International Standard ISO 3691

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Powered industrial trucks — Safety code

Chariots automoteurs — Code de sécurité

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FOREWORD

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3691 was developed by Technical Committee ISO/TC 110, *Industrial trucks.*

This second edition incorporates Addendum 1-1978 and draft Addendum 2, which were circulated to the member bodies in January 1977 and October 1978 respectively. It cancels and replaces the first edition, i.e. ISO 3691-1977.

The second edition has been approved in its entirety by the member bodies of the following countries :

Austria	Netherlands	Sweden
Belgium	Poland	Switzerland
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France	South Africa, Rep. of	USSR
India	Spain	Yugoslavia

Addendum 1-1978 was approved by the member bodies of the following additional countries :

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Draft Addendum 2 was approved by the member bodies of the following additional countries :

Denmark
Japan
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The member bodies of the following countries expressed disapproval of the first edition of ISO 3691 or of the Addenda 1 and 2, circulated in 1975 :

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Japan
New Zealand
United Kingdom

The member bodies of the following countries expressed disapproval of Addendum 1-1978 :

Australia
United Kingdom

The member bodies of the following countries expressed disapproval of draft Addendum 2 :

Australia
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Powered industrial trucks — Safety code

SECTION ONE : GENERAL

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the safety requirements for the manufacture, application, operation and maintenance of powered industrial trucks.

The term "powered industrial trucks" applies to mobile, power-driven vehicles used to carry, push, pull, lift, stack or tier any type of load, as described in clause 3.

The word "shall" is to be understood as expressing a mandatory requirement and the word "should" as expressing a recommended requirement.

2 REFERENCES

ISO 1074, *Counterbalanced lift trucks — Stability — Basic tests.*

ISO 1084, *Industrial tractors — Definition and nominal rating.*

ISO 1214/1, *Powered industrial trucks — Parameters for designation of rated capacity and capacity — Part 1 : Powered high lift trucks.*[1]

ISO 2330, *Fork lift trucks — Fork arms — Technical characteristics and testing.*

ISO 3184, *Reach and straddle fork lift trucks — Stability tests.*

ISO 3287, *Powered industrial trucks — Control symbols.*[2]

ISO 5053/1, *Powered industrial trucks — Terminology — Part 1 : Classification and nomenclature.*[2]

ISO 5766, *Pallet-stackers and high-lift platform trucks — Stability tests.*[2]

ISO 5767, *Industrial trucks operating in special condition of stacking with mast tilted forward — Stability tests.*[2]

ISO 6055, *High-lift rider trucks — Overhead guards — Specification and testing.*

ISO 6292/1, *Powered industrial trucks — Brake performance — Part 1 : High-lift, low-lift and non-lifting.*[2]

ISO 6500, *Powered industrial trucks — Service brakes — Component strength-performance requirements.*

3 NOMENCLATURE, CLASSIFICATION AND DEFINITIONS

3.1 The classification and nomenclature for powered industrial trucks are given in ISO 5053/1. The definitions will be covered in an International Standard currently under study.

3.2 In addition, for the purposes of this International Standard, the following definitions and classifications apply :

3.2.1 low-lift truck : A self-loading truck equipped with an elevating mechanism designed to raise the load to a height just sufficient to permit horizontal movement.

3.2.2 high-lift truck : Either a self-loading truck equipped with an elevating mechanism designed to permit stacking and tiering or an order-picker truck (whether self-loading or not) equipped with a similar elevating mechanism.

NOTE — Sub-clauses 3.2.1 and 3.2.2 are presented for use pending the publication of the International Standard currently under study for the definitions of powered industrial trucks.

SECTION TWO : FOR THE MANUFACTURER OF POWERED INDUSTRIAL TRUCKS

4 RATED CAPACITY (Capacité nominale)

The manufacturer's rated capacity of a powered industrial platform or lift truck is the maximum load, established by the manufacturer, that a given truck is capable of transporting or lifting in normal operation under conditions as set forth in 4.1 to 4.5, based on the strength of the various components of the truck and, when applicable, also based on the stability requirements and tests as set forth in clause 6 of this International Standard.

