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WAREHOUSING, FROM RISK TO SAFETY: COMPREHENSIVE INSPECTION OF STORAGE RACKS

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L. HICK / S. KIEFFER / C. WENGER

AGENDA

1. What is a rack?

2. What does the law say?

3. What are the Risks and which preventive measures to implement?

4. Why and How to control/inspect racks?

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2. WHAT IS A RACK?

1. WHAT IS A RACK?

Description

- **framework or structure, typically metal, used for storing and organizing items**
- **High-rise storage techniques maximize space optimization**

Types of racks:

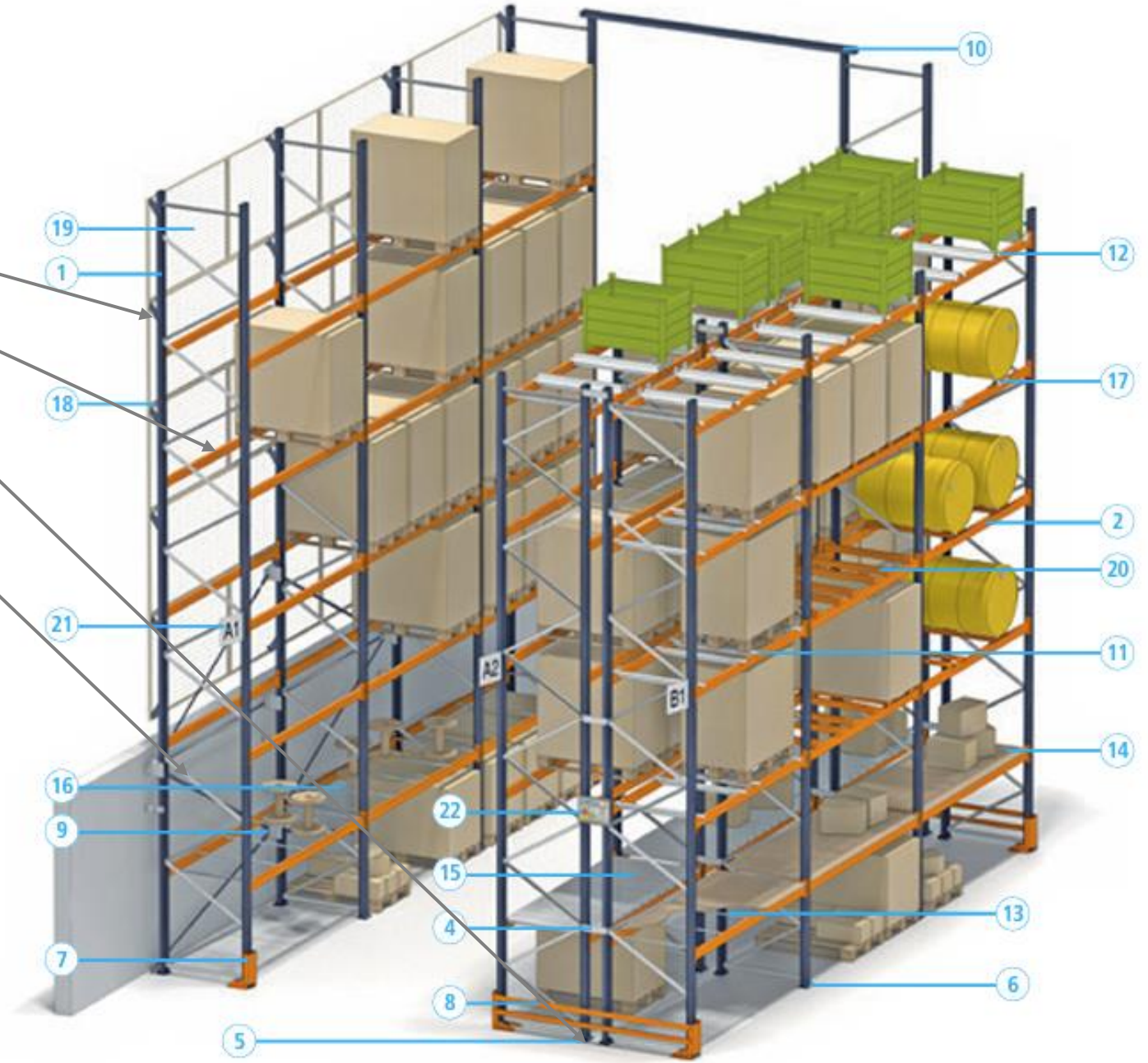
- **Selective Pallet Racks**: Common in warehouses, designed for storing pallets.
- **Drive-In/Drive-Through Racks**: Allows forklifts to drive directly into the rack.
- **Cantilever Racks**: Ideal for storing long, bulky items like lumber or pipes.
- **Push-Back Racks**: Allows for multiple pallets deep storage.
- **Flow Racks**: Uses a gravity flow system for stock rotation (FIFO).

