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Product Group /
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Guideline / Periodic Inspection of Industrial Trucks

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Table of Contents

1. Introduction	3
1.1. <i>Regulatory developments in the field of industrial trucks</i>	3
1.2. <i>Purpose and legal references (Directive 2009/104/EC^[1])</i>	3
2. Scope	5
3. Normative references:	5
4. Definitions	5
5. The inspections	6
5.1. <i>Lifting Devices</i>	8
5.2. <i>Drive units and brakes</i>	14
5.3. <i>Operator seat and controls</i>	20
5.4. <i>Electrical equipment</i>	24
5.5. <i>Hydraulic system</i>	26
5.6. <i>Truck chassis and safety equipment</i>	27
5.7. <i>Miscellaneous and special equipment</i>	28
6. After check documentation	29
6.1. <i>The report of the periodic inspection</i>	29
6.2. <i>Periodic inspection label</i>	29
ANNEX A - Conditions required to carry out the periodic inspection	30
A.1 <i>When the competent person should not proceed with the periodic inspection of the truck</i>	30
A.2 <i>Suitability of areas for the implementation of periodic inspection</i>	31
ANNEX B – Example test equipment and PPE	32
ANNEX C – Test Record	33
ANNEX D – Inspection Label	38
ANNEX E – Inspections for attachments	39
ANNEX F – Brake performance	41

1. Introduction

1.1. Regulatory developments in the field of industrial trucks

To have a proper picture of the trucks that can be today in service it is appropriate to recall the various periods of applicable legislation that have occurred over time:

- **Up to January 1989¹**: Applicable National Legislation – FEM Safety Code; trucks without marking and without any obligation about certifications or conformity declarations.
- **From January 1989 to January 1995**: Directive 86/663/EEC; trucks with capacities up to 10 tons were marked "e" and accompanied, in support, by a Certificate of Conformity. In this period, for forklifts with over 10 tons, National Legislations were still in force.
- **From January 1995** Directive 89/392/EEC; applicable for industrial trucks with capacities over 10 tons and from January 1996 for all other industrial trucks; introduction of mandatory "CE" marking and mandatory "Declaration of Conformity"
- **From September 1998**: consolidated Directive 98/37/EC and European Harmonized Standards (EN 1726-1 for trucks up to 10 tons, EN 1551 for trucks over 10 tons and additional standards by them recalled); trucks "CE" marked and accompanied, in support, by a CE Declaration of Conformity;
- **From 29 December 2009**: Machinery Directive 2006/42/CE and European Harmonized Standards (Series EN ISO 3691 to be used in conjunction with series EN 16307 and additional standards by them recalled); trucks "CE" marked and accompanied, in support, by a CE Declaration of Conformity.

With Directive 95/63/EC the European Commission introduced the obligation to retrofit counterbalanced and side-loading industrial trucks already on the market on **5th December 1998**, with operator restraint systems². From the same date, industrial trucks manufacturers members of FEM, started to equip all the new industrial trucks with seat belts in accordance with FEM 4.002 (FEM 4.002 Operator restraint systems - Specification and test procedure).

The technological evolution leads to a continuous improvement of the state of the art of industrial trucks.

1.2. Purpose and legal references (Directive 2009/104/EC ^[1])

Suggestions and advice contained in these recommendations are based on specifications, procedures, standards and other information gathered by FEM-IT-T group. They represent, to the best knowledge of FEM-IT-T, the best available data at the time of publication, on the construction and the use of industrial trucks in the general conditions described. They are formulated and designed to provide guidance to this limited use.

There is a wide variety of situations in which the industrial trucks can be used, so, in all cases, those who are going to implement these recommendations shall evaluate their suitability and safety at their judgment, by reflecting the specific operating conditions within all applicable legal requirements.

Periodic Inspections of Work Equipment are required according Directive 2009/104/ EC. The national Regulations of the EU member states, implementing the Directive, must be considered.

The recommendations of this guideline are to be intended as a support to the information provided by the manufacturer and focus to the scope of periodic inspection.

Maintenance operations are beyond the scope of this Guideline.

¹ The date of entry into force of European Directives in every member state must be verified with respective national implementation.

² The new rules introduced during the years were never retroactive for the manufacturer. However, users, hirers and operators may have various regulatory obligations to upgrade equipment in service at the date legislation became effective.

However, the instructions provided by the manufacturer take precedence over the recommendation of this Guideline.

It should also be noted that the maintenance is within the user obligations and that these activities should be carried out following the instructions provided by the manufacturer indicated in the instruction handbook (mandatory presence to maintain the truck compliance requirements).

The need of maintenance, for certain equipment, is accompanied by the need to perform additional periodic inspections.

According to Directive 2009/104/EC, periodic inspections should be carried out on all equipment exposed to conditions that can cause deterioration liable to result in dangerous situations, such as the industrial trucks. These activities shall be deduced from the codes of good practice or guidelines.

Users have a legal obligation to keep the truck in well maintained condition and ensure correct operation/adjustment of safety functions required for its use in the context of their operational reality (Directive 2009/104/EC – use of work equipment). Evaluation of the foregoing requires user to proceed with a "periodic inspection" of the truck, as shown in this guideline.

Based on the results of the periodic inspection, the user can verify the condition of the truck in terms of global safety and proceed appropriately with any safety intervention needed.

This guideline, therefore, aims to meet this need in the more specific case of industrial trucks, setting the goal, for this type of equipment, to provide operational and documentary details necessary to perform the tasks required.

Finally, please note that this guide is not in any way usable for a verification of the compliance of the truck (referring to either the applicable European Union provisions or National Regulations) by the technical expert assigned to the periodic inspection of the truck because the periodic inspection activity is addressed exclusively to verify the subsistence of the original safety level of the truck and not the compliance with constructional requirements defined by law.

2. Scope

The recommendations of this guideline are applicable to all industrial trucks defined in ISO 5053-1 (Industrial Trucks – Terminology and classification – Part 1: Types of Industrial Trucks), hereafter referred as trucks, with the following exclusions:

- 3.18 non-stacking low lift straddle carrier
- 3.19 stacking high lift straddle carrier
- 3.21 rough terrain variable reach truck
- 3.22 slewing rough terrain variable reach truck
- 3.23 variable reach container handler reach stacker
- 3.24 counterbalanced container handler
- 3.32 driverless truck

For the following trucks types, additional inspection requirements will apply:

- 3.20 variable reach truck
- 3.9 lateral and front stacking truck
- 3.10 order picking truck

Refer to manufacturer instructions for further details.