1) At present at the stage of draft. (Revision of ISO/R 1214-1971)

2) At present at the stage of draft.

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Alternative capacity ratings may also be established.

The loads shall be expressed in kilograms (kg) and the dimensions in metres (m) or millimetres (mm) in countries using the International System of Units (SI).

The loads shall be expressed in pounds (lb) and the dimensions in inches (in) in countries using the Imperial System.

The rated capacity of a towing tractor corresponds to the maximum draw-bar pull, established by the manufacturer, that the tractor is capable of developing in normal operation under specified conditions.

4.1 Fixed-platform trucks

The rated capacity of a fixed-platform truck is the maximum load, established by the manufacturer, uniformly distributed over the load-carrying platform, which the truck is capable of transporting under normal conditions of operation.

4.2 High-lift trucks

4.2.1 *Counterbalanced fork lift trucks*

The rated capacity of a counterbalanced fork lift truck is as defined in clause 2 of ISO/R 1214.

The designation of the rated capacity shall correspond to the capacities, defined as a function of the maximum lift height *E* of the truck, as stated in clause 3 of ISO/R 1214.

The standard load centre distances shall be as defined in clause 4 of ISO/R 1214.

4.2.2 *Reach and straddle trucks*

The rated capacity of a reach truck or of a straddle fork lift truck is the maximum load, established by the manufacturer, which it is capable of transporting and lifting at a distance *D* measured between the load centre of gravity and the front face of the shank of the fork, with vertical mast and horizontal fork, and for an elevation of 3,3 m (130 in).

The distance *D* shall be 400, 500 or 600 mm for trucks delivered in countries using the International System of Units (SI), and 16, 20 or 24 in in countries using the Imperial System.

NOTE — The above text is valid until a new International Standard defining the rated capacity of these trucks is available.

4.2.3 *Pallet-stacker and high-lift platform trucks*

The rated capacity of a pallet-stacker or high-lift platform truck is the maximum load, established by the manufacturer, which it is capable of transporting and lifting at a distance *D* measured between the load centre of gravity and the front face of the shank of the fork or abutment of the platform and for an elevation of 2,5 m (100 in) for trucks having a width over the fork arms or platform up to and including 690 mm (27 in) and for an elevation of 3,3 m (130 in) for trucks having a width over the fork arms or platform greater than 690 mm (27 in).

The distance *D* shall be 400, 500 or 600 mm for trucks delivered in countries using the International System of Units (SI), and 16, 20 or 24 in in countries using the Imperial System.

NOTE — The above text is valid until a new International Standard defining the rated capacity of these trucks is available.

4.2.4 *Order-picker trucks*

4.2.5 *Side-loading fork lift trucks*

4.3 Low-lift trucks (pallet, stillage and platform)

The rated capacity of a low-lift truck is the uniformly distributed load, established by the manufacturer, which it is capable of transporting.

4.4 Tractors

This term applies to industrial tractors defined in clause 2 of ISO 1084.

The nominal capacity of a tractor is defined in clause 3, "Nominal rating", of ISO 1084.

4.5 Removable attachments

The rated capacity of a removable attachment is the maximum load at a specified load centre distance, established by its manufacturer, that the attachment is capable of handling in normal operation under specified conditions.

5 INFORMATION PLATES

5.1 Powered industrial trucks

Every powered industrial truck shall bear a durable identification plate, permanently attached in a prominent position, which shall indicate the condition of the truck when delivered from the manufacturer and give the following information in indelible characters :

5.1.1 *Engine trucks*

a) name of truck manufacturer (and importer, if required) and also, if desired, the manufacturer's trademark;

b) type;

c) production or serial number;

d) unladen weight in working condition, without removable attachments but complete with fork arms in the case of a fork-lift truck;

e) capacity at maximum elevation.

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5.1.2 *Electric trucks*

a) name of truck manufacturer (and importer, if required) and also, if desired, the manufacturer's trademark;

b) type;

c) production or serial number;

d) unladen weight in working condition, without removable attachments but complete with fork arms in the case of fork lift trucks;

e) capacity at maximum elevation;

f) weight of unladen truck without battery;

g) minimum and maximum allowable battery weight;

h) nominal battery voltage for which the truck system is arranged.

