HEFPRO

Safe and skilled With

Forklift and REACH TRUCK!

Welcome to the Training

Welcome to this training for forklift and reach truck operators. In modern warehouses, production environments, and logistics centers, internal transport plays a crucial role. Forklifts, reach trucks, and other internal transport equipment ensure that goods are moved quickly, efficiently, and safely. These machines enable a lot of work that would otherwise be heavy, slow, or even impossible.

Therefore, it is very important that the operators of these machines are well trained. Techniques are becoming increasingly sophisticated, safety requirements are becoming stricter, and companies expect professional, careful, and responsible operators. Safety is central to this training. Working safely is not a trick you learn once, but an attitude and a way of thinking. It's about being alert, looking ahead, recognizing risks, and taking responsibility — for yourself, for your colleagues, and for the environment in which you work.

This textbook will guide you step-by-step through all the knowledge and skills you need to perform your work safely, efficiently, and with confidence. Both novice and experienced operators will find valuable information in this book.

Why Safe Work is Important

In every work environment where forklifts and reach trucks are used, there is a risk of accidents. Annually, hundreds of incidents occur where employees are injured, goods are damaged, or business processes come to a standstill. These accidents are often caused by a combination of factors:

- Insufficient knowledge
- Unsafe actions
- Work pressure
- Poor workplace design
- Lack of maintenance

> **Safe working doesn't mean you take no risks — it means you consciously and controlledly only take acceptable risks.**

Safety as Attitude and Behavior

Safe working doesn't start with the forklift, but with yourself. Technical knowledge and skills are important, but **safety is primarily a matter of attitude and behavior**.

A safety-conscious driver:

- Works concentrated and takes their time.
- Looks ahead and anticipates risks.
- Is aware of pedestrians and colleagues.
- Does not get distracted by haste, phones, or busyness.
- Sees the forklift as a responsibility, not a race vehicle.

Many accidents occur because drivers:

- Are tired or have difficulty concentrating.
- Repeatedly make the same mistake out of habit or complacency.
- Think they can "just quickly do something".
- Use incorrect work postures or skip procedural steps.

At the end of this training, you will be able to:

- Work safely and responsibly with forklifts and reach trucks.
- Identify hazards and assess risks in advance.
- Perform daily checks and report malfunctions.
- Carry out your work efficiently and professionally.

The Responsibility of the Operator

A forklift/reach truck operator carries a great responsibility. You are the one who operates the machine, assesses risks, and makes the right decisions while working. These vehicles are powerful and useful, but not toys—mistakes can have serious consequences for yourself and your surroundings.

The operator is responsible for:

Safe operation

Operating the truck safely according to instructions and regulations.

Adhering to regulations

Complying with company and traffic regulations.

Using PPE

The use of personal protective equipment (PPE).

Reporting defects

Reporting dangerous situations or defects in equipment.

Preventing damage

Preventing damage to goods, shelving, and buildings.

Protecting colleagues

Protecting colleagues and other people in the workplace.

A professional operator:

- Knows the rules.
- Follows procedures.
- Acts responsibly.
- Is alert to changes in the working environment.
- Does not take unnecessary risks.

Structure of This Textbook

This textbook follows a logical structure that aligns with the learning process of a novice to advanced driver. Each chapter covers a specific aspect of the profession, including:

1. Legislation and Safety Responsibilities
2. Workplace and Warehouse Environment
3. Types of Internal Transport Equipment
4. Structure and Technology of the Truck
5. Propulsion and Energy Sources
6. Stability and Load Handling
7. Load Diagram and Safe Loading
8. Daily Inspection and Maintenance
9. Driving Techniques and Practical Work
10. Picking Up, Transporting, and Storing Loads
11. Environment, Living Environment, and Safety Aspects
12. The Forklift on Public Roads
13. Part of the professional driver's work
14. Competent handling of internal transport, loading and unloading
15. Practice Questions and Final Exam

CHAPTER 1 – Legislation and Safety Responsibilities

This chapter covers the legal frameworks and responsibilities essential for safe work with forklifts and reach trucks. From the Working Conditions Act to practical safety measures: everything you need to know to work safely and in accordance with regulations.

The Working Conditions Act and why it is so important for you as a forklift driver

Working with a forklift or reach truck sometimes seems straightforward: you get on, you move a pallet, you place a load in the rack. But behind this apparent simplicity lies a world of safety requirements, responsibilities, and legal obligations. Not because the government wants to be difficult, but because working with internal transport inherently involves risks.

The Working Conditions Act — the Arbeidsomstandighedenwet — is the foundation in the Netherlands for everything related to safety and health in the workplace. This law was introduced because in the past, too many people were injured at work, sometimes with permanent consequences or even fatal outcomes. The law is designed to prevent this, so that everyone can safely go home at the end of the workday.

> The Working Conditions Act obliges employers to identify risks, take measures, protect employees, and ensure that machines are safe. At the same time, the law obliges you as an employee to actively contribute to that safety, by following instructions, using protective equipment, and reporting unsafe situations.

How the Working Conditions Act (Arbowet) is structured and what it means in practice

The Working Conditions Act itself mainly contains general rules. You will not find in the text of the Working Conditions Act exactly how much space a driving path should have or what training you need to operate a forklift. The Act only states *that* an employer is obliged to ensure safety, health, and welfare, and *that* employees must cooperate.

But of course, that is not enough. Therefore, the Arbo system consists of three layers that become increasingly concrete.

01

The Working Conditions Act: the basis

The Working Conditions Act itself contains obligations such as:

- employees must be able to perform their work safely
- employers must identify and reduce risks
- machinery must be safe
- employees must be sufficiently informed and trained

These are objective rules: they prescribe *what* must be achieved, not *how*.

02

The Working Conditions Decree: the more concrete elaboration

This contains much clearer regulations. For example, that lifting and hoisting equipment, including forklifts and reach trucks, may only be operated by people with **specific expertise**. This means you should never just get on a forklift — you must be trained for it, and your employer is obliged to check that you actually have that expertise.

03

The Working Conditions Regulation: technical details

The Working Conditions Regulation delves even further into detail. In it, you will find, for example, rules on the inspection of machinery, the procedure for reporting accidents, and the requirements for a Risk Inventory and Evaluation (RI&E). Companies are obliged to comply with these.

Thanks to this structure, a complete system is created that clearly defines: what employers must arrange, how workplaces must be designed, how machines must be checked, and what employees must do to work safely.

The role of Occupational Health and Safety Information Sheets and practical applications

Occupational Health and Safety Information Sheets (AI-sheets)

In addition to legislation, the government has also published Occupational Health and Safety Information Sheets (AI-sheets). They are not legally binding, but are used as practical guidelines for safe working. For forklift and reach truck drivers, **AI-14** and **AI-17** are particularly important.

AI-14 provides guidelines for safe warehouse layout, such as the arrangement of aisles, walkways, racking, and sightlines.
AI-17 describes the safe use of mobile work equipment, including driving behavior, stability, loading, and maintenance.

Together, these AI-sheets help to identify and manage risks, and form an important basis for safety regulations in many companies.

As a driver, you notice this, for example, in:

- the width of aisles
- the prescribed driving speeds
- the use of mirrors and markings
- the rules around walkways
- the setup of dock levelers and loading docks
- the distances between trucks and racking

The Dutch Labor Inspectorate: supervision of safety

The Dutch Labor Inspectorate is the organization commissioned by the government to check whether companies comply with the Working Conditions Act. They can enter a company unannounced, address employees, and investigate machinery.

When does an investigation take place?

If a serious accident occurs, the employer is obliged to report it immediately. The Labor Inspectorate then investigates:

What happened

What the cause was

Whether the employer had taken sufficient measures

Whether the employee complied with the rules

Which improvements are mandated

> The inspection has far-reaching powers. If a situation is too dangerous, they can immediately halt work. This means the company may not continue working until the situation is resolved.

You can imagine that this can have major consequences for a company, but the goal is always: **to protect lives**.

The employer's responsibility

Although everyone bears responsibility for safety, the employer has a heavier obligation by law. The employer must create an environment where employees can work safely and must take into account the nature of the work, the employee's skills, and the risks in the workplace.

An employer must therefore ensure:

Safe workplace

A well-designed and maintained work environment

Safe work equipment

Well-functioning and approved machinery and equipment

Safe work procedures

Clear instructions and working methods

Information and instruction

Training and information on safe working practices

Supervision of compliance

Checking that safety rules are followed

Up-to-date RI&E

Current Risk Inventory & Evaluation

Measures for reduction

Concrete actions to limit risks

Personal protective equipment

Provision of necessary PPE

Access to experts

Involvement of occupational health services and specialists

Tailored policy

Taking personal circumstances into account

The law even states that the employer must take into account the personal circumstances of employees. Someone without experience, without language skills, or with physical limitations may require extra guidance.

This specifically means that an employer cannot only expect a driver to work safely — **they must ensure that this is possible**.

The employee's responsibility (you as a driver)

Your obligations

The Working Conditions Act not only obliges the employer. As an employee, you also have responsibilities. You are obliged to:

- to the extent possible, ensure your own safety
- not endanger the safety of colleagues
- follow instructions and procedures
- use PPE correctly
- operate machines and tools correctly
- immediately report hazards and defects
- participate in training and information meetings

These obligations exist because your behavior is one of the biggest factors in accident prevention. Most forklift accidents are not caused by broken machines, but by human actions — driving too fast, steering too tightly, unclear maneuvers, or working under time pressure.

> **As a driver, you are not only the operator of a machine, but also the guardian of safety in the workplace.**

The CE marking and the Machinery Directive

When you use a forklift or reach truck, it is provided with a CE marking. This is a declaration from the manufacturer that the machine complies with European safety guidelines.

However, this marking only says something about the **safety of the construction and design**, not about its use. A safe machine can still be life-threatening in an unsafe working environment.

Therefore, your training and your behavior remain crucial. The machine may have been designed safely, but **you determine how safely it is actually used**.

The Risk Inventory & Evaluation (RI&E): the foundation of all safety measures

Every company is obliged to draw up an RI&E. This document precisely describes which risks are present in the company, how serious they are, and which measures are needed to manage them.

The core of an RI&E lies in analyzing risks: **What can happen? How great is the probability? And what are the consequences?**

It's remarkable how simple, yet how important this formula is:

Risk = probability × impact

A small probability with major consequences is already a significant risk. And a high probability with minor consequences is also a risk, but of a different kind.

An RI&E includes all aspects that influence safety:

employee skills	warehouse layout
condition of floor and shelving	types of trucks used
presence of pedestrians	work pressure
presence of hazardous substances	ergonomic risks

Action Plan

An **Action Plan** follows from this analysis. This is a mandatory document that states:

1. which improvements are needed
2. who is responsible
3. when this will be implemented

Reporting workplace accidents

If something goes wrong, it must be reported — not to find culprits, but to prevent recurrence. The law obliges employers to report serious accidents directly to the Dutch Labour Inspectorate.

An accident must be reported when:

Fatal accident

an employee dies

Permanent injury

an employee sustains permanent injury

Hospital admission

an employee is admitted to the hospital within 24 hours

Common accidents in the forklift world

Collisions with pedestrians

Collisions between forklifts and people on foot

Falling loads

Unsafely stacked or insufficiently secured cargo

Tipping trucks

Overturning due to unbalanced loads or too sharp turns

Crushing injuries

Injury from being caught between the truck and objects

Injury when getting on or off

Slipping, tripping, or falling when entering or exiting

Problems due to poor maintenance

Technical defects leading to dangerous situations

Important: As a driver, you must always report every dangerous situation, even if it was just a near miss. Near misses are important signals.

CHAPTER 2 - Workplace and Warehouse Environment

In this chapter, you will discover how a warehouse is safely organized and which parts of the workplace directly influence your activities as a driver. You will learn how driving routes and walking routes are determined, where the main risk zones are located, and how good markings, lighting, and floor conditions contribute to a safe working environment.

You will also gain insight into working around loading docks and dock levellers, and the importance of clear communication with colleagues. Additionally, you will read about the extra attention points that apply to reach trucks in narrow aisles and high-bay warehouses.

A safely organized workplace

A warehouse is dynamic: forklifts, order pickers, and pallet trucks are driving around, employees are walking, trucks are being loaded and unloaded, pallets are being stored and retrieved. In such a lively environment, safety only arises if everyone understands and applies the same rules, and if the physical layout is designed in such a way that risks are limited.

Maneuvering space and overview

Sufficient space to maneuver and a clear view of all activities in the warehouse.

Good walking routes

Logical layout with clear markings that separate pedestrians and forklifts.

Suitable floor

A floor suitable for internal transport, without obstacles or loose materials.

A safely organized workplace takes into account sufficient maneuvering space, overview, good walking routes, a logical layout, clear markings, and a floor suitable for internal transport. In addition, all workplaces must be free of clutter, loose materials, and obstacles. Waste, packaging material, defective pallets, and broken goods should never be left on the driving route.

> For a forklift driver, a safe workplace means that the environment is set up in such a way that operations are logical, predictable, and consistent. When a warehouse is clear and well-organized, the chance of unexpected situations decreases — and with it, the chance of accidents.

Transport Routes: Requirements and Dimensions

Transport routes form the heart of the warehouse. Forklifts drive through them dozens of times daily, often with different loads, varying heights, and different speeds. Therefore, these routes must meet strict requirements.

A transport route must be wide enough for the forklift to maneuver safely. The width depends on the type of truck, the turning radius, the load, and the driving direction. Generally, a route must provide sufficient space for the driver to turn, enter, exit, and pass without risk.

Clear Identification

Transport routes must be clearly identifiable. This means they are provided with markings, colored strips, or lines that indicate where the truck may drive and where pedestrians are allowed to be. A driver should never doubt where they are allowed or not allowed to drive — this clarity prevents misunderstandings.

Clearance Height

The warehouse must also have sufficient clearance height. A forklift with a raised mast can easily cause damage to pipes, lighting, or structures if the height is insufficiently indicated. Therefore, clearance heights are always visibly marked.

Free of Obstacles

Transport routes must also remain free of obstacles. Pallets should never be placed in a driving aisle, and stationary trucks belong in designated areas. A messy warehouse is an unsafe warehouse — and that certainly applies to the driving aisles.

Risk Zones in the Warehouse

A warehouse has various risk zones: areas where the likelihood of accidents is greater because there is more movement, more functions, or more restrictions.

Intersections

One of the most important risk zones is the intersection of traffic routes. Trucks converge here from different directions, meaning that both visibility and speed are crucial factors. At intersections, driving at walking pace is always required, and mirrors or warning lights are often installed to prevent collisions.

Racking Areas

Areas around racking also constitute risk zones. A small error in steering angle or speed can lead to damage to the racking, posing a direct danger of collapse or falling loads. Especially when picking up and putting away pallets, the driver must work with extreme precision.

Loading and Unloading Areas

Loading and unloading areas are equally risky. Here, truck drivers, dock workers, and forklift operators come together, often with different work assignments and priorities. The chance of miscommunication is high if there are no clear agreements about who drives where, who has right of way, and when a truck may be approached.

Elevation Differences

Another important risk zone is the area around dock levellers, ramps, and elevation differences. The risk of tipping over is greater here because the ground is not level. The stability of the truck is directly affected by angles of inclination — and therefore, driving behavior must always be adjusted accordingly.