3. Normative references:

- ISO 5053-1:2015 Industrial trucks -- Terminology and classification -- Part 1: Types of industrial trucks
- ISO 5057:1993 Industrial trucks -- Inspection and repair of fork arms in service on fork-lift trucks
- ISO 2330:2002 Industrial trucks -- Fork arms -- Technical characteristics and testing
- ISO 6292:2008 Powered industrial trucks and tractors -- Brake performance and component strength

4. Definitions

4.1 Competent person

A person who, based on his education, training and professional experience, has sufficient practical and theoretical knowledge in the technology of industrial trucks to evaluate the safety of an industrial truck according with the indications of this guideline. In addition, the competent person shall be sufficiently familiar with the national regulations in force in the field of safety at workplaces, to perform the inspections safely.

4.2 Test equipment

Equipment, measuring instruments and tools used by the competent person to perform the inspection.

Note: A selection of useful test equipment is given in Annex B.

4.3 Risk Assessment

Documented process carried out by the user to identify hazards, analyse and evaluate the risk to identified persons and specify required control measures.

Note: The risk assessment will consider the verifications to be undertaken, the working environment and the risks associated with the interference between the examination and other workplace activities.

4.4 Test record

Document in written or electronic form, prepared by the competent person, which described the result of the inspection.

Note: An example for the layout of a test record is given in Annex C.

4.5 Inspection label

Label, for example stickers, to show on the truck the date of the performed and next inspection of the truck.

Note: An example for an inspection label is given in Annex D

4.6 Instruction Handbook

All the information provided by the manufacturer to the user according to the Machinery Directive 2006/42/EC.

4.7 Manufacturer specifications

All the information provided by the manufacturer in the instruction handbook and all the additional voluntary information provided by other original manufacturer's documentation.

4.8 User

Person responsible for making available suitable and safe work equipment.

5. The inspections

Periodic inspections described in this guideline shall be performed by a competent person.

The competent person

The competent person is capable of detecting and assessing defects or weaknesses to identify deviations from the proper maintenance conditions of the truck.

The competent person shall have been instructed to work safely with hydraulic and electrical/electronic systems.

Such skills shall be kept up to date, for example by participation in courses carried out by manufacturers, trade associations or training schools.

An up to date record of the training and professional development shall be maintained.

Whenever the competent person has some doubt concerning the results of some analysis, he can consider involving a third party on specific points.

The competent person shall also be impartial and objective in their assessment from a safety point of view (see as reference EN ISO 17020 ^[2]). To avoid self-monitoring of work, it is recommended that the inspection work is clearly separated from routine maintenance and repairing.

The competent person shall be trained and authorised to operate the equipment under test in the working environment of the test area according with the national legislation.

Note: For specific examinations, e.g. inspection and or maintenance of trucks for use in potential explosive atmosphere or pressure equipment on trucks additional authorisation or tests may be required, for instance by notified bodies.

The decision of the competent person to be entrusted with the periodic inspection activity is at the discretion of the user.

Intervals of periodic inspections

Once a year trucks and their attachments shall be subjected to periodic inspection, in order to assess the state of conservation and efficiency. Inspection shall be performed more frequently if the risk assessment conducted by the user highlight the need of a more frequent periodicity because of the operating conditions

or the conditions of the workplace (e.g. trucks working more than 40 hours per week could be inspected every six months) and taking into account the applicable national legislation.

The truck will also be subject to extraordinary periodic inspections whenever any exceptional event that may affect its safety occurs. Such events may be modifications, accidents, natural phenomena (e.g. floods, earthquakes etc...) or prolonged periods of inactivity.

Performing the inspection

Inspections shall be carried out in compliance with the conditions required to carry out the periodic inspection given in Annex A.

The examination and calibration status of tools and equipment to be used during the inspection shall be verified by the competent person prior to commencing the inspection.

Prior to commencing the inspection, a Risk Assessment shall be carried out. Personal Protective Equipment (PPE) shall be utilised as determined by the risk assessment. A suggested list of useful PPE is included in Annex B.

A record of the inspection results shall be provided. (See check list on Annex C of this guideline).

As part of its regular periodic inspection activities, the competent person will have the opportunity to make the following types of inspections:

Table 1: METHOD OF INSPECTION
VISUAL EXAM: <i>Examination conducted in order to identify any anomalies or deviations from normal conditions through visual inspections and measurements. Usually the examination is conducted without removing parts of the equipment, unless a particular need may arise. However, use of some basic hand tools may be required to remove inspection covers, guarding, etc³</i>
FUNCTIONAL TESTS: <i>Verification of the correct functioning of commands, switches, indicators, etc.</i>
OPERATIONAL TESTS: <i>Includes tests with and without load to check the correct operation of the truck by simulating the real operating conditions of the machine.</i>

³ If the visual examination suggests it, the competent person may need to conduct non-destructive tests such as dye penetrant inspections, ultrasonic, magnetic particles, X-rays, etc.

TABLE 2: DETAILS OF TRUCK INSPECTIONS

IMPORTANT: The instructions from truck and attachment manufacturers take precedence over the indications below.

5.1. Lifting Devices

The forks shall be identified with reference to the requirements of ISO 2330. Each fork arm shall bring:

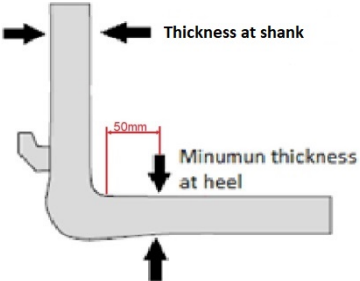
- The capacity C in kg.
- Distance to the load centre D in mm.
- Identification of the fork manufacturer.
- Week or month and year of production or serial number.

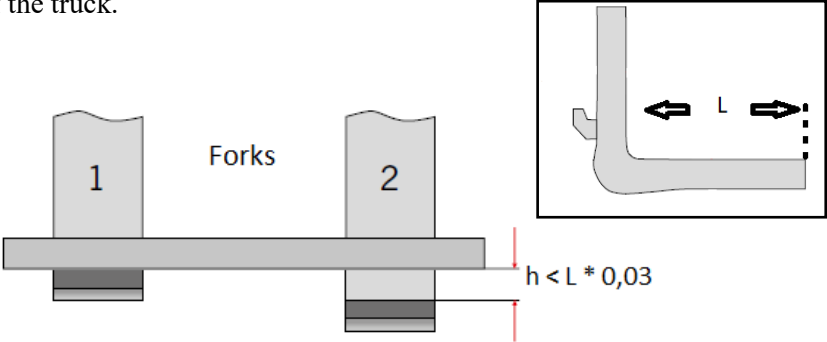
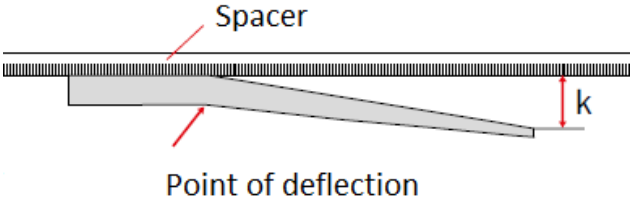
The above data shall match the characteristics of the truck.

