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**Industrial trucks - Safety rules for application, operation
and maintenance**

(ISO 21262:2020, IDT)

工业车辆 使用、操作与维护安全规范

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Industrial trucks - Safety rules for application, operation and maintenance

1 Scope

This document specifies the safety requirements for the application, operation, maintenance, transport, towing, assembly, storage and modification of industrial trucks (hereinafter referred to as “trucks”) as defined in ISO 5053-1.

This document applies to the following types of trucks:

- a) counterbalanced trucks;
- b) reach trucks (with retractable mast or retractable fork arm carriage);
- c) straddle trucks;
- d) pallet stackers;
- e) platform trucks;
- f) double stackers;
- g) single-side-loading trucks;
- h) lateral-stacking trucks (both sides) and lateral- and front-stacking trucks;
- i) order-picking trucks;
- j) bidirectional and multidirectional trucks;
- k) counterbalance container handlers;
- l) articulated counterbalanced trucks;
- m) variable-reach trucks;
- n) pallet trucks;
- o) platform and stillage trucks;
- p) tractors with a drawbar pull up to and including 20 000 N;
- q) burden and personnel carriers;

- r) trucks powered by battery, diesel, gasoline or gas (e.g., liquefied petroleum gas, compressed natural gas, liquefied natural gas).

This document also applies to the above-mentioned trucks with automated functions or driverless variants.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

ISO 3691-1, Industrial trucks - Safety requirements and verification - Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks

Note: GB/T 10827.1-2014, Industrial trucks - Safety requirements and verification - Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks (ISO 3691-1:2011, IDT)

ISO 3691-4 Industrial trucks - Safety requirements and verification - Part 4: Driverless industrial trucks and their systems

Note: GB/T 10827.4-2023, Industrial trucks - Safety requirements and verification - Part 4: Driverless industrial trucks and their systems (ISO 3691-4:2020, IDT)

ISO 5053-1:2020, Industrial trucks - Vocabulary - Part 1: Types of industrial trucks

Note: GB/T 6104.1-2018, Industrial trucks - Terminology and classification - Part 1: Types of industrial trucks (ISO 5053-1:2015, IDT)

ISO 5057, Industrial trucks - Inspection and repair of fork arms in service on fork-lift trucks

Note: GB/T 17910-1999, Industrial trucks - Inspection and repair of fork arms in service on fork-lift trucks (ISO 5057:1993, IDT)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5053-1:2020 and the following apply.

3.1

user

4.1.4 If trucks are used in special areas (e.g., cold storage or public roads), additional requirements may apply.

4.1.5 The user may take additional fire prevention measures or facilities according to the environment where the truck is used.

4.1.6 The user shall ensure that trucks used in work environments subject to electrostatic discharge hazards are equipped with anti-static devices.

4.1.7 When damage or other defects that affect safety are found on the truck or attachments, the truck shall be taken out of service immediately. Trucks and attachments that are unsafe to operate shall not be put into service until they have been completely repaired.

Note: It is considered good practice to place temporary warnings to trucks to indicate that they are unsafe to operate.

4.1.8 The user shall evaluate noise emissions to the operator and other personnel.

4.1.9 Except as provided in Chapter 9, no one shall stand under or pass under the elevated part of the truck whether the truck is laden or not.

4.1.10 Except as provided in Chapter 9, no one shall place any part of the body (e.g., arms, legs or head) between working parts of the truck (e.g., mast).

4.1.11 The user shall monitor and control the operating environment to ensure the safety of persons around the truck and the safe operation of the truck (see Appendix A).

4.1.12 The operator shall receive training on the operation of the truck, including all attachments and automated functions, and shall operate in accordance with the manufacturer's instructions for use.

4.1.13 The operator shall receive training regarding their obligations and be familiar with all safety information including operating instructions of the truck.

4.1.14 The user shall designate the person(s) to be responsible for supervising truck operator(s). The person(s) responsible for supervising truck operators shall be trained on how to take the following actions:

- strengthen operators' safety awareness and practices;
- correct unsafe operating behavior or performance that does not meet the requirements of 4.2.

4.1.15 The user shall not allow unauthorized persons to use the truck and shall take measures (such as providing instructions to the operator on how to leave the truck) to prevent this from happening.

4.2 General requirements for the operator

4.2.1 The operator shall pay attention to the operating environment, including other persons, and fixed or movable objects near the truck and truck travel path.

4.2.2 If the floor of the operating position is 300 mm above the ground, the operator shall use three-point support, such as keeping one hand and two feet or two hands and one foot in contact with the truck at the same time, when getting on or off the truck. At the same time, the hands shall not be holding objects (e.g., food, drinks, tools, phones).

4.2.3 The operator shall always face the truck when getting on or off the truck.

4.2.4 The operator shall wear protective equipment that is suitable for the specific type and operating conditions of truck (e.g., safety footwear).