MAIN COMPONENTS OF A RACK

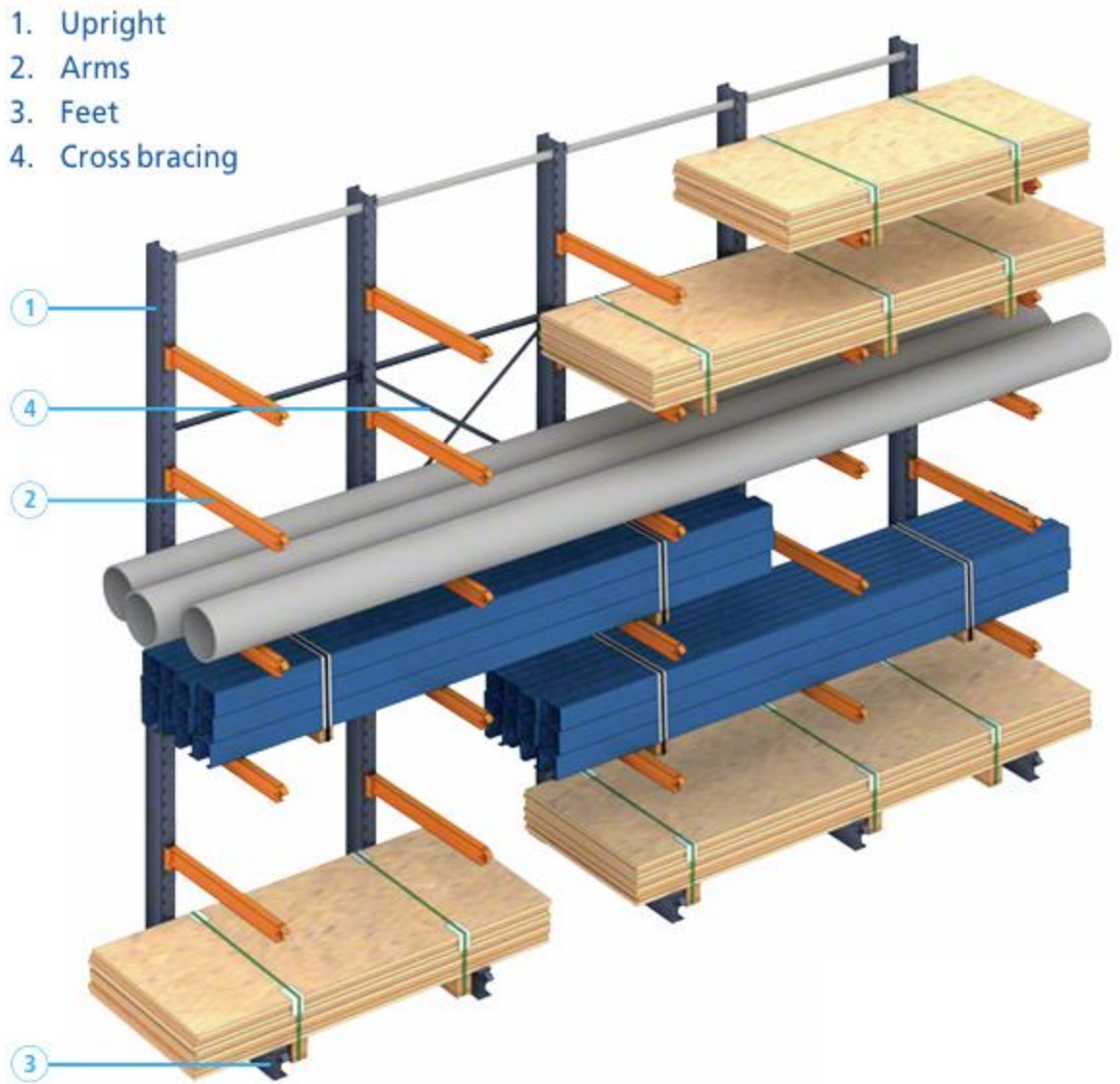
Frames (Uprights):	• Vertical components that provide support.
Beams:	• Horizontal components that hold the load.
Bracing:	• Provides stability and rigidity to the structure.
Baseplates & Anchors:	• Distribute the load and anchor the rack to the floor.

