end to end, with a common platform and base frame. It is used when very long loads must be handled, such as long lengths of pipe or lumber.

VI. Actuation

Actuation can be defined as the type of power utilized to control the movement of the table. There are three types of actuation available for industrial tables; hydraulic, pneumatic and mechanical.

Hydraulic

Hydraulic actuation uses one or more hydraulic ram or cylinder to power the lift up or down. The power source can be either electric or pneumatic.



Hydraulic

Pneumatic

Pneumatic actuation uses air bags or air cylinders as their power source. Pneumatic tables fit a variety of industrial applications and are simply connected to general plant compressed air supply.



Pneumatic

Mechanical

Mechanical actuation uses screw, spiral, gear, chain or lever systems to raise or lower the lift. These non-hydraulic lifts are suited for precise control applications where positioning at specific elevations is required or where the lift must maintain a specific elevation for an extended period of time.

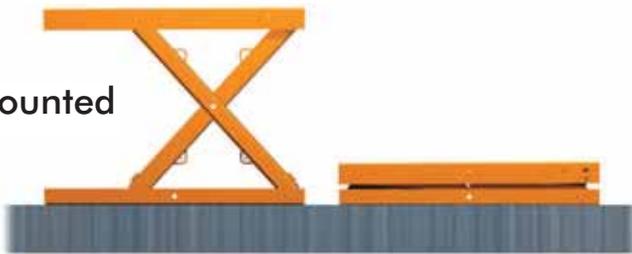


Mechanical

VII. Mounting

Industrial scissor lifts and tilters can be mounted in any number of ways to meet specific application requirements. The most common arrangements for installation are listed below.

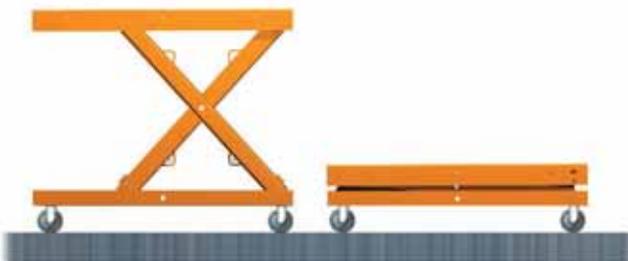
Surface Mounted



Pit Mounted



Mobile



Surface Mounted

Lifts are surface mounted when the lowered height does not interfere with the application. For example: If the lift is lowered as material is stacked on a pallet and the pallet is then removed by a fork truck, the lowered height of the lift does not interfere with the application because the fork truck does not need to drive onto the lift to pick up the loaded pallet.

Pit Mounted

Lifts are pit mounted when the platform must be flush with the surrounding surface. For example: If the lift is lowered as materials are stacked on a pallet and the pallet is then removed by a pallet jack, the platform must be flush with the surrounding surface because the pallet jack must be able to roll onto the lift platform to remove the loaded pallet.

Mobile

A lift is mobile or portable when it must serve more than one workstation. A mobile lift can be manual or power driven. Mobile lifts can also be used to transport a load from one location to another. The lift can be track mounted or have fixed or moveable caster wheels for maneuverability.

VIII. Guarding Alternatives



Toe Guards

Toe guards can be provided for most tables, to warn the operator of potential danger zones. Toe guards can be mounted to the floor or directly to the platform or base. Platform edges can also be beveled to protect personnel from injury.

Toe Sensor Bars

A toe sensor bar is mounted below the platform edge so that when an obstruction is met during descent, the industrial scissor lift will stop before entrapment can occur.

Loss Of Power

In the event that the actuation power source is disrupted, industrial scissor lifts incorporate several means in their designs to prevent rapid descent.

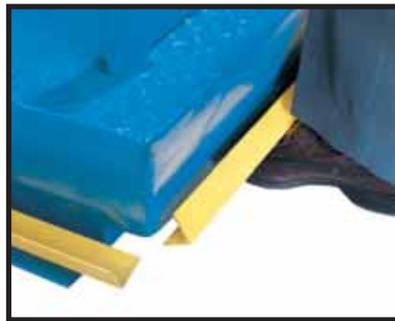
In the material handling industry, operator safety is a concern of the ergonomic equipment manufacturer. Below are some of the guarding devices offered by lift equipment manufacturers.



