shelfbot

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Shelfbot Racking Specification v2.1

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1. Introduction

This document defines the racking requirements for a Shelfbot Automated Storage & Retrieval System (ASRS) installation. It is intended for warehouse designers, racking suppliers, installers, and commissioning technicians responsible for preparing a site for Shelfbot deployment.

The racking system forms a structural component of the Shelfbot solution and must be designed, supplied, and installed in accordance with this specification.

2. Purpose & Scope

2.1 Purpose

The purpose of this specification is to define the minimum racking infrastructure requirements necessary to safely and reliably operate the Shelfbot ASRS, including structural interfaces required for robot rails, bin storage, and electrical equipment mounting.

2.2 Scope

This document covers:

- Pallet racking type and compliance requirements
- Beam types and configurations
- Frame dimensions and pitch
- Mesh decking requirements
- Base plate constraints
- Aisle and clearance requirements
- Installation notes specific to Shelfbot interfaces

This document does not cover:

- Robot mechanical or electrical specifications
- Control systems, software, or networking
- Warehouse fire engineering or sprinkler design
- Floor slab design or certification

For these topics, refer to the Shelfbot User Manual and relevant Shelfbot technical specifications.

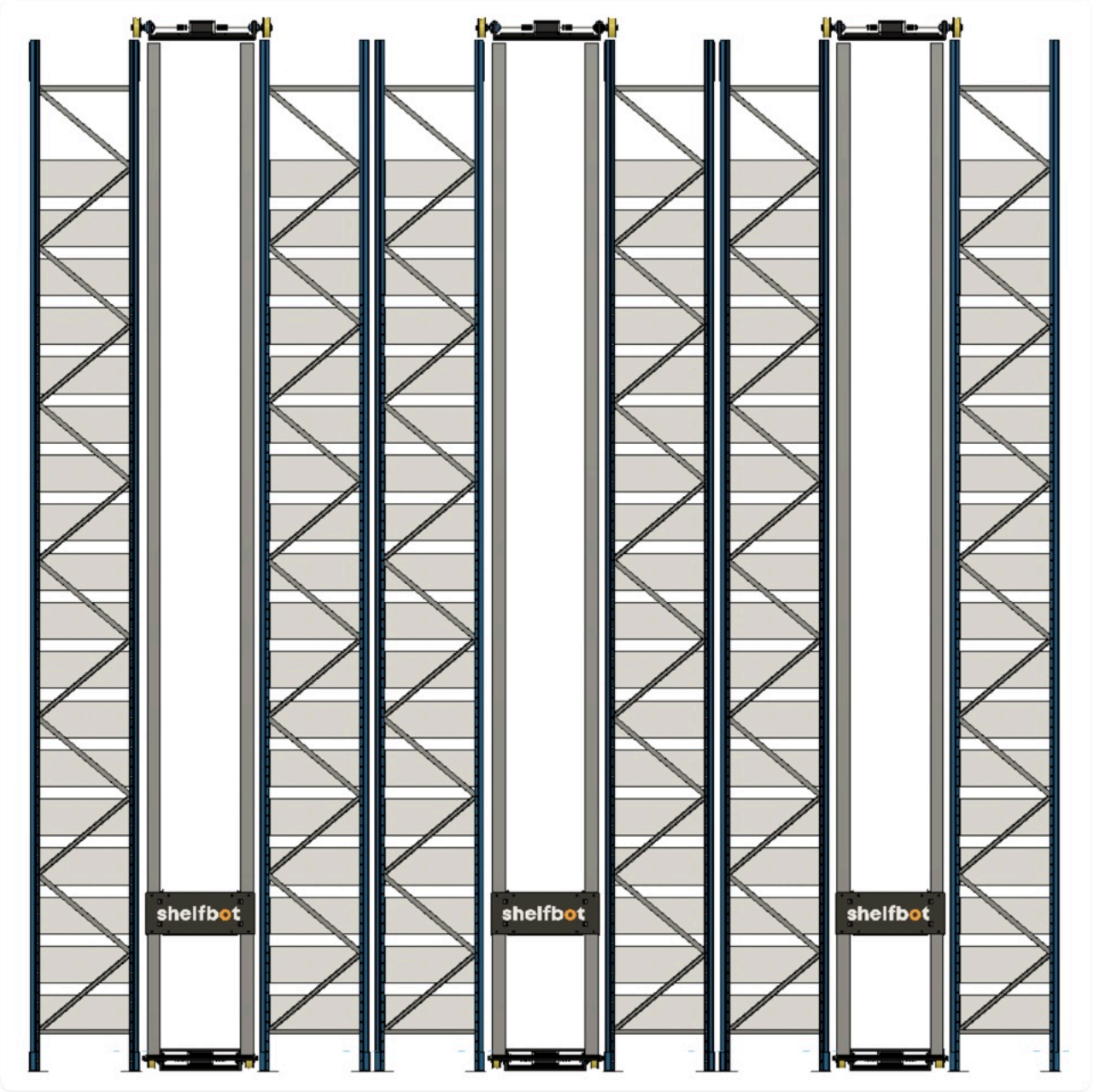
3. Racking Overview

Shelfbot robots are installed on **steel pallet racking compliant with AS4084:2023**.

Each Shelfbot shelf typically stores **five (5) bins uniformly spaced** across the bay.

- Maximum bin weight (including contents): **20 kg**
- Maximum shelf load: **100 kg UDL**

Shelfbot systems may be configured in **single-row or double-row racking layouts**, depending on site design.



Three Bots on Double Rows

4. Parts & Hardware

4.1 Beams (General)

- Box or drop (step) beams are acceptable
- Beam face heights: 40 mm to 100 mm
- Open or closed section beams permitted
- All beams within a row must be the same height, tolerance ±1 mm
- All beams shall be load-rated and certified by the racking supplier to exceed the maximum Shelfbot shelf load, including dynamic and automation factors, in accordance with AS4084.

4.2 Frames (Uprights)

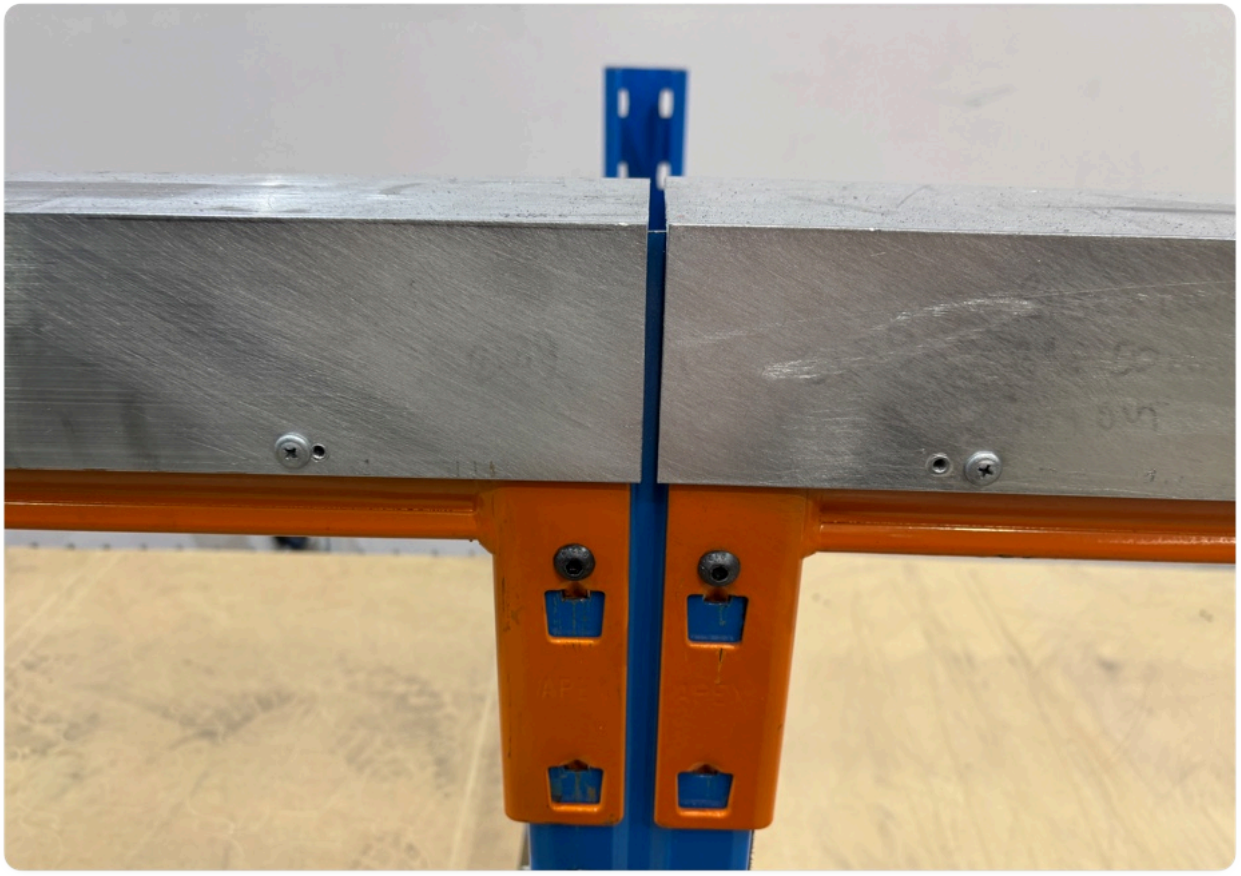
- Height range: 4 m to 10 m
- Frame depth: 838 mm
- Upright pitch options
    - 50 mm
    - 76.2 mm (3”)
- Racking to be installed plumb and square in accordance with AS4084 tolerances