EXEMPLE OF RACKS

1. Frame
2. Beam
3. Safety locking mechanism
4. Frame union
5. Anchor bolts
6. Levelling shims
7. Upright protector
8. Lateral protection barrier
9. Cross bracing set
10. Top portal tie
11. Pallet cross tie
12. Container support
13. Chipboard shelving cross tie
14. Chipboard or melamine shelf
15. Galvanised picking shelf
16. Mesh shelf
17. Drum support
18. Pallet stop set
19. Anti-fall mesh
20. Raised cross tie
21. Aisle identification plate
22. Signalling plate



EXAMPLE OF RACKS



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2. WHAT DOES THE LAW SAY?

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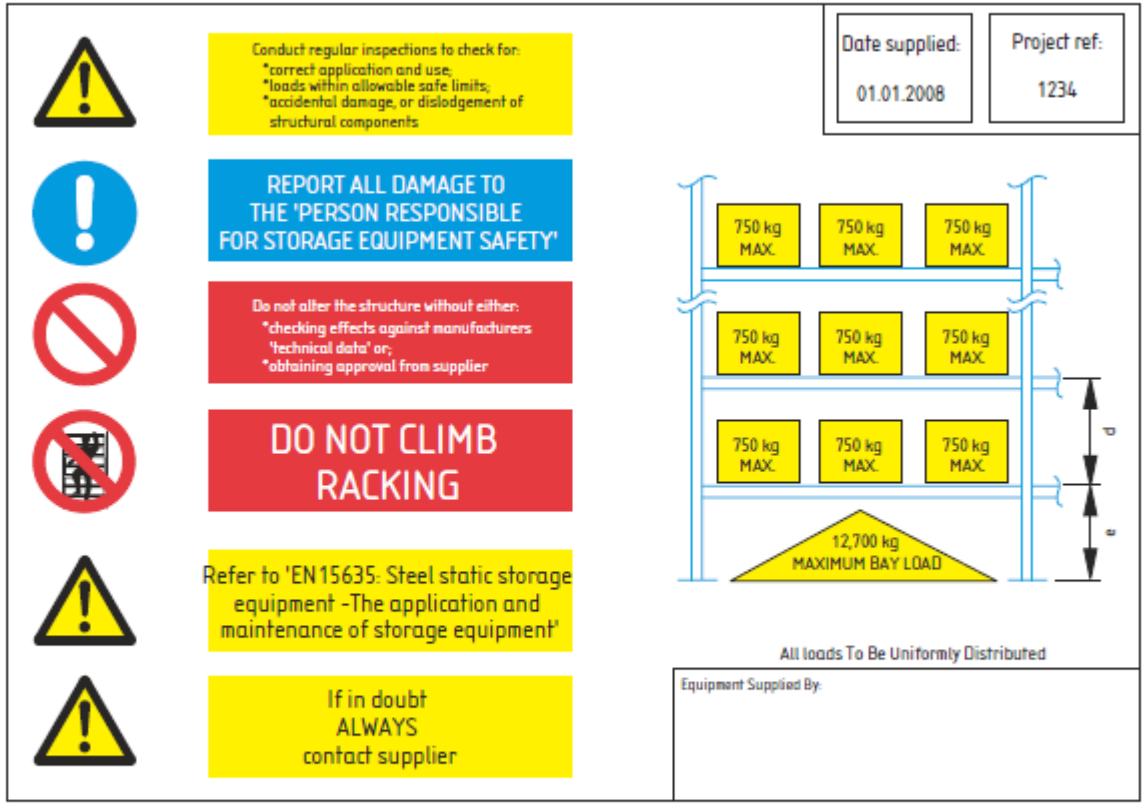
Regulations and Standards