Loading Docks and Dock Levellers

Loading and unloading trucks is among the most hazardous activities within the warehouse. Dock levellers, loading docks, and trailers are places where differences in height, moving vehicles, and changing conditions come together.

Changing stability: When a forklift enters a trailer, the stability of the truck constantly changes. The trailer can flex on its air suspension, the floor may be uneven, and the edges can be damaged from previous intensive use.

Securing the trailer

In addition, the trailer itself must be secured. A truck that unexpectedly rolls away can have dramatic consequences: the dock leveller can become dislodged, the forklift can overturn or fall down, and the driver can sustain serious injuries. Therefore, **wheel chocks, handbrakes, and sometimes even dock locks** are used.

> Loading and unloading requires precision, cooperation, and clear communication. A warehouse can be technically perfectly arranged, but without clear agreements, this remains a risky place.

Pedestrians and Communication

Pedestrians and Walking Routes

Pedestrians are the most vulnerable participants in internal transport. Therefore, walking routes must be strictly separated from driving routes where possible. Where crossings are unavoidable, clear markings, warning signs, and physical barriers ensure safety.

The forklift driver bears a great responsibility, always alert to unexpected movements of pedestrians.

The driver always gives way to pedestrians — without exception.

Communication During Work

In a dynamic warehouse, effective communication is essential for safe collaboration. Drivers, order pickers, and warehouse managers must understand each other, even when direct speaking is difficult.

Communication happens in various ways:

- Hand gestures and eye contact
- Horns or warning signals
- Walkie-talkies and communication systems
- Markings and lighting

A forklift driver must be aware of the impact on others, especially with limited visibility due to loads.

Floor Quality, Lighting, and Visibility

Floor Quality

A poor floor with cracks, bumps, or slippery spots increases the risk of accidents. Regular inspection and immediate repair of defects are crucial for safety.

Lighting

Good lighting is essential for clear visibility, reduced fatigue, and more precise driving by the operator, especially in racks with limited space.

Visibility

The driver's visibility is affected by the load. With a large or high load, driving backward may be safer. The driver must continuously assess which driving direction offers the best overview.

Acting in Unsafe Situations

A safe workplace doesn't mean nothing ever goes wrong. It's about ensuring that when something does go wrong — or is about to go wrong — everyone knows what to do.

Unsafe situations can include:

- a defective truck
- damaged racking
- a truck leaking oil
- a broken pallet
- a dangerously slippery floor
- a pedestrian in the wrong place
- a dock leveller that is incorrectly positioned
- an unstable load

As a forklift operator, you are obliged to report these situations immediately and stop your work if the danger is too great. You must never continue with work that increases risks. **Stopping safely is always better than rushing to continue.**

CHAPTER 3 – Internal Transport Equipment

Get ready! In this chapter, we'll dive deep into the fascinating world of internal transport equipment. Imagine: warehouses bustling with activity, goods flying from A to B. But how exactly does that work? Here you'll discover the unique strengths, clever tricks, and crucial safety aspects of each truck. From the robust forklift to the agile reach truck, you'll not only learn how they differ, but more importantly, *why* the right choice is essential for every task. After this chapter, you'll be ready to operate more safely, efficiently, and with unprecedented professionalism!

Why different trucks are used

In modern logistics, standing still means falling behind. Every day, thousands of goods are moved, stored, collected, and processed. Do you think this all happens with one type of internal transport equipment? Absolutely not! Every task places its own unique demands on the machine. Sometimes you need to quickly store a pallet high up, while in another place maximum maneuverability and speed are crucial. One time the load is extremely heavy, the other time feather-light.

Precisely why there is an impressive variety of internal transport equipment, each with a specific function and its own technical characteristics. As a forklift operator, it is invaluable to understand which truck is intended for what purpose. Why does a certain type of truck work better, safer, or more efficiently in a specific environment? That insight will make you an indispensable professional!

> Choosing the right truck not only determines the speed of the work, but above all, safety. Using the wrong equipment quickly leads to instability, damage, or accidents.

The Forklift Truck

The forklift truck is the most recognizable and widely used internal transport vehicle. This machine is designed to lift, move, and stack pallets and other loads at height. The forklift has a mast with forks, a counterweight for stability, and powerful drive to move heavy loads.

What is special about a forklift truck is the way stability is achieved. In the rear of the truck there is a heavy counterweight that compensates for the load at the front. This keeps the truck balanced, as long as the load remains within the specified lifting capacity.

Versatile deployment

Production, warehouses, distribution, industry, construction sites and outdoor areas

Various drives

Diesel, LPG and electric for indoor and outdoor use

Counterweight system

Heavy weight at the rear for stability

The driver's seat faces forward, which means the operator has a natural line of sight while driving and maneuvering. However, the driver must always remain alert, as visibility can be limited by high or wide loads.

The forklift is powerful, but requires precise operation. The turning circle is small and the wheels often steer from the rear, which can cause unexpected turning movements if the driver does not anticipate sufficiently.

The reach truck

The reach truck is a technically unique vehicle specifically designed for warehouses with high shelving and narrow aisles. Unlike the forklift, the reach truck does not have a large counterweight at the rear. Stability is achieved by the design of the chassis and by the ability to retract the mast.

Unique feature: The mast can "reach" forward — hence the name. The mast is extended forward to pick up a pallet and then retracted, keeping the truck itself very compact.

This makes it ideal for maneuvering in narrow aisles where a forklift would be too wide.

Driver's position

The driver's position is placed sideways, allowing the driver to have a good view both in the direction of travel and towards the racking. Reach trucks are almost always electrically powered, as this is quieter, produces fewer emissions, and is more precise to operate.

Safety at height

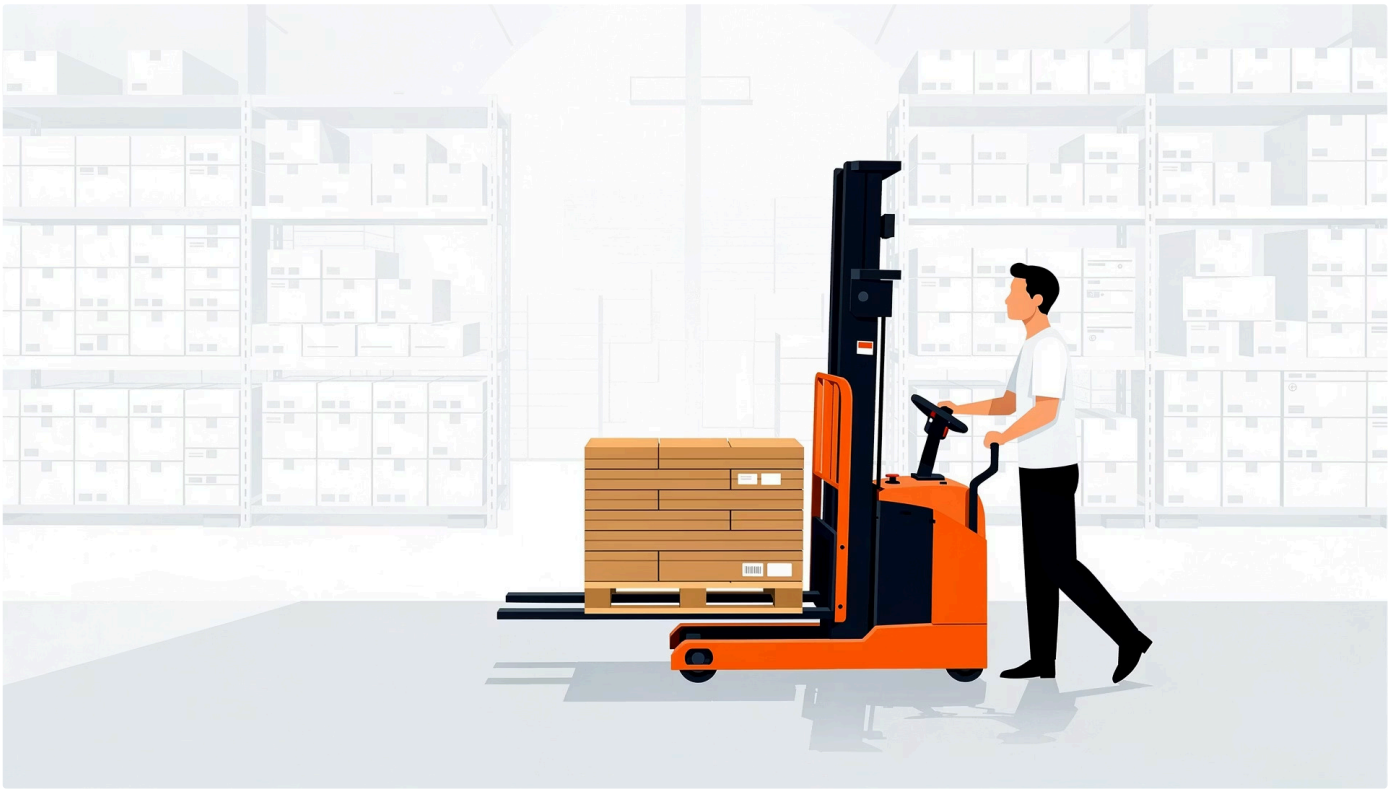
A reach truck can lift exceptionally high, but this increases the risk of instability. The driver must therefore have a good understanding of how changes in the center of gravity, mast extension, and load weight affect stability. An operating error at height can have serious consequences.

The Stacker

The stacker is an internal transport vehicle that functionally sits between the pallet truck and the forklift. It is a machine used for stacking goods, but with a smaller reach and lower lifting capacity than a forklift.

Stackers come in different variants:

- Walk-behind stackers
- Ride-on stackers
- Stackers with a seat
- Stackers with a fold-down platform



The stacker is mainly used for shorter distances and lower stacking levels. It is an agile machine, but less stable than a forklift at greater heights. The load is close to the center of the truck, which is favorable for stability, but the lifting capacity remains limited.

Because many stackers are used by employees who do not have full forklift training, it is important that they are simple and safe to operate. Nevertheless, it remains essential that every operator receives instruction — an unstable load or incorrect use can also lead to serious accidents with a stacker.

The Electric Pallet Truck and Manual Pallet Truck

Electric Pallet Truck (EPT)

The electric pallet truck, often called "EPT," is a widely used tool for horizontally moving pallets over short to medium distances. This truck does not lift loads to height, but only raises the pallet a few centimeters, enough to drive.

Since the operator usually walks or rides on a platform, it is one of the fastest means of transport on the shop floor. The danger of the EPT lies in the combination of speed and walking distances.

Careless use can lead to collisions, entrapments, or foot injuries. Therefore, the operator must always be attentive, especially when pallets are large or obstruct the view.

Manual Pallet Truck

The manual pallet truck, also known as a pump truck, is the simplest and most manual tool in internal transport. The device has no motor but works by hand power: a pumping motion causes the pallet to lift a few centimeters off the ground.

Despite its simplicity, the manual pallet truck must be used safely. Overloading can lead to physical complaints or accidents, especially when pulling or pushing on inclines.

Manual pallet trucks are often used in shops, small warehouses, or in trucks. They are indispensable for light to medium-heavy tasks but are absolutely unsuitable for high lifting or intensive transport.

The Order Picker Truck

Order picker trucks, also known as order pickers, are used in environments where items are collected individually from shelves. These trucks can lift the operator to a certain height, allowing them to directly pick items from the shelves.

Order pickers come in low-, medium-, and high-level variants. With high-level order pickers, the operator can be lifted to several meters in height. This creates a unique situation: the operator is no longer on the floor but works at height. This requires special attention to stability, safety, and working posture.

Working at height

Operator is taken to several meters high for direct access to shelves

Speed vs. safety

Because order picking often needs to happen quickly, there is a risk that operators work hastily

Mandatory procedures

Safety bars, seatbelts, and correct procedures are mandatory to prevent danger

This can pose a danger, especially when not standing firmly or when there is unclear communication with other drivers. For this reason, safety bars, seatbelts, and correct procedures are mandatory.

Four-way truck and sideloading forklift

The four-way truck is a highly specialized vehicle that can drive in four directions: forwards, backwards, and sideways in both directions. This makes the truck excellent for long loads, such as beams, plates, pipes, and long materials.

The sideloading forklift is similar, but is specifically designed to transport long loads on the side of the truck. The driver thus drives forward while the load lies next to them, which keeps the truck very stable with long objects.

Four-way Truck

Drives in four directions: forwards, backwards, and sideways in both directions

Sideloading Forklift

Transports long loads on the side while the driver moves forward

These vehicles are widely used in sawmills, furniture factories, steel companies, and logistics centers for long goods. You will find them less often in a standard warehouse, but they are indispensable in companies that work with long materials.

CHAPTER 4 – Structure and Technology of the Truck

In this chapter, you will learn how a forklift and reach truck are technically constructed and which components are crucial for safety and performance. By gaining insight into the operation of the chassis, mast, forks, hydraulic system, and safety features, you will better understand how the truck reacts during driving and lifting. You will also discover the technical differences between various types of trucks and why these affect stability, load capacity, and operation. A good understanding of the technology helps you to work more safely and to recognize problems earlier.

Chassis and counterweight

The foundation of every forklift is formed by the **chassis**: the sturdy frame on which all components are built. This chassis must be extremely strong because it has to absorb the forces that arise when heavy loads are moved, lifted, or lowered. Unlike a car, a forklift does not have a suspension system that absorbs shocks. The strength of the machine lies precisely in its rigid, non-deformable frame that guarantees stability during work.

The counterweight

One of the most important components of this chassis is the **counterweight**. This heavy metal block is located at the rear of the truck and ensures that the forklift remains balanced when a load is lifted at the front. Without a counterweight, the truck would immediately tip forward as soon as weight hangs on the forks.

The counterweight thus forms the basis of stability. The manufacturer precisely calculates how heavy it needs to be in relation to the truck's lifting capacity. Therefore, it is dangerous — and forbidden — to manually add or remove things from the counterweight. Any change can lead to instability.

Important: The chassis and counterweight together form the foundation upon which the rest of the truck functions. As a driver, you must understand that stability is not a mystery, but a direct result of this technical construction.

Mast Types: Single, Duplex, Triplex

The **mast** of the forklift is the vertical section on which the forks are moved. The mast determines how high you can lift, but also how good your visibility is while driving and stacking.

There are different mast types, each with its own range and technical structure.

Single Mast (simplex)

This is the simplest mast, consisting of a single mast profile that does not extend. The lifting height is limited, but the construction is sturdy and clear. This mast configuration is mainly seen on trucks that do not need to work at height, such as in simple warehouses or outdoor areas.

Duplex Mast

The duplex mast has two mast sections that can slide into each other. This allows the truck to lift higher without the mast being too tall in its retracted position. Duplex masts often have significant free lift, allowing the operator to drive under lower passages with the mast retracted.

Triplex Mast

The triplex mast consists of three extendable mast sections and is used for working at great heights. Reach trucks and modern forklifts are often equipped with a triplex mast because it offers maximum lifting height without the overall height becoming too large.