4.3 Bottom Beam

- Standard beam (typically 50 mm box or step beam)
- Installed height: ~300 mm above floor level
- Lug configurations permitted:
    - Single-entry (bottom lug only), 2-lug max to fit at ~300mm
    - Double-entry (top and bottom lug) preferred

4.4 Top Beam (Robot Top Rail Beam)

- Flush-mounted 80 mm or 100 mm racking beam, rated to a minimum of 2,000 kg UDL per bay, with a maximum beam connector protrusion of 3 mm
- Supplied by the racking vendor directly to Shelfbot prior to installation
- Shelfbot will fabricate this beam to act as the robot top carriage rail
- Shelfbot will fit an aluminium angle 80 × 80 × 4 mm to the top of the beam to form a flat running surface
- Once modified, Shelfbot will return the beam for installation as a standard racking beam
- Substitution of the top beam profile, material, or height is not permitted without written approval from Shelfbot



4.5 Mesh Decks

- Standard waterfall wire mesh decking
- Typical size: 1250 mm × 838 mm
- Typically 2 mesh decks per shelf
- Minimum 4 support channels, 1.8 mm thick
- Wire diameter: 5 mm nominal (min 4 mm, max 6 mm)
- Aperture: 100 × 50 mm
- Maximum depth: 860 mm
- Maximum mesh UDL: 1000 kg

Mesh decks must be rated and certified to suit the beam span and loading.

4.6 Base Plates

- Upright base plates to be compact / low-profile type
- Maximum projection: 35 mm beyond upright profile
- Plates to be:
    - Mechanically anchored to concrete
    - Shimmed as required for levelling
    - Suitable for automated system loads

Extended or seismic-style base plates are not permitted unless approved by Shelfbot.

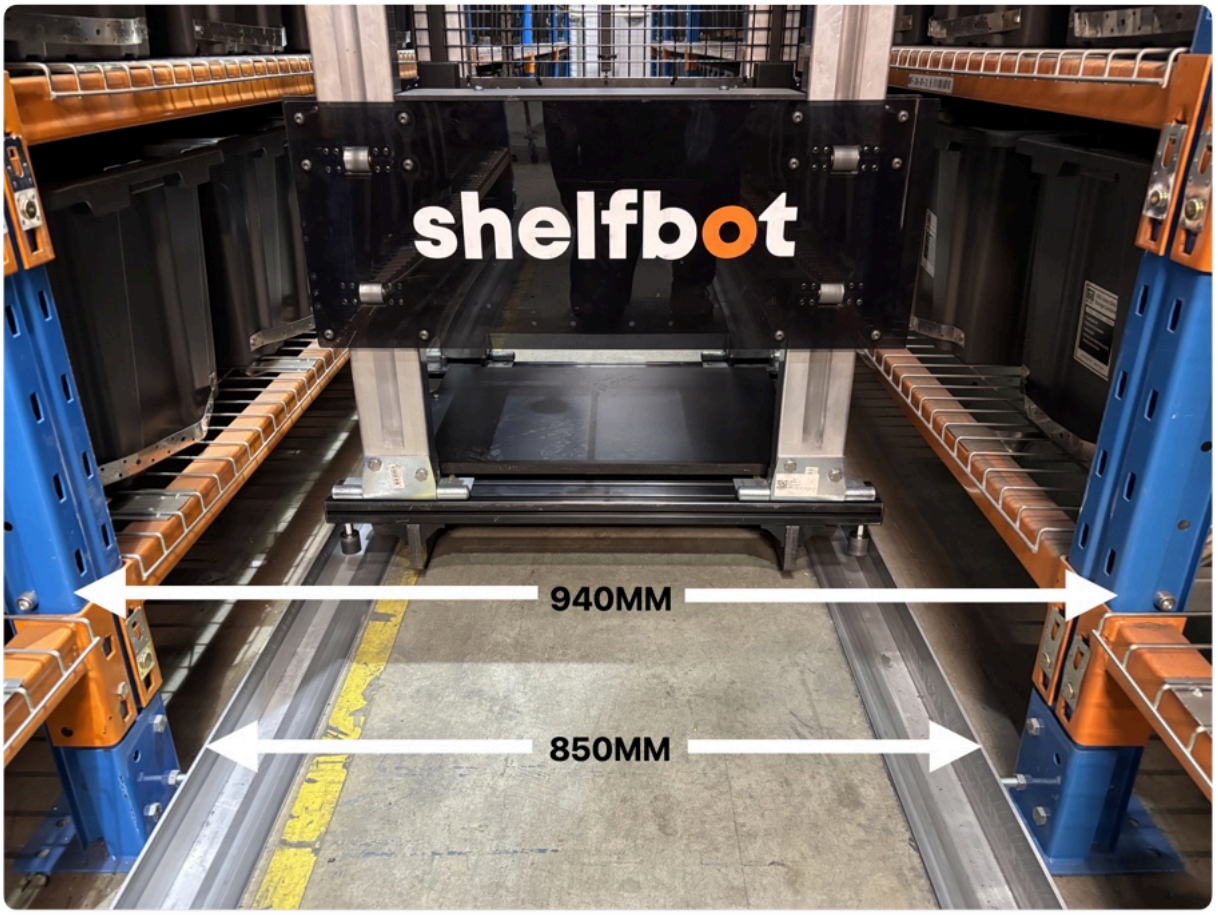
4.7 Back-of-Rack Guarding (Outer Rows)