5.1.3 *Trucks with front end attachments*

In addition to the information listed in either 5.1.1 or 5.1.2, the identification plate shall also bear the following information :

a) type of attachment;

b) weight of unladen truck in working condition, without fork arms but fitted with the attachment;

c) capacity of the truck and attachment combinations at maximum elevation.

NOTES

1 It is also permissible to indicate the manufacturer's rated capacity on the plate.

2 The load capacity may be indicated on a separate plate, if desired.

3 When a truck or attachment is imported by a person other than the original manufacturer, it is the responsibility of the importer to affix an additional plate bearing his name as well as the requirements of 5.1.1, 5.1.2 and 5.1.3.

5.2 Removable attachments

Every removable attachment shall carry a separate identification plate giving the following information :

a) name of attachment manufacturer (and importer if required);

b) type;

c) production or serial number;

d) weight of the attachment and distance of its centre of gravity from the attachment mounting face;

e) rated capacity of the attachment.

NOTE — The following warning shall be added :

"WARNING. Actual load may be restricted by reference to the capacity of the truck."

5.3 Batteries for electric trucks

The traction batteries shall carry an identification plate showing :

a) name of battery manufacturer;

b) type;

c) serial number;

d) nominal voltage;

e) capacity in ampere hours at the 5-hour rate;

f) weight, in working order with removable container (and ballast) if used.

Alternatively, the battery weight may be stamped on the removable container (and ballast) near the lifting means.

5.4 Special use

If a truck is to be operated under conditions other than the normal working conditions, it shall bear a durable plate, in a prominent position, giving the following information :

a) designation of the special condition(s) of use;

b) capacity for each one of the special conditions of use.

6 STABILITY — REQUIREMENTS AND TESTS

Powered industrial trucks shall meet the requirements for stability when tested in accordance with the relevant ISO publications referred in 6.1 to 6.7. The tests set forth in these publications are intended to ensure that high-lift industrial trucks have satisfactory stability characteristics when properly operated under normal operating conditions. The tests are to be carried out by the manufacturer on prototype trucks which are fully representative of series production trucks.

6.1 Counterbalanced trucks

See ISO 1074.

6.2 Reach (retractable mast or forks) and straddle fork lift trucks (pedestrian and rider controlled)

See ISO 3184.

6.3 Pallet-stacker and high-lift platform trucks (pedestrian and rider controlled)

See ISO 5766.

6.4 Order-picker trucks

An International Standard is currently under study.

6.5 Side-loading fork lift trucks

An International Standard is currently under study.

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6.6 Rough terrain trucks

An International Standard is currently under study.

6.7 Trucks operating in the special condition of stacking with the mast tilted forward

See ISO 5767.

NOTE — When available, references to the relevant ISO publication concerning additional stability tests will be added.

7 BRAKE PERFORMANCE

The brakes fitted on a powered industrial truck or tractor shall meet the performance requirements set forth in ISO 6292/1 and ISO 6500.

8 DIRECTION OF TRAVEL — CONTROLS

8.1 General

The best controls are those which most closely agree with natural human instinct. Such controls are sometimes called "directional" where control movement is in the same direction as the desired movement of the truck or accessory. Some controls such as "forward" and "reverse" are obvious and easy to make "directional".

Other control movements are less obviously directional and call for a thorough study and/or testing to determine the most natural human reaction. Recommendations for preferred motions and placement of controls are intended to establish uniform practices in this area.

Still other controls involve no element of "naturalness", and the naming then has to be done on an arbitrary basis. The arbitrary method should be used only after a thorough study reveals no natural tendency or ease for a given type of direction of control. Such arbitrarily named controls would be one of the greatest areas for lack of uniformity unless co-ordinated by some standards-making body.

8.2 Front-end and forward directions of travel

8.2.1 *Front end of a truck*

The front end of a truck is the end nearest the arrow in figures 1 to 18.

8.2.2 *Rear end, left-hand, and right-hand side of a truck*

The rear end, left-hand, and right-hand side of a truck are in conformity with the definition given in 8.2.1.

