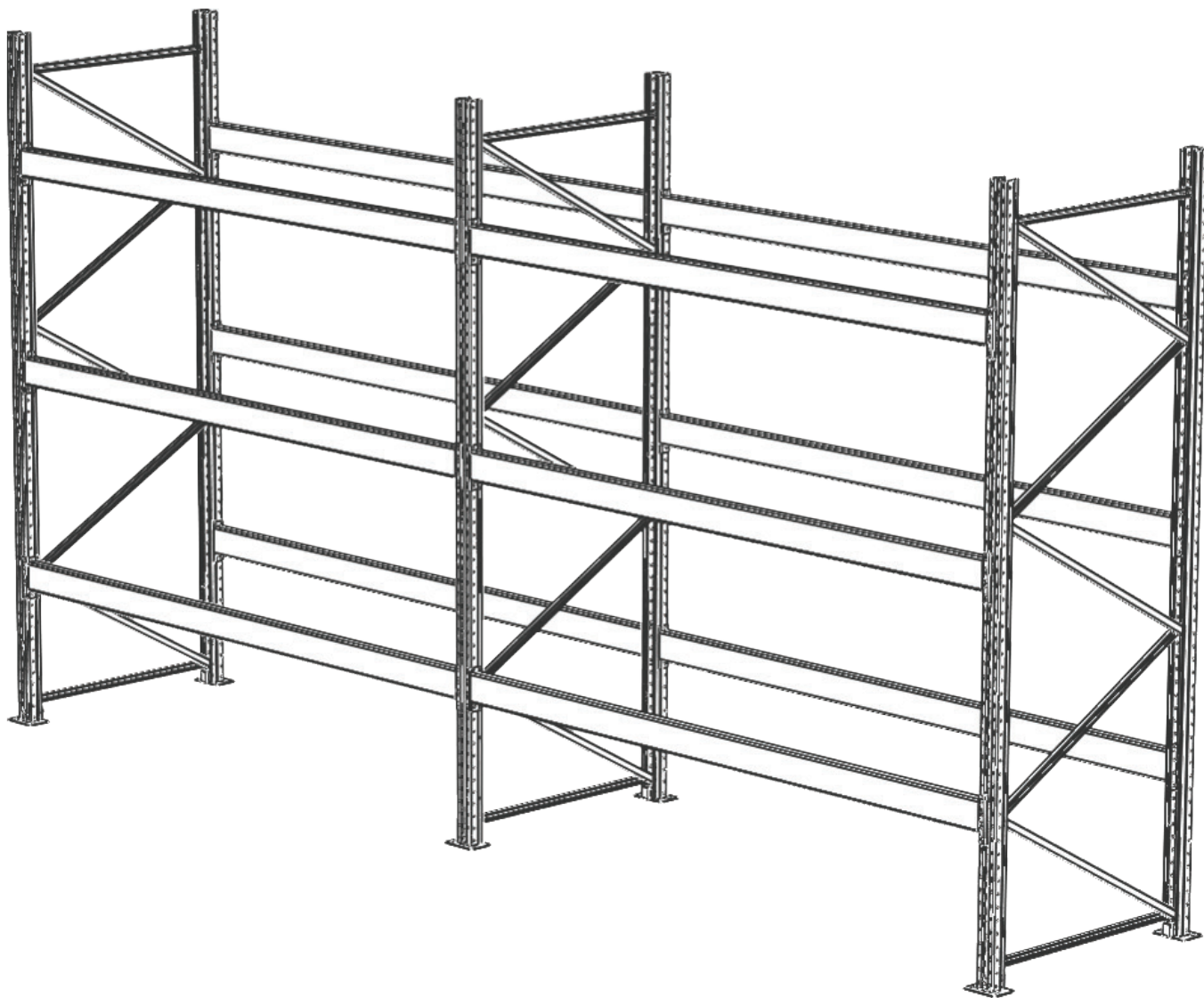




EPSIRACK Safety Manual

V1.5 - 06/2013



Manual for the user

"The assembly and installation of the storage system \[...\] are as important as a good structural design." EN 15635

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Introduction

This Safety Manual provides the user and the installer with information on the implementation, use, maintenance and general safety of the “EPSIRACK” pallet rack storage system.

The “EPSIRACK” pallet rack storage system is designed and calculated according to the following European standards, applicable for static storage systems made of steel :

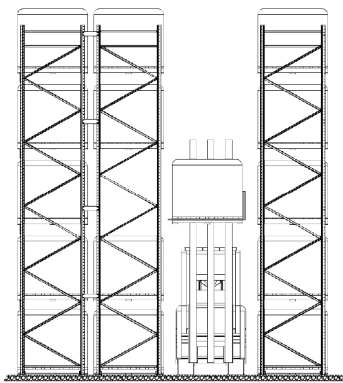
- EN 15512 “Adjustable palette racking systems - Principles for structural design”
- EN 15620 “Adjustable palette racking systems - Tolerances, deformations and clearances”
- EN 15629 “Specification of storage equipment”
- EN 15635 “Application and maintenance of storage system”
- EN 15878 “Terms and definitions”

The system is self-supporting, removable and intended for indoor use unless otherwise specified explicitly.

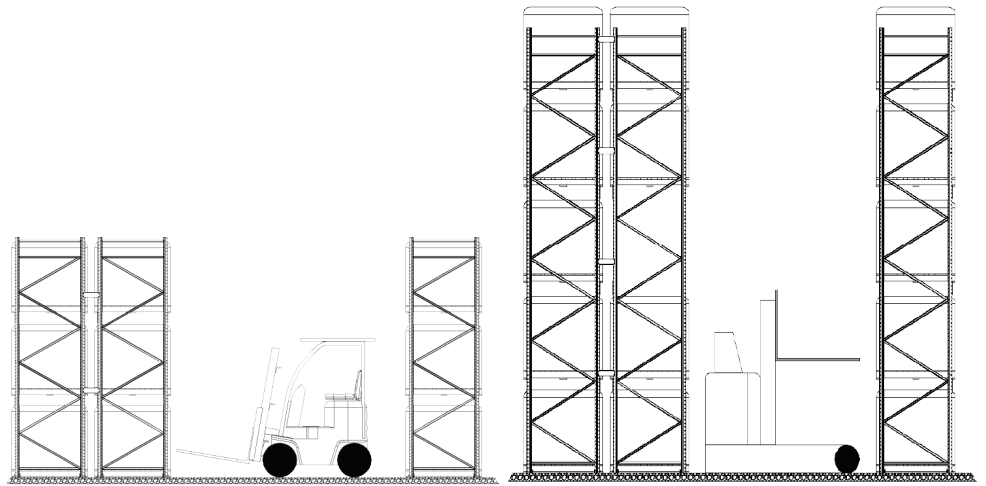
A certificate issued by an independent inspection body confirming our shelving is fully compliant with these design and testing standards is available on request.

A full statement of the structural calculations can be provided for the storage system on request (for an additional cost).

The “EPSIRACK” pallet racking storage system is intended for use in class 300 A, 300 B or 400 in accordance with the standard EN 15620. Class 300 A differs from class 300 B in that the driver travels vertically with the load or has an indirect visibility aid system.



Class 300 A and 300 B : Side loading



Class 400 : Front loading

The EPSIRACK Safety Manual also takes into account the recommendations of the French National Institute for Research and Safety (INRS) issued in the pamphlet ED771.