- Outer racking rows shall be fitted with wire mesh back rack guards (max 50 mm aperture) to a minimum height of 2.5m.
- To prevent reach-through and interference with bins on lower shelf levels, solid infill panels shall be fixed to the mesh from floor level up to a minimum 2500 mm.
- Infill material may be corflute or equivalent lightweight panel or a polycarbonate sheet, securely fixed and easily replaceable. Alternative solid materials (e.g. steel sheet or fire-retardant panels) may be used where required by site risk assessment or fire engineering review.

5. Installation Requirements

5.1 Aisle Width

- Nominal aisle width: 940 mm upright-to-upright. Shelfbot operating envelope and rail clearances are designed relative to this nominal dimension. Minor variation due to installation tolerances is acceptable provided minimum clearances are maintained.
- Shelfbot will install bottom rails at a minimum clear outside-to-outside distance of 850 mm
- No racking components may encroach into the Shelfbot operating envelope



5.2 Vertical Spacing

Standard Shelfbot bin dimensions:

- 720 mm (L) × 420 mm (W) × 285 mm (H)

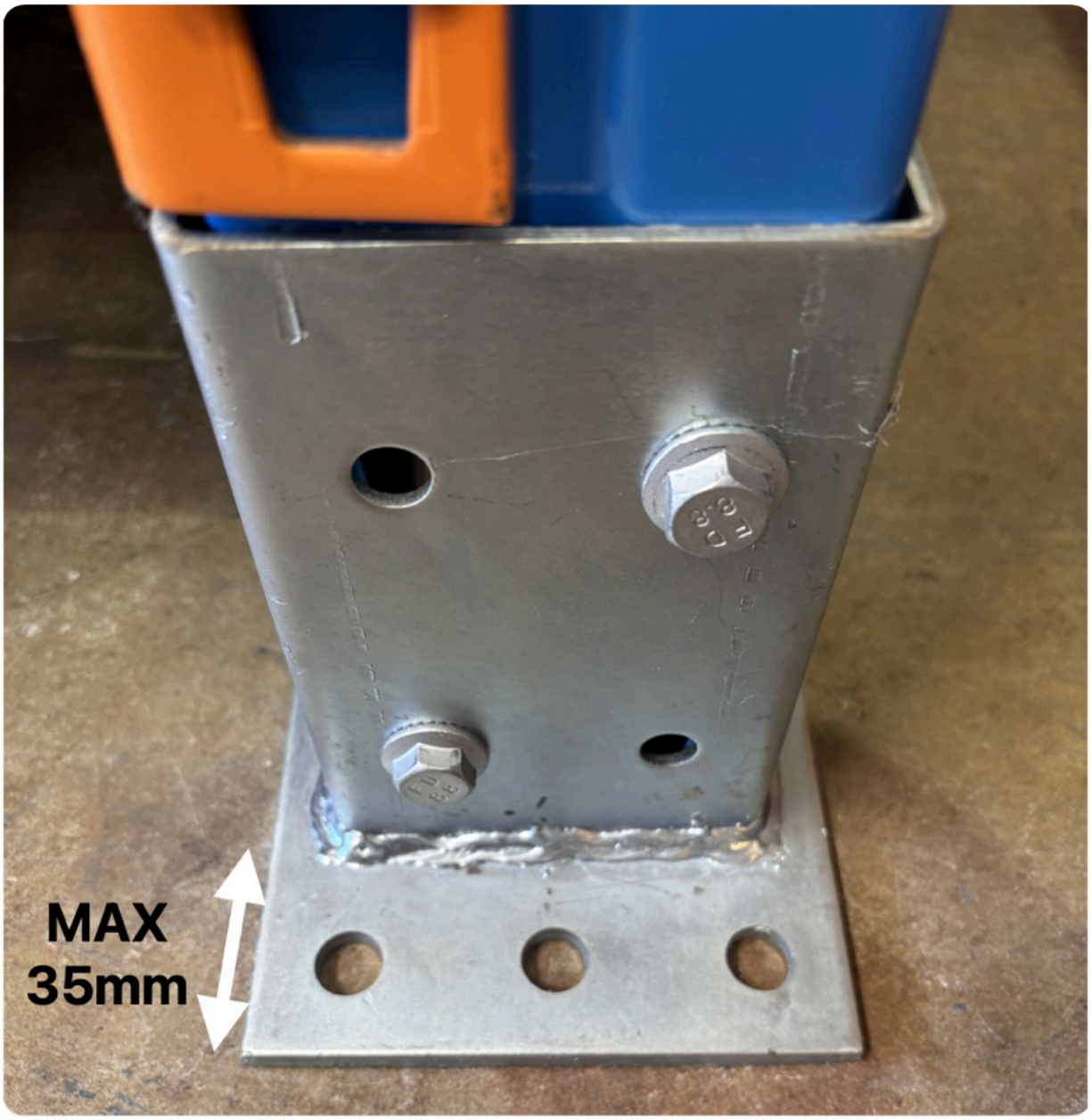
Recommended vertical pitch:

- **400 mm** for 50 mm pitch uprights
- **381 mm** for 76.2 mm pitch uprights

This allows adequate clearance for bin handling and robot tolerances.