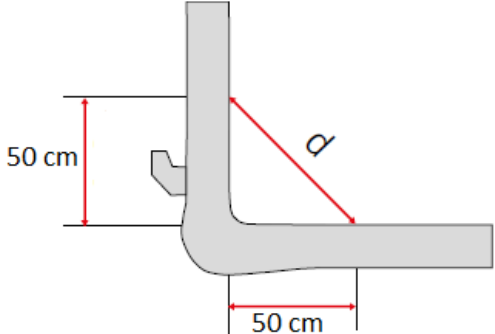
The forks should be a matched pair or in any case forks used as a pair should have the same dimensions, capacity and load centre distance.

Forks, positioning locks, bottom hooks and top hooks shall be inspected according to ISO 5057.

If any defect is found, the part (e. g. fork arm) or truck (e.g. chain(s)) shall be removed from service until satisfactory repairs have been performed.

Check	Target	Inspection instructions
5.1.1 Horizontal part and shank of the fork arm – Thickness	Wear verification	<p>The horizontal and vertical parts of the fork arm shall be fully checked for wear, with a focus in the vicinity of the heel.</p> <p>If the horizontal part thickness is reduced to 90% of the original thickness (detectable on the vertical part), or to the minimum thickness specified by the manufacturer of the fork arm or of the truck, the fork arm shall be removed from service.</p> <p>Typically, the measurement should be made 50mm from the end of the heel radius in order to obviate heel thickening</p> 

Check	Target	Inspection instructions
5.1.2 Permanent deformation		Each fork arm shall be checked for permanent deformation and misalignment in accordance of ISO 5057.
5.1.2.a Difference in height of the fork's tips	Verification of the alignment of the two fork arms	<p>Verify that the difference in height of the tips of the two fork arms (h) is less than 3% of the length of the horizontal part of the fork arm (L), or of that recommended by the manufacturer of the truck.</p> 
5.1.2.b Deflection of blade	Verification of the presence of deformations	<p>In case of presence of deformations of the blade, verify that the difference in height between the starting point of the deformation, and the tip of the fork (k), is less than 3% of the length of the horizontal part of the fork arm (L).</p> 

Check	Target	Inspection instructions
5.1.2.c Angularity	Verification of the angle formed by the two sides, horizontal and vertical, of the fork arm.	<p>The horizontal and vertical part of the fork ideally form a 90 ° angle. Either check angle is within 88° and 91° by use of suitable square or calliper, or verify that the test described in the diagram below gives a value of the diagonal (d) between 69,5 cm and 71,3 cm.</p>  <p>Note: Sometimes forks are used with deviant angular dimensions for specific cases., check before inspection.</p>
5.1.2.d Forks extending over the frame structure	Verification of the integrity	<p>Visually check the state of preservation of the welded joints and verify that, in correspondence of the zone welded to the fork carriage, there are no cracks. In case of doubt, proceed with non-destructive testing (e.g. dye penetrant).</p> <p>Permanent deformation or misalignment shall be less than 3% of the length of the horizontal part of the fork arm, or within the tolerances set by the manufacturer.</p>
5.1.3 Cracks at heel and mountings		Visually check the arms for cracks.
5.1.3.a Heel and mountings	Verification of the integrity	Visually check that there are no cracks on the forks, with particular reference to the inner and outer heel radius, and to the upper and lower hooks, including their connections to the vertical part. In case of doubt, proceed with dye penetrant inspection or magnetic powder crack detection
5.1.3.b Latches and stops	Verification of the integrity	Verify that the positioning lock, where originally planned, is in good condition and in proper operating conditions. If any defect is found, the fork arm shall be removed from service until satisfactory repairs have been performed.

Check	Target	Inspection instructions
5.1.3.c Damage to the tips	Verification of the integrity	Visually check the integrity of the fork tips.
5.1.4 Chains		
5.1.4.a Elongation	Elongation due to wear	<p>Verify that the maximum elongation of a tense chain is not greater than 3%. For chain elongation of between 2% and 3% a judgement needs to be made on whether or not the chain can continue to be used safely up to the next periodic inspection.</p> <p>The measurement shall be carried out in three separate locations over a measurement length of the nearest pitch multiple to 400 mm. The measurement shall be carried out in the area of maximum wear, which, as a rule, is the chain section running over the pulleys when the fork carrier is lifted for travel.</p>
5.1.4.b Wear	Verification of plate wear	Verify that the chain plate depth has not reduced by more than 5% of the original dimension. The unworn dimension may be ascertained by measuring a portion of the chain that does not run over the pulley, e.g. near the chain anchor.
5.1.4.c Anchors	Verification of the integrity	<p>Chain anchors, anchor pins, clevis and locking mechanism, e.g. split pins, to be visually inspected for wear, damage and corrosion.</p> <p>In addition, chain anchors shall be subject to Non-Destructive Testing (NDT) where appropriate, for instance after an incident where shock loadings have been applied to the lifting mechanism. In cause of doubt it shall be replaced.</p>

Check	Target	Inspection instructions
5.1.4.d Visual check	Verification of the integrity	Visual examination Visually examine the chain(s) and or associated components for: <ul style="list-style-type: none"> - Evidence of pitting due to rust or corrosion - Tight chain joints - Missing link plates - Cracked or fractured link plates - Loose pins with enlarged pin holes - Protruding or turned pins - Worn surfaces on the chain outer links or worn/damaged pin heads - Missing or damaged anchor pin locking device (e.g. split pins etc.) Particular attention should be paid to chains of trucks used in aggressive or harsh environments (e.g. cold rooms, saline environments, uneven floors, ...).

Check	Target	Inspection instructions
5.1.5 Lifting group	Verification of the integrity	<p>Check the functionality of rollers, pads, safety stops and end-stroke switches; check the correct setting of the tilt cylinders with the related fixings and supports of the lifting group.</p> <p>Visually inspect the mast/telescopic boom assembly when at maximum lift height/boom extension and operate the mast/boom throughout its full range of movements, including tilt, to establish that it moves in a controlled, even manner. In particular look for any marks/scoring which indicate that the mast may be damaged or the carriage movement impaired.</p> <p>Inspect the fork arm carrier for signs of distortion and cracking and operate any side shift mechanism fitted to ensure that the carrier moves in a controlled, even manner.</p> <p>In particular:</p> <ul style="list-style-type: none"> - check the state of preservation of the guide and support rollers, as well as pads; - check the wear of the profiles and verify that the clearance between masts (mast profiles) and rollers does not exceed 2 mm (unless otherwise specified by the manufacturer). In addition, check the absence of cracks and deformations; - check the integrity of the anti-derailment chains device and hydraulic pipes; - check the integrity of the end-stroke stoppers for the inner masts and for the fork carriage; - check that the joints and related pins of lifting group and tilting cylinders do not show excessive wear or cracks. <p>Verify the absence of cracks on the tilting cylinder rods close to the thread.</p> <p>Check the integrity, if present, of the protection devices in correspondence of pinch, entrapment and shearing points.</p>