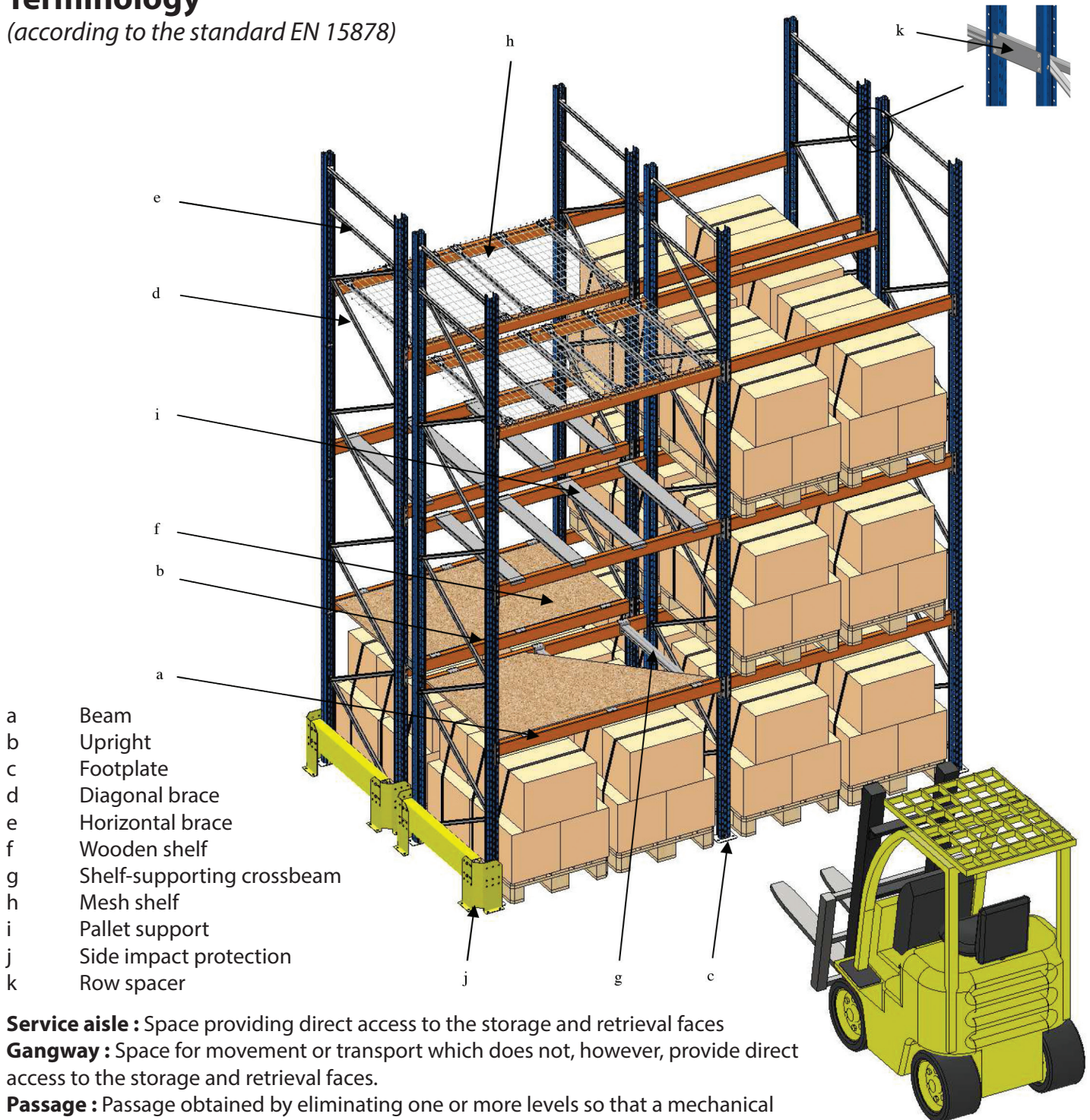
The installer of the system will work to ensure compliance with the different national rules and recommendations applicable in the country in which the system is installed.

As specified in the standard EN 15635, “The user of the storage system is responsible for the safety of persons working within the vicinity of the system and for the completely safe operating conditions of the system used.”

The user of the storage system must comply entirely with the standard EN 15635 which can be purchased through various standards offices such as AFNOR, BEUTH, BSI, NBN, NEN, etc...

Terminology

(according to the standard EN 15878)



Service aisle : Space providing direct access to the storage and retrieval faces

Gangway : Space for movement or transport which does not, however, provide direct access to the storage and retrieval faces.

Passage : Passage obtained by eliminating one or more levels so that a mechanical handling device can pass under the remaining levels.

Operator : Any person authorised to carry out storage/retrieval operations and order picking

Pedestrian : Anyone other than an operator.

User* : Company or person who manages and uses the equipment on a daily basis and who is responsible for the safety of the installation.

Installer* : Qualified person or company tasked with assembling the storage system.

Supplier* : Person or company that supplies the storage system. Manufacturer or its distributor

Specifier* : User, supplier or company who provides the supplier with precise details of the user's requirements.

**For the roles and responsibilities of these entities, see standards EN 15629 and EN 15635.*

Assembly and installation of the storage system

The installer of the EPSIRACK storage system must strictly observe the EPSIRACK assembly instructions provided with the storage system and, where applicable, the installation plans and specific configuration provided by MANORGA or its distributor.

The safety pins are not optional and must be fitted and replaced in the event of impact against the beams in accordance with the periodic maintenance defined in accordance with this manual.

Shelving elements of a different brand are not compatible and must not be used with the EPSIRACK shelving.

As defined in the standard EN 15635, "The assembly and installation of the storage system [...] are as important as a good structural design. The quality and accuracy of this work can have a major influence on the performance of the storage system. The supplier's staff must be trained to install the system and must have the technical experience required to ensure its safety."

Once assembly is finished, a competent person should carry out an official inspection to check that assembly has been carried out correctly, and the user should obtain a certificate of execution confirming that assembly of the storage system was conducted in accordance with the recommendations of the standards and of the supplier.

Service aisles and gangways

The pedestrian gangways and the handling equipment aisles should be segregated if possible and clearly marked on the floor so that the workers on foot do not find themselves in the area of movement of any mechanical equipment.

The aisles and gangways must always be free of obstructions.

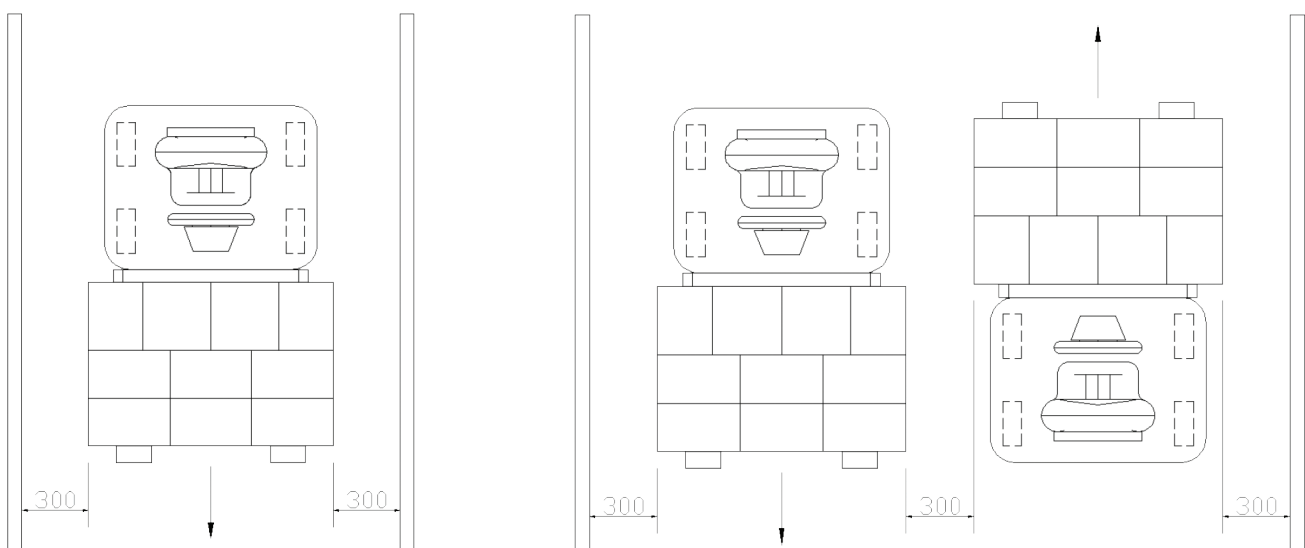
The width of the gangways (for movement of trucks without access to the storage and retrieval faces) must comply with the regulations in force in the country of installation.