5.3 Base Plate

- Plate to be anchor-fixed to concrete and shimmed as required. Suitable for automated system loads. Maximum 35 mm beyond upright profile

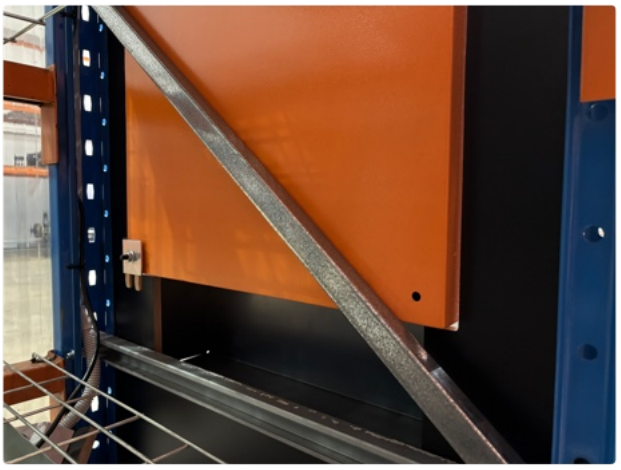


5.4 Front Frame Requirement

For the **first frame in each row**:

- The horizontal bracing must be installed on the **front side of the frame**
- This allows Shelfbot to mount a **500 mm × 500 mm electrical cabinet** on top of the horizontal brace

FRONT OUTSIDE



FRONT INSIDE

5.5 Floors

- Concrete floors must be suitable for automated systems. Excessive floor deviation may require remediation outside the scope of racking supply.

6. Notes & Responsibilities

- Racking supplier is responsible for:
  - Structural certification to AS4084
  - Load signage shall be installed at aisle entry points or as otherwise required by AS4084.
  - Anchor selection and installation
- Shelfbot is responsible for:
  - Robot rail fabrication
  - Robot installation and commissioning

Any deviation from this specification must be approved in writing by Shelfbot prior to manufacture or installation.

Revision History

Version	Date	Notes
v2	10/12/2025	Full rewrite aligned with Electrical Specification v2
v2.1	22/01/2026	Defined Top Beam as flush mounted. Added 4.7 Back-of-Rack Guarding (Outer Rows)