
INTERNATIONAL STANDARD



3691

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

Powered industrial trucks – Safety code

Chariots automoteurs – Code de sécurité

First edition – 1977-09-01

UDC 629.11 : 331.823

Ref. No. ISO 3691-1977 (E)

Descriptors : handling equipment, industrial trucks, self-propelled machines, safety requirements, control devices, driving direction, brakes (motion arresters), accident prevention, name plate, maintenance, technical data sheets.

Price based on 31 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

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*, and was circulated to the member bodies in April 1975.

It was approved by the member bodies of the following countries :

Australia	France	Spain
Austria	India	Sweden
Belgium	Netherlands	Switzerland
Brazil	New Zealand	United Kingdom
Bulgaria	Poland	U.S.A.
Czechoslovakia	Romania	U.S.S.R.
Finland	South Africa, Rep. of	Yugoslavia

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Germany
Japan

This International Standard incorporates draft Addenda ISO/DIS 3691/DAD 1 and 2, which were circulated to the member bodies in July and August 1975 respectively.

Draft Addenda 1 (clauses 14 and 15 and annex B of the present document) and 2 (clause 12 of the present document) were approved by the member bodies of the following countries :

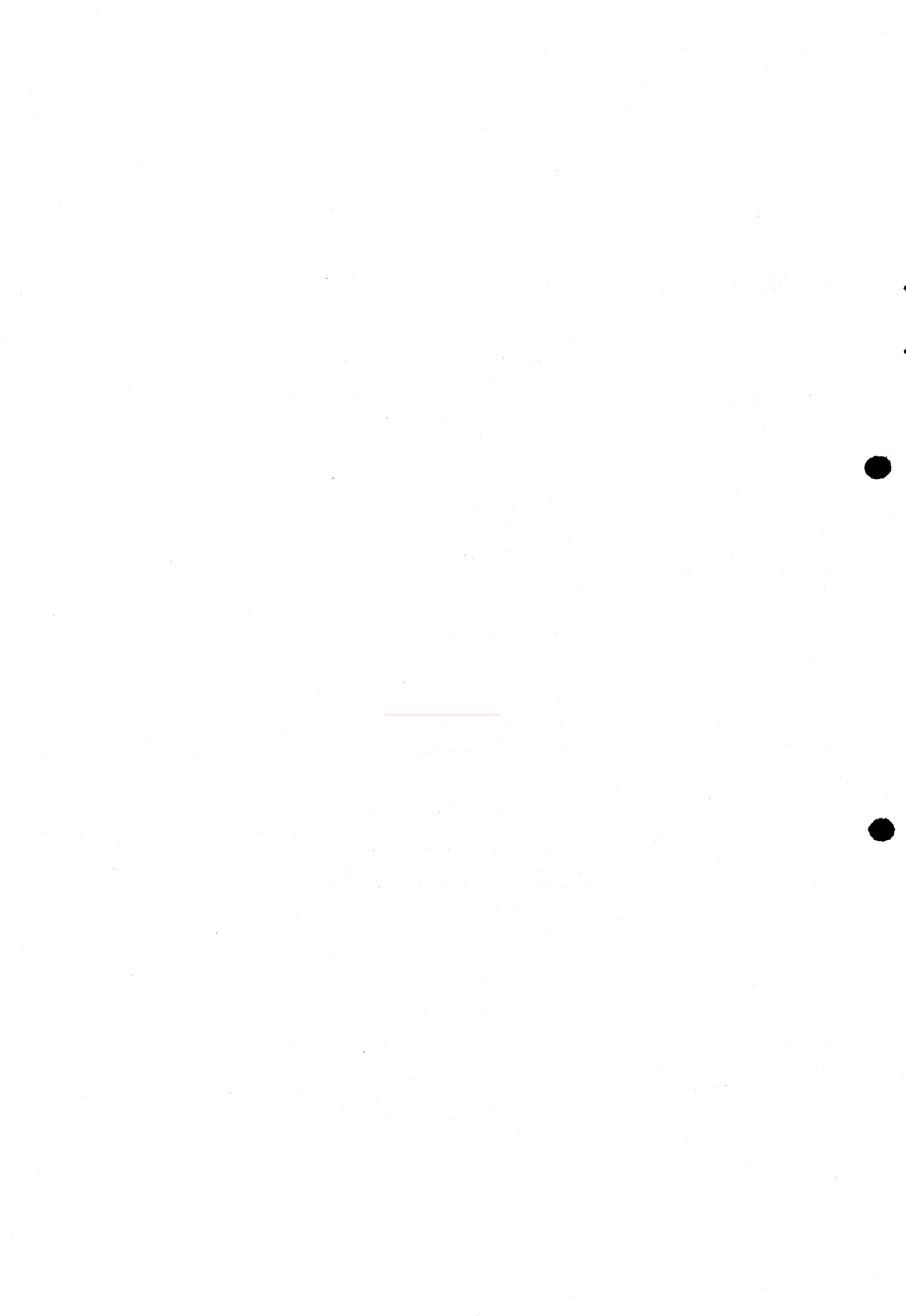
Australia	Japan	Sweden
Belgium	Mexico	Switzerland
Brazil	Netherlands	Turkey
Finland	New Zealand (<i>DAD 2</i>)	United Kingdom (<i>DAD 2</i>)
France	Poland	U.S.A.
India	Romania	U.S.S.R.
Ireland	South Africa, Rep. of	Yugoslavia
Italy	Spain	