In France, the INRS recommends $W + 1\text{ m}$ for movement of one truck and $W + 1.40\text{ m}$ for movement of 2 trucks

Where by W is the width of the truck(s) with its/their load.

Minimum clearances in the gangways (according to standards):

The standard EN 15620 gives a minimum clearance of 300 mm between the truck (with its load) and any obstacle, or between trucks (with their loads), but this does not replace national regulations.



Any passage through the shelving under a level must be secured with a solid or perforated floor.

A clearance of 250 mm must be allowed between the height of the truck plus its load and the height of the passage.

The width of the service aisles is defined by the specifier in accordance with the technical requirements of the truck, or by the supplier of the truck.

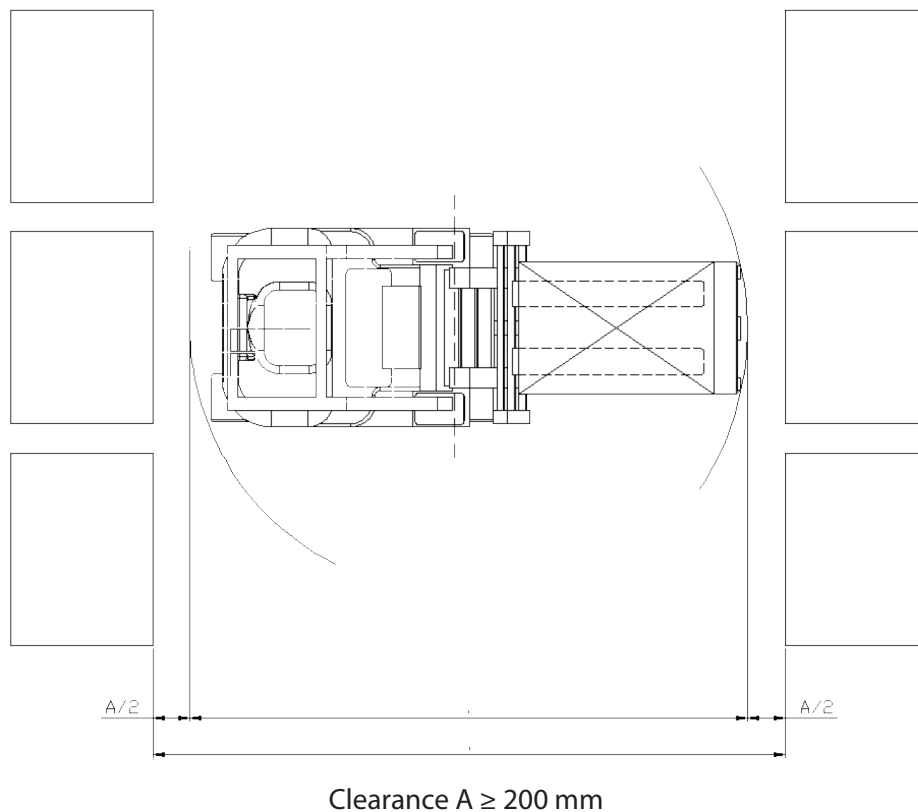
The width of the service aisles (space providing direct access to the storage and retrieval faces) depends on the dimensions of the truck and the palletised load (overhanging goods, fanned-out goods, etc.)

The standard EN 15620 gives the minimum clearance values below.

Choosing the margin for manoeuvre (clearance) is the responsibility of the specifier (person or company that formulates the end user's request to the storage system supplier) and is based on a risk analysis; the normative minimum values are set out below.

Minimum clearances in the service aisles (according to standards):

Class 400



Class 300

To be defined by the specifier in accordance with EN 15635.

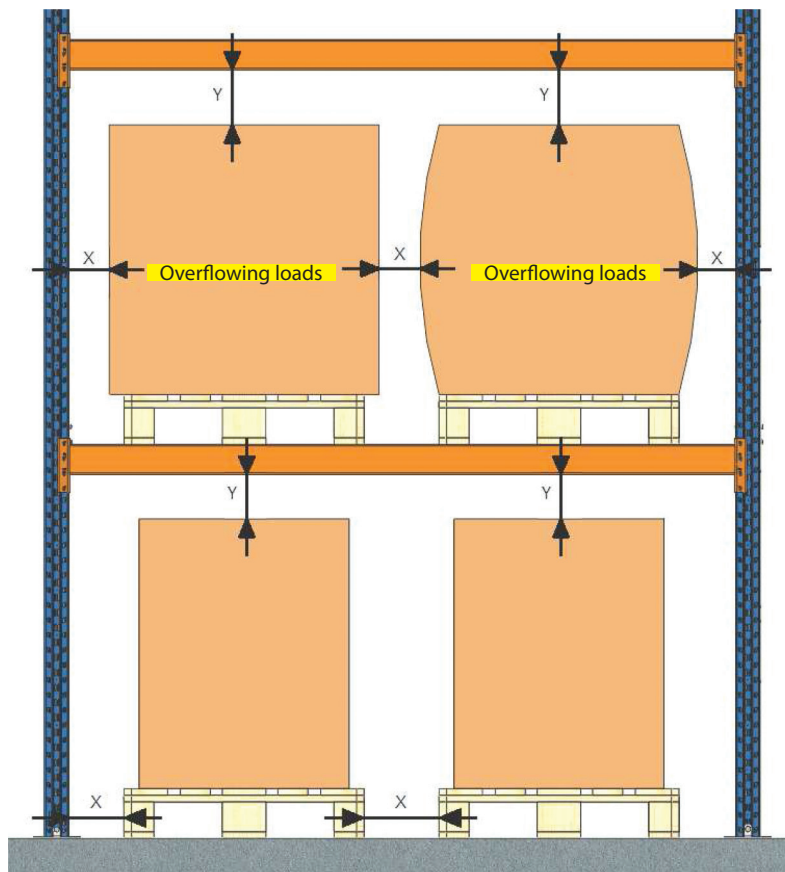
Positioning of pallets : Minimum operating clearances

The load is deemed uniform on a standard pallet and of dimensions suitable for the shelving.