5.2. Drive units and brakes

Check	Target	Inspection instructions
5.2.1 Engine and engine compartment		
5.2.1.a Diesel engine emissions check	Verification of emissions and system integrity	The fuel supply system shall be checked. It shall not show any sign of leakage. Seal and quality of the fuel tank fixing and of its piping shall be verified. Where required by national regulations or specified in the instructions the limits of gaseous pollutant and particulate emissions shall be tested as required.
5.2.1.b Trucks powered by LPG engine	Verification of emission levels and system integrity	The LPG system shall be checked. It shall not show any sign of leakage and proper functioning shall be verified. The integrity and the effectiveness of the fixing of the LPG container, of pipes and of protections of the valves shall be verified. Check the maintenance record of the LPG system to ensure that the maintenance indications given by the industrial truck and/or LPG system manufacturer have been respected. The LPG tank/container shall be examined in accordance with relevant legislation. Where required by national regulations or specified in the instructions the limits of gaseous pollutant and particulate emissions shall be tested as required.
5.2.1.c Checking of the exhaust/intake system	Verification of the integrity	The cabin shall be checked against the ingress of exhaust emissions (e.g. by a visual examination and/or an odour test). The muffler integrity shall be verified. If the truck is provided with guards protecting hot surfaces, the presence, the correct positioning and effectiveness of these guards shall be checked.
5.2.1.d Engine access	Verification of the presence and integrity of the provided safety devices.	If the truck is provided with a device that prevents the access to the engine compartment, the functionality of this device shall be checked. If a fan in the engine compartment can start with the engine off (e.g. because of a thermostat), the integrity of the fan guard or presence of a respective warning shall be checked.

Check	Target	Inspection instructions
5.2.1.e Trucks powered by CNG engine	Verification of emission levels and of system integrity	CNG propelled trucks are subject to additional inspection according to manufacturer specifications.
5.2.2 Service brake, braking performance	Performance verification	<p>Service brake performance shall be checked based on manufacturer specifications.</p> <p>Lacking any manufacturer specifications, brakes performance can be verified by the stopping distance method detailed in Annex F.</p> <p>Details of braking efficiency verification using the deceleration measurement method can be found in Annex C of VDI 2511^[3].</p>

Check	Target	Inspection instructions
<p>5.2.3 Parking brake, braking performance</p>	<p>Performance verification</p>	<p>The parking brake performance shall be verified according to the manufacturer specifications. Alternatively, parking brakes shall be evaluated placing the laden truck on the steepest gradient in the plant the truck can travel on. With parking brake engaged the laden truck shall stand still.</p> <p>When testing the parking brake performance by placing the laden truck on a slope, it is required to verify the availability of the load and the slope equal, at least, to the maximum respectively handled and travelled by the end user, in his work cycle</p> <p>Alternatively, a towing force test can be carried out.</p> <p>Sit-on or stand-on trucks and tractors shall be towed on level ground with a force equal to the one required to keep it stationary on a 15 % slope. Reach stackers, straddle carriers, high-lift forklifts truck, high-lift pallet truck trucks, pallet trucks with low lift height and pedestrian-guided trucks shall be tested on a 10 % slope. Trucks with elevating operator position, side-stackers, three side-stackers, trucks with high and medium lift height and elevating operator position shall be tested on a 5 % slope, in the same working conditions.</p> <p>When the activated parking brake does not disconnect the drive, the parking brake performance can be alternatively checked selecting the driving mode and accelerating against the activated parking brake.</p> <p>If no slope is available at the working place, it is also possible to check the efficiency of the parking brake on 15%, 10% and 5% slope measuring the maximum deceleration of the unloaded truck at maximum speed. Maximum deceleration shall be greater than:</p> $a = g \cdot \sin \alpha \cdot b \approx g \cdot \tan \alpha \cdot b \approx g \cdot i \cdot b \quad [\text{m/s}^2]$ <p>where:</p> <ul style="list-style-type: none"> - "α" is the relate angle of 15, 10 or 5 % slope;

		<ul style="list-style-type: none">- "i" is the value % of the slope: 0.15, 0.10 and 0.05;- b= full load mass/ unladen mass. This value is equal to 1.6 for counterbalanced trucks (see VDI 2511). <p><u>Note 1:</u> engaging the parking brake while travelling could be dangerous and damage the brakes, particularly if the truck is equipped with negative brakes.</p> <p><u>Note 2:</u> the test shall be carried out driving backward or constraining the load.</p> <p>For testing purposes, it may be necessary to temporarily disable the device that cuts off the traction when engaging the parking brake, if technically feasible (or to switch off the drive).</p> <p>When testing the parking brake performance by placing the laden truck on a slope, it is required to verify the availability of the load and the slope equal, at least, to the maximum respectively handled and travelled by the end user, in his work cycle.</p>
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Check	Target	Inspection instructions
5.2.4 Braking system by tiller of trucks	Performance verification	<p>Tillers on pedestrian propelled trucks with mechanically operated brake shall move into the braking position automatically.</p> <p>Make sure that when the tiller is released, it returns automatically to the upper rest position and any traction movement is interrupted by inserting the brake, independent from the traction control.</p> <p>Check that when the tiller is completely lowered, <i>any</i> traction movement is interrupted by inserting the brake, independent from the traction control.</p>
5.2.5 Braking system	Verification of integrity and functionality	<p>Check brake fluid level in the reservoir. The wear of mechanical transmission elements, flexible or rigid pipes and their fittings shall be checked.</p> <p>The stroke of the device used to actuate the braking (e.g. lever, pedal, etc.) shall be checked, taking care that the device itself stops before hitting any surface that physically limits its stroke (e.g. pedals shall not touch the chassis).</p> <p>Also, the actuating device shall keep a steady position when the operator engages it fully.</p>
5.2.6 Wheels and tyres	Verification of the integrity	<p>Tyres shall be visually checked; they shall not be excessively worn off or damaged</p> <p>Wheels and their assemblies shall be in maintained in good conditions.</p> <p>Items to be verified are mainly:</p> <ol style="list-style-type: none"> 1. rims shall not be bent or significantly damaged; 2. bolts shall not be missing and shall not be damaged as well as their seats; 3. bolts shall not be loose; 4. tyres shall be inflated at the manufacturer specified pressure and tyre sidewalls shall not show punctures or cuts. Tyre tread shall be at least 1.6 mm deep across the central $\frac{3}{4}$ of the tread around the complete circumference of the tyre; general condition and wear limits of super elastic wheels shall be checked. Both cushion and super elastic wheels shall be replaced when reaching the wear indicator on the sidewall or as specified by the manufacturer; 5. the maximum wear allowed for polyurethane type wheels (indoor use) is 50 % of the original height, unless specified otherwise by the manufacturer.

