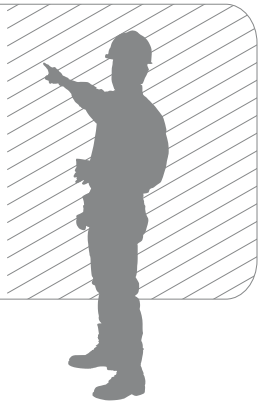
SLOTTED ANGLE SYSTEM

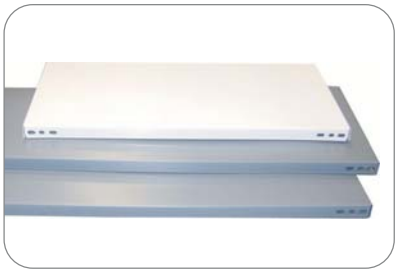
Storage Solutions
Shelving Division



1. ASSEMBLY SYSTEM

1.1. The AR system is a light-duty metal shelving system consisting of angles and decks. Components are joined together using bolts and nuts, usually M8. These are zinced and the bolt has a washer head for better fixing.

Angles



Decks

Bolts and nuts

1.2. Stability is achieved and guaranteed through:

- Profile geometry, both decks and angles
- Angle-to-deck joints by using bolts and nuts
- Corner plates, providing a “bracing” effect on the set

Galvanized corner plate detail

2. LOAD BEARING CAPACITIES

2.1. The Slotted Angle shelving supplied by AR Storage Solutions is a hand loaded system.

2.2. There is no accepted standard in the market for this type of shelving to define its expected behaviour under load, but we have specified strict requirements for our products at AR:

- Maximum deflection supported is L/200 under nominal load (where L is the length of the deck). This means that, for example, a 900x400mm deck would show a maximum vertical deflection of 4.5 mm longitudinally at the centre when bearing the maximum load for which it was specified.

- The overload factor is 1.5. This means our decks can bear an overload equal to 50% of the nominal load without breaking. Thus avoiding negative effects on the system derived from potential extra forces by accidental impacts, incorrect handling of stored loads, etc.

2.3. Strength and rigidity of the shelving system depend on other factors, such as the profile geometry (defining its mechanical properties, e.g. area and moment of inertia) and steel quality (yield strength) with which it is formed. Optimization of a framework is achieved by properly combining geometry and steel quality. Both are critical for the final target, that is, the load it can bear.

2.4. In order to guarantee the load bearing capacity, we only work with cold rolled steel, obtained from a high-precision rolling mill. The yield strength and material thickness, basic characteristics of material to guarantee correct behaviour, have been defined and are checked for each product.

2.5. In all cases, the load is assumed to be uniformly distributed across the whole deck surface.

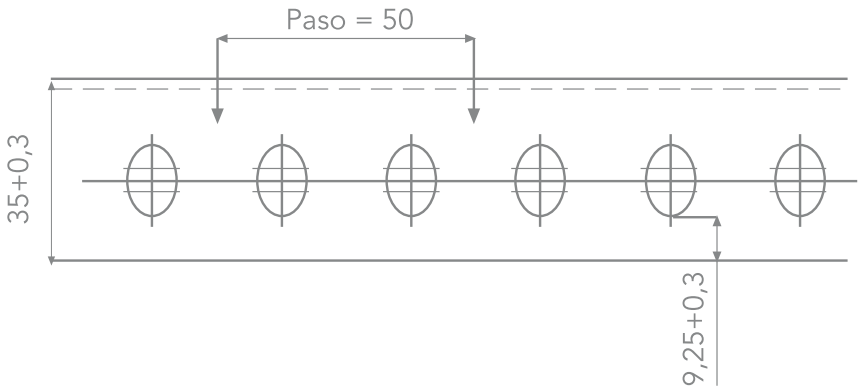
2.6. Deck load capacities for the Slotted Angle system have been confirmed with both internal and external tests and are certified by Lloyd´s Register Quality Assurance.

2.7. AR's Quality Management System meets the requirements of the ISO 9001:2008 Standard according to the certification issued by Lloyd´s Register Quality Assurance.

3. USES

3.1. Designed for versatility in sizes and finishings (gray, white, galvanized, etc.), the Slotted Angle shelving system can be used in storage rooms, garages, industrial warehouses, file rooms, offices, and even for home use.

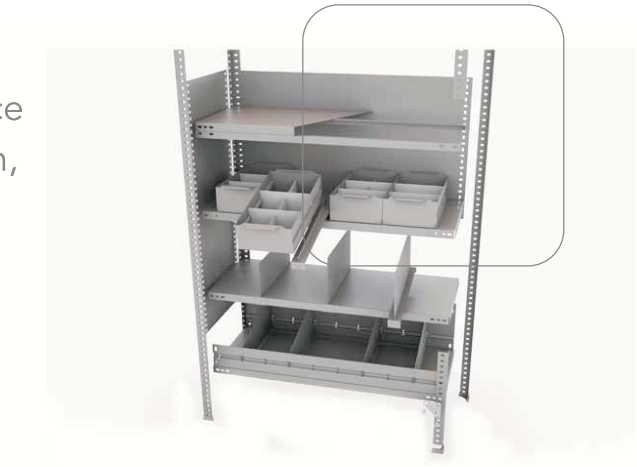
3.2. The angle pitch (25 mm), together with the available widths and depths for decks, allows for high modularity to cover multiple dimension or load needs.



Angle pitch detail (25 mm between slots)

3.3. The design characteristics of the AR system provide versatility beyond its standard usage as a storage shelving system. For more details or use cases, see the USAGE section.

3.4. The accessories in this range offer multiple storage possibilities, distance between levels, product classification, load capacity increase, etc.

