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Vozila za talni transport - Paletni viliļ arji z visokim dvigom - Preskusi stabilnosti

Pallet stackers and high-lift platform trucks -- Stability tests

Chariots à fourche recouvrante et chariots à plate-forme à grande levée -- Essais de stabilité

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ISO 5766

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Pallet stackers and high-lift platform trucks — Stability tests

Chariots à fourche recouvrante et chariots à plate-forme à grande levée — Essais de stabilité

Reference number
ISO 5766 : 1990 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 5766 was prepared by Technical Committee ISO/TC 110, *Industrial trucks*, Sub-Committee SC 2, *Safety of powered industrial trucks*.

This second edition cancels and replaces the first edition (ISO 5766 : 1978), of which it constitutes a revision.

International Organization for Standardization
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Pallet stackers and high-lift platform trucks — Stability tests

1 Scope

This International Standard specifies the basic tests for verification of the stability of pedestrian- and rider-controlled pallet stackers and high-lift platform trucks. It applies to such stackers and trucks with tiltable and non-tiltable masts, or tiltable or non-tiltable load platforms or fork arms, of rated capacity up to and including 5 000 kg (10 000 lb). It also applies to trucks operating under the same conditions when equipped with load-handling attachments.

This International Standard does not apply to trucks with retractable devices, such as mast or fork or when handling suspended loads which may swing freely.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5353 : 1978, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point.*

3 Purpose of tests

3.1 Normal operating conditions

The basic tests specified in this International Standard are designed to verify that the pallet stacker or high-lift platform truck demonstrates satisfactory stability when reasonably and appropriately used under normal operating conditions, i.e.

a) stacking with the mast approximately vertical and the fork arms reasonably horizontal on substantially firm, smooth, level and prepared surfaces;

b) travelling with the mast or fork arms tilted rearwards (if applicable) and the load in the lowered (travelling) position on substantially firm, smooth and prepared surfaces;

c) operating with the load centre of gravity approximately on the longitudinal centre-plane of the truck.

3.2 Operating conditions other than normal

When the operating conditions differ from those stated in 3.1, it is necessary to use either:

a) a truck complying with other International Standard(s) covering different specific conditions (e.g. ISO 5767[1]); or

b) a truck the stability of which is agreed between the interested parties. This agreed performance shall not be less than that required by the tests specified for normal operating conditions (see 3.1).

4 Stability tests

4.1 Test requirements

The stability of these trucks shall be verified by means of one of the test methods described below. In the case of dispute, the tilting platform method shall be the referee method.

4.2 Verification procedure

4.2.1 Tilting platform

A platform which can be tilted about one side shall be used. A truck being tested for stability is placed on the initially horizontal tilting platform, in the conditions specified in 4.3 and, successively, in each of the positions described in table 2.

In each of these tests, the tilting platform shall be tilted slowly to the slope indicated in table 2. The truck is considered stable if it passes all tests without overturning.

For the purposes of these tests, overturning is defined as the test platform slope value which, if increased, would cause overturning of the truck.

It is permissible in lateral tests for one of the load wheels to lose contact with the test platform and it is acceptable for parts of the structure or other designed features to make contact with the test platform.

4.2.2 Fixed slope

Fixed slopes with inclinations equivalent to the prescribed test slope shall be used. The slope surface shall be smooth and capable of supporting the truck mass without deformation likely to affect the test results.

1) ISO 5767 : 1978, *Industrial trucks operating in special condition of stacking with mast tilted forward — Stability tests.*

The truck under test conforming to the conditions specified in 4.3 shall be driven onto the fixed slopes with mast lowered and positioned according to the table of tests. For each of the laden truck positions, the load shall be elevated slowly and smoothly to the height indicated in the table.

4.2.3 Calculation

Compliance with the specified stability values may be determined by calculation.

Such calculated capacities shall allow for manufacturing variations and deflections of mast, tyres, etc.

4.3 Test conditions

4.3.1 Condition of truck

The tests shall be carried out on an operational truck.

The operator on rider-controlled trucks shall be represented by an object having a mass of 90 kg if the stability during a test is thereby decreased. For a truck with a standing operator, an object having a mass of 90 kg shall be secured with its centre of gravity 1 000 mm above the floor of the operator's platform at the centre of the position normally occupied by the operator. For a truck with a seated operator, the centre of gravity of the object shall be secured 150 mm above the seat index point (SIP) as determined in accordance with ISO 5353, with the seat at the midpoint of the adjustments provided.