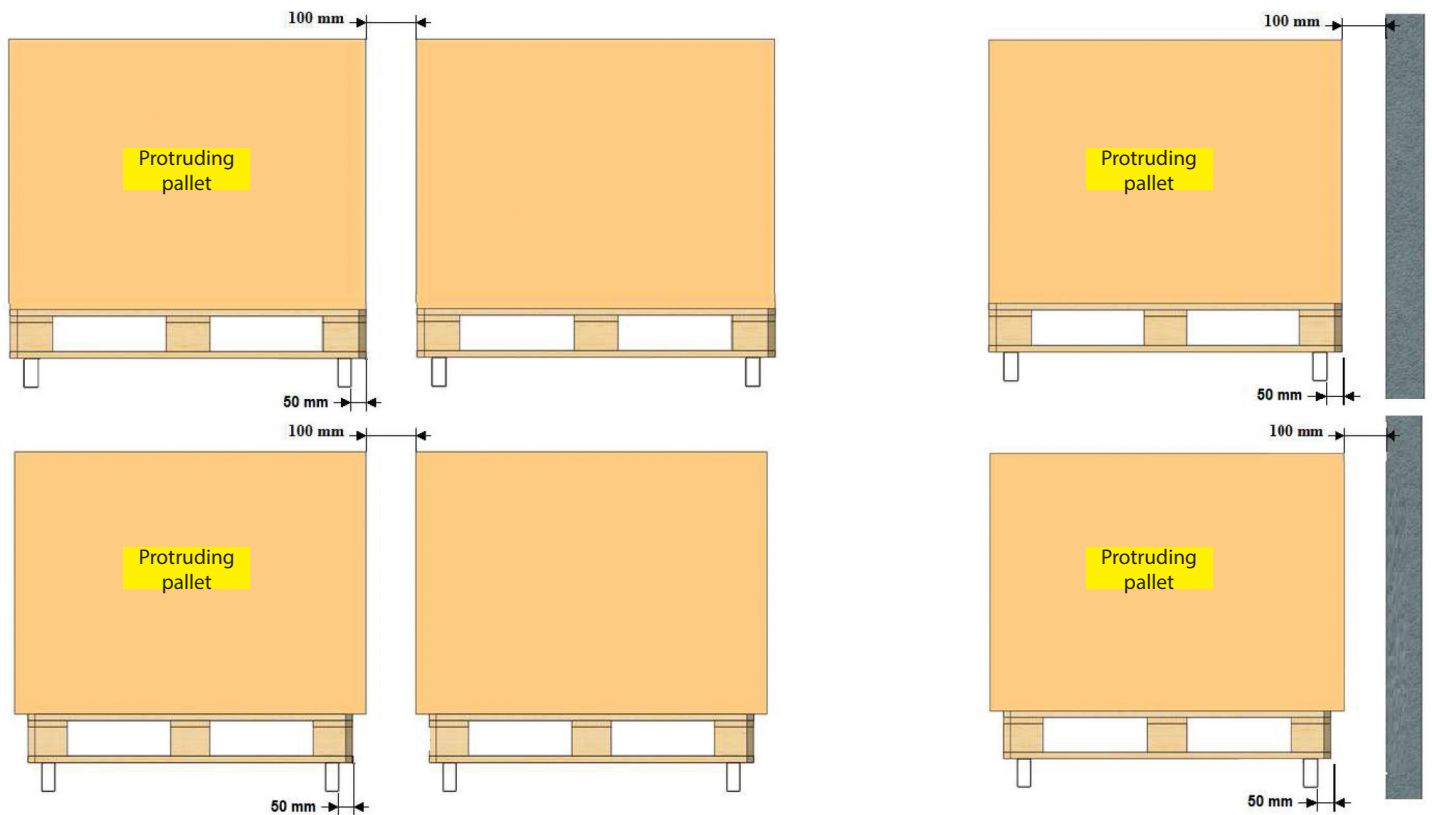
The longitudinal operating clearances are defined by the standard EN 15620, such as:

Height of position H (in m)	Class 400		Class 300 A		Class 300 B	
	X	Y	X	Y	X	Y
$0 \leq H \leq 3 \text{ m}$	75	75	75	75	75	75
$3 < H \leq 6 \text{ m}$	75	100	75	75	75	100

The longitudinal and transverse operating clearances must take into account the actual size of the loads if they are protruding.



The transverse operating clearances in the case of single and two-sided access must be 100 mm between the protruding loads or 50 mm between pallets, such as:



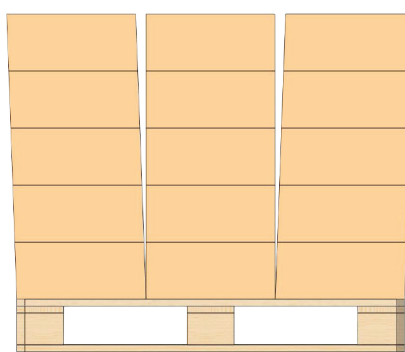
If the stored loads exceed the pallet, the dimensions of these protruding loads must be taken into account by the specifier during project preparation for calculating the operating clearances.

Examples of protruding loads, the dimensions of which must be taken into account when calculating the operating clearances:

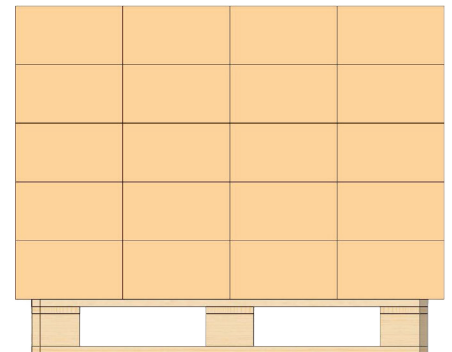
Bulbous



Fanned out



Overhanging



Loads and handling equipment

The working loads must be clearly defined by the specifier during analysis of the system in accordance with the intended use thereof.

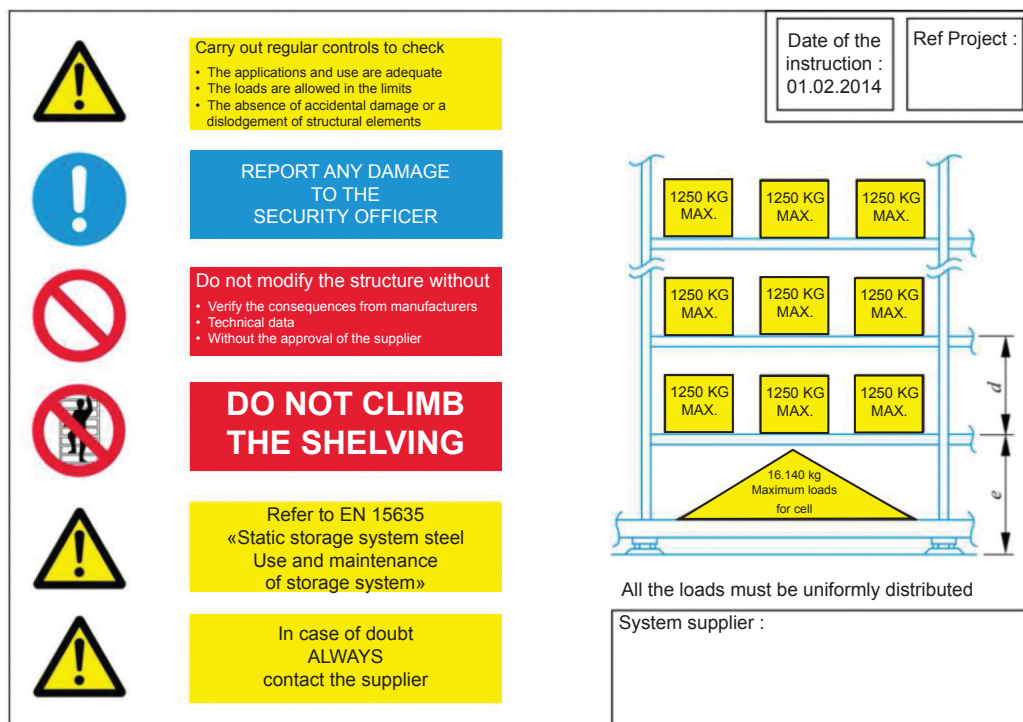
We provide you with load tables, taking into account a load uniformly distributed on the pallet, not protruding, loaded uniformly depending on:

- The type of upright
- The type and length of beam
- The height between storage levels

You can also contact your supplier for further information about the conditions and load capacities of our shelving if necessary.