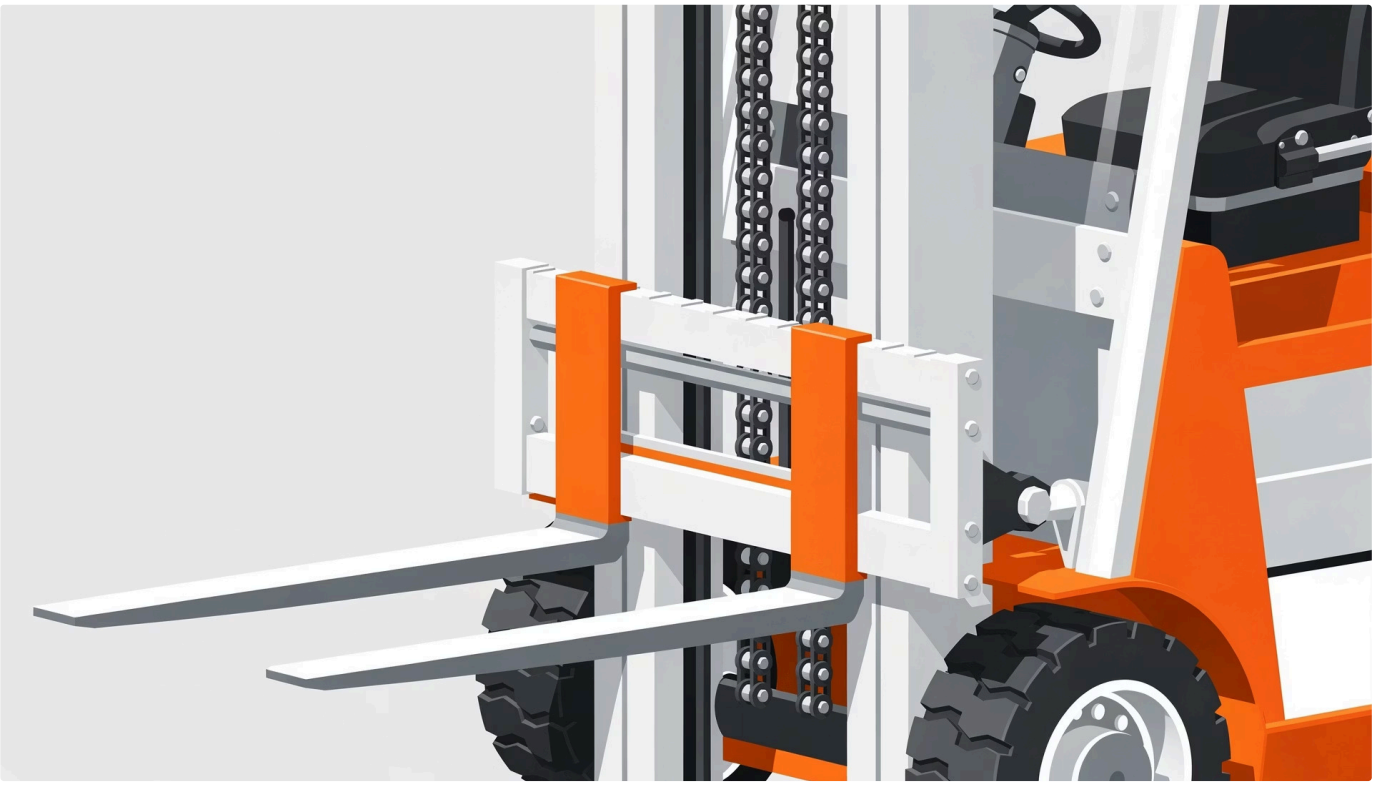
An important aspect of mast technology is the concept of **free lift**: the height the forks can rise without the operator's view being obstructed by the mast extending. This is particularly important in warehouses with low clearances.

> **Critical:** The higher the mast is extended, the more critical the stability becomes. The operator must be aware of the changing center of gravity when working at height. A mast extended to 8 or 10 meters can make the truck unstable with a small steering error or uneven surface.

Reach trucks use the same mast types as forklifts, but due to their **in and outreach function**, these masts behave differently. In a reach truck, the entire mast assembly moves forward and backward, driven by hydraulic reach cylinders.

This construction allows a reach truck to achieve higher lifting heights than most forklifts, but the **sideways movement ("mast sway")** increases as the mast is extended higher. The operator must allow the mast to stabilize briefly after each movement at height before continuing work. This is normal behavior for reach trucks but requires extra patience and precision.

Fork Carriage, Forks, and Chains



The **fork carriage** forms the sturdy frame to which the **forks** are attached. The forks are made of strong steel, but can still be damaged or bent if incorrectly loaded, for example when a load is tilted or does not rest fully on both forks.

Lifting Chains and Lifting Cylinders

Behind the fork carriage are the **lifting chains** and **lifting cylinders** that lift the mast. These chains are constantly under heavy load. It is crucial that they are:

- Free from wear.
- Show no rust.
- Have even tension.

Important for Reach Trucks

In **reach trucks**, the entire **fork carriage** moves with the **reach-in and reach-out function**. This changes the forces on the **forks** and **lifting chains** as soon as the mast is extended forward.

The mast should always be fully **retracted** before driving, and the technical condition of the fork carriage, forks, and chains requires extra attention.

Instrument Panel

In the driver's cabin, you'll find the **instrument panel**, which is comparable to a car's dashboard, but specifically designed for forklift operations.

On this panel, you will find, among other things:

- a speedometer (not always present)
- lighting and warning symbols
- a battery or fuel gauge
- an indication of mast position or lift height (on some models)
- hydraulic function lighting
- error codes
- turn signals
- horn control

The instrument panel provides the driver with crucial information about the truck's condition. A warning light for low hydraulic pressure, an empty battery, or an engine malfunction should never be ignored. **Safely stopping the truck is always the right choice.** The controls for mast movements — lifting, lowering, tilting, sideshifting — are also often within easy reach next to the steering wheel.

The Hydraulic System

The **hydraulic system** provides the power behind all lifting and tilting movements of the truck. This system uses hydraulic oil pumped at high pressure through lines. This pressure causes cylinders to extend, moving the mast and forks upward.

Hydraulics are incredibly powerful but susceptible to leaks. A small tear in a line can cause pressure to drop and the load to suddenly lower. Moreover, oil on the floor poses a significant slip hazard.

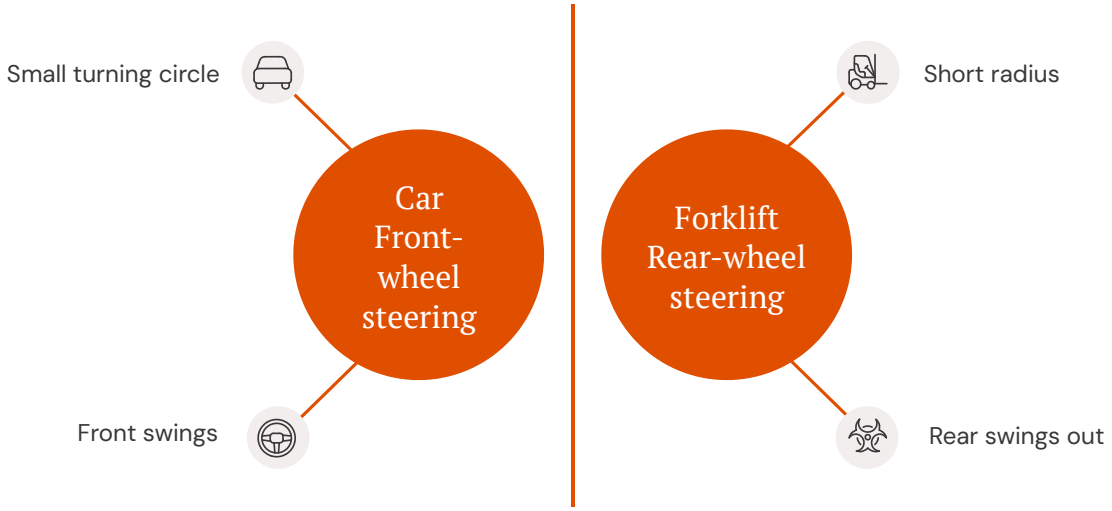
Daily check focused on:

- leaks
- damaged hoses
- unusual noises in the hydraulics
- jerky movements during lifting

> The driver must immediately report deviations and never continue working with an unsafe truck.

Steering and braking system

A forklift steers differently than a car. While cars steer with the front wheels, a forklift almost always steers with the **rear wheels**. This makes the truck very maneuverable, but also less predictable for inexperienced drivers. A slight steering movement can lead to a sharp turning circle.



This steering behavior means that the rear of the truck swings outwards during a turn. This is also known as "swing-out" and is a significant cause of collisions with racks, pallets, or colleagues.

Braking system

Forklifts and reach trucks have different braking systems that together ensure safe control. The **service brake** is used while driving to brake smoothly without losing stability. Electric trucks — including almost all reach trucks — also use **regenerative braking**: as soon as you release the accelerator pedal, the truck automatically slows down. This is ideal for precision work and narrow aisles.

Many modern trucks also have an **automatic parking brake**, which engages when the truck is stationary or when you step out. This prevents rolling away and ensures that the truck is always left safely.

Safety Features

Forklifts and reach trucks are equipped with various safety features intended to protect the operator, but also to keep others in the warehouse safe.

Overhead guard

The protective roof that prevents falling objects from hitting the driver.

Seatbelt

Necessary to keep the driver within the protective zone in case of tipping.

Deadman's switch

The truck only moves when the driver is seated or presses the lever.

Flashing lights and warning lights

Make the presence of the truck clear.

Audible signals

Such as reversing beepers or a horn.

Mirrors

For better visibility of the surroundings.

Load backrest

Prevents the load from sliding backward towards the driver.

Attachments and Tires

Attachments

A forklift can be equipped with various types of **attachments**, making it suitable for special tasks.

Examples include:

- paper roll clamps
- fork extensions
- rotators for tilting bins
- cone clamps
- spikes for rolls or carpets
- double pallet forks

Each attachment changes the truck's characteristics:

1	2	3
the front weight increases	the center of gravity shifts	the lifting capacity decreases

> **Therefore, the driver must always know the adjusted load diagram when attachments are fitted.** Ignorance of this quickly leads to tip-over risks or mast overload.

Types of Tires

The tires of a forklift largely determine how stable, comfortable, and suitable the truck is for the surface.

There are three main types:

Solid Tires (Superelastic)

These are indestructible, cannot go flat, and are very suitable for industrial environments with sharp materials. They offer less suspension, but maximum durability.

Pneumatic Tires

Suitable for outdoor areas or uneven floors. They offer more suspension and comfort, but can go flat and require more maintenance.

Solid Rubber Tires

Used on stackers or light trucks. They provide stability on smooth floors but have limited shock absorption.

The choice of tire determines, among other things:

- riding comfort
- stability
- floor wear
- maneuverability

CHAPTER 5 – Drive and Power Sources

The type of drive of a truck determines how the truck performs, where it can be used, and which safety measures are necessary. Different forklifts are powered by diesel, LPG, or electricity. Each energy source has its own advantages, limitations, and risks. Therefore, it is essential for a driver to know how the drive works, what the truck needs, and the associated safety rules.

A forklift is not a car: it is industrial equipment, designed with the goals of power, control, and durability. This means that maintenance, energy supply, and safety around the drive are much stricter than with consumer vehicles. A thorough understanding of the energy source is therefore an important part of safe and responsible driving.

Reach trucks always operate fully electrically. Unlike forklifts, they do not use a diesel or LPG engine, but exclusively a traction battery or lithium-ion accumulator. This makes reach trucks suitable for indoor use, narrow aisles, and high-bay warehouses, as they produce no exhaust gases and can be operated very precisely.

Diesel Forklift

The diesel forklift is one of the most powerful and robust forklifts available. These trucks are primarily used in outdoor applications, on construction sites, in industrial areas, ports, and large production locations where heavy loads need to be moved.

A diesel engine provides a lot of pulling power, even at low speeds. This makes the truck suitable for rough surfaces, slopes, and prolonged, intensive use. Moreover, a diesel engine is less susceptible to power loss under heavy loads, making it very suitable for work where constantly high loads occur.

Disadvantages and safety aspects

However, diesel also has disadvantages. First, emissions: a diesel engine produces exhaust gases that can be harmful to health, including particulate matter and nitrogen oxides. Therefore, diesel forklifts are generally **not permitted for use in enclosed indoor spaces**.

In addition, a diesel engine produces relatively a lot of noise and vibrations. This can lead to fatigue during prolonged use. The operator must also be alert when refueling: spilling diesel can cause slipperiness and should never be left on the floor.

Each energy source has its own safety rules. With diesel, refueling usually goes smoothly, but spilling diesel can lead to slipperiness, fire hazard, and environmental pollution. Therefore, refueling must always take place in a designated area, with absorbent material readily available.

LPG Forklift

The LPG forklift offers a middle ground between diesel and electric driving. LPG — liquefied petroleum gas — is cleaner than diesel and therefore more suitable for indoor work, although good ventilation remains necessary.

The LPG engine provides a smooth and powerful drive, similar to gasoline engines. These trucks are fast, respond directly to the accelerator, and are therefore pleasant for drivers who do a lot of maneuvering.

Important: An important aspect of the LPG forklift is changing the gas cylinder. This must be done with knowledge and accuracy, as LPG is a flammable and volatile gas.

Safety Checks

Leaks can cause dangerous situations. Therefore, a driver must always check that the cylinder is properly sealed, the rubber seals are intact, and the coupling is secure.

Areas of Application

LPG forklifts are popular in warehouses, distribution centers, and production halls where driving indoors and outdoors is common. They are flexible, powerful, and less polluting than diesel.

Points of Attention

Nevertheless, they still use a combustion engine, which means exhaust gases and heat production always require attention.

Safely Changing the Gas Cylinder

With LPG, changing the gas cylinder is a potentially dangerous moment. If a cylinder is not properly connected, gas can escape. This is not only flammable but can also accumulate in low-lying areas. For the driver, this means he must always check that the coupling closes, the rubber seals are intact, and that no leak is audible or noticeable by smell.

Electric Trucks

Electric trucks are the standard in modern warehouses: they are quiet, emission-free, maneuverable, and economical to use. **Reach trucks are always electric**, as their design is exclusively suitable for indoor use and precise operation.

Electric trucks run on traction batteries. **Lead-acid batteries** are the most common and can form hydrogen gas during charging, requiring good ventilation. Damage or spillage of battery acid can pose a danger. Increasingly, trucks are equipped with **lithium-ion batteries**, which do not form gas, are low-maintenance, and can be safely charged intermittently. However, they must be protected from damage and overheating.

Regardless of the battery type, safe charging, careful handling of the battery, and immediately reporting deviations always remain the driver's responsibility.

Advantages and Considerations

Advantages

- Minimal noise level
- Less vibration and noise
- More comfortable working conditions
- Lower risk of fatigue
- Emission-free on the work floor

Considerations

- Extra alertness needed: trucks are very quiet
- More easily overlooked by pedestrians
- Careful handling of batteries required
- Battery is heavy and susceptible to damage
- Contains hazardous substances

Working with traction batteries

A traction battery is the "heart" of the electric forklift. This type of battery is designed to deliver power over a full work shift for an extended period. It is a powerful yet fragile component that must be handled with care.

Traction batteries consist of lead plates and an electrolytic liquid. During charging and discharging, chemical reactions occur that produce electricity. Incorrect use, such as deep discharging, disconnecting too early, or charging too quickly, can significantly shorten its lifespan.

> **Warning:** A lead-acid battery can produce hydrogen gas during charging. This gas is highly flammable and must be properly vented. Therefore, charging areas are always equipped with ventilation, special flooring, and fire-resistant facilities.