The member bodies of the following countries expressed disapproval of draft Addendum 1 on technical grounds :

New Zealand
United Kingdom

Attention is drawn to the fact that annex A is included for reader information only; owing to the difficulty of updating, it may be omitted from subsequent editions of this International Standard.

CONTENTS	Page
SECTION ONE : GENERAL	
1 Scope and field of application	1
2 References	1
3 Nomenclature, classification and definitions	1
SECTION TWO : FOR THE MANUFACTURER OF POWERED INDUSTRIAL TRUCKS	
4 Rated capacity	1
5 Information plates	2
6 Stability – Requirements and tests	3
7 Brake performance	4
8 Direction of travel – Controls	4
9 Control symbols	13
10 Requirements for power systems and accessories	13
11 Systems and components for lifting, tilting and other movements	15
12 Protective devices	16
13 Ergonomic and other environmental factors	17
SECTION THREE : FOR THE APPLICATION, OPERATION AND MAINTENANCE OF POWERED INDUSTRIAL TRUCKS	
14 Operating safety rules and practices for the user and the operator	17
15 Maintenance practices	20
Annexes	
A List of national safety regulations, codes and standards concerning powered industrial trucks	22
B Example of a check form	31



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/R 1214, *Counterbalanced fork lift trucks – Rated capacity.*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 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⁾

3 NOMENCLATURE, CLASSIFICATION AND DEFINITIONS

3.1 The nomenclature, classification and definitions for powered industrial trucks are given in ISO... (in preparation).

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 ISO...

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 transport-

ing 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) Under revision.

2) At present at the stage of draft.

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 trade-mark;
- 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.

5.1.2 *Electric trucks*

- a) name of truck manufacturer (and importer, if required) and also, if desired, the manufacturer's trade-mark;
- 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*

See ISO . . . (in preparation).

6.5 *Side-loading fork lift trucks*

See ISO . . . (in preparation).

6.6 Rough terrain trucks

See ISO . . . (in preparation).

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 . . . (in preparation).