Check	Target	Inspection instructions
5.2.7 Drive axle	Verification of the integrity	Visual check of the integrity of the structure of drive axle and gears and the proper mounting of the axles shall be performed.

5.3. Operator seat and controls

Check	Target	Inspection instructions
5.3.1 Restraint system	Verification of the integrity	Check the operator's restraint system for proper function and / or other devices having the same purpose. In case of duo-sensitive lap belt type, check its locking when the seat is tilted or equivalent status according to the manufacturer indications.
5.3.2 Operator seat	Verification of the integrity	Check the seat mounting and adjustment functions.

Check	Target	Inspection instructions
5.3.3 Steering system	Verification of the integrity and functionality	<p>Check that there are no backlash and/or damage such as to compromise the functionality with and without load.</p> <p>Check the steering limits depending on the type of mechanism:</p> <ul style="list-style-type: none"> • With bearing and chain: <ul style="list-style-type: none"> • Check the condition of the chain, the bearing and its mounting systems; check the backlash of the system (the chain tension) and the efficiency of its mechanical stops; the steering chain shall be replaced when it is no longer possible to adjust the tension. • With slewing ring and pinion: <ul style="list-style-type: none"> • Check the teeth backlash • With kingpins: <ul style="list-style-type: none"> • Check the backlash in the steering box. Verify that the components of the system (such as, for example: the steering arms and kingpins) for damage or deformation. <p>Kinds of actuation:</p> <ul style="list-style-type: none"> • Mechanical: <ul style="list-style-type: none"> • Check the function of the return smoother (kickback) on the steering wheel. <p><u>Note:</u> The return smoother device is not mandatory for industrial tow-tractors.</p> • Electrically or hydraulically servo-assisted: <ul style="list-style-type: none"> • For hydraulic servo-steering: check the transmission parts for auxiliary steering pump and check the oil level; check the status of conservation and efficiency of pipes and hoses: replace them, when in doubt, respecting the dimensions and strength specifications. • For electric servo-steering: check wiring and connections.

		<ul style="list-style-type: none">• Hydrostatic<ul style="list-style-type: none">• Check the sealing of the drive unit control. Check the status of preservation of the hoses, pipes and replace them, if in doubt, taking care to preserve the original specification.• Check hydraulic system for sponginess or creep that may indicate the presence of air in the system.
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Check	Target	Inspection instructions
5.3.4 Controls and their marking	Verification of the integrity and functionality	<p>Check all the command devices functions and the integrity of the relevant pictograms.</p> <p>Check the functionality of device to prevent unauthorised starting.</p> <p>Check the presence of the indications, the consistency between the command and the movement and the individual engagement positions of the selection devices (e.g. lifting – lowering).</p> <p>Verify the acceleration devices (pedals and transmission elements); they shall allow a fluid drive traction and return autonomously in the zero position.</p>
5.3.5 Engine or electric power source compartment	Verification of the integrity	<p>Check the presence of the cover and integrity of the structure</p> <p>Also, check that the cover is correctly fixed in such a way as to avoid unintentional movement.</p>
5.3.6 Overhead guard	Verification of the integrity	<p>Check the status of the overhead guard, cabin, grids against falling small objects (where present), as well as load backrest extension (where present).</p> <p>Check the overhead guard, its mountings and supporting structure for damage or any signs of permanent deflection. For tiller trucks, in the presence of a folding platform and/or side restraint, check their integrity and proper functioning in accordance with the manufacturer's specifications.</p>

5.4. Electrical equipment

Check	Target	Inspection instructions
5.4.1 Electric power source conditions	Verification of the integrity	<p>Check electric power source and connections condition. Make sure that bolted connections are properly tightened and insulated.</p> <p>Check the absence of electrolyte/fluid inside the electric power source compartment due to spill, leakage or water ingress.</p>
5.4.2 Electric power source restraints	Verification of the integrity	Inspect the integrity of systems and/or electric power source restraints.
5.4.3 Electric power source data	Verification of the compatibility	Check that the specifications, e.g. electric power source type, voltage and weight, of the electric power source are compatible with what specified by the manufacturer of the lift truck. Data shall be marked on a specific plate attached to the electric power source.
5.4.4 Device to prevent powered movement	Verification of the functionality	<p>Checking for shut-off functionality of power units (e.g. seat- or dead man switch), when the operator leaves the normal operating position.</p> <p><u>Note:</u> Shut-off device shall be installed on IC trucks built after 29/12/2009 as well.</p>
5.4.5 Emergency shut-off	Verification of the functionality	Emergency switch off shall be verified (for electrical trucks separate switch or electric power source connector).
5.4.6 Electronic safety unit	Verification of the functionality	<p>Where applicable, check that control systems faults, simulated according to manufacturer specifications, initiate the safety procedure defined by the manufacturer.</p> <p><u>Note:</u> For systems which have automatic functionality monitoring, checking should be considered outdated.</p>
5.4.7 Wiring and fuses	Verification of the integrity	Visually inspect the integrity of electrical wirings (insulation, connections) and fuses.
5.4.8 Tiller switch	Verification of the functionality	Checking for correct behaviour of tiller switch. Switch shall be able to either stop the truck or reverse the direction when activated.
5.4.9 Acoustic and visual warning	Verification of the functionality	Check function of audible and visual warning devices.

Check	Target	Inspection instructions
5.4.10 Insulation resistance checking	Check insulation resistance	<p>Battery powered trucks up to 120V nominal voltage: The insulation resistance of the truck and traction battery shall be checked separately.</p> <p>The insulation resistance between live parts of all electric components and the frame of the industrial truck with the exception of the battery shall be at least 1000 Ω multiplied by the nominal voltage of the truck system.</p> <p>The insulation resistance of the disconnected, filled and charged traction battery mounted on the truck shall be at least 50 Ω multiplied by the nominal voltage of the truck system between the live parts and the frame of the truck. Where the battery is fitted into more than one container this test shall be carried out with the sections (including metal battery containers) electrically connected.</p> <p>IC-trucks with electrical transmissions (Hybrid):</p> <p>The insulation resistance between live parts of all electric components and the frame of the truck shall be at least 1000 Ω multiplied by the nominal voltage of the truck system</p> <p>Additional requirements for batteries in excess of 120V:</p> <p>The insulation resistance of the disconnected, filled and charged traction battery mounted on the truck shall be at least 500 Ω multiplied by the nominal voltage of the truck system between the live parts and the frame of the truck.</p> <p>Note: Requirements for the test voltages to check insulation are defined in the EN 1175^[4] series.</p>
5.4.11 Assistance system	Verification of the functionality	If applicable, check functionality of assistance systems of the truck, according the respective manufacturers instructions.
5.4.12 Electric power source plug	Verification of the integrity	Check electric power source plug (e.g. for mechanical secureness and for condition of connector pins).