Safety rules for drivers

The driver must know how to handle a battery safely. This means:

- Regularly checking the fluid level (for lead-acid)
- Recognizing damage to cables or cells
- Ensuring the battery is fully charged (for lead-acid)
- Not placing metal on the battery
- Not bringing open flames or sparks nearby
- Always switching off the charger before disconnecting it

Safe charging and changing of batteries

Lead-acid batteries must always be charged in a well-ventilated area because explosive hydrogen gas can be produced during charging; open flames and sparks are prohibited, and intermediate charging shortens their lifespan.

Lithium-ion batteries do not produce gas, can be safely recharged intermittently, and do not require a special charging area, but they should never be charged if they are damaged or overheated.

Recognizing Common Malfunctions

Recognizing malfunctions is an important part of a forklift operator's job. Not because the operator has to perform the repair themselves, but because early detection prevents accidents and minimizes damage.

Diesel Trucks

Malfunctions can arise from engine problems, clogged filters, or poor fuel quality. You often notice this by irregular idling, smoke emission, or loss of power.

LPG Trucks

May have problems with ignition, leaking hoses, or freezing couplings. An irregular engine run or a strange odor may indicate a gas leak — and this must be reported immediately.

Electric Trucks

Often display error codes when there are problems with the battery, motor controller, or hydraulics. A slow reaction from the truck, hesitations during lifting, or a rapidly decreasing battery percentage are signals that should not be ignored.

A good operator has an eye and ear for anomalies. They hear when a truck sounds different, feel when the steering reacts strangely, and see when a battery becomes abnormally warm. This technical alertness directly contributes to a safe working environment.

CHAPTER 6 – Forklift Stability

The stability of a forklift is a subject that every operator must fully master. You can steer and maneuver perfectly — but if you don't understand how stability works, one wrong move can be enough to cause a forklift to tip over. And when a forklift tips over, it happens in fractions of seconds, without the operator being able to intervene. It is therefore necessary to learn step by step why a forklift is stable or unstable, how the center of gravity works, what forces occur during driving, and how your choices directly affect safety. It's pure physics, but in a form that everyone can learn to understand. The forklift is designed to operate safely within its limits, but as soon as you go beyond those limits, the risk increases rapidly. This chapter teaches you how to recognize, respect, and safely stay within those limits.

The Load's Center of Gravity

Every load, no matter how big or small, has a center of gravity. This is the imaginary point where the object's weight is balanced. When you lift a pallet, the forklift not only moves the weight but also the center of gravity of both the load and the truck itself.

With a compact, evenly distributed load — for example, a box of stones — the center of gravity is close to the middle. With an unstable or asymmetrical load — such as a pallet with a heavy machine on one side — the center of gravity is much less predictable.

The forklift is designed to carry loads whose center of gravity is within a certain area. As long as this is the case, the truck remains stable. But as soon as the center of gravity moves too far forward, sideways, or upward, the forklift can tip over.

It is important to understand that the center of gravity shifts with the load. If you lift something, the center of gravity moves upward. If you drive too fast around a bend, it shifts to the outside of the turn. If you lift a load far away from you, it shifts forward.

All of this determines how stable the truck is. So, it's not the shape of the load that poses the risk — but where the center of gravity ultimately ends up.

Load Center Distance

The load center distance is the distance from the load's center of gravity to the front face of the forks. The greater this distance, the more unstable the forklift becomes.

Standard Distance: 500 mm

Most forklifts are designed to safely carry their lifting capacity with a load's center of gravity up to a maximum of 500 mm (50 cm).

Practical Deviations

In practice, pallets are often loaded longer, stacked crookedly, or contain protruding goods. This automatically shifts the center of gravity further forward.

Leverage Effect

Every extra centimeter increases the leverage on the truck. Think of a seesaw: if you sit close to the middle, it's stable; if you slide far to the end, the seesaw tips easily.

It works exactly the same way with a forklift. The distance between the load and the mast determines how heavy the forklift "feels" the load. Therefore, a driver must always be aware of:

- how the load is constructed
- how far the forks are inserted under the load
- whether the load does not hang too far forward
- whether there are protruding parts that shift the center of gravity

Impact of Speed and Turns

Speed is one of the biggest enemies of stability. The faster you drive, the greater the force on the truck with every steering movement. Even a seemingly small turn can cause the center of gravity to move outside the stability triangle. In turns, there is additional force. The truck "wants" to continue straight, but the steering movement forces it into a circle. This force pushes the center of gravity outward — precisely to the side where a tip-over can occur.

Always Take a Turn Slowly

Reduce speed before entering the turn, not while turning.

Always Drive at Walking Pace with a Raised Load

The higher the load, the slower you must drive.

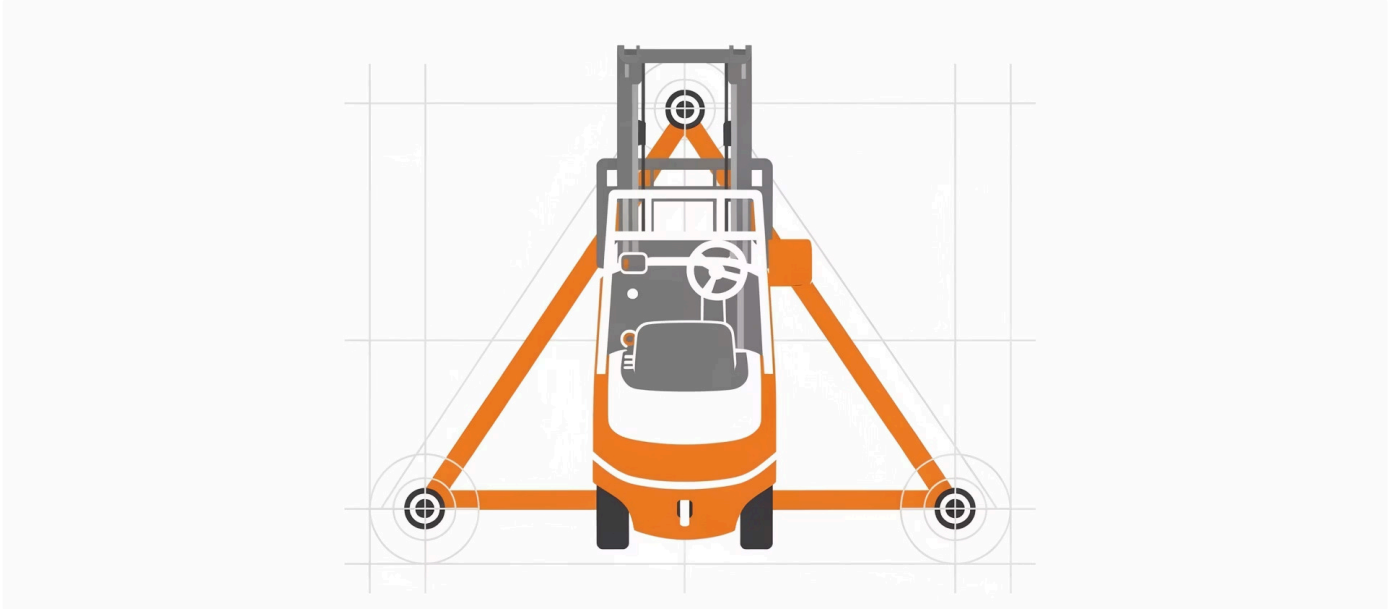
Never Steer Abruptly, but Smoothly

Sudden steering movements shift the center of gravity too quickly.

Many accidents happen not because a driver drives recklessly, but because they underestimate how quickly the center of gravity shifts.

The Stability Triangle

The stability triangle is perhaps the most important concept in this entire chapter. It precisely determines why a forklift remains upright—and when it doesn't.



A forklift rests on three support points:

- the left front wheel
- the right front wheel
- the pivot point of the rear axle

Between these three points, you can draw an imaginary triangle. **As long as the combined center of gravity of the truck and load remains within this triangle, the forklift is stable.** If the center of gravity moves outside, the truck will tip—always towards the side where the center of gravity exits.

The center of gravity can move due to:

- height of the load
- quality of the floor
- steering movements
- slopes
- load center
- speed
- mast movement (lifting, tilting, reaching with reach trucks)
- unexpected obstacles

The stability triangle is therefore not a fixed space, but an area continuously influenced by your actions. By remaining aware of these movements, the truck stays safely within its design limits.

Forward, Sideways, and Backward Overturning

Forward Overturning

Forward overturning occurs when the load excessively overloads the counterweight. This can be caused by:

- an excessively heavy load
- a center of gravity positioned too far forward
- excessive lift height in combination with a heavy load
- braking too quickly with a raised load
- use of attachments without an adapted load diagram

When a forklift overturns forwards, it happens suddenly. There is almost no time to react.

Sideways Overturning

Sideways overturning is the most common form of overturning. It is often caused by:

- driving too fast through a turn
- uneven floors
- hitting an obstacle with one wheel
- driving with a raised load
- sloping surfaces
- sharp steering movements

Because forklifts have rear-wheel steering, the rear can unexpectedly swing out. This causes the center of gravity to shift faster than the operator expects.

Backward Overturning

Backward overturning primarily occurs with:

- thick loads pressing against the load backrest
- the mast tilted too far back at height
- driving down slopes with a raised load

Although less frequent, this type of overturning is dangerous because the operator is forced backward and the overhead guard is heavily stressed.

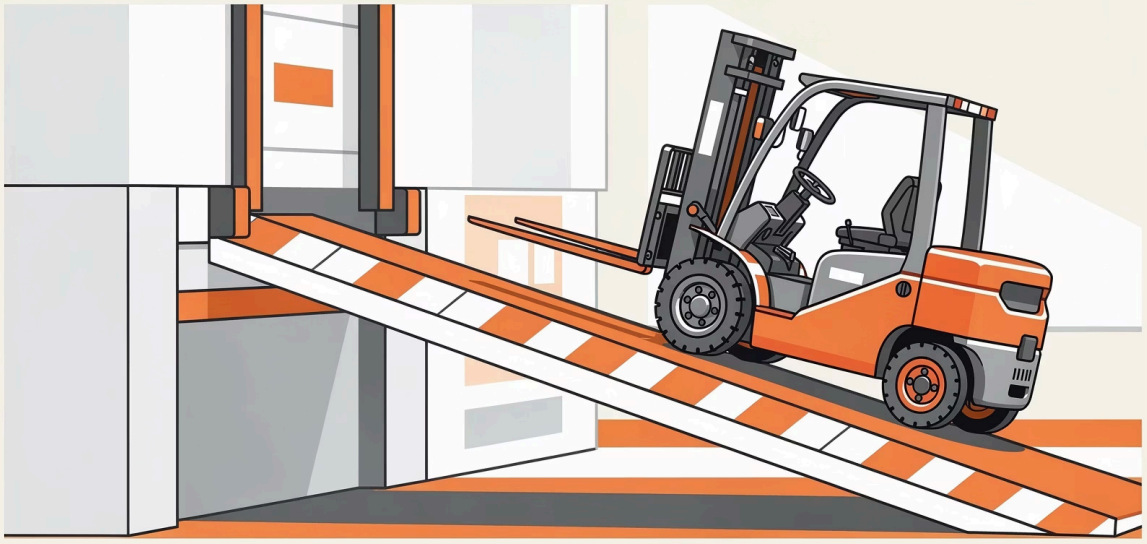
Influence of floor, environment, and slopes

The floor is a crucial factor for stability. A forklift is designed for flat surfaces. Unevenness, holes, cracks, or slippery floors cause extra movements in the center of gravity that you cannot compensate for. A small bump at the wrong moment, especially with a heavy or high load, can unbalance the truck. Floors with different friction — for example, wet, dusty, or painted floors — can also cause unexpected sliding movements.

Slopes pose an even greater risk

On a slope, the center of gravity automatically shifts:

- uphill to the rear
- downhill to the front
- sideways when driving at an angle



Therefore, you should:

- never drive sideways on a slope
- never drive up or down a slope with a raised load
- always drive uphill with the forks (load facing upwards)
- never turn on a slope

Practical Examples of Instability

To truly understand stability, it's useful to look at examples that often occur in warehouses.

- ## The "innocent" turn

  A driver is driving with a half-high load and takes a turn just a little too fast. The truck leans slightly, the load swings outwards, the center of gravity shifts — and before he knows it, one wheel lifts off the ground. A small bump further and the truck fully overturns.

- ## Driving with a raised load

  A driver raises a pallet to "save time". Due to the height, the center of gravity shifts, causing even small steering corrections to create a lever effect. When he hits a threshold, the truck tips forward.

- ## The ramp at the dock

  A driver drives down a slight incline with a load. The incline is so small that he hardly notices it, but the center of gravity shifts forward. When he brakes, the truck briefly feels unstable. This is exactly how forward turnovers begin.

- ## A damaged pallet

  An unstable pallet shifts the center of gravity unexpectedly. When a plank breaks, the load sags slightly crookedly, causing the truck to suddenly become unstable sideways.

- ## A slippery floor

  A wet spot causes wheel slip. The slip itself is not the danger — the sudden re-traction afterwards is. This can cause the truck to make an abrupt sideways movement that brings the center of gravity outside the triangle.

> In all these situations, one thing applies: stability is lost long before the driver feels anything. Therefore, you should never rely on your instincts — but always on the rules.

CHAPTER 7 - Load Chart and Safe Load

The load chart is one of the most important documents for a truck. It not only determines how much a truck can lift, but more importantly, under what circumstances it can do so safely. Although many drivers think that the lifting capacity is simply "on the side of the truck", the reality is much more complex.

When does the lifting capacity change?

- **Mast Height**
  When the mast goes up
- **Load Position**
  When the load hangs further forward
- **Attachments**
  When you use attachments
- **Fork Length**
  When the forks are longer
- **Load Stability**
  When the load is unstable
- **Mast Tilt**
  When the mast tilts forward or backward

To work safely, a driver must understand the load chart as if it were the traffic rules of the forklift. This chapter teaches you exactly how it works.

For reach trucks, an additional variable plays a role:
the position of the mast (retracted or extended).

A load that is stable when retracted can immediately become too heavy when extended.

A concrete example of load center of gravity

The principle

A forklift has a lifting capacity of 2500 kg at a load center of gravity of 500 mm. When that center of gravity shifts to 600 mm, the safe load can drop to 2000 kg — or even lower.

The mass of the load does not change. But for the forklift, it "feels" as if the load is much heavier.

This is why the load chart has multiple columns: one for each possible center of gravity distance. The greater the distance, the lower the safe load.

What is a load chart?

A load chart is a technical diagram that indicates how much weight a truck can safely lift at different lifting heights and different load center distances. It is unique to:

- the specific type of truck
- the mast mounted on it
- the forks or attachments used

The load chart is always affixed to the truck, usually in the cabin or on the mast, so that the operator can easily consult it. The diagram shows that the lifting capacity:

- decreases when the mast is raised, and
- decreases when the load moves further forward.

This is not a limitation, but a safety measure: the higher the load and the further forward it is, the smaller the stability triangle becomes within which the truck can remain upright. A truck therefore cannot lift the same amount everywhere — but always exactly as much as is safely permissible according to the load chart.

How to read a load chart?

