

## **4123:1-5-19 Manlifts of the endless belt type.**

(A) Reserved.

(B) Reserved.

(C) General requirements.

(1) Floor openings.

(a) Allowable size.

Floor openings for both the up and down runs shall be no less than twenty-eight inches nor more than thirty-six inches in width for a twelve-inch belt; no less than thirty-four inches nor more than thirty-eight inches for a fourteen-inch belt; and no less than thirty-six inches nor more than forty inches for a sixteen-inch belt and shall extend no less than twenty-four inches, nor more than twenty-eight inches from the face of the belt.

(b) Uniformity.

All floor openings for a given manlift shall be uniform in size and shall be approximately circular, and each shall be located vertically above the opening below it.

(2) Landings.

(a) Vertical clearance.

The clearance between the floor or mounting platform and the lower edge for the conical guard above it required by paragraph (C)(3) of this rule shall be no less than seven feet six inches. Where this clearance cannot be obtained no access to the manlift shall be provided and the manlift runway shall be enclosed where it passes through such floor.

(b) Clear landing space.

The landing space adjacent to the floor openings shall be free from obstructions and kept clear at all times. This landing space shall be no less than two feet in width from the edge of the floor opening used for mounting and dismounting.

(c) Lighting of landings.

Adequate lighting, no less than five foot candles, shall be provided at each floor landing at all times when the lift is in operation.

(d) Landing surface.

The landing surfaces at the entrances and exits to the manlift shall be constructed and maintained as to provide safe footing at all times.

(e) Emergency landings.

Where there is a travel of fifty feet or more between floor landings, one or more emergency landings shall be provided so that there will be a landing (either floor or emergency) for every twenty-five feet or less of manlift travel.

(i) Emergency landings shall be accessible from both the up and down runs of the manlift and shall give access to the ladder required in paragraph (C)(8) of this rule.

(ii) Emergency landings shall be completely enclosed with a standard railing and toeboard.

(iii) Platforms constructed to give access to bucket elevators or other equipment for the purpose of inspection, lubrication and repair may also serve as emergency landings under this rule. All such platforms will then be considered part of the emergency landing and shall be provided with standard guard railings and toeboards.

(3) Guards on underside of floor openings.

(a) Fixed type.

The ascending side of the manlift floor openings shall be provided with a bevel guard or cone meeting the following requirements:

(i) Slope.

The cone shall make an angle of no less than forty-five degrees with the horizontal. An angle of sixty degrees or greater shall be used where ceiling heights permit.

(ii) Extent.

The lower edge of this guard shall extend no less than forty-two inches outward from any handhold on the belt. It shall not extend beyond the upper surface of the floor above.

(iii) Material and construction.

The cone shall be made of no less than "No. 18 U.S. Gauge" sheet steel or material of equivalent strength or stiffness. The lower edge shall be rolled to a minimum diameter of one-half inch and the interior shall be smooth with no rivets, bolts or screws protruding.

(b) Floating type.

In lieu of the fixed guards specified in paragraph (C)(3)(a) of this rule, a floating type safety cone may be used, such floating cones to be mounted on hinges no less than six inches below the underside of the floor and so constructed as to actuate a limit switch should a force of two pounds be applied on the edge of the cone closest to the hinge. The depth of this floating cone shall not exceed twelve inches.

(4) Protection of entrances and exits.

(a) Guardrail requirement.

The entrance and exits at all floor landings affording access to the manlift shall be guarded by a maze (staggered railing) or a handrail equipped with self-closing gates.

(b) Construction.

The rails shall be standard guardrails with toeboards meeting the provisions of rule 4123:1-5-02 of the Administrative Code.

(c) Gates.

Gates, if used, shall open outward and shall be self-closing. Corners of gates shall be rounded.

(d) Maze.

Maze or staggered openings shall offer no direct passage between enclosure and outer floor space.

(e) Except where building layout prevents, entrances at all landings shall be in the same relative position.

(5) Guards for openings.

(a) Construction.

The floor opening at each landing shall be guarded on sides not used for entrance or exit by a wall, a railing and toeboard or by panels of wire mesh of suitable strength.

(b) Height and location.

Such rails or guards shall be no less than forty-two inches in height on the up-running side and sixty-six inches in height on the down-running side. Rails or guards shall be located no more than one foot from the edge of the floor opening.

(6) Bottom arrangement.

(a) Bottom landing.

At the bottom landing the clear area shall be no smaller than the area enclosed by the guardrails on the floors above, and any wall in front of the down-running side of the belt shall be no less than forty-eight inches from the face of the belt. This space shall not be encroached upon by stairs or ladders.