Pit Mounted
Toe Guard



Beveled Platform
Edge



Toe Sensor Bar

Environmental Protection
Bellows skirting provides environmental protection, aids in housekeeping and assists in preventing injuries.



Bellows
Skirting

IX. Technical Application Specifications

1. **SEQUENCE OF OPERATION** - How, where, when and why will the lift be used and what is the lift expected to do?

2. **LIFTING CAPACITY** - What is the weight of the load (in lb./kg.) plus any conveyors, pallets, carts, operators, etc.?

3. **EDGE LOADING CAPACITY (ENDS & SIDES)** - How will the load get on and off the lift? Will it roll over the sides or ends, be placed on by a fork truck, etc.? Is the load concentric and evenly distributed? Is the load static or dynamic?
End Load Capacity=_____lb./kg. Side Load Capacity=_____lb./kg.
4. **PLATFORM SIZE** - What platform size, if required, is needed to adequately support the load, any material handling equipment and a riding operator?
Width= _____in./cm. Length= _____in./cm.
5. **LOWERED HEIGHT** - What is the maximum lowered height acceptable for the application? Can the lift be pit mounted? Is mobility required?

6. **TRAVEL** - If the lift is pit mounted, the travel required is equal to the highest elevation the platform must reach. If the lift is surface mounted, the travel required is equal to the highest elevation the platform must reach minus the lowered height of the lift.

7. **RAISED HEIGHT** - The distance between the surface the lift is sitting on and the platform height when the lift is fully raised.

8. **POWER UNIT** - What electrical power is available to operate or lift? If pneumatic, psi and cfm available?
_____Volts _____Hertz _____phase _____psi _____cfm _____other
9. **SPEED AND FREQUENCY** - How fast does the lift have to travel to satisfy the application? Is up and down speed required the same?
_____fpm _____cycles per day _____motor starts per minute
10. **CONTROLS** - What operating controls are required (push-button, foot switch, etc.)?

11. **ACCESSORIES** - What optional accessories are required?

Additional Information for Tilter Applications

1. **TILT ANGLE** - What is the angle that the tilter will have to open to?

2. **MOUNTING** - Will the tilter be mounted to another machine (sub-base frame, scissors lift, casters, etc.)?

3. **SPECIAL CONDITIONS** - Are there any special conditions (quick tilt / return times, special environmental situations, etc.)?