- **OSHA (Occupational Safety and Health Administration):** Guidelines for the safe use of racks in the workplace.
- **ANSI (American National Standards Institute) / RMI (Rack Manufacturers Institute) Standards:** Specifications for the design, testing, and utilization of industrial storage racks.
- **European Standards (*Design* : EN 15512, EN 15620, EN 15629, *Use & Maintenance*: EN 15635):** Cover the design, storage, and operation of steel static storage systems.
- **Luxembourg regulation**: **L.312-1 and L.312-2:** defining the employer's obligations regarding the compliance of work equipment made available to workers

Key Legal Requirements

- **Design**: Must be clearly analysed and customized according to end user needs
- **Installation:** Must be installed according to **manufacturer specifications and industry standards**.
- **Load Capacity:** Racks must be **clearly marked** with maximum load capacities.
- **In use**: Implement a Management procedure (including *Person responsible for storage equipment safety PRSES, Inspection, maintenance and damage reduction)*
- **Inspections and Maintenance: Regular inspections are mandatory** to ensure structural integrity and safety.
- **Training: Employees** must be **trained** in the safe use of racks and equipment.



Key

d beam pitch

e height to first beam

EXAMPLE OF MAXIMUM LOAD CAPACITIES MARKING

(EXTRACT FROM NF EN 15635)

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3. WHAT ARE THE RISKS AND WHICH PREVENTIVE MEASURES TO IMPLEMENT?

TYPICAL RISKS

Structural Failure due to **Design, installation and/or maintenance**

- Design defect / Poor floor flatness / Improper installation
- Lack of routine inspection to detect signs of deterioration or weakness.
- Insufficient regular maintenance to ensure rack stability and safety

Structural Failure due to **Overloading**

- Max. loading capacity not respected

Structural Failure due to **Improper Loading**

- Poor distribution of loads leading to instability
- Wrong Loading sequence

Traffic accidents / **Collisions with forklifts**

- Lack of training / awareness
- Absence of bumpers or guards to prevent impacts with racks

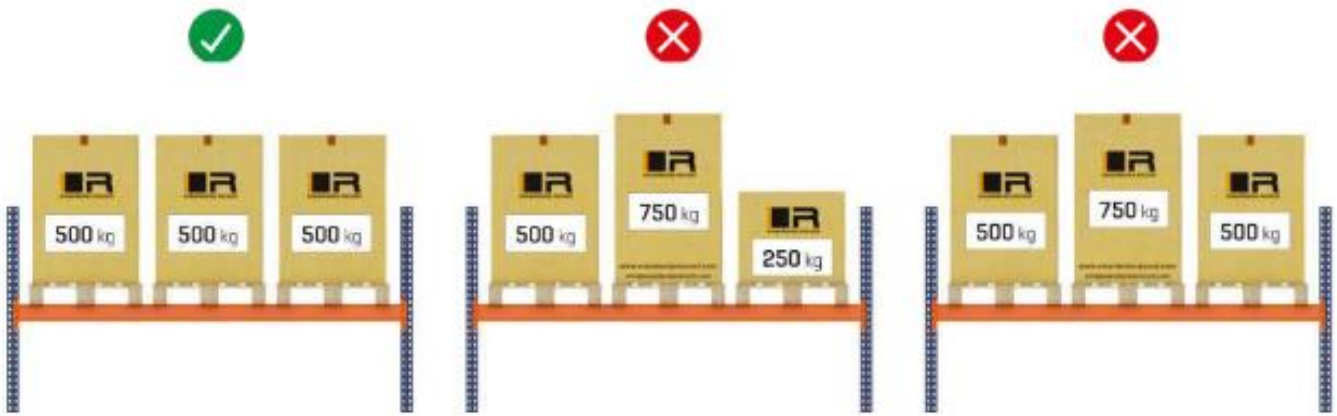
Falling objects

- Incorrect handling during loading or unloading from racks
- Absence of protective bumpers

Environmental Factors

- Corrosion or deterioration due to environmental conditions.