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

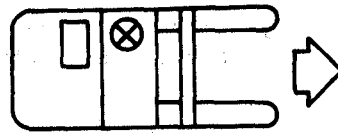


FIGURE 1

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

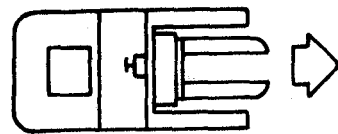


FIGURE 2

- c) Shunting tractor

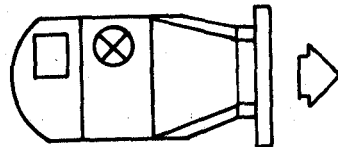


FIGURE 3

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

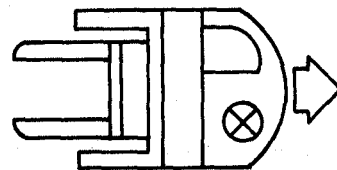


FIGURE 4

- b) Towing tractor – Front-end control

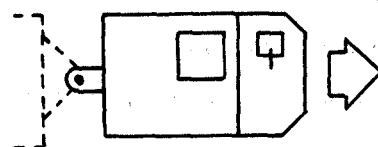


FIGURE 5

c) Towing tractor – Rear-end control

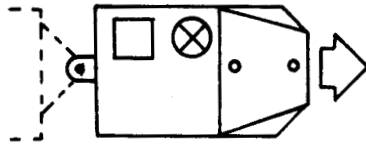


FIGURE 6

d) Fixed-platform truck

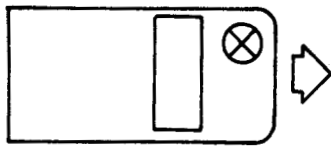


FIGURE 7

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

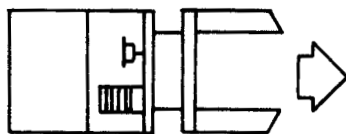


FIGURE 8

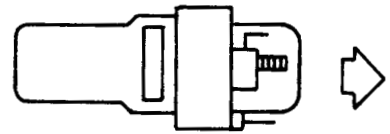


FIGURE 12

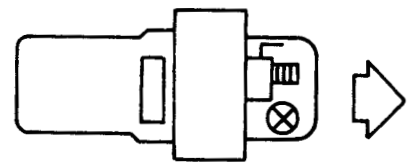


FIGURE 13

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

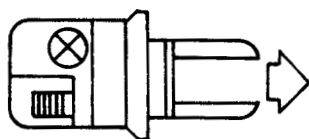


FIGURE 9

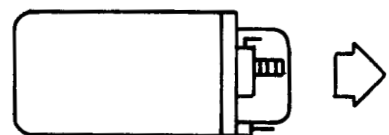


FIGURE 14

c) Fixed-platform truck

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



FIGURE 10

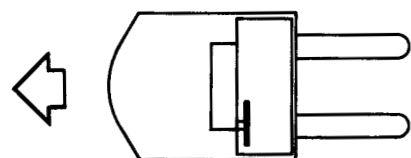


FIGURE 14 a)

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

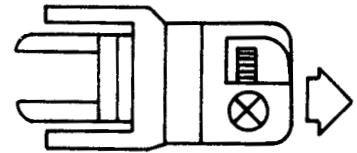


FIGURE 11

b) High-lift or low-lift platform truck

8.2.3.3 PEDESTRIAN-CONTROLLED TRUCKS

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

a) Pallet truck

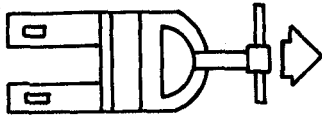


FIGURE 15

b) High-lift or low-lift platform truck

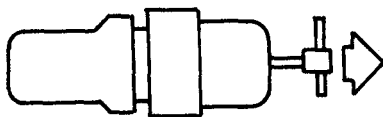


FIGURE 16

c) Counterbalanced fork lift truck

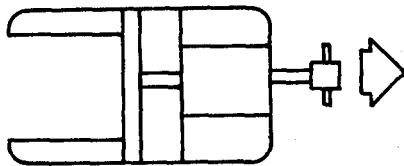


FIGURE 17

d) Tractor

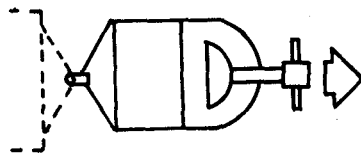


FIGURE 18

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.

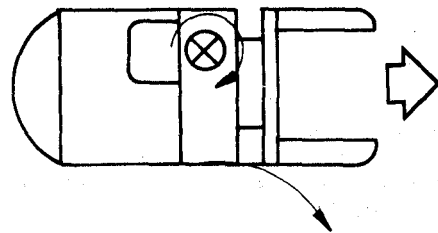


FIGURE 19

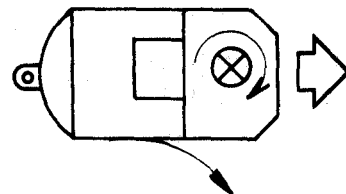


FIGURE 19 a)

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.)