(b) Location of lower pulley.

The lower (boot) pulley shall be installed so that it is supported by the lowest landing served. The sides of the pulley support shall be guarded to prevent contact with the pulley or the steps.

(c) Mounting platform.

A mounting platform shall be provided in front or to one side of the up-run at the lowest landing, unless the floor level is such that the following requirement can be met: the floor or platform shall be at or above the point at which the upper surface of the ascending step completes its turn and assumes a horizontal position.

(d) Guardrails.

To guard against employees walking under a descending step, the area on the down side of the manlift shall be guarded in accordance with paragraph (C)(4) of this rule. To guard against an employee getting between the mounting platform and an ascending step, the area between the belt and the platform shall be protected by a guardrail.

(7) Top arrangements.

(a) Clearance from floor.

A top clearance shall be provided of no less than eleven feet above the top terminal landing. This clearance shall be maintained from a plane through each face of the belt to a vertical cylindrical plane having a diameter two feet greater than the diameter of the floor opening, extending upward from the top floor to the ceiling on the up-running side of the belt. No encroachment of structural or machine supporting members within this space will be permitted.

(b) Pulley clearance.

(i) There shall be a clearance of no less than five feet between the center of the head pulley shaft and any ceiling obstruction.

(ii) The center of the head pulley shaft shall be no less than six feet above the top terminal landing.

(c) Emergency grab rail.

An emergency grab bar or rail and platform shall be provided at the head pulley when the distance to the head pulley is over six feet above the top landing, otherwise only a grab bar or rail is to be provided to permit the rider to swing free should the emergency stops become inoperative.

(8) Emergency exit ladder.

A fixed metal ladder accessible from both the up and down run of the manlift shall be provided for the entire travel of the manlift. Such ladder shall be in accordance with paragraph (C)(6) of rule 4123:1-5-03 of the Administrative Code, except that a safety cage shall not be provided, notwithstanding the provisions of paragraph (C)(6) of rule 4123:1-5-03 of the Administrative Code.

(9) Superstructure bracing.

Manlift rails shall be secured in such a manner as to avoid spreading, vibration and misalignment.

(10) Illumination.

(a) General.

Both runs of the manlift shall be illuminated at all times when the lift is in operation. An intensity of no less than one foot candle shall be maintained at all points. (See paragraph (C)(2)(c) of this rule for illumination requirements at landings).

(b) Control of illumination.

Lighting of manlift runways shall be by means of circuits permanently tied in to the building circuits (no switches), or shall be controlled by switches at each landing. Where separate switches are provided at each landing, any switch shall turn on all lights necessary to illuminate the entire runway.

(11) Weather protection.

The entire manlift and its driving mechanism shall be protected from the weather at all times.

(D) Mechanical requirements.

(1) Machines.

(a) Brakes.

Brakes provided for stopping and holding a manlift shall be inherently self-engaging, by requiring power or force from an external source to cause disengagement. The brake shall be electrically released, and shall be applied to the motor shaft for direct-connected units or to the input shaft for belt-driven units. The brake shall be capable of stopping and holding the manlift when the descending-side is loaded with two hundred fifty pounds on each step.

(b) Belt.

(i) Material.

The belt shall be of hard-woven canvas, rubber-coated canvas, leather, or other material meeting the strength requirements of paragraph (D)(1)(b)(iii) of this rule and having a coefficient of friction such that when used in conjunction with an adequate tension device it will meet the brake test specified in paragraph (D)(1)(a) of this rule.

(ii) Width.

The width of the belt shall be no less than twelve inches for a travel not exceeding one hundred feet, no less than fourteen inches for a travel greater than one hundred feet but not exceeding one hundred fifty feet and sixteen inches for a travel exceeding one hundred fifty feet.

(iii) Strength.

The strength of the belt shall be no less than one thousand five hundred pounds per inch of belt width for belts having a distance between pulley centers not in excess of one hundred feet, and one thousand eight hundred pounds per inch of belt width for belts having a distance between pulley centers of over one hundred feet but not in excess of two hundred feet; for over two hundred feet, two thousand four hundred fifty pounds per inch of belt width.

(iv) Belt fastenings.

Belts shall be fastened by a lapped splice or shall be butt-spliced with a strap on the side of the belt away from the pulley.