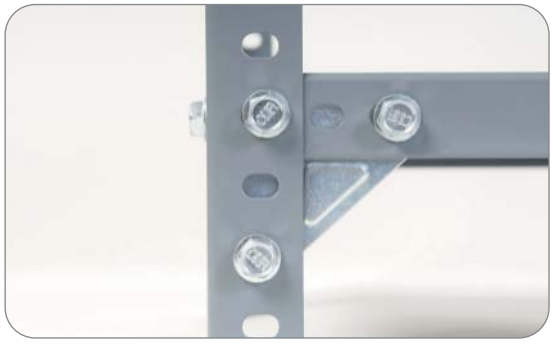


Wide range of available accessories

4. ASSEMBLY TIPS

4.1. We recommend to join each deck to the angle by using 8 bolts in order to ensure safe fixing.

4.2. To ensure adequate structural stability, each bay must be fitted with 4 corner plates to join decks and angles. Two of them must be placed in the plane normal to the wall, and the other two in the plane parallel to the wall.



Longitudinally bolted corner plate detail

4.3. We recommend to fasten the shelving system to the wall by using appropriate anchors in the holes of the angles. Fixing to the wall must be performed as high as possible (above 2/3 of the bay height is recommended). You must make sure the wall strength can support the forces imposed by the shelving system.

4.4. We recommend that the bolts are not fully tightened until the bay is placed in its final location, with the shelving system resting on the floor and its elements correctly leveled.

4.5. Before selecting the deck models to be used, we recommend to previously analyze the available space and the loads to be stored according to our load bearing capacities table. We recommend to cover most of the available area with long decks (for example, 1000 mm) and the remaining area with shorter decks to choose from the wide range available.

4.6. A safety recommendation is to place the heaviest loads on the lowest levels of the system to avoid the risk of falls from high levels.

4.7. To minimize assembly time, we recommend to use automated tools for tightening bolts or, if unavailable, a spanner for the nut and a ratchet wrench for the bolt.

Ratchet wrench

Electric screwdriver

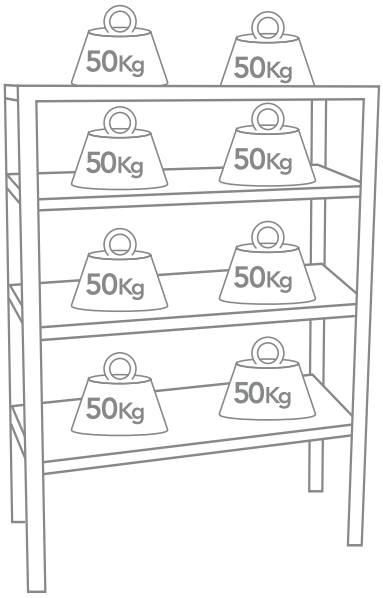
4.8. The spanner for fixing the bolt is the one usually classified as:

- N° 13 for M8 bolts (most commonly used for AR system)
- N° 10 for M6 bolts

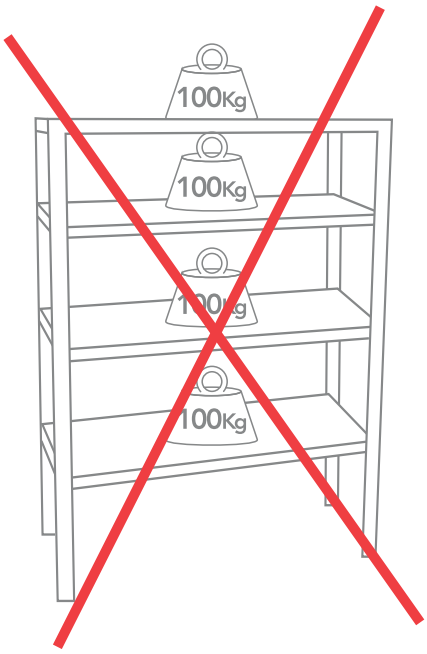
4.9. Avoid the following:

- Overloading the decks beyond the specified nominal load
- Impacting the loaded shelving system
- Loading only the upper levels, leaving the lower levels free

4.10. We recommend to distribute the load as uniformly as possible, avoiding concentration on a single spot. Stated loads are for uniform distribution across the whole surface of the deck. If the whole load is concentrated on a single spot in the middle of the deck, the load capacity is reduced approximately by half.



Uniformly distributed load



Incorrectly distributed load

4.11. Never climb on the system by stepping on the lower level decks as if it were a ladder. The deck can collapse and you risk falling off.

4.12. When using a ladder or other elements to access the highest levels, avoid resting it on the system to prevent unforeseen forces.

4.13. Whenever, as a consequence of handling and use, you detect permanent deformations in a deck or angle, unload the relevant deck or bay and replace the damaged elements with new ones. The amount of load capacity reduction for a deformated shelving system cannot be predicted and it might collapse.

4.14. Possibility to add levels. Once the shelves are assembled, you can add more decks:

- The traditional way, by placing the applicable bolts and nuts on the four corners of the deck.

- By using the so-called "deck supports" accessories, which eliminate the need to use bolts at a given level and allow for faster assembly.

Detail of a deck with a galvanized support.

4.15. A bay cannot be assembled by using only deck supports, since it would not be stable enough. Deck supports should only be used when the stability of the set has been guaranteed by bolting other levels (at least highest and lowest deck + corner plates).

4.16. We recommend to assemble the system on a correctly leveled floor (lack of maximum acceptable leveling in any direction of the floor: 1/350), in order to prevent falling of loads and undesired effects on the load distribution.

4.17. We recommend to place the first level closest to the floor.
If possible, above 10 cm high for the home insurance to cover the stored goods. We recommend to bolt at the 5th slot from the bottom.

An example of last deck bolting.