The storage system supplier must provide the user with one or more load plaques, in the local language, which must be clearly and permanently displayed on the storage system.

The load plaque must conform to the standard EN 15635 and be established based on and in accordance with the conditions of the load tables provided.



Example of load plaque according to the standard EN 15635

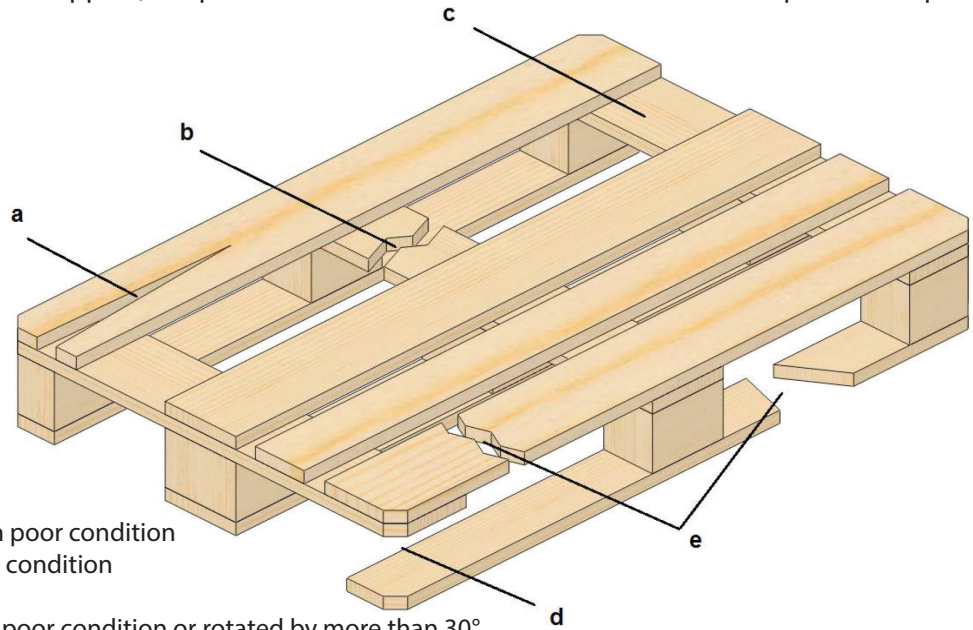
The mechanical equipment used for loading must be in perfect working order, well maintained and in complete conformity with the storage system.

Reminder: forklift truck drivers must be properly trained and have the authorisations required for this role.

Placement and condition of pallets

The pallets used must be in perfect working order and must be suitable for the loads they are expected to bear, for the forklift truck and for storage on a pallet rack.


Should any of the faults listed below appear, the pallet shall be deemed unusable and must be repaired or replaced.

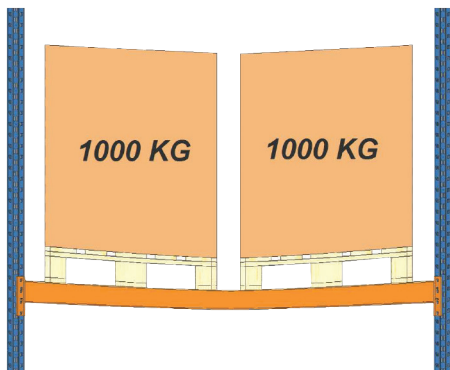


- a : Top lead deckboard cracked or in poor condition
- b : Stringer board broken or in poor condition
- c : Top interior deckboard missing
- d : Bottom deckboard missing or in poor condition or rotated by more than 30°
- e : Top/bottom lead deckboard broken

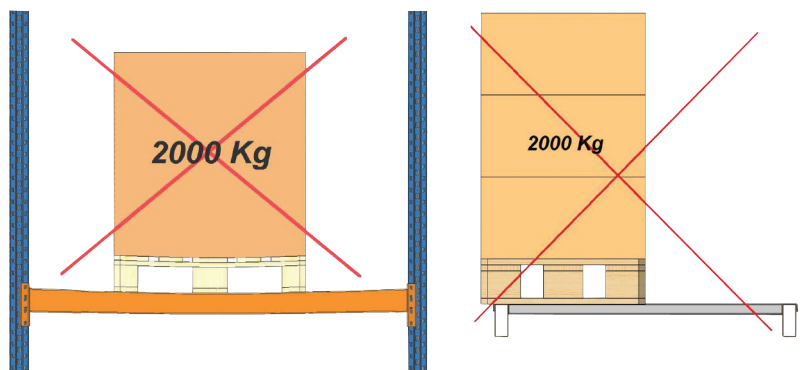
All loads must be stable and well-distributed on the pallet.

In case of storage on the ground, the area must be demarcated to the pallets are correctly placed off the gangway.

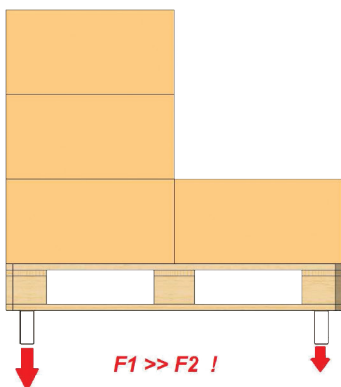
 By default, the loads indicated in the load tables are deemed for a uniform load, evenly distributed on the front and rear beams.



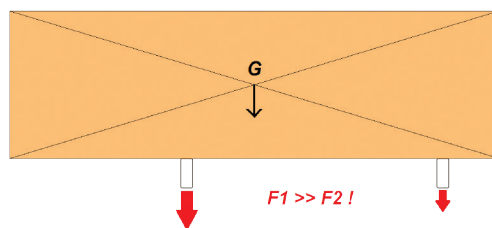
Correct distribution for an acceptable load of 2000 kg per level