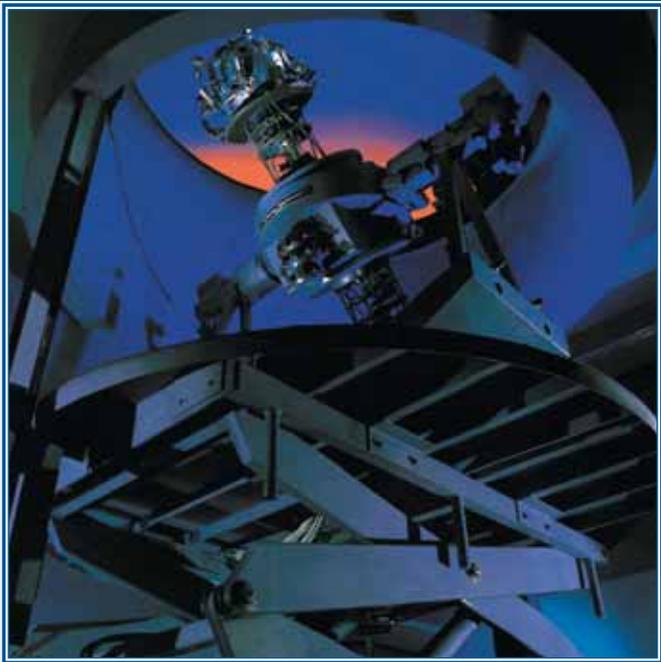
X. Applications



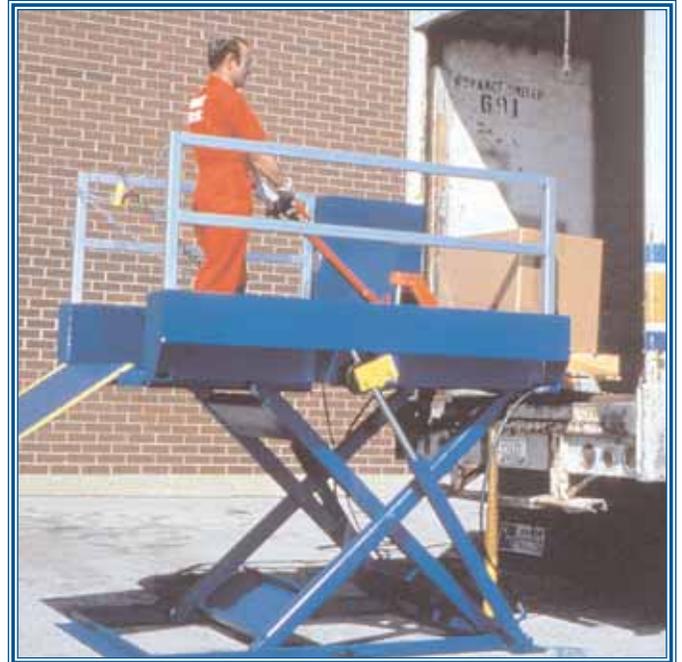
Lift & Rotate



Tilt



Lift



Dock Lift

X. Applications(Continued)



Lift & Tilt



Lift



Mobile Industrial Tilter



Mobile Lift Table

X. Applications (Continued)



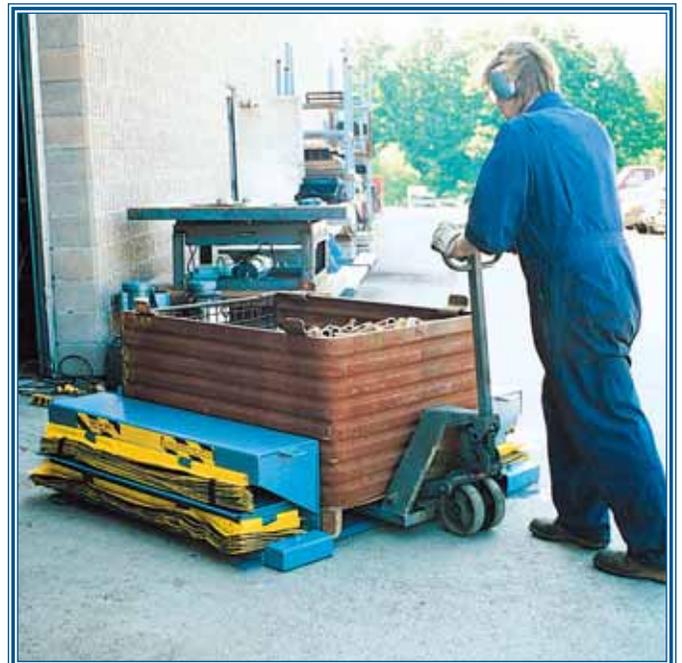
Personnel Lift



Self Propelled Personnel/Maintenance Lift



Mobile Lift Table