8.2.3 *Forward direction of travel*

The forward direction of travel is the direction indicated by the arrow in figures 1 to 18. All sketches show plan views of trucks.

8.2.3.1 SIT-ON TRUCKS

8.2.3.1.1 *Trucks where the load is leading when the truck travels in the forward direction*

a) Counterbalanced fork lift truck

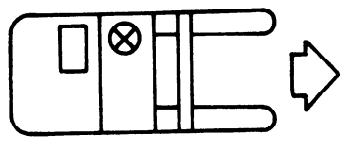

FIGURE 1

b) Straddle or reach (with retractable mast or fork) truck

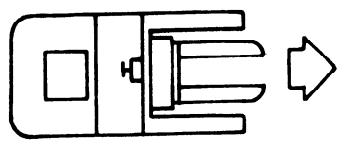

FIGURE 2

c) Shunting tractor

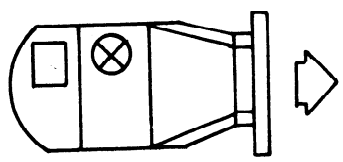

FIGURE 3

8.2.3.1.2 *Trucks where the load is trailing when the truck travels in the forward direction*

a) Straddle or reach (with retractable mast or fork) truck where the operator is seated sideways

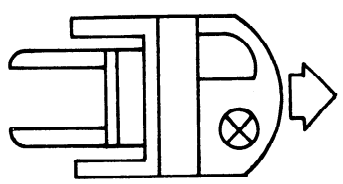

FIGURE 4

b) Towing tractor — Front-end control

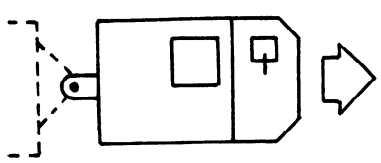

FIGURE 5

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c) Towing tractor — Rear-end control

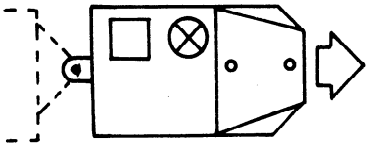

FIGURE 6

d) Fixed-platform truck

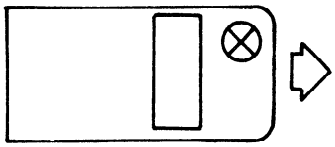

FIGURE 7

8.2.3.2 STAND-ON TRUCKS

8.2.3.2.1 *Centre control*

Trucks where the load is leading when the truck travels in the forward direction

a) Counterbalanced fork lift truck

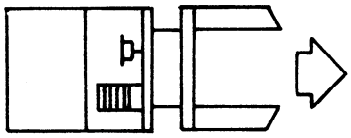

FIGURE 8

8.2.3.2.2 *End control*

8.2.3.2.2.1 *Trucks where the load is leading when the truck travels in the forward direction*

a) Counterbalanced fork lift truck

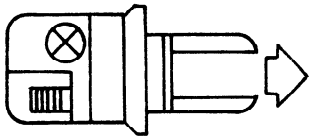

FIGURE 9

b) Straddle or reach (with retractable mast or fork) truck

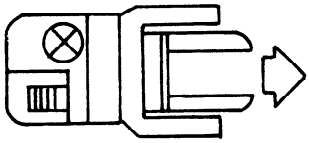

FIGURE 10

8.2.3.2.2.2 *Trucks where the load is trailing when the truck travels in the forward direction*

a) Straddle or reach truck (with retractable mast or fork), with the operator standing sideways