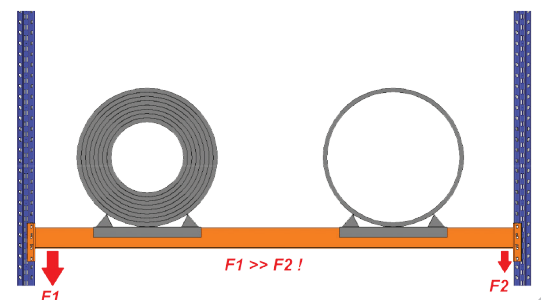
Dangerous overload situations



$F1 \gg F2 !$



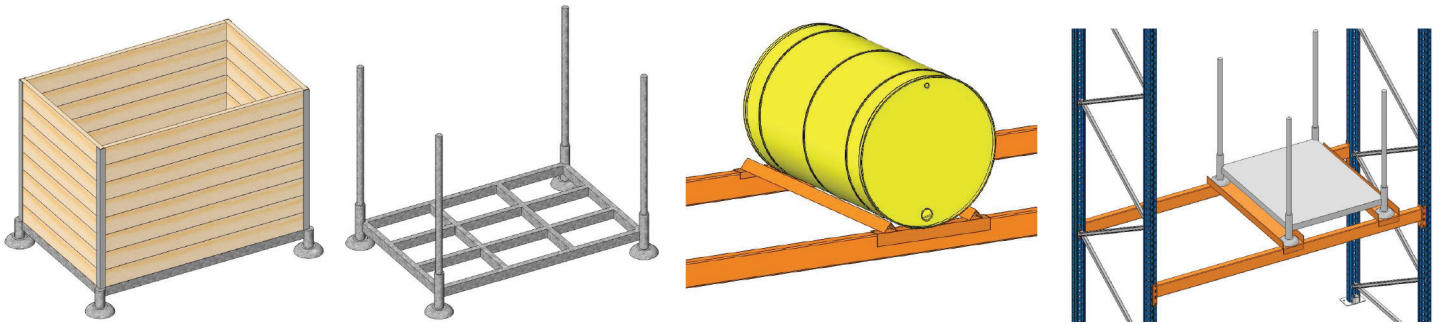
$F1 \gg F2 !$



$F1 \gg F2 !$

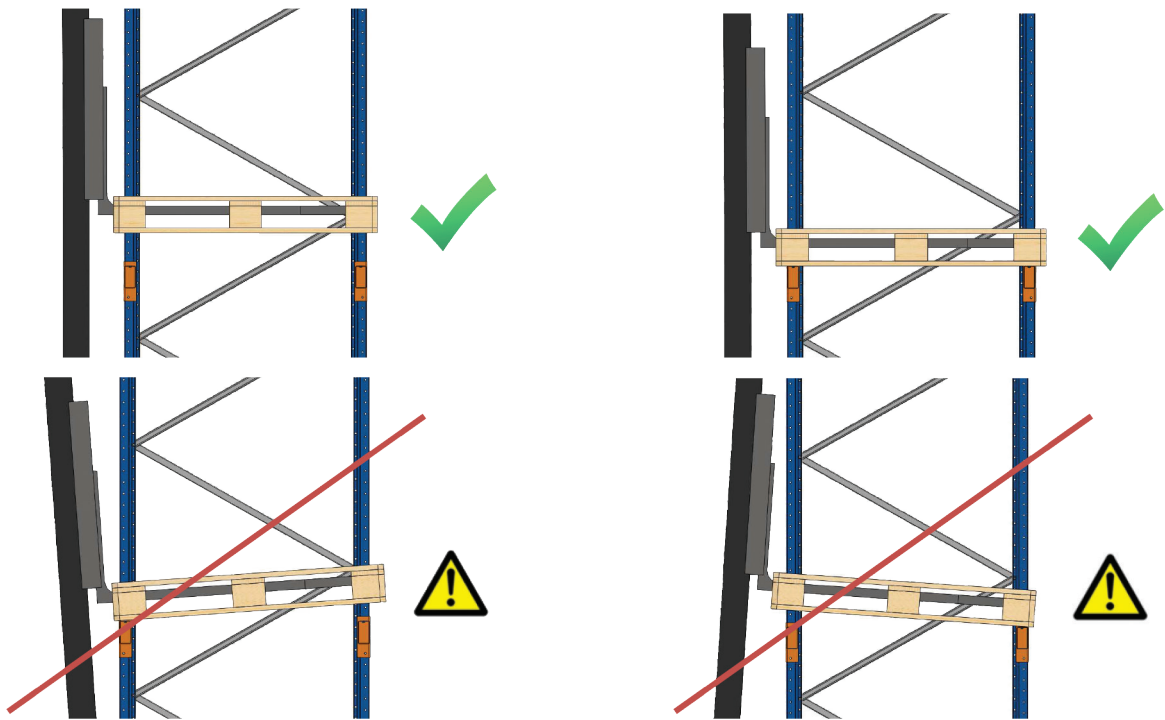
Examples of non-uniform load situations

Non-uniform loads, e.g. barrels, reels, tubs, containers on feet, etc., are not permitted as a rule and must be taken into account and considered during project preparation. The capacities per pair of beams will therefore be determined according to the type of load.



Examples of non-uniform load situations to be specified during project preparation

Non-uniform loads, e.g. barrels, reels, tubs, containers on feet, etc., are not permitted as a rule and must be taken into account and considered during project preparation. The capacities per pair of beams will therefore be determined according to the type of load.

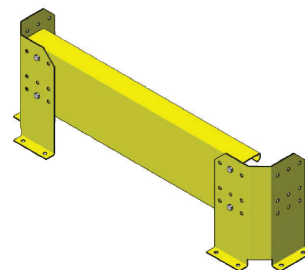
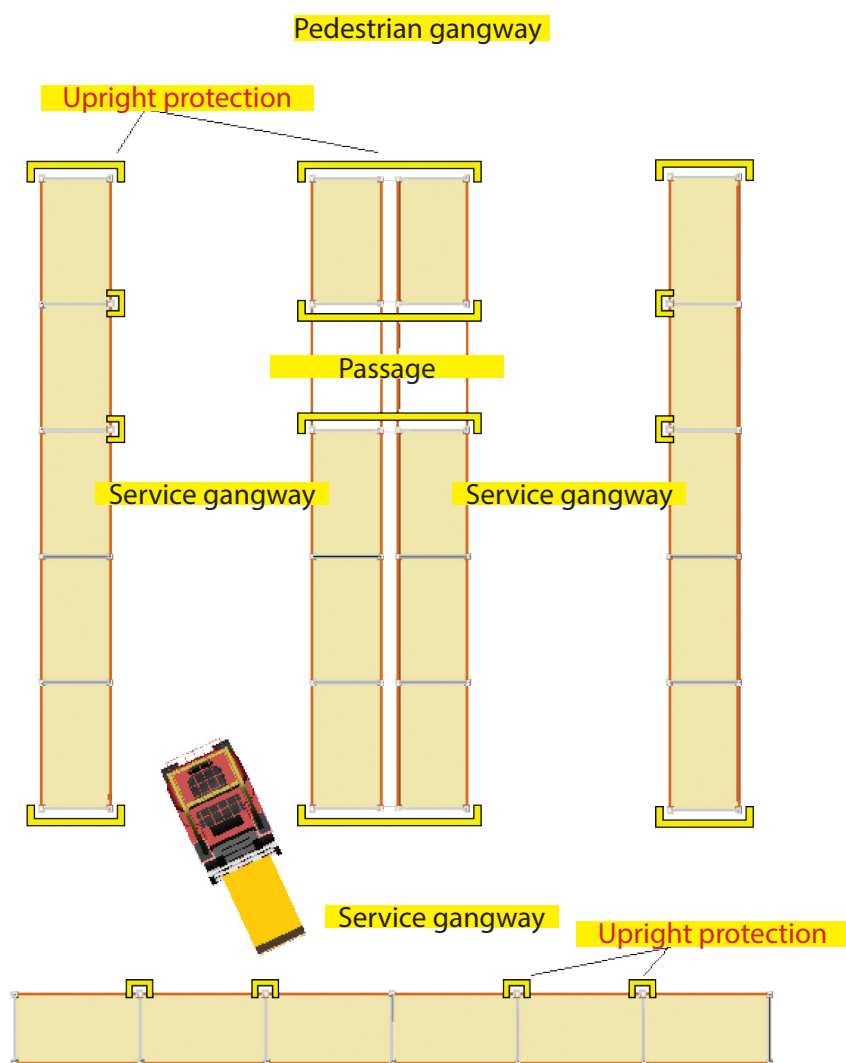


Impact protection

All the end frames, uprights and frames at aisle intersections must be protected by protectors at least 400 mm high, of adequate strength and guaranteed by the supplier (according to EN 15512 tests).