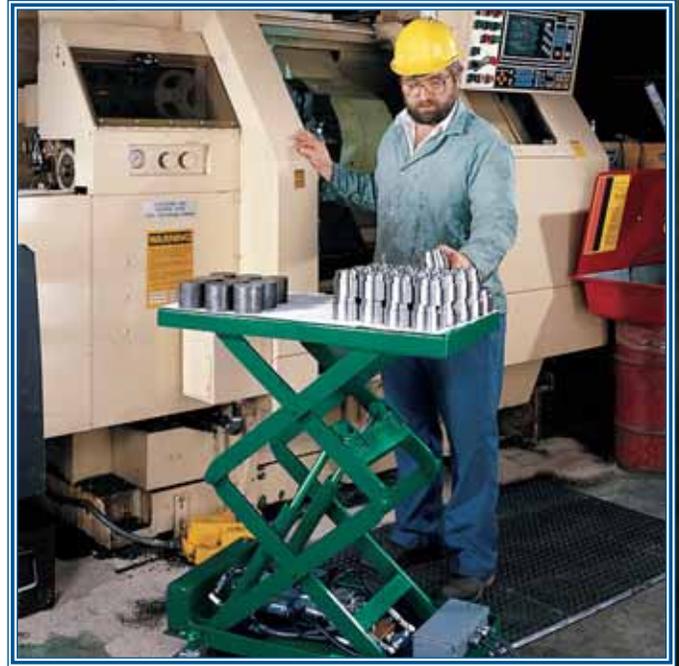


Zero Height Loader

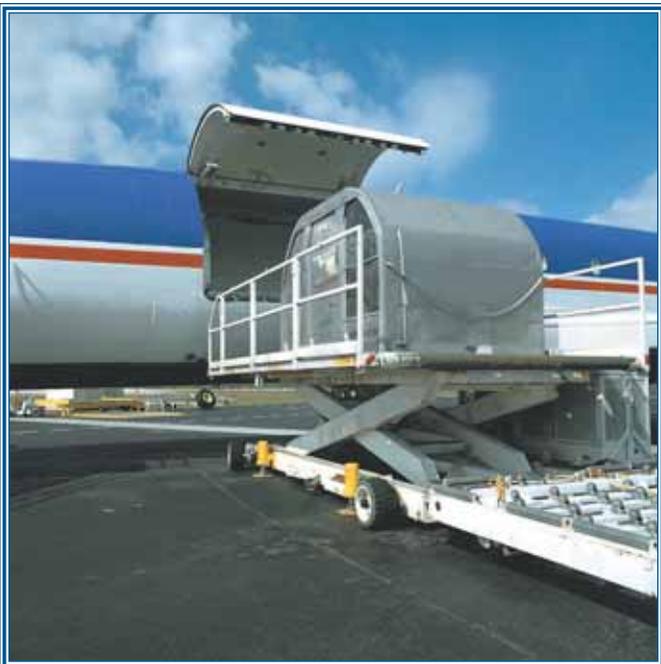
X. Applications (Continued)



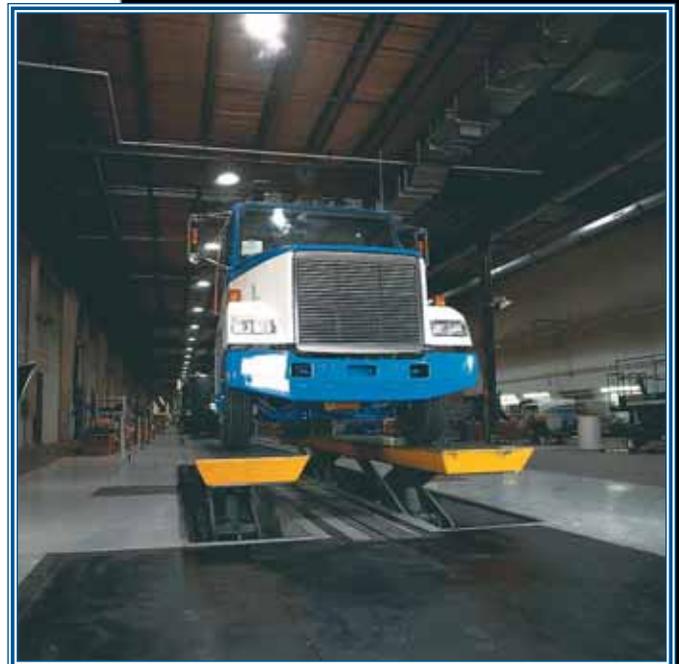
Lift & Tilt



Multiple Height Portable Lift



Mobile Dock Lift



Pit Mounted Lift

The Lift Manufacturers Product Section

8720 Red Oak Blvd.,
Suite 201, Charlotte, NC 28217-3992
Phone 1-800-345-1815
Fax 704-676-1199
Web Site www.mhia.org