4.2.5 When leaving the truck, except for pedestrian-propelled trucks, the operator shall prevent it from being used by unauthorized persons.

4.2.6 Self-propelled trucks shall not be used to transport passengers, unless the truck is specially equipped with facilities for transporting accompanying passengers. In this case, the number of persons carried by the truck shall not exceed the number of permissible passengers on the truck.

4.2.7 Before starting the truck, the operator shall ensure that no one remains in the hazard zone. When operating the truck, if someone is found to be in danger, a warning signal shall be issued. If a person fails to leave the hazard zone despite an appropriate warning, the operator shall immediately stop operating the truck.

4.3 Training program

4.3.1 Persons who have not been trained in truck operation shall operate a truck for training purposes under the direct supervision of a trainer. This training should be conducted in an area away from other trucks, obstacles and pedestrians.

4.3.2 The training program shall emphasize safe and correct operation to avoid injury to the operator and other persons and prevent property damage. The training program shall cover the following aspects.

a) basic principles of the truck the trainee will operate, including:

- characteristics of the truck and attachments, including differences from trucks in the workplace;
- difference between automobiles and trucks;
- significant plate information, including rated capacity, warnings and instructions posted on the truck;

- narrow aisles, entrances and exits, overhead wires and pipelines, and other areas of restricted clearance;
- areas where the truck is allowed to operate near other trucks, other means of transport, or pedestrians;
- use and capacity of elevators;
- operation near the edge of elevated dock or the edge of improved surface;
- other special operating conditions and possible hazards.

c) operation of the truck, including:

- pre-shift inspection and method for decommissioning of a truck that needs repair;
- load handling techniques: lifting, lowering, picking up, placing, tilting;
- operation with or without load, turning;
- parking and shutdown procedures;
- other special operating conditions for specific applications.

d) operating safety rules and practices, including:

- provisions on operating safety rules and practices in Chapter 4 ~ Chapter 7;
- provisions on truck management in Chapters 8 and 9;
- other specifications, regulations or practices specified by the user in the place where the truck is used.

4.3.3 Operational training practice shall:

- if possible, be conducted in a separate area from other workplace activities and personnel;
- be conducted under the supervision of a trainer;
- include the actual or simulated operations of all operating tasks such as load handling, maneuvering, travelling, parking, starting and other activities that will be encountered during the use of the truck.

4.3.4 The trainer shall have appropriate training in teaching techniques and skills assessment.

4.3.5 The trainer shall only provide instruction on the types of truck and attachments for which they have been trained and successfully tested as operators. The trainer shall have experience to enable them to provide guidance based on actual situations and shall understand the work environment in which the trainees will operate.

4.3.6 Appropriate training records shall be kept.

4.3.7 When new equipment is introduced, existing equipment is modified, operating conditions are changed, or the operator's operating ability does not meet the requirements, the operator shall be retrained (regular retraining as determined by the user).

4.3.8 Operators shall be trained on all types of trucks and attachments they are required to operate. If the operator is subsequently required to operate other types of trucks or attachments, additional training shall be provided.

Note: Operators with some experience of trucks or similar vehicles will require less training than inexperienced operators. However, it is best not to overestimate the value of such experience.

4.4 Operating condition

4.4.1 Travel surface

4.4.1.1 The workplace and travel surface where the truck operates shall comply with the specifications of the truck manufacturer.

4.4.1.2 The travel surface of the workplace shall be solid enough, flat and free of obstacles. Drain channels, railway crossings and similar pavements shall be covered with bridge plates or dockboards if necessary.

4.4.1.3 The slope on which the truck travels shall not exceed the slope value specified by the truck manufacturer. Uniform transitions shall be used at the upper and lower ends of the slope to prevent loads from contacting the ground or damaging the truck.

4.4.1.4 The travel surface in narrow aisle shall be flat, dry, horizontal, and free of cracks or damage that would affect the normal operation of the truck, and shall comply with the specifications of the truck manufacturer.

4.4.1.5 Sufficient clearance shall be left between the truck, the load and fixed objects of the surrounding environment.

4.4.1.6 Hazardous road sections within the operating area (e.g., intersections with poor visibility, pedestrian areas, entrances and exits) shall be secured or marked by appropriate plates.

- functions of distance sensor and angle sensor;
- operator control device function;
- functions of additional items (e.g., attachments or special equipment);
- emergency cut-off/power-off function;
- operator restraint system (e.g., seat belt);
- reversing switch function at the end of the tiller of a pedestrian controlled truck;
- operator fall arrest system (e.g., guarding, fall protection device).

4.5.2 If the truck is found to be in need of repair or unsafe during the pre-shift inspection, the operator or designated person shall immediately report the matter to the user's designated authority and the truck shall not be operated until it has been restored to a safe operating condition.