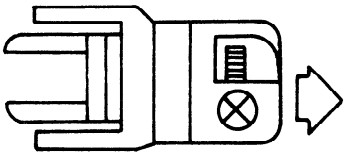

FIGURE 11

b) High-lift or low-lift platform truck

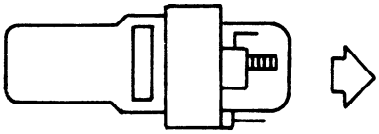

FIGURE 12

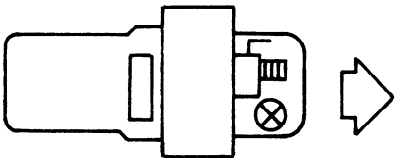

FIGURE 13

c) Fixed-platform truck

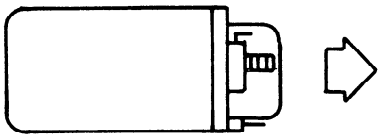

FIGURE 14

d) Order-picker truck

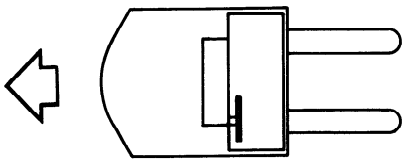

FIGURE 14 a)

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8.2.3.3 PEDESTRIAN-CONTROLLED TRUCKS

Trucks where the load is trailing when the truck travels in the forward direction

a) Pallet truck

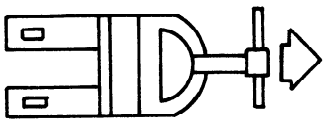

FIGURE 15

b) High-lift or low-lift platform truck

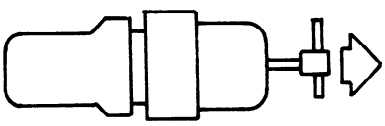

FIGURE 16

c) Counterbalanced fork lift truck

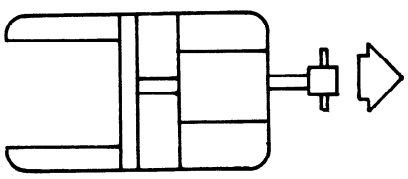

FIGURE 17

d) Tractor

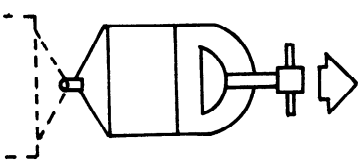

FIGURE 18

8.3 Steering controls

8.3.1 *Steering — Rider trucks*

a) All steering controls shall be confined within the plan view outline of the truck, or guarded to prevent injury to the operator during movement of the controls when passing obstacles, walls, columns, etc.

b) Where steering must be accomplished with one hand, steering knobs are necessary for safe operation. Steering knobs, when used, shall be mounted within the periphery of the steering handwheel and provision shall be made to prevent injury to the operator's hand.

c) When conditions of use would result in steering shocks being generated, the transmission of such shocks to the steering hand wheel shall be limited to the extent necessary to avoid injury to the driver's hand or arm.

d) Where a steering hand wheel and knob are used, either the configuration shall be of a design which will minimize the hazard from a spinning hand wheel due to road reaction feedback, or the steering mechanism shall be of a type which prevents road reactions from causing the steering hand wheel to spin.

e) It is recommended that steering knobs, when used, be of a type which is engaged by the operator's hand from the top, and within the periphery of the steering hand wheel.

8.3.1.1 STEERING WHEELS

8.3.1.1 On all trucks on which the operator faces in the normal line of travel and which are steered by means of a steering wheel (horizontal, inclined or vertical), a clockwise rotation of the steering wheel shall steer the truck to the right in the forward direction of travel.

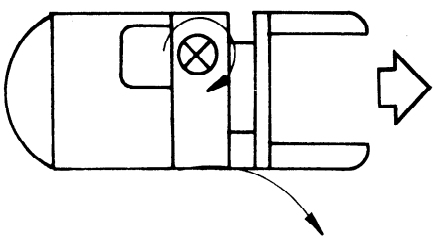

FIGURE 19

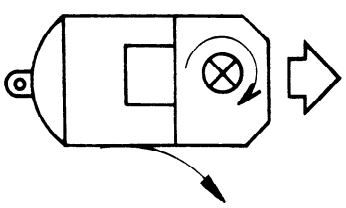

FIGURE 19 a)

NOTE — Considerable numbers of trucks of models 8.2.3.1.2 a) and 8.2.3.2.2 have been built with a steering reverse of the above standard. Such trucks may still be operated, provided that the function and mode of operation of the controls is clearly indicated.