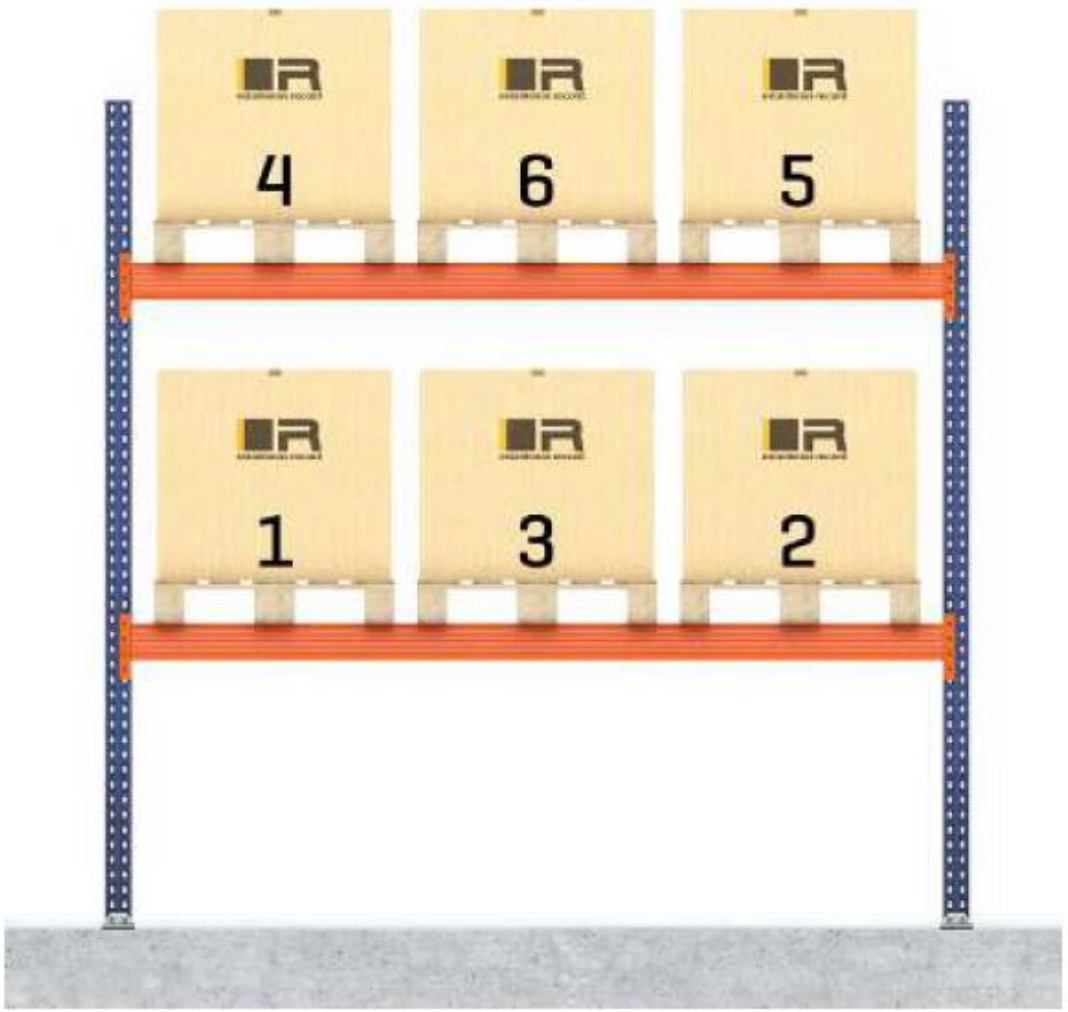
OVERLOADING



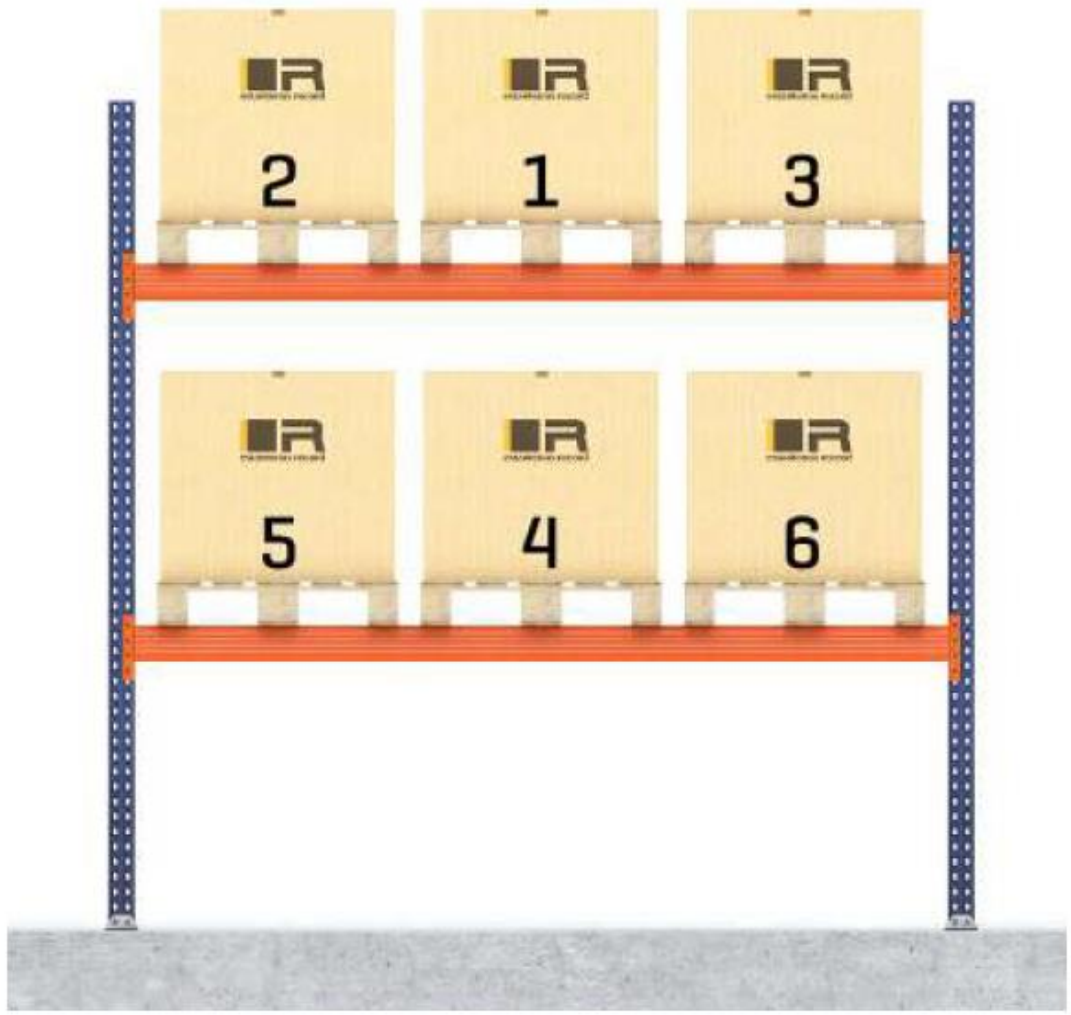
IMPROPER LOADING

Overloads on a rail by non-horizontal descent

IMPROPER LOADING



Loading sequence



Unloading sequence

FORKLIFT DAMAGE - COLLISIONS WITH RACKS CAN COMPROMISE STRUCTURAL INTEGRITY.

Sudden descent or rise of the load

PREVENTIVE MEASURES

Proper Design and Installation:

- Select qualified professionals for design and installation
- Follow manufacturer and industry guidelines / Norms

Training:

- Regular training sessions for employees on safe loading/unloading practices
- Training on recognizing and reporting damage

Load Management:

- Ensure loads do not exceed rack capacity
- Distribute weight evenly across beams

Protection Systems

- Column protectors
- Guard rails, bumpers
- and other protective devices.

Regular Inspections (focus in the last section)

- Visual inspections for signs of damage or wear
- Professional inspections at regular intervals

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4. WHY AND HOW TO CONTROL/INSPECT RACKS

RACKS INSPECTION

Inspections According to NF EN 15635

Preventive maintenance program must be implemented

Program Should include:

- Verification checklists
- Periodic control plan

Classification of the damage identified during inspection

- According to assessment matrix

Records of inspection

RACKS INSPECTION

FREQUENCY AND TYPE OF INSPECTION

Daily inspection

- By warehouse personnel
- Easily identifiable anomalies (bent beams/ladders, broken anchors, cracked floor, etc.)