Although a load chart may seem complex at first glance, it is fundamentally a very logical diagram. The diagram usually contains three variables:

1. Lift height (vertical axis or table column)
2. Load Center (LC)
3. Maximum safe load (expressed in kilograms)

Example Load Chart (simplified diagram)

Lift Height	Load Center 500 mm	Load Center 600 mm	Load Center 700 mm
0 meters (floor)	2500 kg	2200 kg	1800 kg
3 meters	2400 kg	2000 kg	1600 kg
4 meters	2200 kg	1800 kg	1400 kg
5 meters	2000 kg	1500 kg	1200 kg
6 meters	1800 kg	1300 kg	1000 kg

What stands out?

- The lifting capacity always decreases when the height increases
- The lifting capacity always decreases when the center of gravity moves further forward
- These two effects are cumulative

A load that is safe at floor height may be too heavy at 5 meters. A load with a heavy component positioned further forward may already be dangerous at 2 meters height. Therefore, you should always use the load chart as a guide – never as an estimate.

Influence of the Load Center

The load center — also known as the Load Center (LC) — is one of the most important factors for safe lifting. The load center is the distance from the center of gravity of the load to the front face of the forks. The further this center of gravity is forward, the more unstable the forklift becomes. This is because the load acts as a lever:

- a short lever is stable,
- a long lever makes the forklift "more sensitive" and more vulnerable to tipping.

Why is this so important?

Many warehouses work with pallets of 80 × 120 cm. These are often considered standard loads, with a center of gravity at 600 mm. But in reality, this often deviates:

- The load can protrude forward.
- A heavy object might be on one side.
- The pallet might be unevenly stacked.
- The load might have shifted during transport.

These deviations shift the center of gravity, sometimes by tens of centimeters. A load that seemingly falls within the lifting capacity can still be unsafe due to a larger center of gravity.

Influence of Mast Tilt and Lift Height

The load diagram also shows that the lifting capacity decreases as the mast is raised higher. This is due to the effect of lift height on stability.

Why does stability decrease at height?

When the mast extends:

- the load becomes higher,
- the lever becomes longer,
- the center of gravity rises,
- and the truck becomes more susceptible to sideways forces.

This makes the truck more vulnerable during:

- turns
- unevenness in the floor
- wind (when working outdoors)
- slight steering movements

Mast Tilt

In addition, mast tilt affects stability:

Tilting backward

Brings the load closer to the mast → **safer while driving**.

Tilting forward

Brings the load further forward → **more dangerous, especially at height**.

A practical example of mast tilt

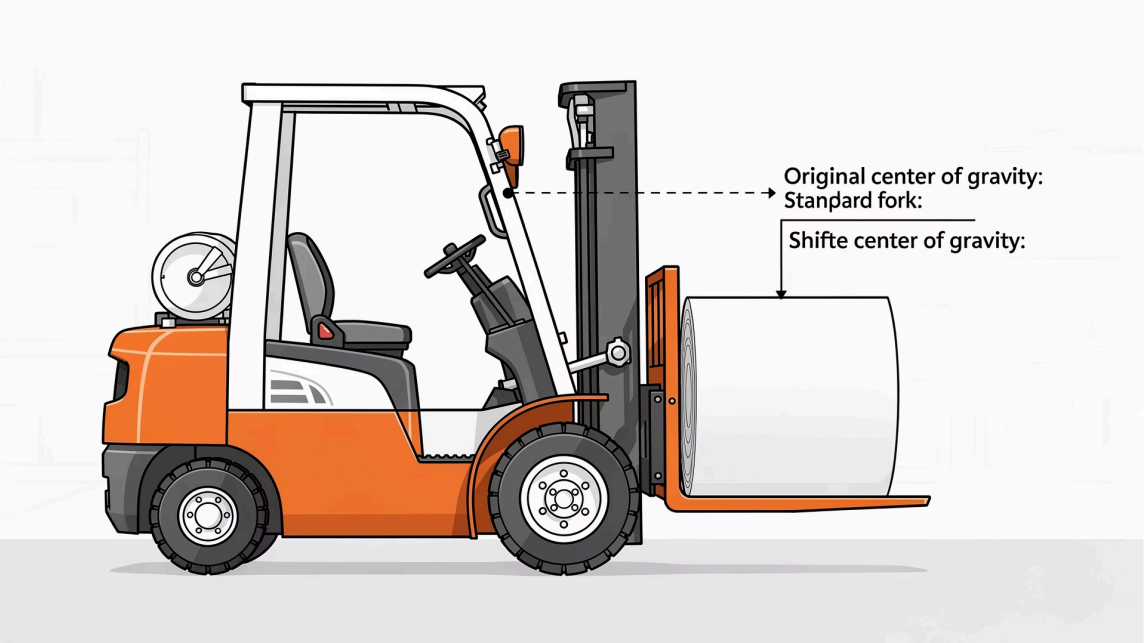
Situation: A driver lifts a load of 1800 kg to a height of 5 meters. At this height, the forklift can lift a maximum of 2000 kg according to the load diagram, with a center of gravity of 500 mm.

However, when the mast is tilted slightly forward to slide the pallet into a rack, the center of gravity immediately shifts forward.

Consequence: the safe limit is exceeded.

Influence of attachments

Attachments change the load diagram. They add 100-500 kg of extra weight in front of the mast and increase the load center distance. This increases leverage and significantly reduces lifting capacity.



Standard situation

A forklift typically has a lifting capacity of 2500 kg.

After mounting attachments

After mounting a paper roll clamp, this becomes 1800 kg. But at greater mast heights, this can drop further, sometimes to 1200–1500 kg.

Therefore, a new load diagram is mandatory when an attachment has been installed. Without this adjusted diagram, it is impossible to lift safely.

Examples of Safe and Unsafe Loads

Safe Example: Stable Pallet with Even Distribution

Imagine: a pallet with neatly stacked boxes, all mass evenly distributed.

- Load center of gravity within 500 mm
- No protruding parts
- Sufficient stability
- Load fits within all columns of the load diagram

This load can be moved safely, even at medium heights.

Unsafe Example: Load with Shifted Center of Gravity

A pallet with:

- a heavy machine at the front
- boxes that shift during transport
- a heavy object on one corner
- an IBC container with liquid (moving mass)

The result:

- Center of gravity shifts forward or sideways
- Stability drastically decreases
- Lifting height must be greatly restricted
- Mast tilt becomes very dangerous

Table: comparison of two seemingly identical loads

Characteristic	Load A (safe)	Load B (unsafe)
Mass	1500 kg	1500 kg
Load center of gravity	500 mm	650 mm
Lifting threshold at 4 m	1800 kg	1400 kg
Safe according to diagram	Yes	**No – exceeded**

The mass is the same. The danger comes entirely from the center of gravity.

CHAPTER 8 – Daily Inspection and Maintenance

A forklift or reach truck is a powerful and technical vehicle that operates daily under demanding conditions. They lift heavy loads, maneuver in tight spaces, cover many meters, and are often in use all day. Precisely because these trucks deliver so much power, a small defect can have major consequences. A tear in a tire, a leaking hydraulic hose, a malfunction in the reach function, or a worn fork can be enough to cause a serious accident. Therefore, a thorough inspection before each shift is not only sensible but also legally required. The employer is responsible for maintenance and inspection, but the driver is responsible for the daily inspection, as they are the first to notice deviations. A truck that is not safe should never be used — not later, not after a break, and certainly not "just quickly". Safe work begins and ends with the driver.

Why inspection is mandatory

Daily inspection prevents accidents, damage, and dangerous situations. Machines that are used intensively wear out. Sometimes slowly, sometimes unexpectedly quickly. What was fine yesterday might pose a risk today. The law states that work equipment must:

- be in a safe condition
- be inspected regularly
- only be used when safe

Therefore, the driver must check before each shift whether their truck is ready for use. The purpose of the inspection is:

Detect defects early	Prevent accidents	Avoid damage to goods or shelving
Extend the lifespan of the forklift	Comply with legal requirements	Ensure the truck remains constantly reliable

Pre-shift check

The daily check is always performed before the first drive. It is a fixed moment when the driver goes over the forklift from top to bottom. This moment serves four functions:

Safety

The truck must be safe before even one meter is driven.

Predictability

The driver knows exactly what condition the machine is in.

Responsibility

The driver shows that they work professionally.

Registration

Some companies require the inspection to be registered (e.g., digitally or on paper).

This doesn't have to be a long process; within a few minutes, the driver has a good overview of the truck's condition. But it must be done **carefully and attentively**.

Daily Inspection of Forklift and Reach Truck

A good daily inspection is systematically and calmly structured. The most commonly used method is the **'outside-in-technique'**: first, you walk around the truck for a visual inspection, then you check the cabin, controls, and technical functions. Many checkpoints are the same for forklifts and reach trucks, but differences are noted where necessary.

1. Tires and wheels

The tires are your direct connection to the floor and crucial for the stability of the truck. Inspect thoroughly for both forklifts and reach trucks for:

- Cracks, chips, or severe wear that could affect integrity.
- Missing pieces on solid tires, which can lead to imbalance.
- Sufficient pressure for pneumatic tires (check with a gauge) to prevent punctures and instability.
- Straight rims and securely fastened wheel bolts; loose bolts are a major safety risk.

Reach trucks, with their often single drive wheel and small support wheels, require extra attention to **uneven wear**. This directly affects maneuverability and stability, especially in the narrow aisles of warehouses.

2. Forks and fork carriage

The forks are the primary tools for load handling. Carefully check for both the forklift and the reach truck that the forks are:

- Straight and exactly the same length; uneven length or bending can damage or drop the load.
- Free from cracks, dents, and deformations, which can severely impact load capacity.
- Equipped with securely attached locking pins, which prevent the forks from unintentionally shifting.

For reach trucks, where the fork carriage can extend further forward due to the reach function, it is essential to also check that the fork carriage is **firmly and without play** seated in the mast guide. **A loose fork is life-threatening!**

3. Mast and chains

For both trucks, check:

- if the mast is straight and has no bends or kinks
- if the chains are equally tensioned
- if the mast and fork rollers run smoothly
- if there is no visible rust, dirt, or damage

Additionally for reach trucks:
Because reach trucks can extend and retract the mast, you should check daily:

- if the reach function works smoothly
- if mast guides and rails are clean and undamaged
- if the mast fully **retracts** against the truck
- if the mast does not sag or lean in the outreach position

4. Hydraulics and lifting cylinders

For both trucks, check:

- leaking hoses or pump units
- damaged couplings
- irregular movements during lifting and lowering

5. Load backrest / protective guard

The load backrest protects the operator from falling goods. You check:

- if the rack is present and straight
- if no welds or mounting points are damaged
- if the rack is not bent from previous impact

For reach trucks, the load backrest is often higher due to operations at greater lifting heights.

6. Chassis and underside

Walk calmly around the truck and pay attention to:

- cracks or dents in the chassis
- loose parts
- oil, water, or hydraulic leaks
- damage to protective plates or underbody panels

For reach trucks, extra attention is needed for the **side panels and rear**, as these can swing out further during turns.

7. Battery or fuel system

For electric forklifts and reach trucks:

- is the battery sufficiently charged?
- are cables secured and undamaged?
- is the battery firmly secured in its compartment?
- are there no burn marks or melting traces?

Reach trucks are always electric, so this section fully applies to them.

For LPG trucks (forklifts only):

- inspection of coupling, hose, and valve
- bottle placed upright and properly secured
- no gas odor perceptible

For diesel trucks (forklifts only):

- fuel level
- no leaks
- cap tightly closed

8. Steering and brakes

In the cabin, check:

- steering play and smoothness
- kickback of steering wheel
- operation of service brake
- operation of parking brake

Reach trucks often have an electric steering motor and a central drive wheel construction; pay attention to **unnatural noises** or delayed reactions here.

9. Control levers and instruments

In the cabin, check:

- Operation and smoothness of all control levers and pedals.
- Correct display of all screens and gauges (e.g., charge status, hour meters).
- Functioning of all buttons and switches (e.g., lift, lower, tilt).
- Integrity of warning lights and indicators.

Ensure there are no loose wires and that the controls feel intuitive and respond immediately.

10. Lighting and Signals

Check:

- working lights
- turn signals
- brake lights
- reverse signal
- horn
- flashing light or red/blue pedestrian light

For reach trucks, which often operate in narrow aisles, these signals are even more important because pedestrians and other trucks can easily overlook you.

What to do in case of malfunctions

The rule is clear, regardless of the situation: A forklift with a malfunction may not be used. Not "just quickly", not "just this one trip", not "because it's busy".

The driver must:

1. Immediately stop work
2. Safely park the truck
3. Remove the key
4. Report the malfunction to the supervisor or technical service
5. Block the truck if that is policy (e.g., label or lock)

Working on a forklift yourself is prohibited, unless you are a certified maintenance technician.

Ready-for-use checklist – Daily forklift inspection

1. External visual inspection	• Tires intact, correct pressure • Forks straight, locking pins present • Mast and chains undamaged • No oil leaks • Load backrest present and intact
2. Hydraulic system	• No leaks • Lift and tilt cylinders move smoothly
3. Power source	• Battery charged / sufficient fuel level • Cables, lines, and connections in order • Gas cylinder correctly placed and closed
4. Cabin and controls	• Seat adjusted and secured • Steering responds normally • Brakes functioning • All levers operate smoothly
5. Lighting and signaling	• Flashing light works • Horn works • Reversing alarm works • Lights function
6. Test drive at low speed	• No abnormal noises • Perform brake test • Check steering
7. Check for malfunction messages	• Check display • No error codes
8. Safety features	• Seatbelt in order • Overhead guard intact

CHAPTER 9 - Driving Techniques and Practical Work

Operating a forklift or reach truck requires more than just steering and accelerating. You work in an environment where goods, shelving, pedestrians, and other vehicles constantly intersect. A small mistake can cause significant damage. Therefore, you not only need to know how to drive, but also what your vehicle does in different situations.

While forklifts and reach trucks have many similarities, each type of truck requires specific driving techniques. A forklift is robust and stable due to its counterweight, while a reach truck is agile and compact, but more susceptible to instability — especially at height. In this chapter, you will learn how to operate both vehicles safely and professionally.

Basic Driving Techniques

Driving a truck always begins with control, awareness, and calm. The truck reacts differently from vehicles you might be familiar with. The center of gravity constantly shifts, and the truck turns around its rear axle. Therefore, you will first learn basic principles that always apply, regardless of the situation.

Starting Off

Before you depart, ensure that:

- the seating position is correctly adjusted
- the seatbelt is fastened
- the forks are at driving height (10–15 cm from the floor)
- the load is properly secured

Never drive away without a complete overview.

Parking

A forklift or reach truck must always be parked safely: park in a safe, flat area away from driving routes, lower the forks to the floor, tilt the mast slightly forward, straighten the steering wheel, engage the parking brake, and completely shut down the truck. Take the key or access chip with you and ensure you never park in front of emergency exits, walkways, or fire extinguishers.

Speed and Driving Behavior

High speed is a primary cause of accidents, as it increases the chance of the center of gravity falling outside the stability triangle during braking, steering, or collisions.

Professional driving behavior means:

- smooth acceleration
- controlled braking
- adjusting speed to circumstances
- never driving faster than visibility and surroundings allow

In a dynamic warehouse environment, with pedestrians and moving goods, high speed reduces reaction time and significantly increases the risk of accidents.

Driving with Limited Visibility

When you have poor visibility — for example, due to high racks, heavy traffic, or loading docks — you must halve your speed. Also, when driving with a load that obstructs your forward view, drive at walking pace and, if necessary, use reverse as your direction of travel. A safe driver understands that speed is never more important than safety.