Fuel tanks of internal combustion engine trucks shall be full if stability is thereby decreased. All other tanks shall be filled to their correct operating levels, as applicable. Tyres shall be inflated to the pressure specified by the truck manufacturer.

4.3.2 Position of truck on platform (see table 2)

For tests Nos. 1 and 2, the truck shall be placed on the test platform with the drive (steer) axle and the axle of the outrigger wheels parallel to the tilt axis, XY, of the test platform (see figures 7 and 8).

For tests Nos. 3 and 4, the truck shall be placed on the test platform with line MN parallel to the tilt axis, XY, of the test platform (see figures 11 to 16).

For tests Nos. 5 and 6, the truck shall be placed on the test platform with the longitudinal axis of the truck at right angles to the tilt axis, XY, of the platform (see figures 19 and 20).

In the case of figure 13, the steerable wheel nearer to the tilt axis shall be parallel with it. Positions of steerable wheels on other designs are shown in figures 11, 12, 14, 15 and 16.

Lateral tests shall be conducted to the side of the truck which is the less stable.

Point N is the centre-point of the area of contact between the test platform surface and the outrigger wheel nearest to the tilt axis XY in figures 11 to 16.

Point M is defined as follows.

a) For trucks with a single non-articulating drive (steer) wheel (figure 11), point M is the vertical projection onto the test platform of the point of intersection between the centreline of the drive (steer) axle and the centreline of the drive wheel width.

b) For trucks with a dual non-sprung castor wheel (figure 12), point M is the vertical projection onto the test platform of the point of intersection between the centreline of the castor wheel axle and the midpoint between the two castor wheels, the non-sprung castor being positioned with the centreline of the castor wheel axle nearer to the centre-plane of the truck.

c) For trucks with a drive-steer axle in an articulating frame articulated in the centre-plane of the truck (figure 13), point M is the vertical projection onto the test platform of the point of intersection between the lateral axis of the articulating frame and the centre-plane AB of the truck.

d) For trucks with a sprung castor wheel and a single unsprung drive (steer) wheel (figure 14), point M is the vertical projection onto the test platform of the point of intersection between the centreline of the drive wheel axle and the centreline of the drive wheel width, with the axle of the drive wheel positioned at right angles to the tilt axis.

e) For trucks with non-articulated dual drive (steer) wheels (figure 15), point M is the vertical projection onto the test platform of the point of intersection between the centreline of the drive axle and the centreline of the width of the drive wheel closer to the tilt axis, with the axle of the drive wheels positioned at right angles to the tilt axis.

f) For trucks with non-articulated, non-sprung outrigger castors (figure 16), point M is the vertical projection onto the test platform of the point of intersection between the centreline of the castor wheel width and the centreline of the castor wheel axle of the non-sprung castor nearer to the centre-plane of the truck.

NOTE — Figure 19 shows the same way of determining point M as figure 13.

g) For trucks with non-articulated, non-sprung outrigger castors (figure 20), point M is the vertical projection onto the test platform of the point of intersection between the centreline of the castor wheel axles and the centreline of the castor wheel width, with the non-sprung castors positioned with the centreline of the castor wheel axles parallel to the tilt axis and the castor wheels further away from the tilt axis.

4.3.3 Test load

The test load shall have a mass equivalent to the maximum load, Q, which the truck can elevate to its maximum lift height acting through the centre of gravity, G, nominally positioned at the standard load centre distance, D, as indicated on the information plate of the truck, both horizontally from the front face of the fork arm shank and vertically from the upper face of the fork arm blade.

When additional lift heights, loads, and load centre distances are to be indicated on the information plate, the truck shall meet the requirements established by the tests specified in this International Standard for these additional ratings.

For tests Nos. 1, 2, 3 and 5, the centre of gravity, G, of the test load (see figure 1) shall be located in the longitudinal centre-plane AB of the truck (see figures 7, 8, 19 and 20 for examples).

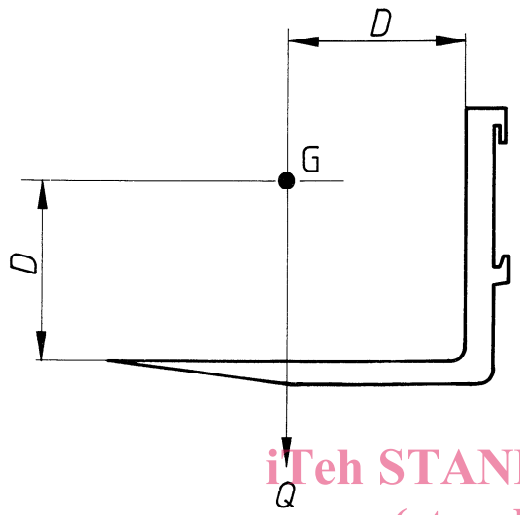


Figure 1

The standard load centre distances, D, are as follows:

— 600 mm;

— 24 in (Imperial units).