At the user's discretion, the central frames can be protected by individual boots if there is a risk of impact.

The protectors have to be replaced or re-tightened frequently because they act like protection fuses for the uprights with respect to light knocks. Regular maintenance is required for these devices.



Examples of protective devices

Examples of protective devices fitted at the frame ends and at intersections

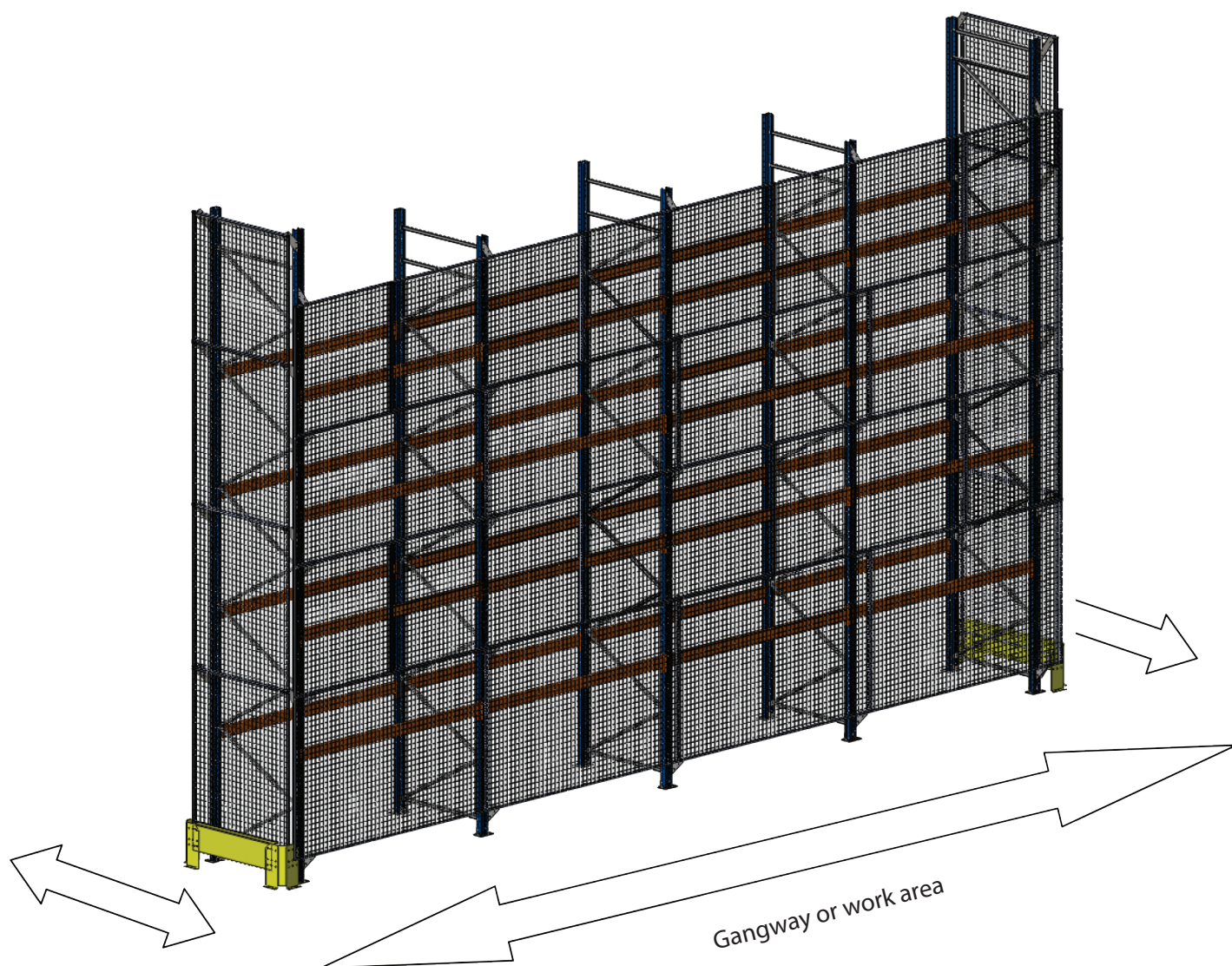
Guards to prevent goods falling off

If a pedestrian gangway or a work area is located to the rear of single-sided shelving, a retainer suitable for the loads stored must be used.

The INRS brochure also demands that end frames on the border of a pedestrian gangway or in proximity of a work area are extended to the height of the stored goods and that end frames be fitted with a retainer (solid or mesh, for example) if the goods are likely to pass through the frame.

The correct placement and good condition of the pallet as described above will limit the risk of palletised goods falling off.

The use of shrink wrap remains the best solution.



Floor of the building

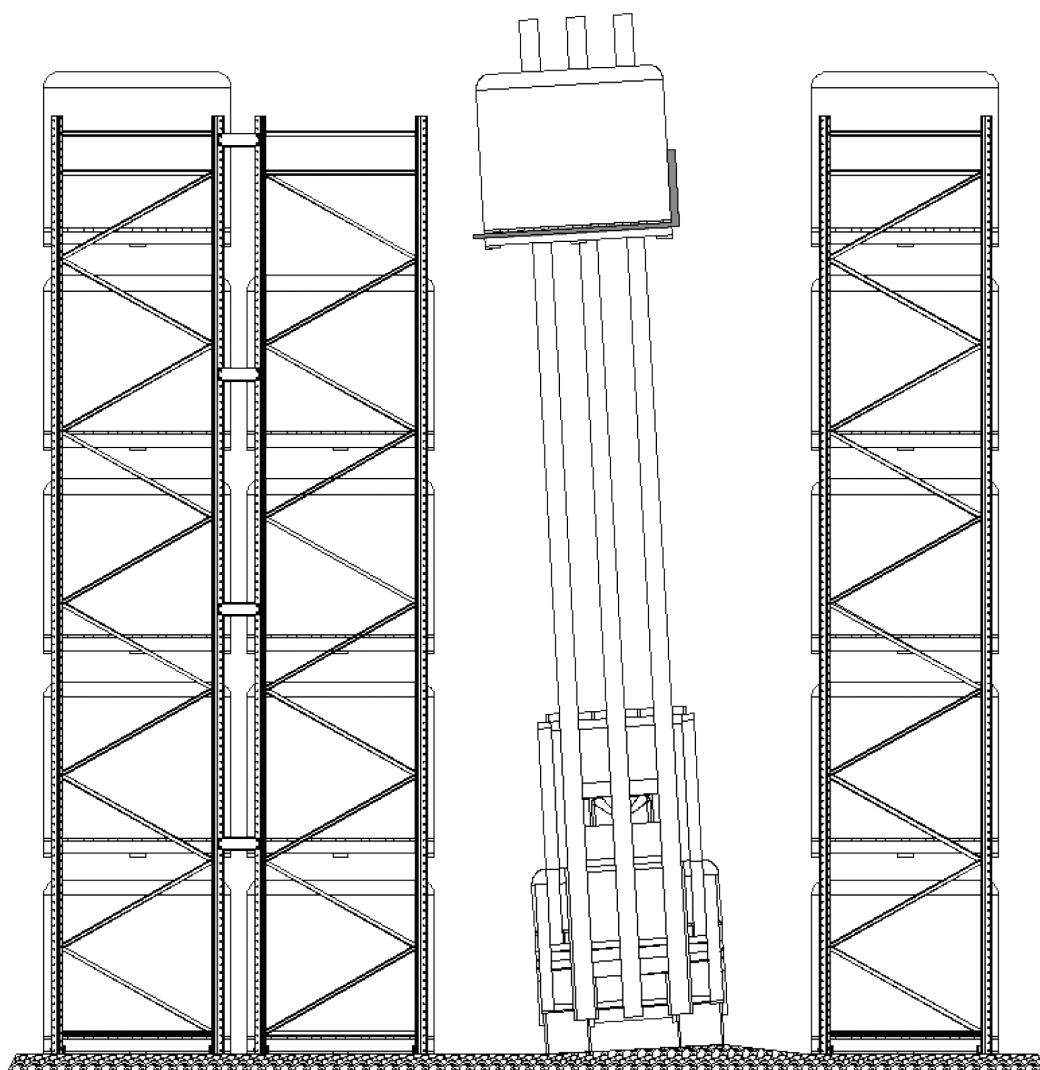
Pallet rack storage systems generate a load concentration of several tons per upright so the floor must be concrete, stable and of adequate strength (Class C20/25 mini) to be able to support the point and overall loads and must be flat and level in compliance with the standard EN 15620.