Driving Around Corners and Maneuvering

Taking turns with a truck is risky. The center of gravity shifts outwards, especially in sharper turns and with heavy loads, which affects stability.

Safely Taking Turns

- Take turns slowly.
- Make the turn wide and spacious.
- No sudden steering movements.
- No last-minute steering corrections.

Rear-wheel Steering in Turns

Due to the rear-wheel steering of a forklift, the rear of the truck makes a wider swing. Maintain extra distance from objects, as rear-end swing is a common cause of damage.

Maneuvering

Maneuvering should be done at walking speed. The truck is designed to move precisely at low speed. Make small steering movements, constantly observe, and stop when you lose sight. In narrow aisles, you may sometimes need to reverse and steer. This is normal; do not try to turn in one go.

Driving with a Load

Driving with a load completely changes the truck's behavior. The load determines the center of gravity, affects steering, and restricts visibility.

01

The load is always kept low to the ground

02

The mast is slightly tilted backward

03

Driving is done calmly and controlled

04

The driver looks in the direction of travel, even if this means driving in reverse

A load that is too high does two things:

1. The center of gravity rises → less stability.
2. The forklift becomes "top-heavy" → risk of tipping in turns.

Therefore, a load is always lifted just above the floor — high enough to avoid unevenness, low enough to remain stable.

Driving in Reverse

Driving in reverse is a standard skill for a forklift operator. Because the forks and load often block forward visibility, an operator must feel comfortable driving in reverse for extended periods.

What should you pay attention to?

Look in the full direction of travel

not just in mirrors

Rotate your shoulders

this eases neck strain

Drive slower than forward

Account for rear swing

Use mirrors as support

not as the primary direction of view

Working in narrow aisles

Narrow aisles pose a particular challenge. Space is limited, goods are close together, and a single steering error can cause damage to goods or racks.

Therefore, in narrow aisles, the following apply:

01	02	03	04
low speed	extremely precise steering movements	load low and mast tilted back	continuous focus on both sides

Intersections in narrow aisles

Aisle intersections require extra vigilance. Other trucks or pedestrians can suddenly appear between racks. Before approaching an intersection:

- you stop
- you look left, right, again
- and only proceed when the path is clear

Driving on slopes

Slopes pose one of the biggest risks for trucks. Even a slope barely visible to the naked eye can already affect stability. The center of gravity automatically shifts on a slope:

Basic rules on slopes

1. Always drive straight up and down slopes
2. Load always facing uphill
   - uphill → load to the front
   - downhill → load to the rear
3. Never drive sideways on a slope
4. Never turn on a slope, not even small steering corrections

The center of gravity and stability

Behind every safe operation with a forklift or reach truck lies one fundamental principle: the center of gravity of the truck and load must remain within the **stability triangle**. For a forklift, this triangle is formed by the two front wheels and the pivot point of the rear axle. For a reach truck, this principle works the same, but because the truck is narrower, has no counterweight, and operates with an **in-and-out telescopic mast**, the stability triangle is smaller and more sensitive to shifts in the center of gravity.

As long as the combined center of gravity remains within the triangle, the truck is stable. If the center of gravity moves outside of it — for example, by steering too quickly, driving with a high or extended mast, abrupt braking, or taking inclines — then there is an immediate risk of tipping. With reach trucks, this happens more quickly, especially when the mast is extended or working at great heights.

Summary: The professional driver

A professional driver is distinguished not by speed, but by **control, insight, and awareness.** He understands that the truck is a working machine with unique characteristics: rear-wheel steering, shifting center of gravity, and limited visibility when driving with a load.

Overview

Always know what is happening in front of, behind, and next to the truck

Speed management

Adjust speed to conditions, never faster than safe

Smooth movements

Gentle acceleration, braking, and steering without sudden actions

Monitor stability

Keep load low, mast tilted back, center of gravity within the triangle

Recognize risks

Treat slopes, turns, narrow aisles, and limited visibility as hazard zones

Discipline

Always follow the basic rules, even under time pressure

Driving techniques are not tricks, but life-saving skills. They protect you, your colleagues, the goods, and the workplace. Master them, apply them, and make them second nature. That's what a professional does.

CHAPTER 10 - Picking Up, Transporting, and Storing Loads

The safe and efficient movement of loads is at the core of every forklift and reach truck operator's work. Although the actions seem simple — forks under the pallet, lifting the load, driving — this work requires insight, technique, and continuous alertness. The stability of the truck, the quality of the pallet, the height of the work, and the position of the mast determine whether an operation proceeds safely. In this chapter, you will learn how to safely pick up, transport, and put away loads, with the differences between a forklift and a reach truck clearly explained.

Pallet Types and Pallet Inspection

Every safe movement starts with the pallet. A damaged, wet, or weakened pallet can tear during lifting, causing the load to fall unexpectedly. This can already be dangerous with forklifts, but with reach trucks — which often operate at greater lifting heights — the risk is even higher. Therefore, before inserting the forks, you must always assess whether the pallet is in good condition.

You check if the wood is intact, if the blocks are firmly attached, and if no planks are missing. The load must also be stable and not tilt to one side.

For reach trucks, pallet quality is even more crucial, as shelves at great heights allow no room for error. A pallet that seems sturdy on the floor can bend or break at the top of a rack. Therefore, in high-bay warehouses, only high-quality pallets, such as EPAL pallets, are often used.

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Correctly picking up loads

Correctly sliding the forks under the load is the basis of safe working. With a forklift, this is done by placing the truck squarely in front of the pallet, fully inserting the forks, and lifting the load a few centimeters. The mast is tilted slightly backward, so the load rests stably against the fork carriage. The relationship between weight, mast position, and balance makes the forklift predictable and stable, as long as these operations are performed correctly.

01

Position truck straight

Position the forklift squarely in front of the pallet

02

Fully insert forks

Slide the forks completely under the load

03

Lift load a few centimeters

Lift the pallet just off the ground

04

Tilt mast backward

Ensure the load rests stably against the fork carriage

Reach truck: a crucial difference

With a reach truck, this works differently, because the mast can extend and retract. The load is picked up in the same way, but before the driver starts moving, the mast must be fully **reached in**. This retraction of the mast is crucial for stability: as long as the mast is extended forward, the center of gravity shifts significantly and the reach truck becomes unstable.

> **Many accidents with reach trucks occur because drivers — sometimes due to time pressure — drive with an extended mast.**

Transporting loads safely

Once the load is on the forks, attention shifts to safe transport. For both trucks, the load must remain as low as possible above the floor during driving, so that the center of gravity remains low. The mast is straight or slightly tilted backward and the driver makes no abrupt steering movements.

Forklift

More stable as the load is pulled against the mast. Robust construction offers more stability during transport.

Reach truck

More susceptible to tipping if the mast is not fully retracted. Slim chassis and high mast react more strongly to small steering movements.

With reach trucks, caution is even more important. Due to their slim chassis and high mast, they react more strongly to small steering movements. The rear can also swing out further than many novice drivers expect. While a forklift becomes more stable as the load is pulled against the mast, a reach truck remains more susceptible to tipping if the mast is not yet fully retracted.

Therefore, driving calmly, especially in narrow aisles, is essential. Speed is never more important than control.

Loading and unloading trucks

Forklift

Forklifts are excellent for loading and unloading trucks. Their larger tires, higher ground clearance, and robust construction make them suitable for docks, loading ramps, and sometimes uneven trailer floors.

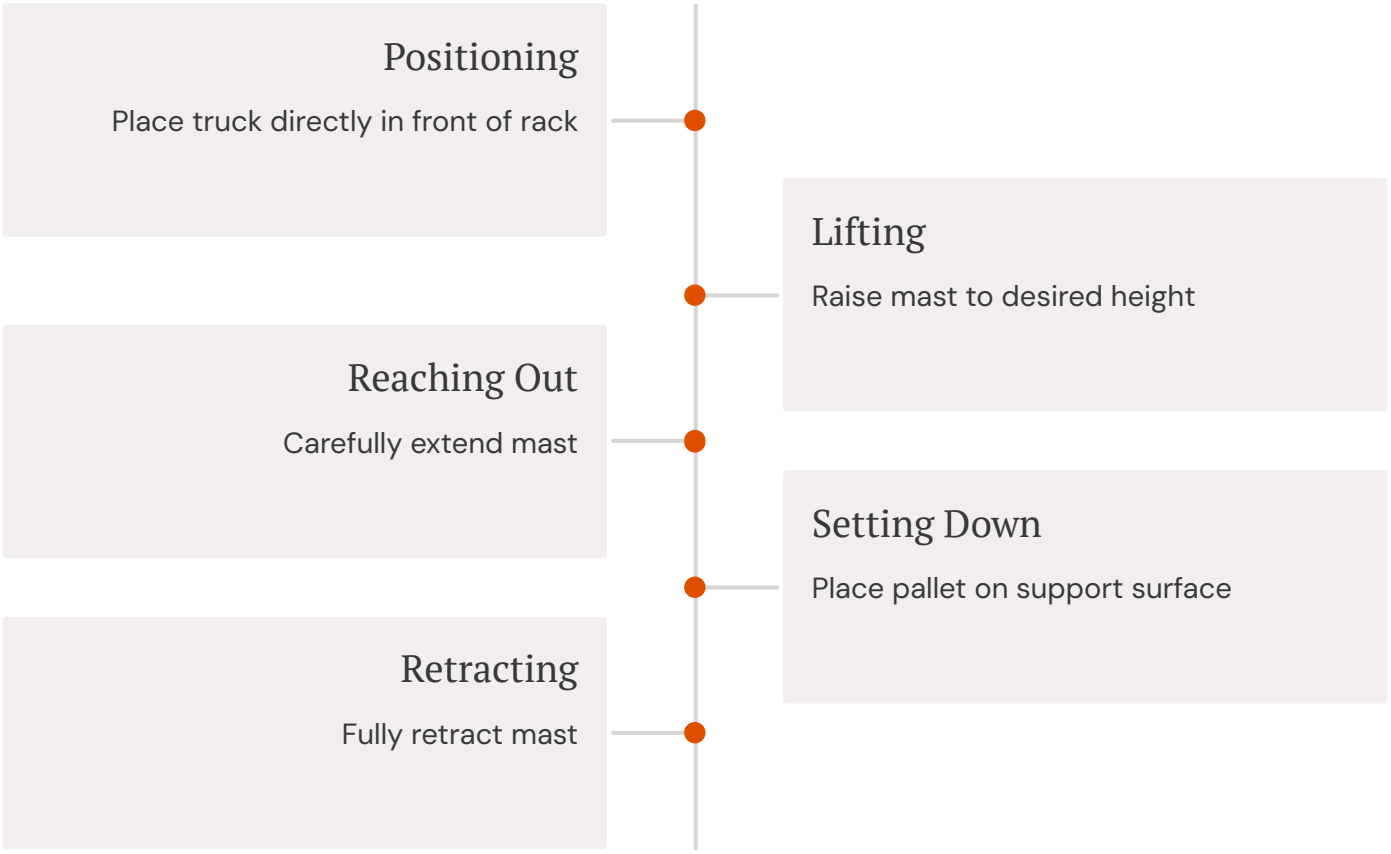
A forklift can safely enter a trailer, provided the dock leveller is correctly positioned and the trailer is secured against rolling away.

Stacking and Picking Up

Placing and picking up loads requires precise actions. A forklift operator drives straight in front of the rack, lifts the load to the desired height, and carefully places the pallet on the support surface. When unstacking, the same movement is performed in reverse. The forklift remains relatively stable during this process, as long as the load is not lifted too high while driving.

Reach Truck: More Technical Stacking

With reach trucks, stacking and picking up is more technical. The truck is positioned directly in front of the rack, and the mast is raised to height. Then, the mast is carefully extended until the pallet touches the support surface. After the pallet has been set down, the operator retracts the forks slightly and then fully retracts the mast. Only then is it permitted to drive away.



The same applies when picking up a pallet: first, reach out to get under the load, then lift the load, and then fully retract the mast before moving the truck.

> This sequence is not arbitrary, but necessary to prevent tipping. A reach truck is most unstable when the mast is high and extended.

Working in Racking Systems

Racking systems are the environment in which reach trucks function most optimally. These trucks are specially designed for narrow aisles and high lift heights. At the same time, this entails additional risks. The mast can move slightly at height, an effect known as **"mast sway"**. This is normal, but it requires the driver to be patient and let the mast stabilize before moving further.

Safety Distance

Pedestrians must maintain a minimum distance of 15 meters in narrow aisles

Swinging Rear End

Risk of collision due to the rotating rear of the reach truck

Falling Goods

Danger of falling pallets or products from great heights

An important safety rule in racking systems is that pedestrians are not allowed to enter the aisle when a reach truck is in operation. In narrow aisles, a distance of at least 15 meters must be maintained. This prevents pedestrians from being hit by the swinging rear end or by falling goods.

For forklifts, working at great heights is less common, but the same principles still apply: always stand directly in front of the racking, maneuver calmly at height, and never turn with a raised load. The difference is that a forklift has its load closer to the mast, so stability is distributed differently and is less dependent on an extended mast.

Common Mistakes and Risks

Many accidents occur due to haste, routine, or overestimation of one's own skills. Forklift drivers often make mistakes such as driving with too high a load, turning too quickly in corners, or picking up pallets at an angle. Reach truck drivers, on the other hand, more often make technical errors, such as driving with an extended mast, maneuvering too quickly in narrow aisles, or making corrections at height without the mast having stabilized.