4.3.4 Location of truck on test platform

The initial position of the truck on the test platform shall be maintained during each test.

This may be achieved by application of parking or service brakes, which can be secured in the "on" position, or by wedging the wheels against the truck frame, ensuring however that articulation is not affected.

Blocks or chocks having a maximum height not exceeding the value indicated in table 1 may be used, if necessary, to maintain the initial position of the truck on the test platform. Blocks or chocks, if used, shall not artificially improve stability.

Table 1 — Height of blocks or chocks

Tyre outside diameter, d mm	Height of blocks or chocks max.
$d \leqslant 250$	25 mm
$250 < d \leqslant 500$	0,1 d
$d > 500$	50 mm

The coefficient of friction of the platform surface may be increased if necessary by an appropriate friction-increasing material.

4.3.5 Position of front face of fork arm shank

Test No. 1 shall be conducted with the horizontal position of a load datum point (e.g. point E) unchanged when elevated from the lowered position (see figure 4).

By means of a plumb-line or other suitable equipment, set the mast vertical. Elevate the fork and the prescribed test load to approximately 300 mm (12 in) above the test platform. With the front face of the fork arm shank vertical, establish a point, E (see figure 2) on the fork or fork carrier having a fixed relationship to the centre of gravity of the test load, G (see figure 1). This point E shall be used to provide a reference datum, F, on the test platform (see figure 2). When the mast is elevated, a new point, F_1, on the test platform may occur (see figure 3): by the following adjustments this new point F_1 can be returned to the original location of F (see figure 4).

For trucks with tiltable masts, changes in the location of F_1 shall be corrected by varying the tilt of the mast or the fork arms within the limits provided by the truck design.

For trucks with non-tiltable masts, adjustments in the fork arms or fork carrier tilt (where provided) may be used to correct for changes in location of point F_1 within the limits of tilt provided by the design of the truck.

For trucks having non-tiltable masts, fork arms or fork carrier, adjustments cannot be made.

4.3.6 Lift height for tests simulating travel

For tests simulating travelling, i.e. tests Nos. 2, 4 and 6, the upper face of the fork arms, measured at the heel of the fork arms, shall be positioned approximately 300 mm (12 in) from the test platform.

Where outriggers prevent the attainment of this fork arm position, the heels of the fork arms shall be positioned at a height not less than 150 mm (6 in) above the outriggers.

4.3.7 Safety precautions

Precautions should be taken to prevent the overturning of the truck or displacement of the test load during the course of the tests. If the means for preventing the total overturning of the truck consists of lashing or chain, this shall be sufficiently slack to impose no appreciable restriction on the truck until the overturning point is reached.

Displacement of the test load shall be prevented by means such as

a) firmly securing the test load to the load carrier or equivalent structure;

b) suspending the test load near the ground from an appropriate support placed on the fork such that the suspension point is at the point where the centre of gravity, G, of the test load would be located if the test load were to be placed on the fork.

5 Stability tests for trucks with attachments

Trucks fitted with attachments other than fork arms shall be subjected to the same stability tests, except in cases where the attachment can bring the centre of gravity of the load out of the plane AB of the truck.

For the verification of the vertical position of the mast, a reference point with a fixed relationship to the centre of gravity of the test load, G (see figure 1) shall be chosen.

The test load shall be the specified load at the specified load centre distance indicated for the attachment when used on the truck being tested.

The fork lift height specified for the tests shall be measured between the test platform surface and the underside of the load or the attachment, whichever is the lower.

