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Bi-directional and multi-directional fork-lift trucks — Stability tests

*Chariots élévateurs à fourche bi-directionnelle et multi-directionnelle —
Essais de stabilité*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15794 was prepared by Technical Committee ISO/TC 110, *Industrial trucks*, Subcommittee SC 2, *Safety of powered industrial trucks*.

This International Standard has been prepared using EEC 89/240 Method 6 as a basis.

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Bi-directional and multi-directional fork-lift trucks — Stability tests

1 Scope

This International Standard specifies basic tests to verify the stability of bi-directional and multi-directional fork-lift trucks with tiltable or non-tiltable mast or fork arms. It is applicable to trucks fitted with fork arms and/or attachments.

This International Standard is not applicable to trucks that handle suspended loads that can swing freely.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 5353:1995, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point.*

ISO 5767:1992, *Industrial trucks operating in special condition of stacking with the mast tilted forward — Additional stability test.*

ISO 10658:1996, *Industrial trucks operating in special conditions of stacking with load laterally displaced by powered devices — Additional stability test.*

3 Purpose of tests

3.1 Normal operating conditions

The basic tests specified in this International Standard ensure that the type of truck specified has satisfactory stability when reasonably and appropriately used under normal operating conditions, as follows:

- a) operating (travelling and stacking) on substantially firm, smooth, level and prepared surfaces;
- b) travelling with the mast or fork arms tilted backwards and the load in the lowered (travelling) position;
- c) stacking with the mast substantially vertical and the fork arms substantially horizontal;
- d) operating with the load centre of gravity approximately on the centre plane of the truck.

3.2 Operating in conditions other than normal

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

- a) a truck complying with other International Standards covering different specific conditions, such as ISO 5767 or ISO 10658, or

- b) a truck whose stability has been agreed upon between the interested parties; this agreed stability shall not be less than that required by the tests specified for normal operating conditions in 3.1.

4 Stability tests

4.1 Test requirements

The stability of bi-directional and multi-directional fork-lift trucks shall be verified by one of the procedures specified in 4.2.

4.2 Verification procedure

4.2.1 Tilting platform

Use a test platform that can be tilted about one side. Place the truck being tested for stability on the initially horizontal test platform, in accordance with 4.3 and, successively, in each of the positions described in Table 3.

In each of the tests, tilt the test platform tilted slowly to the slope specified in Table 3. The truck is considered stable if it passes all tests without overturning. For the purposes of the tests, overturning is defined as the test platform slope value that, if increased, would cause the truck to overturn.

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

4.2.2 Fixed slope

Use fixed slopes with inclinations equivalent to the specified test slope. The slope surface shall be smooth and capable of supporting the truck mass with no deformation that could affect the test results.

Drive the truck under test onto the fixed slopes with the mast lowered and positioned as specified in Table 3. For each of the truck positions with an elevated load or load carrier, the mast shall be elevated smoothly to the position specified in Table 3.

4.2.3 Calculation

Compliance with the specified stability values may be determined by calculation methods verified by empirical data.

The calculated capacities shall take into account manufacturing variations and deflections of the mast, tyres, etc.

4.3 Test conditions

4.3.1 Condition of the truck

The tests shall be carried out on an operational truck.

The operator on rider-controlled trucks shall be simulated by an object having a mass of 90 kg if the stability during a test is thereby decreased. For a truck designed for operation 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 designed for operation by 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 closest position to the midpoint of the adjustments provided.

Fuel tanks of internal combustion engine trucks shall be full if the 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. Where tyre ballast is incorporated in the truck design, the use of ballast shall be in accordance with the truck manufacturer's instructions.

4.3.2 Position of truck on platform

The truck shall be placed on the test platform or slope, with the line MN parallel to the tilt axis, XY, of the test platform, in accordance with the positions shown in Table 3.

Tests shall be conducted on the side of the truck which is the less stable.

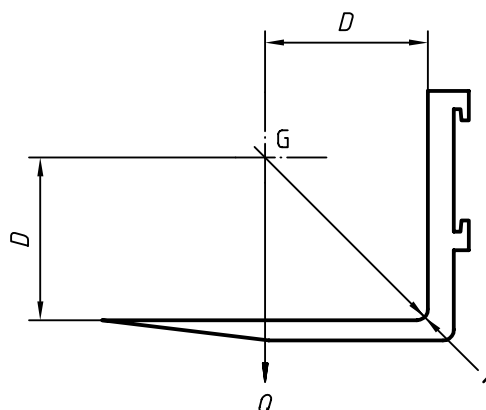
The truck wheel positions and general truck configurations in the diagrams are representative only and other arrangements are permissible provided the general principles relating to the test position are maintained.

4.3.3 Test load

The test load shall have a mass equivalent to the maximum load, Q , that 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 capacity 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 (see Figure 1).

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

The centre of gravity, G , of the test load shall be located on the centre plane between the mast uprights.



Key

- D is the load centre distance
- 1 is a point (E) on the inside heel of the fork arm
- G is the centre of gravity
- Q is the load

Figure 1

Table 1 — Standard load centre distance

Load, Q kg	Load centre distance, D mm
$Q < 1\,000$	400
$1\,000 \leq Q \leq 4\,999$	500
$5\,000 \leq Q \leq 10\,000$	600
$Q > 10\,000$	600, 900, 1 200 or 1 500