5.5. Hydraulic system

Check	Target	Inspection instructions
5.5.1 Oil leakage test in the lowering phase	Check of the oil leakage in the lowering phase	Check the mast lowering with the maximum nominal load, not exceeding the rated load , available on site (maximum allowed lowering drift 100 mm / 10 min for trucks up to 10 tons of capacity and maximum 200 mm / 10 min for trucks over 10 tons of capacity). The test shall be carried out with the hydraulic oil at the same temperature as used in the standard working condition and with all the cylinders in pressure.
5.5.2 Oil leakage test in the tilting phase	Check of the oil leakage in the tilting phase	With the maximum load, not exceeding the rated load , available on site (in case the nominal load is not available) check the oil leakage of the lift truck tilting cylinders at a lift height of 2.5 m: the maximum allowed tilt drift must be 5° every 10 min. <u>Note:</u> The load must be fixed to the forks.
5.5.3 Leakage and damage	Verification of the integrity	Visual inspection of the hoses, pipes and fittings. They must be in good condition, without leakage, corrosion, wearing signs, cracks, blisters, flattening, folds or twists.
5.5.4 Lowering speed control valve	Functionality check	Measure the lowering speed to test that the valve works properly. The max lowering speed tested with the rated load shall not exceed 0.6 m/s, unless otherwise specified by the manufacturer.
5.5.5 Safety and mechanical setting	Verification of the integrity	Check if the mechanical safety stoppers (e.g. steering, tilting, batteries etc.) are in place, the setting and stroke of the tilting and lifting cylinders.

5.6. Truck chassis and safety equipment

Check	Target	Inspection instructions
5.6.1 Mounting point	Verification of the integrity	<p>By visual inspection, or other suitable methods, e.g. displacement, check the mountings of:</p> <ul style="list-style-type: none"> • mast • counterweight • drive axle • steering axle • overhead guard • tilt cylinder, etc., <p>In case of doubt about the integrity, a partial disassembly or a test with dye penetrant may be required.</p>
5.6.2 Frame and safety Structures	Verification of the integrity	Visually check frame and safety equipment (e.g. overhead guard, barriers, folding lateral barriers...), for cracks, damage, distortion that could affect the operational safety.
5.6.3 Trailer coupling	Verification of the integrity	Visual check of the integrity of the trailer coupling, to verify the absence of cracks, damage and deformations which could affect the operational safety.
5.6.4 Bottom opening on LPG powered trucks	Verification of the functionality	Check if the bottom opening on LPG powered trucks in the lower position in the engine compartment foreseen by the manufacturer is not accidentally closed.
5.6.5 Hood	Verification of the functionality	<p>Functionality check of the hood lock.</p> <p>When the restraint system for operator is fitted with the seat on the hood, it is necessary to check all the connecting elements:</p> <ul style="list-style-type: none"> • of the restraint system to the seat; • of the seat to the hood; • of the hood to the frame. <p>Check the efficiency of the system which holds the hood(s) in the open position.</p>
5.6.6 Stabilizers buffers on three tyre trucks	Verification of the integrity	Where applicable, verify the presence, integrity and compliance with manufacturer's instructions.

5.7. Miscellaneous and special equipment

Check	Target	Inspection instructions
5.7.1 Labelling	Verification of the integrity	Check that information plate and the plate of actual capacity of the truck and all other labels, specified by the manufacturer are securely attached and legible. If applicable, check labelling for attachments.
5.7.2 Operating instructions	Verification of the availability	Check that instruction handbook, including associated documents, are available (e.g. attachment instruction handbook).
5.7.3 Attachments for load handling	Verification of the presence of necessary information and securities	In the absence of the capacity plate of the whole truck-attachment system or where there is reasonable doubt about to the existing one, the competent person shall strictly highlight that the truck cannot be used safely. Check the functionality of control devices for attachments including secondary action function to prevent unintentional release for load clamping attachments where fitted. For example, of the inspections to be carried out on the attachment, refer to Annex E which describes the most common attachments on the market.
5.7.4 Optional equipment	Verification of the integrity and functionality	Check the functionality of the optional equipment such as flashing lighting, mirrors, reversing alarm.
5.7.5 Additional check		Additional safety controls may be required for trucks dedicated to specific uses (e.g. Explosion-proof trucks). The competent person shall record the inspected items not detailed in this document but present on the truck being inspected. These items are to be detailed by expert on the after-check documentation.

6. After check documentation

6.1. The report of the periodic inspection

The competent person carrying out the periodic inspection shall prepare a report detailing the inspection carried out, identifying identified faults and highlighting any weaknesses or areas of concern.

The report should clearly state:

- 1) No faults have been detected.
- 2) Faults have been detected and the listed actions are required within the time limits specified, or
- 3) The truck should not be used until the listed actions are carried out

The original of the report should then be given to the truck users representative with a copy of the original being sent to the owner (who may be the same person).

An example of the report is given in Annex C.

Records of periodic inspections should be kept according to applicable National Regulations. It is recommended to keep the records for a period of at least three years.

6.2. Periodic inspection label

To give evidence of the inspection carried out and remember the expiration date for next inspection, the label in Annex D can be used

ANNEX A - Conditions required to carry out the periodic inspection

A.1 When the competent person should not proceed with the periodic inspection of the truck

The user shall make available to the competent person dedicated to the periodic inspection activity, a truck in such conditions that the same can be verified. The truck shall be accompanied by all the documentation required by the regulations applicable to the machine.

The reasons for which the competent person should not proceed to the periodic inspection of the truck are as follows (indicative and non-exhaustive list):

1. The truck is presented in such dirty conditions that the periodic inspection would be unreasonably difficult to perform.
2. The truck can't be driven properly or has insufficient electric power source power, fuel or oil for which the tests to be carried out can't be properly performed.
3. The access to elements of the truck, for which an inspection is expected, is impossible
4. The truck is in such conditions that, on the judgement of the experienced technician, the periodic inspection activity could cause damages to persons or things. This can include also e.g. lack of information required to perform the inspections safely, unauthorized modifications that can imply impossibility to perform specific inspections (this could be also highlighted in the after-check documentation), etc.

Inspections cannot be considered passed on trucks where:

- The nameplate of the truck is missing, extremely damaged or not available (in this case it shall be replaced).
- The capacity plate is missing, extremely damaged or not available (in this case it shall be replaced).
- The original instruction handbook is missing, extremely damaged or not available (in this case it shall be replaced).
- The Declaration of Conformity and/or the CE or "e" marking on the truck is missing, extremely damaged or not available (in this case it shall be replaced).
- The competent person has reason to suspect that the machine has been modified or accessorized beyond what is permitted and foreseen by the manufacturer.
- The user / owner of the truck cannot provide the documentation from the manufacturer or modifier that describes / approves the modification to the truck.