Forklift Mistakes

- Driving with too high a load
- Turning too quickly in corners
- Picking up pallets at an angle
- Overestimation of stability

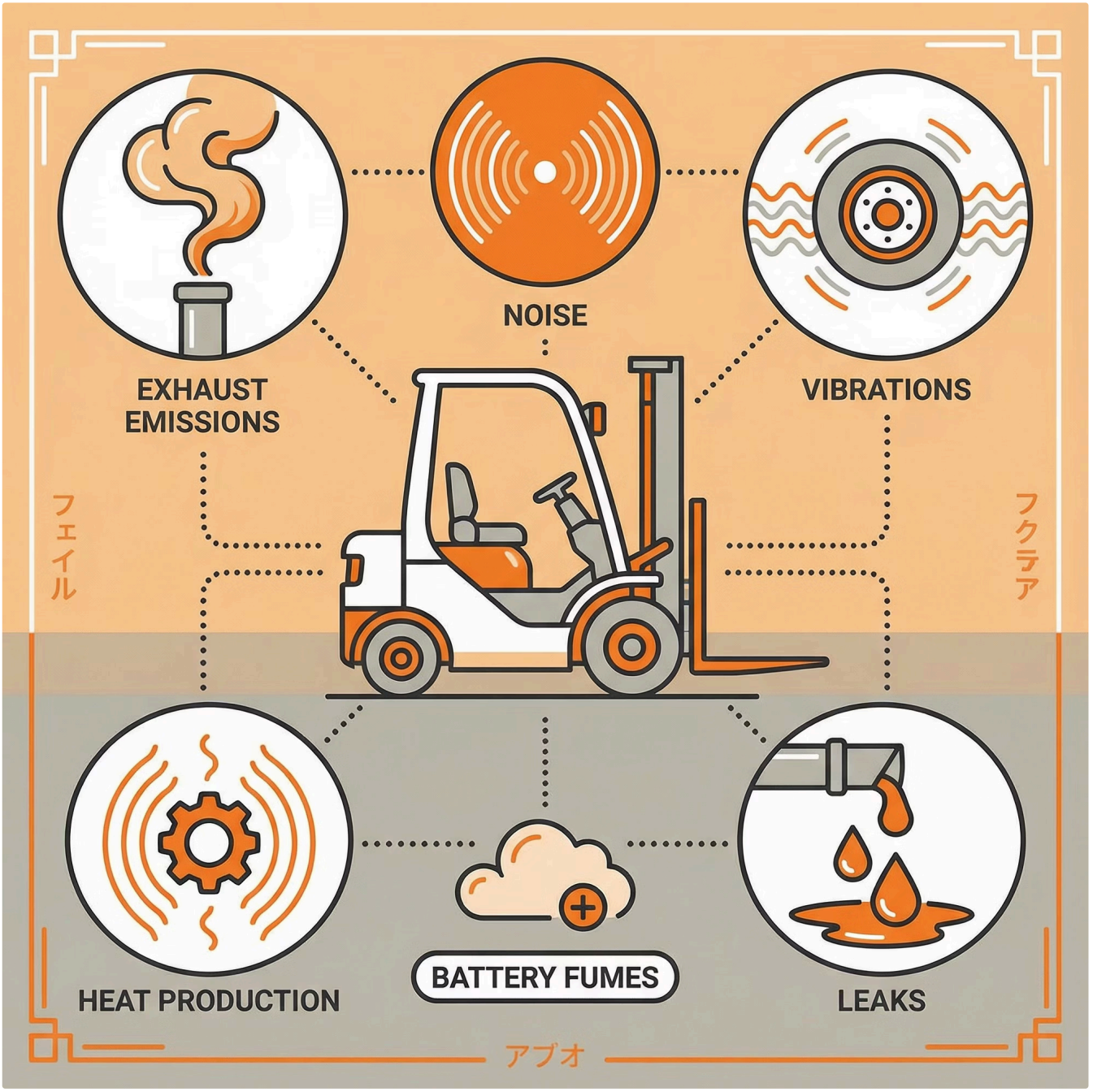
Reach Truck Mistakes

- Driving with an extended mast
- Maneuvering too quickly in narrow aisles
- Corrections at height without stabilization
- Ignoring the mast sway effect

CHAPTER 11 – Environment, Living Environment, and Safety Aspects

A forklift not only affects the loads it moves, but also the environment in which it is used. Consider exhaust fumes, noise, vibrations, heat production, battery fumes, and potential leaks of fuels or hydraulic oil. All these factors determine not only work comfort, but also the safety and health of everyone in the vicinity.

In modern logistics, sustainability is becoming increasingly central. Companies want to reduce emissions, limit noise pollution, and work energy-efficiently. At the same time, the driver must understand the risks associated with working with fuels, batteries, or other hazardous substances. This chapter provides insight into these aspects and explains how a forklift operator can contribute to a safe and environmentally friendly working environment.



Fuel Types and Emissions

1

Diesel Forklifts: Powerful, but Emission-Rich

Diesel forklifts are robust, suitable for outdoor use, and deliver high power. However, they produce:

- soot particles (particulate matter)
- nitrogen oxides
- carbon monoxide
- heat
- a recognizable diesel smell

These emissions are harmful to health and contribute to environmental pollution and CO_2 emissions. Working with diesel forklifts in enclosed spaces is therefore almost never permitted, except with exceptionally good ventilation or special filter systems.

2

LPG Forklifts: Cleaner than Diesel, but Not Emission-Free

LPG is considered a cleaner combustion fuel. Emissions are lower than diesel, both in terms of particulate matter and odor. Nevertheless, an LPG engine also produces:

- carbon monoxide
- hydrocarbons
- heat

Therefore, even with LPG use, ventilation must be adequate. In poorly ventilated areas, carbon monoxide can accumulate — an odorless, toxic gas that quickly becomes dangerous. Although LPG is less environmentally harmful than diesel, it remains a fossil fuel with associated emissions.

3

Electric Forklifts: Emission-Free at the Workplace

Electric trucks produce:

- no exhaust gases,
- no odor,
- less heat,
- much less noise.

This makes them ideal for indoor work, especially in sectors where hygiene is central, such as food production or pharmaceuticals.

Please note: Although the truck itself operates emission-free, the production of electricity and batteries is environmentally intensive. Nevertheless, electric driving remains the most sustainable option.

Noise, Vibrations, and Health

A truck always produces noise and vibrations — sometimes more, sometimes less, depending on the type of drive.

Noise

Diesel and LPG forklifts produce significantly more noise than electric trucks. Noise can:

- cause hearing damage with prolonged exposure
- reduce concentration
- increase stress
- make communication difficult

Therefore, earplugs or other hearing protection are sometimes mandatory in noisy environments.

Electric forklifts are significantly quieter, but this also carries a risk: colleagues hear the truck approaching less quickly, increasing the risk of collision. Warning sounds and good driving behavior are then crucial.

Vibrations

Vibrations occur during:

- driving over uneven floors
- driving over bumps
- prolonged work on a forklift without suspension

Prolonged vibrations can lead to:

- back pain
- fatigued muscles
- joint strain
- reduced concentration

Modern forklifts are equipped with ergonomic seats, often with suspension and adjustable damping. It is important that operators adjust this seat correctly. A poorly adjusted seat can unnecessarily strain muscles.

Significant vibrations can also sometimes indicate mechanical problems, such as:

- worn tires
- wheel imbalance
- damaged bearings
- chassis damage

An operator should always report unusual vibrations.

Battery Safety and Hazardous Substances

Electric forklifts use heavy traction batteries, classifying them as hazardous substances. Incorrect handling can lead to:

- chemical fire
- corrosion
- explosion due to gas formation
- severe burns

Danger: Gas Formation During Charging

During the charging of a traction battery, hydrogen gas can form. This gas is:

- colorless
- odorless
- extremely flammable
- dangerous in enclosed spaces

Therefore, batteries must always be charged in a special, well-ventilated charging area. Sparks, open flames, or smoking are prohibited here.

Danger: Leaking Battery Fluid

Battery fluid is highly acidic and causes severe damage upon skin contact. In case of leakage, the following must happen:

- the area must be cordoned off
- technical service must be notified
- neutralizing material (e.g., acid binder) must be deployed

The driver should never "just clean it up" without the proper equipment.

Hazardous Substances in Internal Combustion Engines

Diesel and LPG trucks pose risks due to:

- fuel leaks
- oil leaks
- coolants
- hydraulic oil

These substances are environmentally harmful and can cause fire. A small drop of oil can also make a floor dangerously slippery.

In modern warehouses, **lithium-ion batteries** are increasingly used. These are safer because they do not form gas, require no maintenance, and can be charged intermittently. Nevertheless, caution remains important: a lithium-ion battery must not be damaged or overheat, as this can still cause risks. Safe and careful handling of charging points, cables, and the battery compartment therefore remains essential.

Leaks, Spills, and Cleaning Procedures

A safe workplace starts with a clean floor. Leaks and spills are not only environmentally polluting but also pose direct risks of slipping, fire, or forklift instability.

Common Leaks

- hydraulic oil
- engine oil
- coolant
- diesel or LPG
- battery fluid
- meltwater from frozen goods

- ### Immediate action in case of a leak

  When a driver notices a leak, they must:

  1. stop immediately
  2. park the truck (if safe)
  3. cordon off the area
  4. notify a supervisor or technical service
  5. not enter the area until it has been declared safe

Cleaning Up Spills

Different procedures apply depending on the substance:

- **oil** → use absorbent material, never rinse with water
- **fuel** → report immediately, risk of explosion
- **battery fluid** → neutralize with acid binder, wear personal protective equipment
- **water or ice** → remove to prevent slip hazards

CHAPTER 12 – The Forklift on Public Roads

Forklifts are mainly used within company premises, but sometimes have to cross public roads or cover short distances between locations. In such cases, traffic laws apply instead of internal company rules. Driving a forklift on public roads entails additional risks due to limited visibility, lower speed, and a design not optimized for higher speeds. Therefore, specific rules are in force to ensure the safety of the driver and other road users.

When is this allowed?

A forklift may not simply be used on public roads. It is only permitted when:

- the forklift performs a direct function that necessitates driving on public roads;
- there is no alternative within the premises;
- the route is short and clearly defined;
- the forklift complies with all legal requirements for vehicles allowed on the road.

Examples of situations where this may be permitted:

Movement between locations

A forklift needs to move goods from a warehouse to a second location across the street.

Work on public facilities

The truck is used for work on public facilities (e.g., loading/unloading for a large project).

Crossing between premises

A forklift needs to cross a connection between two premises because there is no internal passage.

Not permitted:

- Using a forklift as a replacement for a delivery van or other transport vehicle.
- Driving long distances on public roads.
- Going on the road without necessity or permission.

In many municipalities, reporting or requesting permission is mandatory, especially when it occurs frequently or structurally.

Legal Equipment Requirements

As soon as a forklift enters public roads, it must comply with requirements comparable to those for other motor vehicles. A standard warehouse forklift is usually not directly suitable for road use. Depending on the use, adjustments must be made.

Mandatory equipment on public roads

A forklift must have:

Lighting front and rear

- high beam and low beam
- taillights
- brake lights
- turn signals

Reflectors / retroreflection

The truck must be visible in the dark and in bad weather.

A working horn

To warn other road users.

A license plate or registration

- For forklifts that can go faster than 25 km/h, a yellow license plate is mandatory.
- For forklifts that travel at a maximum of 25 km/h, an agricultural vehicle registration or company name with vehicle number suffices.

A proper driver's seat

Including seat belt and protective structure (overhead guard).

Speed limiter (if applicable)

Forklifts are often technically limited to low speeds — this must function correctly.

Mirrors or camera systems

For sufficient visibility to the rear and sides.

Marking of protruding parts

When the forks or attachments protrude, they must be:

- directed backward while driving
- clearly marked,
- folded in or removed safely.

Rules of Conduct and Liability

Driving on public roads entails a different responsibility than driving on private property. The forklift driver is expected to behave as a full participant in traffic and must take into account:

- pedestrians
- cyclists
- cars
- motorcycles
- trucks
- public transport

Rules of Conduct for the Forklift Driver

1 Respect the maximum permitted speed

The forklift often does not drive faster than 20–25 km/h. Driving faster is not permitted and technically unsound.

2 Always drive on the right

As with all other vehicles.

3 Follow right-of-way rules

The forklift is NOT a priority vehicle.

4 Extra caution at intersections and bends

Anticipation is necessary due to limited sightlines.

5 Do not drive with an unstable load

The load must be low and stable, even on public roads.

6 Do not transport passengers

Unless the forklift is equipped with an approved second seat.

Liability and Driving Authorization

Liability

When damage or injury occurs on public roads due to a forklift:

- the driver is responsible, and
- the company can also be liable.

Liability is assessed based on:

Compliance with traffic rules

Condition of the forklift

(Vehicle inspection status for industrial vehicles)

Driver's behavior

Training and authorization of the driver

If the forklift did not meet legal requirements, or the driver was insufficiently trained, liability may increase.

Important: driving authorization

For driving a forklift on public roads, the following applies:

- A T-driving license is mandatory for forklifts that can exceed 25 km/h or fall under specific categories.
- Forklifts that cannot exceed 25 km/h fall under exceptions, but training and expertise requirements still apply.
- A forklift certificate is not a traffic driving license, but it does demonstrate that the driver is competent.

> The company must be able to demonstrate that the driver was authorized, competent, and instructed to drive the forklift on public roads.

Chapter 13 – Part of the professional driver's work

As a professional driver, you are part of a logistical process that extends far beyond just transporting goods by road. This chapter discusses the role of internal transport in your daily work and how you can collaborate safely and professionally in this environment.

The professional driver within a logistical process

As a professional driver, you are part of a logistical process that extends far beyond just transporting goods by road. Goods are prepared, stored, moved, loaded, and unloaded before they reach their final destination. In all these steps, different people, vehicles, and systems play a role.

It is precisely at the moments when goods are transferred – for example, at warehouses, distribution centers, and loading and unloading areas – that intensive collaboration arises between drivers and internal transport. In this environment, different risks and points of attention apply than on public roads. The space is more limited, the overview is often less, and multiple activities take place simultaneously.

Why is this important?

For a professional driver, it is therefore important to have insight into this logistical environment. Understanding internal transport helps you to better assess situations, act more safely, and collaborate more professionally with other stakeholders.

The presence of internal transport in your daily work

Forklifts and reach trucks are indispensable in warehouses and on company premises. They are used to move goods that you, as a driver, transport. These vehicles often move in the same space as you, sometimes at a short distance and in changing directions.

Internal transport equipment has different characteristics than trucks. It works with heavy loads, has a different center of gravity, and reacts differently to steering and driving movements. In addition, the driver's view is often limited by the load or the vehicle's construction.

By understanding how internal transport functions, you gain more insight into:

why forklift drivers follow certain driving lines	why they sometimes have to stop or wait	why extra space is necessary during maneuvers	why calm and overview are more important than speed

This insight helps you anticipate better and prevent unsafe situations.

Working at loading and unloading areas

Loading and unloading areas are among the riskiest working environments in logistics. Multiple vehicles and people work simultaneously in a confined space. Time often plays a major role, and the pressure to keep working can be high.

Accidents at loading and unloading areas often arise not from technical errors, but from human behavior. Standing too close to a working forklift, making unexpected movements, or unclear communication can quickly lead to dangerous situations.

As a professional driver, it is important that you:

- Are consciously aware of your position on the site
- Know when you can move safely
- Understand when to keep your distance
- Follow the instructions of internal transport personnel

Knowledge of internal transport increases your safety awareness and helps you recognize risks in time.

Stability, load handling and damage

The way goods are moved and placed has a major impact on safety and damage prevention. A load that is not picked up stably or is placed incorrectly can shift, fall, or cause damage to goods, vehicles, or people.

By gaining insight into stability and load handling in internal transport, you will better understand why certain actions are necessary and why speed is subordinate to control.