Weekly inspection

- By the warehouse manager
- Check the verticality of the structure and the components of the lower levels

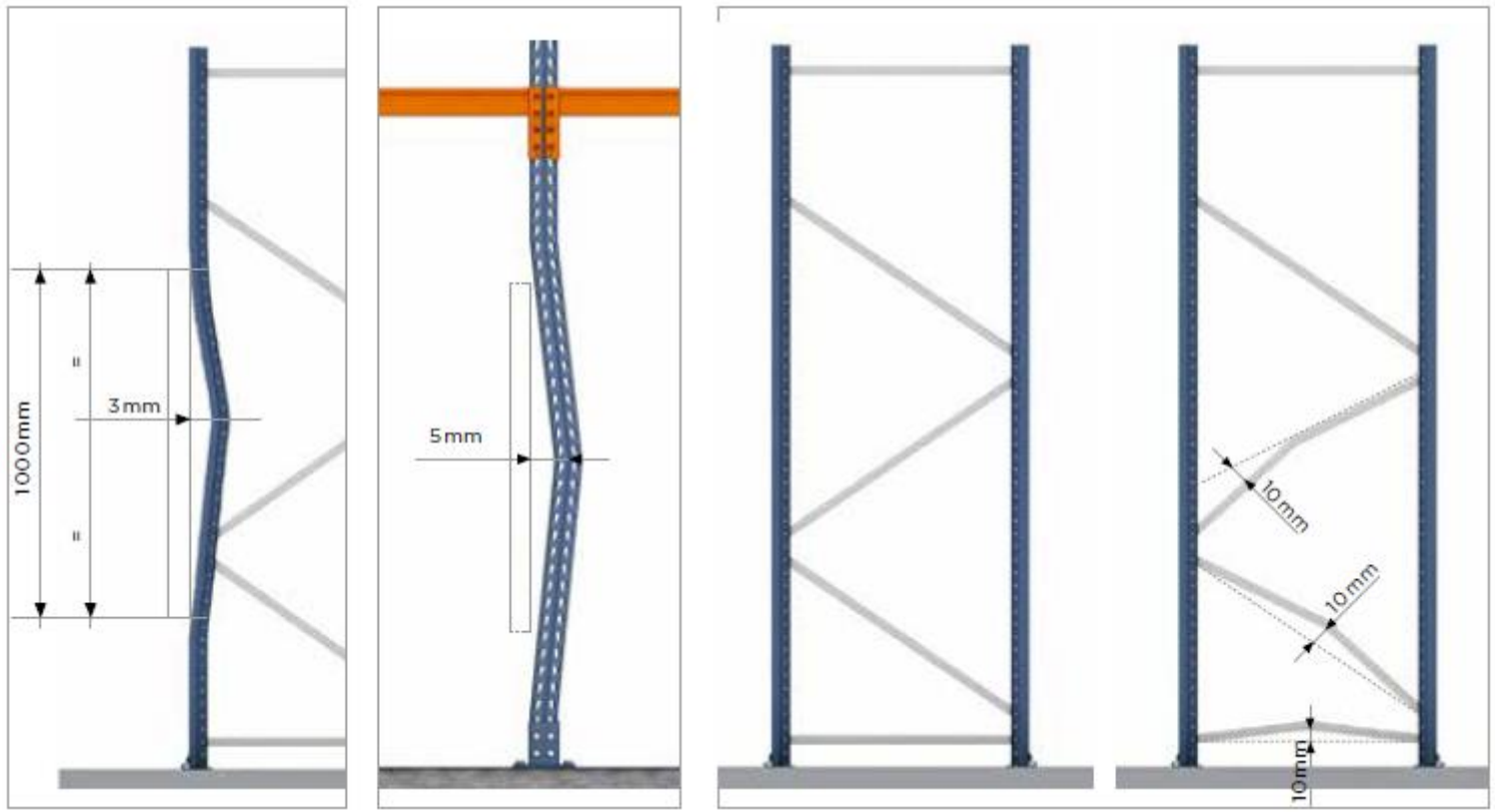
Monthly inspection

- By the warehouse manager
- Check the verticality of the structure and all levels