(a) For lapped splices, the overlap of the belt at the splice shall be no less than three feet where the travel of the manlift does not exceed one hundred feet and no less than four feet, if the travel exceeds one hundred feet. Where butt splices are used the straps shall extend no less than three feet on one side of the butt for a travel not in excess of one hundred feet and four feet for a travel in excess of one hundred feet.

(b) For twelve-inch belts, the joint shall be fastened with no less than twenty special elevator bolts, each of a minimum diameter of one-fourth inch. These bolts shall be arranged as to cover the area of the joint effectively.

(c) The minimum number of bolts for a belt width of fourteen inches shall be no less than twenty-three and for a belt width of sixteen inches, the number of bolts shall be no less than twenty-seven.

(v) Repairs prohibited.

A belt that has become torn while in use on a manlift shall not be spliced and put back in service.

(vi) Flush bolt heads.

All bolts used for splicing the belt or securing handholds or steps to the belt shall be installed and maintained so that the heads do not project beyond the inner surface of the belt.

(c) Pulleys.

Drive pulleys and idler (boot) pulleys shall have a diameter no less than given in the following table to this rule.

Table 19-1

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BELT CONSTRUCTION	MINIMUM STRENGTH POUNDS PER INCH OF WIDTH	MINIMUM PULLEY DIAMETER INCHES
5 ply	1500	20
6 ply	1800	20
7 ply	2100	22

(The above values are based on thirty-two-ounce duck; three hundred pounds per linear inch per ply.)

(d) Pulley protection.

The machine shall be designed and constructed as to catch and hold the driving pulley in event of shaft failure.

(e) Belt location.

Manlift belts shall be centered in the floor openings.

(f) Pulley lagging.

All head pulleys shall be lagged (i.e., covered with non-slip material securely fastened in place).

(2) Speed.

No manlift designed for a speed in excess of eighty feet per minute shall be installed.

(3) Steps.

(a) Minimum depth.

Steps shall be no less than twelve inches nor more than fourteen inches deep, measured from the belt to the edge of the step.

(b) Width.

The width of the step shall be no less than the width of the belt to which it is attached.

(c) Distance between steps.

The distance between steps shall be equally spaced and not less than sixteen feet measured from the upper surface of one step to the upper surface of the next step above it.

(d) Angle of step.

The surface of the step shall make approximately a right angle with the up and down run of the belt, and shall travel in the approximate horizontal position with the up and down run of the belt.

(e) Surfaces.

The upper or working surfaces of the step shall be of a material having inherent nonslip characteristics (coefficient of friction no less than 0.5) or shall be covered completely by a nonslip tread securely fastened to it.

(f) Strength of step supports.

When subjected to a load of four hundred pounds applied at the approximate center of the step, step frames or supports and their guides shall be of adequate strength to:

(i) Prevent the disengagement of any step roller.

(ii) Prevent any appreciable misalignment.

(iii) Prevent any visible deformation of the step or its support.

(g) Prohibition of steps without handholds.

No step shall be provided unless there is a corresponding handhold above or below it meeting the requirements of paragraph (D)(4) of this rule. If a step is removed for repairs or permanently, the handholds immediately above and below it shall be removed before the lift is again placed in service.

(4) Handholds.

(a) Location.

Handholds attached to the belt shall be provided and so installed that they are no less than four feet nor more than four feet eight inches above the step tread. These shall be so located as to be available on both up and down run of the belt.

(b) Size.

The grab surface of the handhold shall be no less than four and one-half inches in width, no less than three inches in depth and provide two inches of clearance from the belt. Fastenings for handholds shall be located no less than one inch from the edge of the belt.

(c) Strength.

The handhold shall be capable of withstanding, without damage, a load of three hundred pounds applied parallel to the run of the belt.

(d) Prohibition of handhold without steps.

No handhold shall be provided without a corresponding step. If a handhold is removed permanently or temporarily, the corresponding step and handhold for the opposite direction of travel shall also be removed before the lift is again placed in service.

(e) Type.

All handholds shall be of the closed type.

(5) Up limit stops.

(a) Requirements.

Two separate automatic stop devices shall be provided to cut off the power and apply the brake when a loaded step passes the upper terminal landing. One of these shall consist of a split-rail switch or equivalent mechanically operated by the step roller and located no more than six inches above the top terminal landing. The second automatic stop device may consist of any of the following:

(i) A split-rail switch placed six inches above and on the side opposite the first limit switch.

(ii) An electronic device.

(iii) A switch actuated by a lever, rod or plate, the latter to be placed on the up side of the head pulley so as to just clear a passing step.

(b) Manual reset location.