Missing or wrong documentation shall be recorded in the inspection report.

A.2 Suitability of areas for the implementation of periodic inspection

Before starting any periodic inspection activity, move the truck to a suitable place and make sure that:

- such operations are carried out by qualified personnel;
- operations can be performed in safety both for the competent person and for others;
- adequate lighting and safe working facilities shall be provided
- were required, refer to the user manual and maintenance of the original truck manufacturer and/or attachment.

To ensure the safety conditions during the periodic inspection activity, the user and the competent person need to evaluate, before the execution of the activities or contracting, the risk of interference between the specific activities of the workplace and the competent person activities, in accordance with the provisions of national regulation about safety at workplaces.

ANNEX B – Example test equipment and PPE

Non-exhaustive catalogue of test equipment and PPE.

- Chain gauge
- Fork calliper
- Vernier calliper
- Jacks and blocks
- Set square
- Harness
- Torch
- Hand tools (basic set for removal of covers, etc.)
- Access equipment, e.g. ladder
- Insulation tester
- Tool for brake testing
- Tape measure
- Emission Check Tools (if test is requested by local legislation)
- Personal Protective Equipment (PPE)⁴
 - Safety footwear
 - Protective gloves against dangerous chemicals
 - Protective gloves against mechanical risks
 - Electrical insulating gloves
 - Safety glasses/goggles Electrically insulating helmets for use on low voltage installations
 - High visibility clothing
 - Safety helmets
 - Filtering half masks to protect against particles

⁴ The final indication on what kind of PPE shall be used depends on the specific task that the competent person will carry out and is responsibility of the employer of the competent person.

ANNEX C – Test Record

Industrial Trucks				
Periodic Inspection Test Report				
				Page 1
Inspected by:	Type of industrial truck:			
_____	_____			
User Company Name:	Manufacturer and model:			
_____	_____			
Date:	Serial Number and year of manufacture:			
_____	_____			
Place:	Hours of operation:			
_____	_____			
Pre-check analysis				
Nameplate	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Capacity Plate	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Declaration of Conformity	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Instruction handbook	<input type="checkbox"/> Yes <input type="checkbox"/> No			
The condition of the industrial truck is such that it allows to carry out the inspection efficiently and safely	<input type="checkbox"/> Yes <input type="checkbox"/> No. Reason: _____ _____ _____			
Method of inspection				
	Visual Exam	Functional Test	Operational Test	Remarks\Comments
5.1 Lifting Devices				
5.1.1 Horizontal part and shank of the fork arm – Thickness				
5.1.2 Permanent deformation				
5.1.2.a Difference in height of the fork's tips				
5.1.2.b Deflection of blade				
5.1.2.c Angularity				
5.1.2.d Forks extending over the frame structure				

	Method of inspection			Page 2
	Visual Exam	Functional Test	Operational Test	Remarks\Comments
5.1.3 Cracks at heel and mountings				
5.1.3.a Heel and mountings				
5.1.3.b Latches and stops				
5.1.3.c Damage to the tips				
5.1.4 Chains				
5.1.4.a Elongation				
5.1.4.b Wear				
5.1.4.c Anchors				
5.1.4.d Visual check				
5.1.5 Lifting group				
5.2 Drive units and brakes				
5.2.1 Engine and engine compartment				
5.2.1.a Diesel engine emissions check				
5.2.1.b Trucks powered by LPG engine				
5.2.1.c Checking of the exhaust/intake system				
5.2.1.d Engine access				
5.2.1.e Trucks powered by CNG engine				
5.2.2 Service brake, braking performance				
5.2.3 Parking brake, braking performance				
5.2.4 Braking system by tiller of trucks				
5.2.5 Braking system				
5.2.6 Wheels and tyres				
5.2.7 Drive axle				

	Method of inspection			Page 3
	Visual Exam	Functional Test	Operational Test	Remarks\Comments
5.3 Operator seat and controls				
5.3.1 Restraint system				
5.3.2 Operator seat				
5.3.3 Steering system				
5.3.4 Controls and their marking				
5.3.5 Engine or electric power source compartment				
5.3.6 Overhead guard				
5.4 Electrical Equipment				
5.4.1 Electric power source conditions				
5.4.2 Electric power source restraints				
5.4.3 Electric power source data				
5.4.4 Device to prevent powered movement				
5.4.5 Emergency shut-off				
5.4.6 Drive safety check system				
5.4.7 Wiring and fuses				
5.4.8 Tiller switch				
5.4.9 Acoustic and visual warning				
5.4.10 Insulation resistance checking				
5.4.11 Assistance system				
5.4.12 Electric power source plug				

	Method of inspection			Page 4
	Visual Exam	Functional Test	Operational Test	Remarks\Comments
5.5 Hydraulic System				
5.5.1 Oil leakage test in the lowering phase				
5.5.2 Oil leakage test in the tilting phase				
5.5.3 Leakage and damage				
5.5.4 Lowering speed control valve				
5.5.5 Safety and mechanical setting				
5.6 Vehicle frame and safety equipment				
5.6.1 Mounting point				
5.6.2 Frame and safety structures				
5.6.3 Trailer coupling				
5.6.4 Bottom opening on LPG powered trucks				
5.6.5 Hood				
5.6.6 Stabilizers buffers on three tyre trucks				
5.7 Miscellaneous and special equipment				
5.7.1 Labelling				
5.7.2 Operating instructions				
5.7.3 Attachments for load handling				
5.7.4 Optional equipment				
5.7.5 Additional check				

Additional Notes:

Result of the inspection (indicate any eventual shortcomings):	Evaluation on the continuation of operation:
_____	_____
_____	_____
_____	_____
Eventual additional controls suggested:	Signature:
_____	_____
_____	_____
_____	_____

ANNEX D – Inspection Label

Company


**Periodic Safety Inspection
FEM 4.004**

**Carried out according to
National regulation:**


(1) _____
(Directive 2009/104/EC)

on: (2) _____

by: (3) _____



Member of

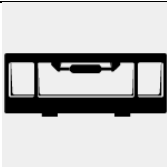
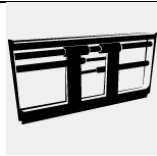


 **European
materials
handling
federation**

(1) National regulation





(2) Date

(3) FEM – member – company
dealer (if applicable)

ANNEX E – Inspections for attachments⁵

		Side-shift	Fork Positioner	Multiple Fork Positioner	Rotator
					
1	Equipment fixing system (screw condition, backlash between hooking and plate, interlocking and coupling plate, lower supports, welding of the third rotating plate engagement, load protection grid)	X	X	X	X
2	Hydraulic system (piping and fittings status, no oil leakage, operating pressure, maximum pressure valve efficiency (check data on the nameplate)	X	X	X	X
3	Block valve efficiency				
4	Greasing of slider pads	X	X	X	X
5	Greasing of the bar	X	X	X	
6	Greasing of buckles and rotators		X	X	X
7	Operation of gas shock absorbers			X	
8	Calibration of movements (movement of forks, rotation, shifting)	X	X	X	X
9	Check of tightening torque of bolts, clamps, forks and rotating group		X	X	X
10	alignment of forks, arms, screws and cylinders	X	X	X	X
11	Status of fork lock	X	X		X
12	Visual control of welding status	X	X	X	X

⁵ This document only describes the most common attachments on the market.