Annual inspection

- By an independent expert
- Check all safety aspects

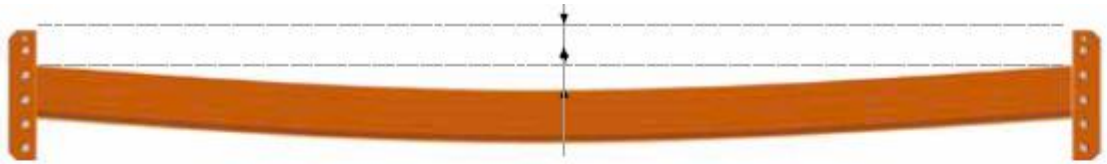
EXAMPLE OF INSPECTION POINT



EXAMPLE OF INSPECTION POINT

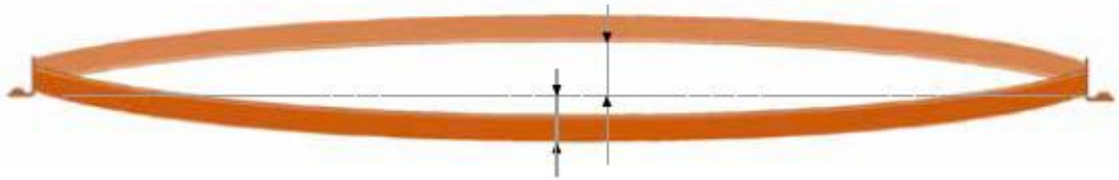
Montant éraflé

Montant plié

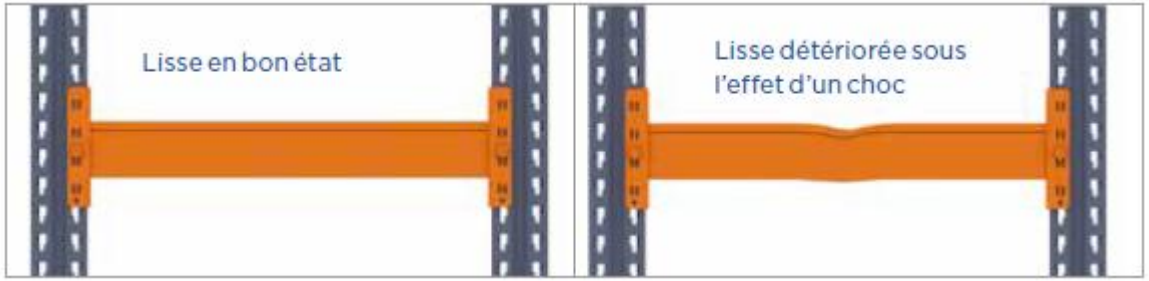


Déformation verticale d'une lisse

- Déformation résiduelle latérale supérieure à 50 % de la déformation ou de la flèche nominale verticale sous charge (L/200).



Déformation horizontale d'une lisse



ASSESSMENT MATRIX

Red Risk

Immediate unloading of all racking modules and replacement of damaged éléments before reuse

The replacement of all damaged parts has been correctly completed

Recommissioning

Orange (AMBER) Risk

1. Identify the damaged elements to be replaced.
2. Organize the replacement of the material.
3. Ensure that all locations affected by the damage are not reloaded until perfectly reinstated.
4. Perform the replacements as soon as possible.

The replacement of all damaged parts has been correctly completed.

Recommissioning

Green Risk

Record the authorization of the installation and proceed with a new evaluation during the next check, which must be carried out within the following 12 months

In the absence of modifications, continue the inspection at a normal level and at the same intervals

Service not interrupted

RECORDS – EXAMPLE OF DAMAGE'S LIST

Item #	*Localisation*	*Affected elements*	*Pictures #*	*Comments*	*Type of damage*	*Damage classification*	*Action*	*Pilot*	*Deadline*	*Status*
1	Hall 1 Rack 1	Frame	Pict. 1	< 2 times limit values	Bended	Orange	To be replaced	Supplier	4 weeks	Done
2	Hall 2 Rack 1	Beam	Pict. 2	Within tolerances	Deflection	Green	To be monitored	Maintenance	Next inspection	Ongoing
3	Hall 1 Rack 2	Beam connector	/	/	Missing Locking device	Red	To be replaced	Maintenance	Immediate	Done
4	Hall 2 Rack 2	Beam	Pict. 3	> 2 times limit values	Deflection	Red	To be replaced	Supplier	Immediate	Rack in Quarantine

Picture 1

Picture 2

Picture 3

THANK YOU! STAY SAFE ☺

LAURENT HICK : LAURENT.HICK@LUXCONTROL.COM

STEPHANE KIEFFER: STEPHANE.KIEFFER@LUXCONTROL.COM