After the manlift has been stopped by a stop device it shall be necessary to reset the automatic stop manually. The device shall be so located that a person resetting it shall have a clear view of both the up and down runs of

the manlift. It shall not be possible to reset the device from any step or platform.

(c) Cut-off point.

The initial limit stop device shall function so that the manlift will be stopped before the loaded step has reached a point twenty-four inches above the top terminal landing.

(d) Electrical requirements.

(i) Where such switches open the main motor circuit directly they shall be of the multiple type.

(ii) Where electronic devices are used they shall be so designed and installed that failure will result in shutting off the power to the driving motor.

(iii) Where flammable vapors or dusts may be present all electrical installations shall be of a type approved for use in such locations.

(iv) Unless of the oil-immersed type, controller contacts carrying the main motor current shall be copper to carbon or equal, except where the circuit is broken at two or more points simultaneously.

(6) Emergency stop.

(a) Requirements.

An emergency stop means shall be provided.

(b) Location.

This stop means shall be within easy reach of the ascending and descending runs of the belt.

(c) Operation.

This stop means shall be so connected with the control lever or operating mechanism that it will cut off the power and apply the brake when pulled in the direction of travel.

(d) Rope.

If rope is used, it shall be no less than three-eighths inch in diameter. Wire rope, unless marlin-covered, shall not be used.

(7) Factor of safety.

All parts of the machine shall have a factor of safety of six based on a load of two hundred pounds on each horizontal step on the up and down runs.

(8) Instruction and warning signs and devices.

(a) Instruction signs at landings or belt.

Signs of conspicuous and easily read style giving instructions for the use of the manlift shall be posted at each landing or stenciled on the belt.

(i) Size and legibility.

Such signs shall be of letters no less than two inches in height and of a color having high contrast with the surface on which it is stenciled or painted (white or yellow on black or black on white or gray).

(ii) Inscription.

The instructions shall read approximately as follows: "Face of the belt. Use the handholds. To stop - pull rope."

(b) Top floor warning sign and light.

(i) Requirements.

At the top floor an illuminated sign shall be displayed bearing the following wording: "Top floor - get off". The sign shall be in block letters no less than two inches in height. This sign shall be located within easy view of an ascending passenger and no more than two feet above the top terminal landing.

(ii) Additional warning light.

In addition to the sign required by paragraph (D)(8)(b)(i) of this rule, a red warning light of no less than forty-watt rating shall be provided immediately below the upper landing terminal and so located as to shine in the passenger's face.

(c) A visual or audible warning system shall be provided to alert passengers and others in the vicinity when a manlift is started or re-started.

(d) Visitor warning.

A conspicuous sign having the following legend, "Authorized Personnel Only", shall be displayed at each landing. The sign shall be of block letters no less than two inches in height and shall be of a color offering high contrast with the background color".

(E) Recommended minimum instructions in the proper use of manlifts.

- (1) Only authorized personnel, trained in their use, shall be permitted to use manlifts.
- (2) When riding a manlift, the passenger shall stand squarely on the step, face the belt and grip the handhold securely. Jumping on the step, yanking on the handhold or engaging in horseplay of any kind is prohibited.
- (3) No freight, packaged goods, pipe, lumber or construction materials of any kind shall be handled on any manlift.
- (4) No tools, except those which will fit entirely within a pocket in usual working clothes shall be carried on any manlift.
- (5) Before starting or re-starting the manlift, it shall be necessary to alert all passengers on the manlift and all others in its vicinity.

(F) Inspection and maintenance.

(1) Frequency.

All manlifts shall be inspected by a competent designated person at intervals of no more than thirty days. Limit switches shall be checked weekly. Manlifts found to be unsafe shall not be operated until properly repaired.

(2) Items covered.

The inspection shall cover but is not limited to the following items:

- (a) Steps;
- (b) Steps fastenings;
- (c) Rails;
- (d) Rail supports and fastenings;
- (e) Rollers and slides;
- (f) Belt and belt tension;

- (g) Handholds and fastenings;
- (h) Floor landings;
- (i) Guardrails;
- (j) Lubrication;
- (k) Limit switches;
- (l) Warning signs and lights;
- (m) Illumination;
- (n) Drive pulley;
- (o) Bottom (boot) pulley and clearance;
- (p) Pulley supports;
- (q) Motor;
- (r) Driving mechanism;
- (s) Brake;
- (t) Electrical switches;
- (u) Vibration and misalignment;
- (v) Skip on up or down run when mounting step (indicating worn gears).

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