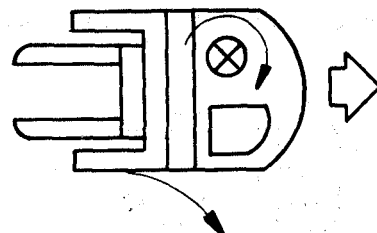


FIGURE 20

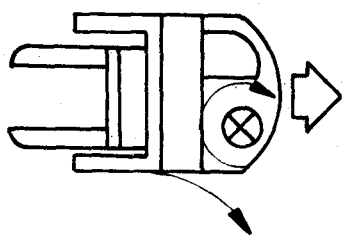


FIGURE 20 a)

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.

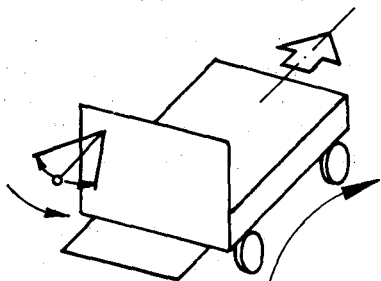


FIGURE 21 a)

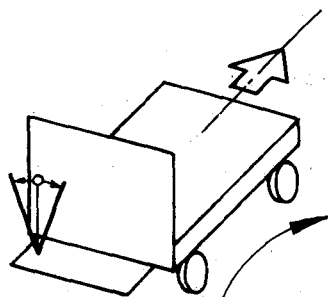


FIGURE 21 b)

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.)

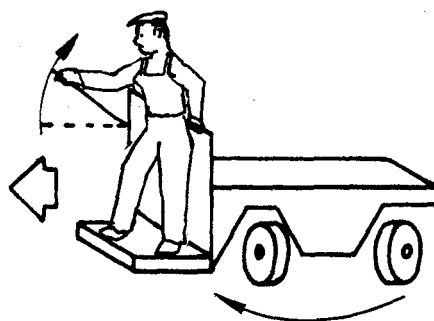


FIGURE 22

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.

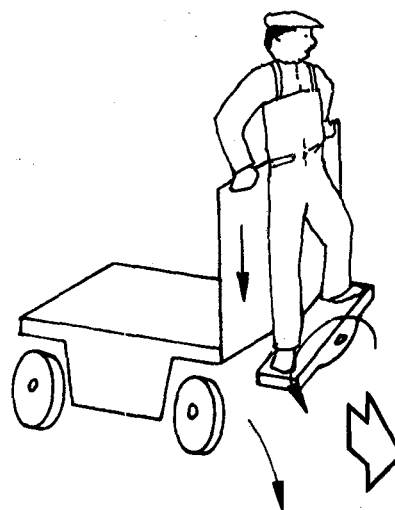


FIGURE 23

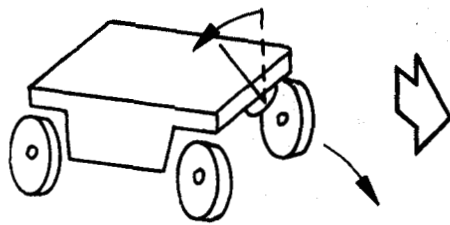


FIGURE 24

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.

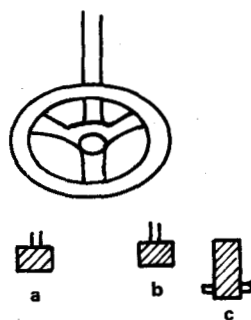
A means shall be provided whereby the control circuit(s) in the case of electric trucks and the ignition and/or starting means in the case of internal combustion engine trucks may be disconnected or rendered inoperative.

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).

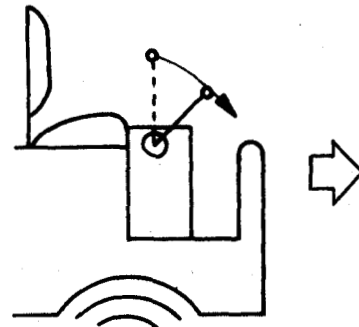


FIGURE 26

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.