8.3.1.1.2 On all trucks on which the operator faces at a right angle to the normal line of travel and which are steered by means of a steering wheel (horizontal, inclined or vertical), a clockwise rotation of the steering wheel shall steer the truck clockwise when the truck is travelling with the load trailing. (See the note in 8.3.1.1.1, which also applies in this case.)

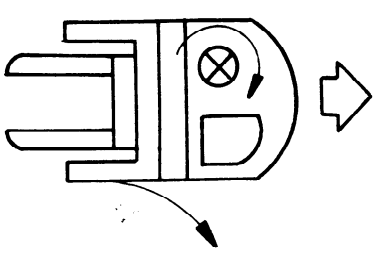

FIGURE 20

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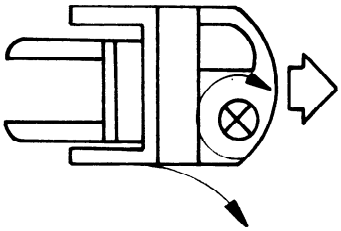

FIGURE 20 a)

8.3.1.2 TILLERS

8.3.1.2.1 *Tillers operating in a horizontal plane*

On trucks steered by a tiller which moves in the horizontal plane and which in the neutral position is parallel to the longitudinal axis of the truck, or on trucks steered by a tiller which rotates on a shaft parallel to the longitudinal axis of the truck and which in the neutral position stands upright, when the driver is facing in the direction of travel, movement of the tiller to his right shall steer the truck to his right.

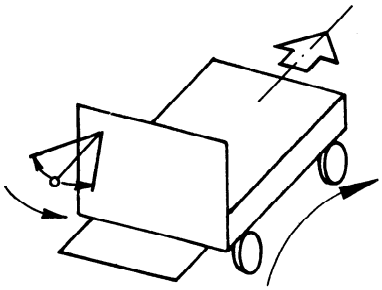

FIGURE 21

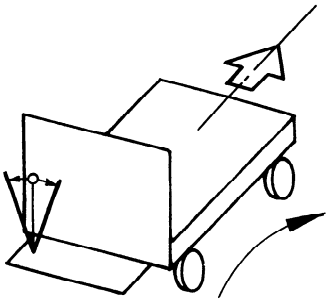

FIGURE 21 a)

8.3.1.2.2 *Tillers operating in a vertical plane*

On stand-on lift platform trucks (8.2.3.2.2.2 b)) and fixed-platform trucks (8.2.3.2.2.2 c)) which are steered by means of a tiller situated on the right of the operator and operating in a vertical plane, raising the tiller (clockwise rotating) shall steer the truck to the right in the forward direction of travel (figure 22). (See the note in 8.3.1.1.1, which also applies in this case.)

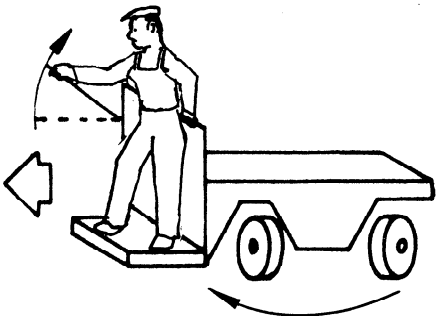

FIGURE 22

8.3.2 *Steering handle — Motorized hand and hand/rider trucks*

8.3.2.1 The handle on the tongue shall be provided with suitable means to protect the operator's hand against injury from swinging doors, walls, columns, etc.

8.3.2.2 Motorized hand/rider trucks employing a steering tongue control which extends beyond the confines of the truck shall steer as follows :

With the walking operator facing in the direction of travel, with the load trailing, clockwise movement of the steering tongue shall steer the truck clockwise.

With the riding operator facing in the direction of travel, with the load trailing, clockwise movement of the steering tongue shall steer the truck clockwise.

8.3.3 *Pivoting steering controls*

On trucks which are steered by means of a pivoting control operated by foot (figure 23) or by hand (figure 24), a clockwise rotation of this control, looking in the forward direction of travel, shall steer the truck to the right.