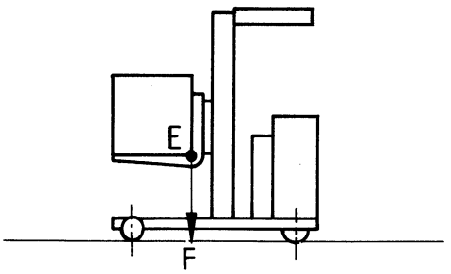


Figure 2

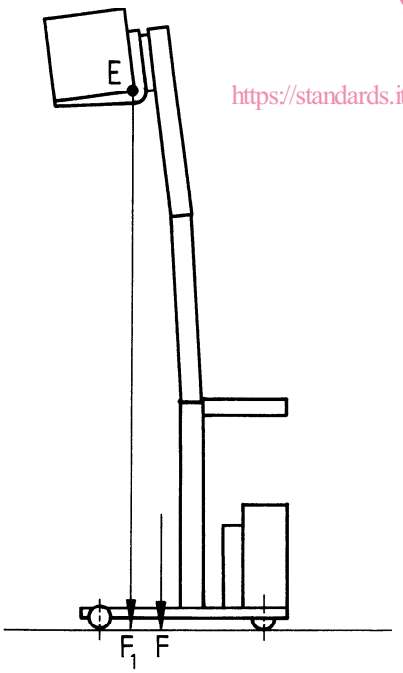


Figure 3

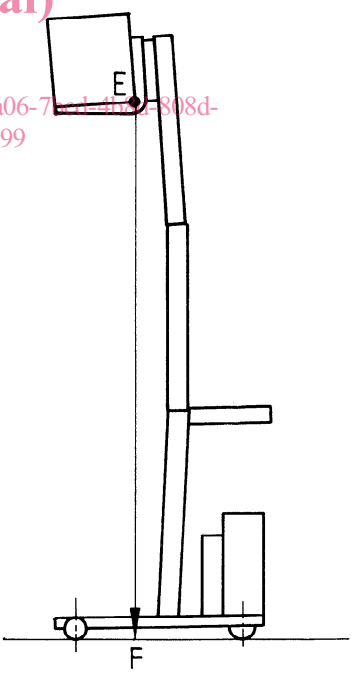
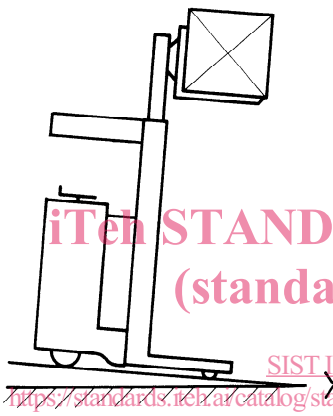
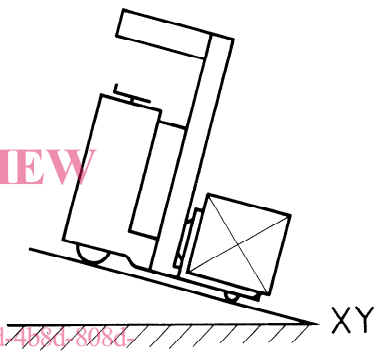
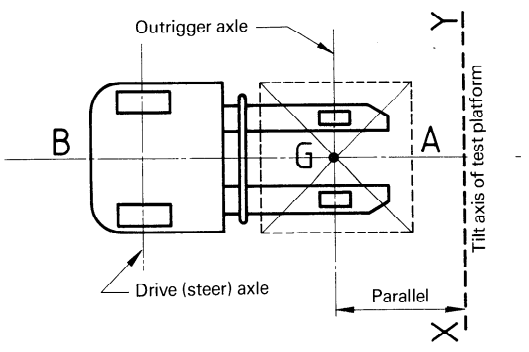
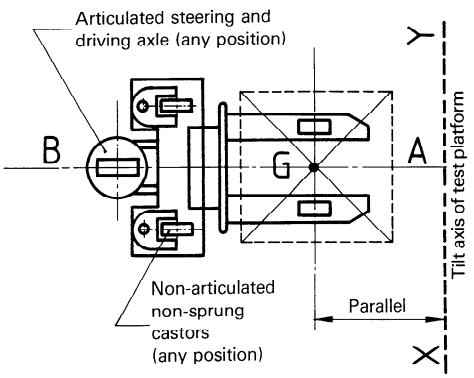


Figure 4

Table 2 — Summary of tests

Test No.	1	2 (see note 1)
Stability	**Longitudinal**	
Operation	Stacking	Travelling
Load	Test load	Test load
Centre of gravity distance	*D*	*D*
Lift height	Maximum	Lowered (see 4.3.6)
Position of mast or fork arms	Vertical (see 4.3.5)	Maximum backward tilt
Position on test platform	See figures 5, 7 and 8	See figures 6, 7 and 8
Platform slope	4 %	18 %
Position of the truck on the tilting platform (see 4.3.2)	 **Figure 5**	 **Figure 6**
	 **Figure 7**	 **Figure 8**
NOTES — See page 8.		