4.5.3 Repairs or adjustments shall only be carried out by specially authorized competent persons.

4.6 Operation requirements

4.6.1 General requirements

4.6.1.1 The operator shall abide by the regulations of the site (factory) when operating the truck in the site (factory).

4.6.1.2 The truck and its load shall not exceed the allowable unit area load and concentrated load of the travel surface.

4.6.1.3 The operator shall adjust the travel speed of the truck according to on-site conditions (e.g., when turning, approaching or in a narrow passageway, passing through a swing door, in an area with poor visibility, or on an uneven road).

4.6.1.4 The operator shall always maintain a safe braking distance from vehicles or persons in the direction of travel. During operation, the operator shall focus on the operation of the truck and shall ensure that the truck is always under control.

Note: The braking distance may vary depending on road surface conditions (e.g., wet, dusty, gradient).

4.6.1.5 When traveling, the operator shall ensure that the travel path is clear and pay attention to the direction of travel. When turning, at an intersection, or in other situations with limited vision, if there are other vehicles or pedestrians nearby, the operator shall issue an audible warning signal, slow down or stop, and pass slowly after confirming safety. The operator shall check the space between the truck, the goods and possible obstacles before turning/maneuvering to ensure adequate clearance.

4.6.1.6 If the goods block the view, the operator shall drive the truck with the goods behind the direction of travel (except upslope), or the operator shall drive the truck carefully at walking speed under the guidance of a spotter in a safe location.

4.6.1.7 If it is necessary to expand the field of vision through visual aids (e.g., rearview mirrors, cameras/monitoring systems), the operator shall be competent in the use of the equipment. The operator shall look in the direction of the travel path and keep a clear field of vision.

4.6.1.8 Unless operating conditions require otherwise, the operator should not start running the truck when the steering wheels are at the full-lock position.

4.6.1.9 The operator shall start, brake, turn or reverse smoothly. Sudden stops, sharp turns or overtaking at dangerous areas or areas with poor visibility shall be avoided.

4.6.1.10 For rider-controlled trucks, when the truck is in operation, the operator and passengers (if permitted) shall keep the entire body within the contours of the truck.

Exception: For rider-controlled trucks with a tiller, the arms/hands may be outside of the contours of the truck when the tiller is in the normal operating position.

4.6.1.11 When the truck is running, the load or load handling device shall be maintained at a running height sufficient to pass through the travel path surface and local obstacles. If possible, tilt the load backward and retract the mast/fork (when applicable). Loads shall not be lifted except for stacking operations. This provision does not apply to trucks capable of operating with a lifted load.

4.6.1.12 Trucks shall not be operated jointly during operation (traveling and load operating simultaneously), unless permitted by the truck manufacturer.

4.6.1.13 When a truck malfunction occurs during operation (e.g., steering system or service braking system failure), the operator shall stop the truck safely as soon as possible.

4.6.1.14 There shall be no risk of tip-over when the truck is operating.

The following conditions may increase the risk of tip-overs:

- failure to slow down to a safe speed before making a loaded or unloaded turn;
- making sharp turns;
- sudden stopping;
- driving with an elevated load or load handling device;
- driving with a load that is biased to one side;
- making a U-turn or running diagonally across a slope;

4.6.1.18 The user shall implement traffic management plans to allow trucks and pedestrians to interact safely.

4.6.1.19 Programming, configuration and execution of driverless truck system operations shall comply with the provisions of 4.6.

4.6.2 Driving in narrow aisles

4.6.2.1 Only trucks that are allowed to operate in narrow aisles are allowed to operate in them.

4.6.2.2 Unauthorized persons shall not enter narrow aisles. These areas shall be appropriately identified.

4.6.2.3 Before entering a narrow aisle, the operator shall check whether there are persons or other trucks in the narrow aisle. If there are no protective measures (such as warning signs at the entrance of the narrow aisle), trucks shall be prohibited from entering the narrow aisle.

4.6.2.4 Existing safety devices used to reduce hazards and protect personnel on trucks or racking equipment shall not be disabled, misused, displaced or removed.

4.6.2.5 If the truck in the narrow aisle is equipped with a non-mechanical guidance system, the truck can be driven out of the narrow aisle only after slowing down and giving an audible warning.

4.6.2.6 If pedestrians are required to stay in the narrow aisle, appropriate protective measures shall be taken (e.g., placing warning signs at the entrance of the narrow aisle, prohibiting trucks from entering or operating in the narrow aisle, etc.).

4.6.3 Driving over bridge plates or dockboards

Before driving over a bridge plate or dockboard, the operator shall ensure that:

- the bridge plate or dockboard is properly mounted;
- the bridge plate or dockboard is secured;
- the bridge plate or dockboard has sufficient load-bearing capacity;
- measures have been taken to prevent the lorry connected to the bridge plate or dockboard from moving or driving off;
- when on any ramp, elevated dock or platform, a safe distance is kept from the edge (see 7.1.2).

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