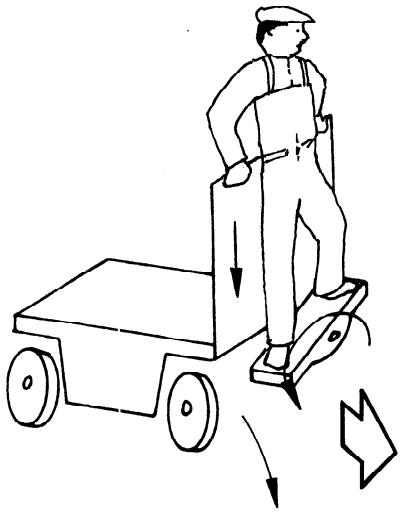

FIGURE 23

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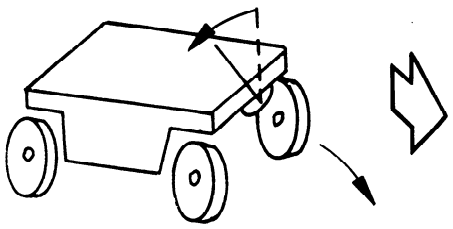


FIGURE 24

8.4 Driving and braking controls

A parking brake (or mechanism) which may be part of or include the service brake shall be provided on all powered industrial trucks. The parking brake (or mechanism) shall be manually or automatically applied, and shall remain applied until intentionally released.

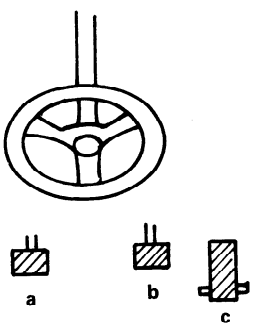
A means shall be provided whereby the control circuit(s) in the case of electric trucks and the ignition and/or starting means in the case of internal combustion engine trucks may be disconnected or rendered inoperative.

8.4.1 *Sit-down rider trucks*

8.4.1.1 Pedals

The accelerator, brake pedals (and clutch pedal when fitted) of all sit-down ride-trucks shall be arranged as shown in figure 25.

Where the pedal arrangement differs from that shown in figure 25, its function shall be clearly indicated both in the driving instructions and on the truck itself.



a : clutch

b : brake

c : accelerator

View from driver's position

FIGURE 25

8.4.1.2 Gear-change lever

The positions for gear engagement shall be clearly indicated.

8.4.1.3 Direction-change levers

The direction levers on internal combustion engine powered trucks and the control levers on electric trucks shall be arranged in such a way that their operation would correspond to the required direction of travel (figure 26).

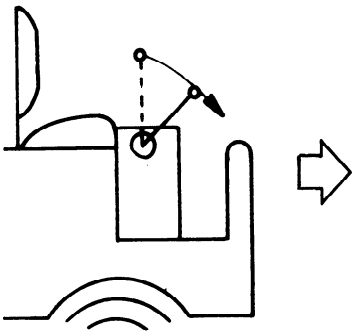


FIGURE 26

8.4.1.4 Safety control and brakes – Electric-powered sit-down rider industrial trucks

Means shall be provided to open automatically the travel circuit when the operator leaves the truck.

Travel control shall be so arranged that the truck will move only when the direction control is actuated and will not move at a speed greater than inching speed unless control has been actuated for both speed and direction. Where no neutral position is provided, the truck shall not move unless the speed control is activated.

The accelerator, if foot operated, shall be located for operation by the right foot and shall increase travel speed when depressed.

Service brakes, if foot operated, shall be applied by depressing the pedal.

When a single pedal is used to control both the above functions (i.e. acceleration and braking), it shall be located for operation by the right foot and shall release the brakes and increase travel speed when depressed. Conversely, it shall reduce travel speed and apply the brakes when released.

8.1.4.5 Safety control and brakes – Internal combustion engine powered sit-down rider industrial trucks

Travel control shall be so arranged that the truck will move only when the direction control is actuated and will not move at a speed greater than inching speed unless control has been actuated for both speed and direction.

Service brakes, if foot operated, shall be energized by depressing the pedal.

If a combination clutch-and-brake pedal is used, the initial pedal movement shall disengage the clutch and the final pedal movement shall apply the brakes, and the pedal shall be operated by the left foot.

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