These tolerances are reiterated in the assembly instructions.

Information regarding the conditions of implementation of any shims are given in the **EPSIRACK assembly instructions**.

The specifier (user or his/her representative) is responsible for the adequacy of the floor and of its local and overall strength under the loads induced by the storage system.

The rigidity of the storage system, its wear and tear and maintenance must also be taken into account in the needs analysis, along with the floor condition.



The effect a fault in the floor would have on the operating clearances. For example, a fault of 3 mm at floor level would produce an out-of-plumb of 12.5 mm at 6 m high, excluding flexibility of the mast.

Use

The user of the storage system is responsible for the safety of the workers and must conduct a risk analysis in accordance with EN 15635.

Staff must be aware of the conditions of use and the acceptable loads of the storage system. The system should not be put into service until assembly and inspection have been thoroughly completed.

Modification of the structure or its configuration in deviation from the plans or configuration defined in our offer is not permitted. Should it be necessary to modify the storage system, the strength and stability of the new configuration created will need to be verified and its load capacities updated in accordance with our instructions and load tables.

In the event of impact against any part of the structure or if an anomaly is noticed (unusual warping, absence of an element of the shelving, unstable loads, etc.), use of the shelving must cease and the user must notify the safety officer who will unload the goods and replace the damaged elements in compliance with the procedures cited in the following chapter of this manual: "Periodic maintenance of the shelving and instructions in case of impact against the structure".

Note: if a safety pin is even slightly deformed, it must be replaced.

For further information about the safe use of forklift trucks, you can download brochures from trade associations for free at [1]www.INRS.fr[2], [1]www.BGHW.de [2] etc.

Periodic maintenance of the shelving and instructions in case of impact against the structure

The user must appoint a safety officer to ensure the completely safe operation of the storage system in accordance with EN 15635.

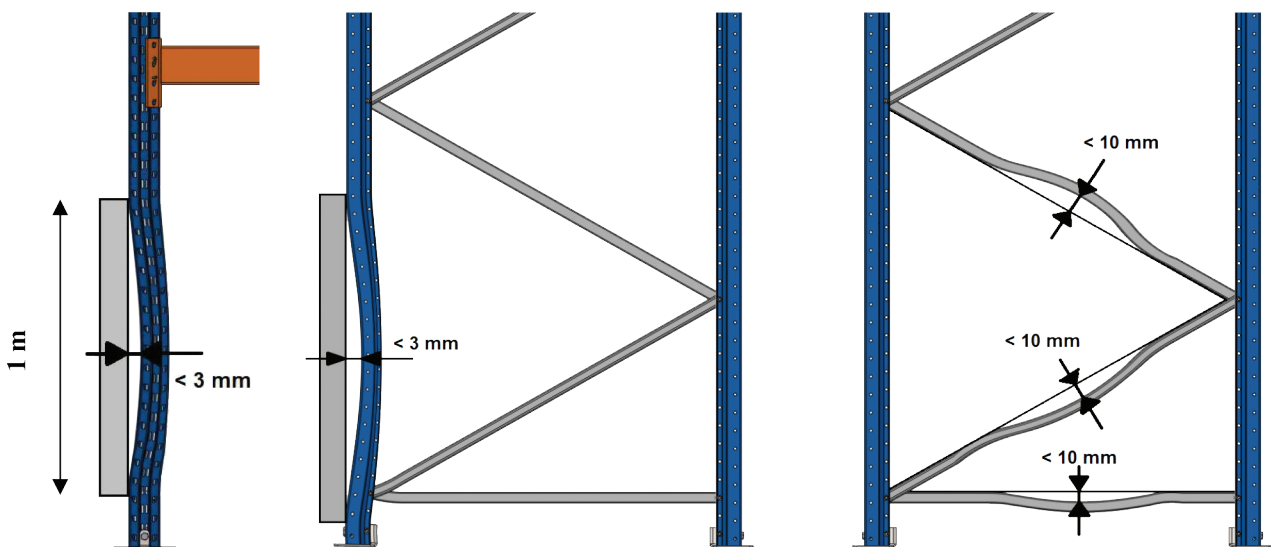
Users must be informed of the consequences regarding the reduction in the system's capacities in the event of impact, and they must alert the safety officer immediately in this event.

We will provide you with replacement elements; please contact your supplier quoting the offer reference and the list of elements that need replacing.

Regular internal visual inspections must be conducted at a frequency deduced from the risk analysis.

A more in-depth annual inspection must be conducted by a person or organisation specialising in storage system inspections in accordance with EN 15365 and a report must be submitted to the safety officer.

The annual inspection includes verification of the condition of the storage system with respect to any damage, the loading conditions and the conditions of use. This report will be a valuable aid for risk analysis.



Damage measurement examples in accordance with EN 15635.

If the damage exceeds these limits, the respective elements must be replaced.

Specific use and environment

If a sprinkler system is in place, additional rules may be defined regarding the positioning of loads from each other, of island storage areas and of the gangways.

It is the specifier's responsibility to ensure compliance with these rules, which are specific to the type of sprinkler in place.

If a request is made for the structure to be validated with respect to seismic risk, the specifier must take on this responsibility during analysis of the system and must identify the characteristics of the foundations and of the earthquake hazard based on the location of installation of the system.

You will be provided with a quote for ensuring compliance of the structure and for producing a full statement of the seismic calculations (additional cost).

Wind and snow are not taken into account in the dimensioning because the system is only ever installed inside a building, unless explicitly offered otherwise.

The minimum temperature of use is -10°C for standard steel thicknesses of less than 6 mm.

Atmospheric conditions such as relative humidity, condensation, pollution and exposure to chemical agents will strongly influence the duration of protection of the shelving.

Fixing the shelving to the building requires verification of the load from the user or the user's representative with respect to the forces of interaction between the two structures.

The user or the user's representative and the storage system supplier must define the points of application and the type of attachment implemented as a function of the forces induced.

The proprietor of the building must be informed of the presence of these points of fixation.

Lighting should be adequate and appropriate in accordance with the national standards and regulations.

In case of non-compliance with these rules, the constructor cannot be held responsible in the event of a disaster."