		Clamp	Bale Clamp	Push Attachment	Fork Extension
					
1	Equipment fixing system (screw condition, backlash between hooking and plate, interlocking and coupling plate, lower supports, welding of the third rotating plate engagement, load protection grid)	X	X	X	X
2	Hydraulic system (piping and fittings status, no oil leakage, operating pressure, maximum pressure valve efficiency (check data on the nameplate)	X	X	X	X
3	Block Valve efficiency	X	X	X	X
4	Greasing of slider pads	X		X	X
5	Greasing of the bar				
6	Greasing of buckles and rotators	X	X	X	X
7	Operation of gas shock absorbers				
8	Calibration of movements (movement of forks, rotation, shifting)	X	X	X	X
9	Check of tightening torque of bolts, clamps, forks and rotating group	X	X	X	X
10	alignment of forks, arms, screws and cylinders	X	X	X	X
11	Status of fork lock	X	X	X	X
12	Visual control of welding status	X	X	X	X

ANNEX F – Brake performance

Trucks manufactured after October 2008 shall comply with ISO 6292:2008 as follows:

The test shall be carried out on smooth level ground of sufficient length to bring the truck to a halt travelling in a straight line.

The truck velocity immediately prior to application of the brake shall be at least 90% of the maximum truck velocity.

The service brake shall bring the truck to a complete stop within the braking distance shown in Figure F.1.

The measured distance shall be from the point where the brake control is actuated. Operator response time does not form part of the test.

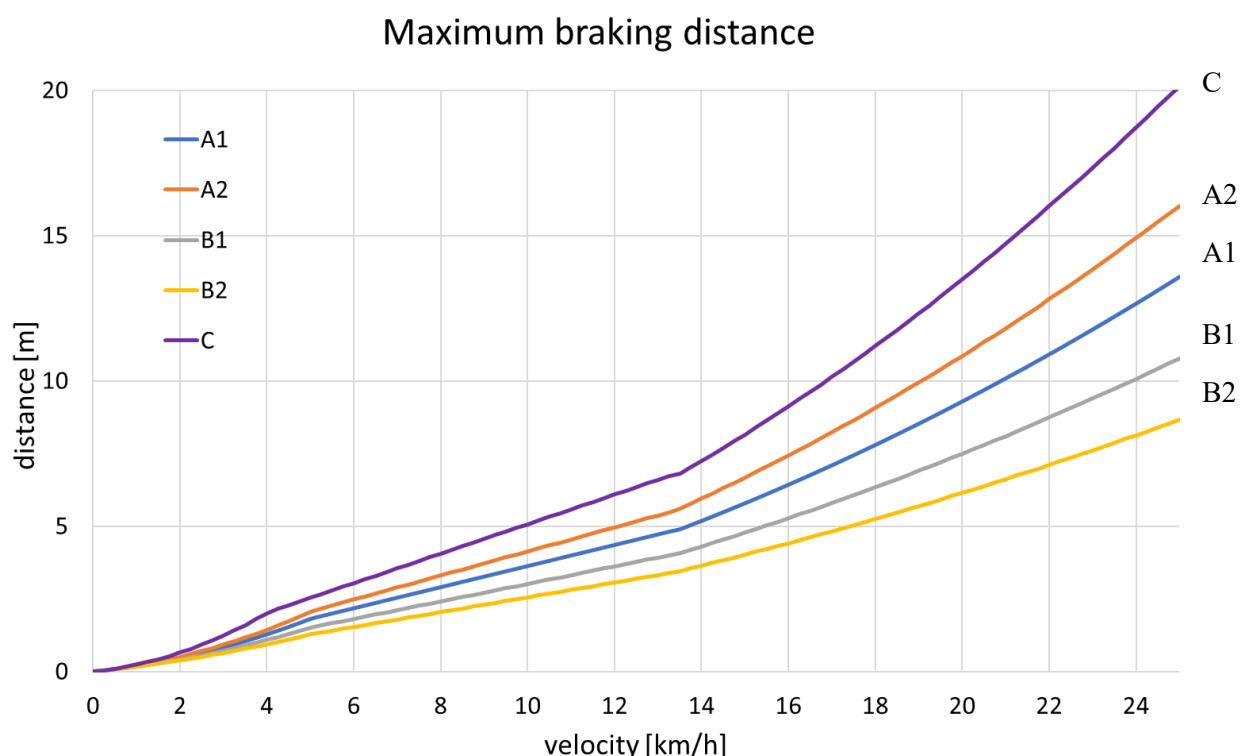


Figure F.1 – Maximum braking distance for different groups of truck

Key:

Group	Type of truck
A1	Industrial trucks, excepting those in groups B and C, having laden capacity < 16 000 kg and laden mass < 35 000 kg
A2	Industrial trucks, excepting those in groups B and C, having laden capacity \geq 16 000 kg or laden mass \geq 35 000 kg
B1	Industrial tractors with up to two braked wheels
B2	Industrial tractors with more than two braked wheels
C	Industrial trucks with elevating operator position above 1 200 mm, and, industrial trucks specifically designed to travel with elevated loads

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- [4] EN 1175-1:1998+A1:2010 Safety of industrial trucks - Electrical requirements - Part 1: General requirements for battery powered trucks
EN 1175-2:1998+A1:2010 Safety of industrial trucks - Electrical requirements - Part 2: General requirements of internal combustion engine powered trucks
EN 1175-3:1998+A1:2010 Safety of industrial trucks - Electrical requirements - Part 3: Specific requirements for the electric power transmission systems of internal combustion engine powered trucks

The recommendations and advice contained in this Guidance Note are based on specifications, procedures and other information that have been collected from the FEM from its members. They represent what is, as far as FEM is aware, the best available data at the time of publication on the instruction and use of the equipment concerned in the general conditions described and are intended to provide guidance for such use.

The suitability of this Guidance Note must be determined by the judgement of the person applying it in accordance with the conditions in which use is envisaged and subject to all relevant statutory requirements.

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