What you need to understand:

Extra attention

why certain loads require extra attention

Direct displacement

why not every pallet can be moved immediately

Speed vs control

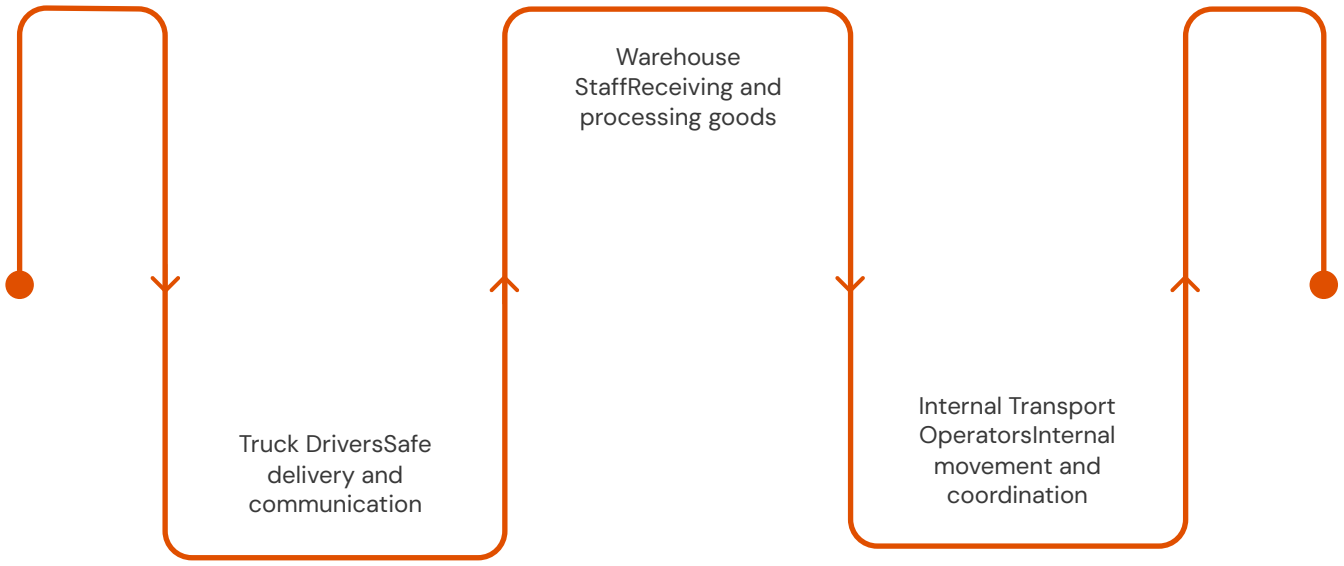
why speed is subordinate to control

Calm essential

why calm is essential during loading and unloading

This knowledge helps you prevent damage and have realistic expectations of the loading and unloading process.

Collaboration within the Logistics Chain



Safe and efficient work in logistics requires collaboration. Truck drivers, warehouse staff, and internal transport operators are interdependent. Understanding each other's tasks and responsibilities contributes to a safe working environment.

Benefits of Understanding

- Greater understanding of others' choices and actions
- Improved communication among all parties
- Reduced irritation in stressful situations
- More professional work atmosphere

By gaining insight into internal transport, you develop a greater understanding of others' choices and actions. This promotes communication, reduces irritation, and contributes to a more professional work atmosphere.

Chapter 14 – Professional conduct in internal transport, loading and unloading

Professional competence means more than just safe driving on the road. In the daily practice of a professional driver, professional conduct largely takes place off public roads, namely on company premises, in warehouses, and at loading and unloading facilities.

Professional Competence Off Public Roads

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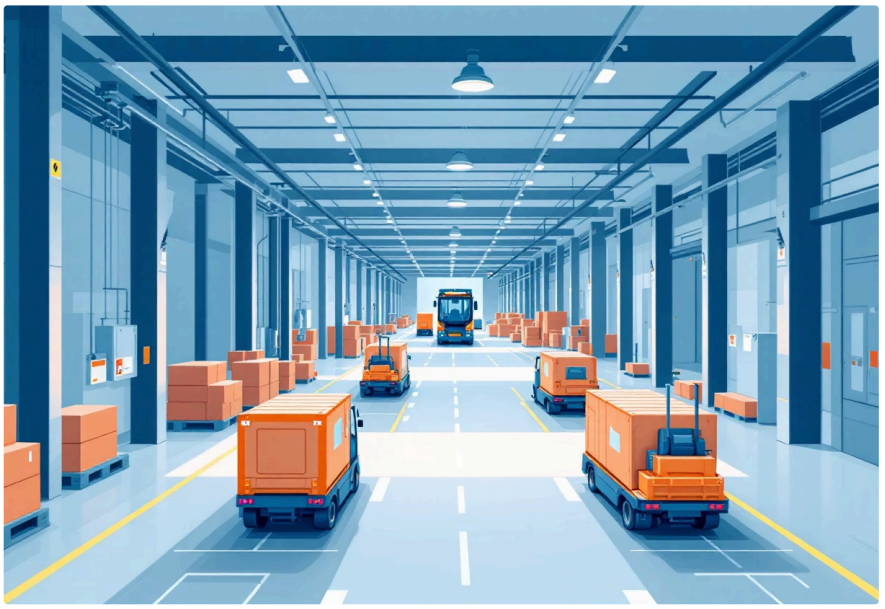


Different risks apply here, and the work environment demands a different attitude. By having knowledge of internal transport, you develop a broader understanding of safety and responsibility within this context.

Your behavior as a determining factor for safety

In logistical environments, behavior is often more decisive for safety than technology. Calm actions, maintaining an overview, and clear communication are essential to prevent incidents.

As a professional driver, this means you:

Stay alert

Stay alert for moving internal transport

Respect zones

Respect safety zones

Adhere to agreements

Adhere to clear agreements

Avoid risks

Do not take unnecessary risks

Insight into internal transport helps you consciously apply this behavior.

Limits of responsibility and action

In practice, drivers sometimes perform actions that are not part of their duties. This can stem from helpfulness or time pressure, but it entails risks.

By understanding internal transport, you better understand:

01

Authorized tasks

Which tasks are reserved for authorized personnel

02

Necessary training

Why training and experience are necessary

03

Calling for help

When you should wait or call for help

Respecting these limits is an important part of professional conduct.

Communication and Professional Collaboration

Good communication is a prerequisite for safety. By understanding internal transport, you can communicate more effectively with forklift drivers and warehouse employees. This prevents misunderstandings and increases mutual understanding.

Professional collaboration means that you:

- respect clear agreements;
- remain calm in busy situations;
- always prioritize safety.

Practical Application in Daily Work

The knowledge from these chapters is intended to be applied directly in your daily work. By consciously dealing with internal transport and logistical processes, you not only increase your own safety but also that of others.

This contributes to:

Fewer incidents

Fewer incidents

Less damage

Less damage

Safer working environment

A safer working environment

Professional conduct

Professional and responsible conduct within the logistics chain

CHAPTER 15 – Practice Questions and Final Exam

The knowledge and skills covered in this textbook collectively form the foundation for safe and responsible forklift operation. To check whether the student understands and can apply the material, this chapter contains both practice questions per theme and a complete final exam. In addition, the assessment criteria for the practical exam are set out.

The goal of this chapter is to:

- test insight
- review knowledge
- build self-confidence
- prepare the student for the official exam

Review Exercises per Chapter

Below you will find a selection of review questions per chapter. These are intended as practice and help to reinforce core concepts.

Chapter 1 – Introduction to the Course

1. Why is safe forklift operation important?
2. What is meant by safety as an attitude and behavior?
3. What is the responsibility of the forklift operator within the company?

Chapter 2 – Legislation and Safety Responsibilities

1. What is the purpose of the Working Conditions Act?
2. What is a Risk Inventory & Evaluation (RI&E) and why is it mandatory?
3. Name two responsibilities of the employer and two of the employee.
4. What should you do in the event of an industrial accident?

Chapter 3 – Workplace and Warehouse Environment

1. Why must transport routes be clearly marked?
2. What is a risk zone in a warehouse?
3. Why should you always be alert for pedestrians?
4. What do you do when you identify an unsafe situation?

Chapter 4 – Internal Transport Equipment

1. What is the main difference between a forklift and a reach truck?
2. Why is a stacker less suitable for high racks?
3. Name two types of attachments and their function.

Revision Exercises

Chapter 5 – Structure and Technology of the Truck

1. What is the function of the counterweight?
2. What is a triplex mast and when is it used?
3. Why should a chain be checked regularly?
4. What is the danger of a defective hydraulic system?

Chapter 7 – Stability of the Forklift

1. What is the stability triangle?
2. Why should you never drive with a raised load?
3. What happens to the center of gravity when turning?
4. Why is driving sideways on a slope dangerous?

Chapter 9 – Daily Check and Maintenance

1. Why is a daily check mandatory?
2. Name three components you check externally.
3. What should you do if you discover an oil leak?
4. Why is it dangerous to drive with a damaged tire?

Chapter 11 – Picking Up, Transporting, and Storing Loads

1. Why should you check a pallet before use?
2. What is the risk of partially inserted forks?
3. Why should you drive straight towards a rack?

Chapter 6 – Drive System and Energy Sources

1. Name an advantage and disadvantage of a diesel forklift.
2. Why is ventilation important when using LPG forklifts?
3. What is hydrogen gas and when does it form?
4. Why should the driver be careful when changing a battery?

Chapter 8 – Load Diagram and Safe Loading

1. What is the purpose of a load diagram?
2. What happens to the lifting capacity when the load is lifted higher?
3. Why is the center of gravity of the load so important?
4. What should you do when attachments are fitted?

Chapter 10 – Driving Techniques and Practical Work

1. Why should you always drive with a low load?
2. Why should you drive slowly around corners?
3. When should you drive in reverse?
4. Why should you never turn on a slope?

Chapter 12 – Environment, Living Conditions, and Safety Aspects

1. What are the health risks of diesel emissions?
2. Why should a battery charging area be well-ventilated?
3. What should you do if battery fluid leaks?
4. How does the risk of slipping arise from spills?

Final Exam – Practice Questions at Exam Level

Here is a compiled final exam that is representative of a theory exam. The test contains multiple-choice questions, open questions, and practice-oriented situations.

Multiple-choice questions

1. What happens when the load's center of gravity is too far forward?

- A. The forklift becomes more stable
- B. The lifting capacity increases
- C. The forklift can tip forward
- D. The mast no longer extends

2. What do you do if your forward view is obstructed by the load?

- A. Drive forward cautiously
- B. Lift the load higher for better visibility
- C. Drive in reverse in the direction of travel
- D. Ask someone to walk ahead

3. Hydrogen gas is formed:

- A. when changing LPG
- B. during the charging of a traction battery
- C. in diesel engines
- D. only with defective batteries

4. What is a mandatory component for a forklift on public roads?

- A. Extra heavy forks
- B. License plate or registration
- C. Attachments
- D. Reach function

5. A forklift may only drive up or down a slope:

- A. Sideways
- B. In high gear
- C. With the load facing upwards
- D. Without a load

Final Exam – Practical Scenarios

These questions test your ability to apply safety knowledge in realistic work situations. Think carefully about the correct course of action and the underlying safety reasons.

Scenario 1: Shifted Load

You approach a pallet where the top box has shifted. What do you do?

Scenario 2: Driving Down a Slope

You are driving down a slope with a load. What is the correct driving direction and why?

Scenario 3: High Lifting

You need to place a pallet at a height of 5 meters. Which safety measures do you take before lifting?

Scenario 4: Strange Noise

While driving, you hear a strange noise from the wheel area. What is your reaction?

Scenario 5: Hitchhiking

A colleague wants to "hitch a ride" on the forks. What do you say and why?

Practical Assessment Criteria

During the practical exam, the instructor assesses whether the candidate:

1. Works Safely

- remains alert and maintains overview
- pays attention to pedestrians and colleagues
- accurately follows safety regulations

2. Operates the Truck Correctly

- drives smoothly
- correct driving height
- correct mast operation
- good steering technique
- correct speed

3. Picks up, transports, and sets down loads safely

- approaches straight
- forks fully inserted
- load lifted in a controlled manner
- load transported stably
- stacked/unstacked safely

4. Reacts Correctly to Unexpected Situations

- stops in time
- chooses correct driving direction
- communicates with colleagues
- adjusts speed

5. Performs Technical Checks

- pre-operational check
- identifying defects
- safely taking the truck out of service in case of malfunction

Exam Preparation

Success Starts with Good Preparation

This chapter has provided you with all the necessary practice material to prepare for both the theoretical and practical exams. By reviewing the chapter repetition exercises, taking the final test, and studying the practical situations, you will build the confidence and knowledge needed for safe and responsible forklift operation.

Study the Theory

Review all chapters thoroughly

Practice with Questions

Complete all exercises and the final test

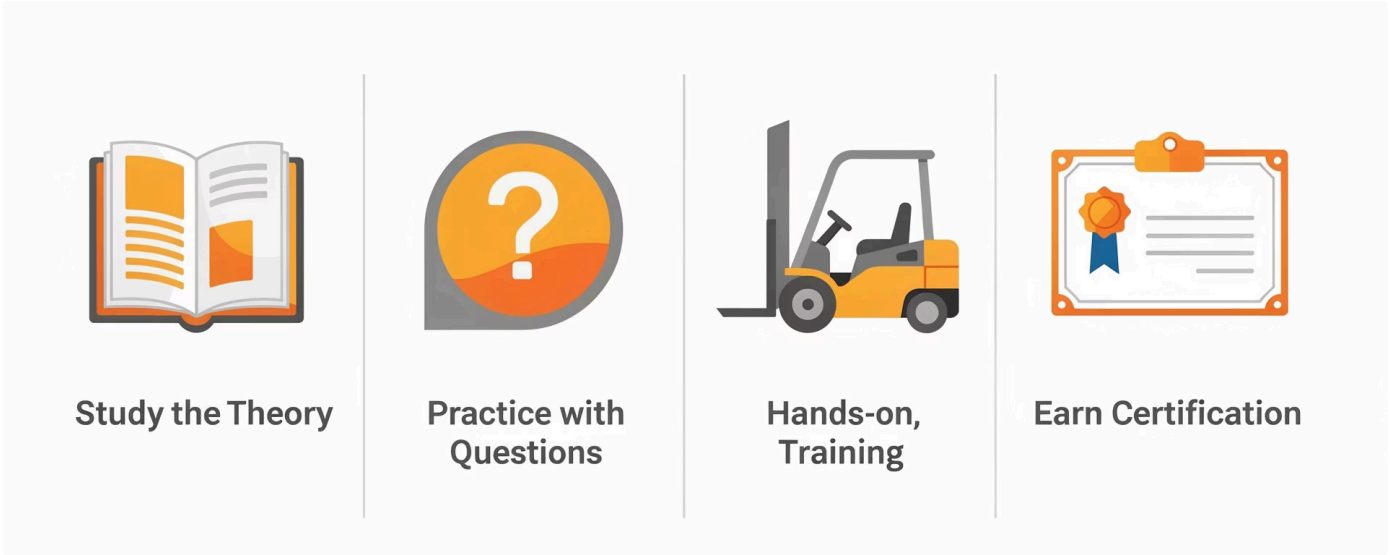
Train Practically

Apply the knowledge during driving lessons

Obtain Your Certificate

Approach the exam with confidence

> **Remember:** Safety is not accidental, but the result of knowledge, training, and the right attitude. With the proper preparation, you are ready to become a professional and safe forklift operator.



HEFPRO

Safe and skillied with Forklift and Reach Truck is a comprehensive and practice-oriented training manual for anyone working with internal transport equipment. This book provides the theoretical foundation for both beginner and experienced operators and fully aligns with current requirements regarding safety, professional competence, and legislation.

The manual is designed as a reference guide during and after training. Operators can use it to prepare for exams, refresher courses, and Code 95 training, as well as a practical handbook to quickly look up information when questions or uncertainties arise in daily operations.

Dit boek is geschikt voor:

- Beginner forklift and reach truck operators
- Experienced operators refreshing their knowledge
- Refresher training courses and Code 95
- In-company training and internal education programs

In dit lesboek leer je onder andere:

- How to work safely and responsibly with forklifts and reach trucks
- How to recognize and control risks in the workplace
- Correct handling of loads, stability, and driving behavior
- Working in accordance with applicable laws and regulations
- Professional conduct in warehouse and logistics environments

This book covers all essential knowledge required to work safely and competently, whether you are operating a truck for the first time or have many years of experience.

Editie: 2026
Titel: Safe and Skilled with Forklift and Reach Truck
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