shelfbot

156 Highbury Road
Burwood, VIC 3125
+61 3 9069 5000
www.shelfbot.com

Shelfbot Technical Data Sheet v2

December 10th, 2025

1. Introduction

This Technical Data Sheet defines the functional, mechanical, electrical, and environmental specifications of the Shelfbot Automated Storage & Retrieval System (ASRS). It is intended for engineers, consultants, warehouse designers, fire authorities, racking manufacturers, and integration partners evaluating system compatibility and performance characteristics.

The Shelfbot system is a modular, mains-powered Goods-to-Person robotic solution designed for high-density storage and automated retrieval of small items using standard warehouse racking.

2. Purpose & Scope

2.1 Purpose

This document provides formal technical specifications for the Shelfbot system to support:

- warehouse design and engineering assessments,
- fire and building compliance modelling,
- racking layout and load analysis,
- electrical infrastructure planning,
- integration with external WMS/ERP systems.

2.2 Scope

This specification covers:

- system architecture and operating principles,
- robot mechanical and electrical performance,
- racking dimensional requirements,
- bin specifications,
- safety systems,
- environmental and operational limits,
- maintenance intervals and service requirements.

2.3 Exclusions

This document does not cover:

- WMS operational workflows,
- commissioning procedures,
- maintenance procedures,
- safety processes or operator training,
- installation instructions

Refer to the Shelfbot User Manual and Shelfbot Electrical Specification for those topics.

3. System Overview

A Shelfbot system consists of robots operating inside aisles of standard pallet racking. Each robot retrieves storage bins, transports them along the aisle, and presents them at a Pick Station for picking or replenishment.

The system supports installations ranging from a single aisle to large multi-aisle deployments of up to 96 robots.

System Characteristics

- Retrofittable to existing racking
- Robots travel on fixed upper and lower rails
- Bins are extracted and inserted using a suspended Platform mechanism
- All robots operate under the control of a local Shelfbot Server with cloud connected redundancy

4. System Architecture

4.1 Robots

Each robot consists of:

- Top Car: Drives along upper rail and provides vertical hoisting capability
- Bottom Car: Drives along lower rail and stabilises system motion
- Suspended Platform: Extracts and deposits bins using motor-driven arms

The robot operates on the X-axis (aisle length) and the Platform moves on the Y-axis (vertical).

4.2 Racking

Shelfbot robots install on standard steel storage racking compliant with AS4084:2023. Racking is configured as:

- Single Row: Two robots operate on opposite aisles and access a shared central row
- Double Row: One robot accesses two adjacent rows (left and right)

4.3 Rails (Top and Bottom)

Bottom Rail

- Material: 80 × 80 × 4 mm aluminium angle
- Mounting: Anchored directly to concrete floor
- Fixings: 8G screws with concrete anchors, spacing per installation engineering drawings
- Function: Provides lower running surface and stabilisation of Bottom Car

Top Rail

- Material: 80 × 80 × 4 mm aluminium angle
- Mounting: Fixed to the top 100 mm racking beam
- Beam: 100 mm beam
- Fabricated: Shelfbot
- Supplied: Racking Company
- Installed: Racking Company
- Function: Provides primary running surface and vertical support for Top Car and Platform hoisting

Drag Chain Channel

- Material: 40 × 40 × 3 mm steel channel
- Position: Installed adjacent to the top rail
- Fabricated: Shelfbot
- Supplied: Shelfbot
- Installed: Shelfbot
- Function: Protects and guides control and power cabling along the aisle

These components must be installed to maintain straightness, parallelism, and clearances specified in this document. Tolerances for aisle deviation, rail alignment, and plumbness must be verified during commissioning.

4.4 Bins

Bins are mechanically compatible storage containers designed for robotic extraction provided by Shelfbot. Two configurations are supported:

1. Standard plastic bins (default)
2. Steel fire-rated bins, which may reduce or eliminate the requirement for in-rack sprinklers subject to fire engineer approval

4.5 Pick Stations

Pick Stations include:

- Access Hatch (interlocked)
- Safety Control Panel
- Operator iPad running Shelfbot App

4.6 Server

A Linux-based Shelfbot Server installed in a secure cabinet provides:

- robot coordination,
- cloud connectivity via VPN,
- API integration with customer WMS/ERP via cloud server

5. Performance Specifications

5.1 Robot Throughput

Configuration	Robots per Aisle	Nominal Presentations per Hour
Single Bot	1	~60
Dual Bot	2	~100

Maximum system capacity: 96 robots × 60 presentations/h ≈ 5,760 presentations per hour, varying by SKU distribution and operator utilisation.

5.2 Mechanical Performance

Parameter	Specification
Maximum Speed	2,500 mm/s
Maximum Acceleration	1,500 mm/s^2
Typical Braking Distance	1,500 mm
Noise Level	Typical operating noise measured at the Pick Station during bin presentation ~65 dBA.

6. Mechanical Specifications

6.1 Robot Mass

Component	Mass
Top Car	40 kg
Bottom Car	20 kg
Platform	20 kg

6.2 Payload

Item	Specification
Maximum Item Weight	5 kg
Maximum Bin Payload	20 kg

7. Racking Requirements

7.1 Dimensional Requirements

Parameter	Specification
Aisle Width	940–950 mm
Aisle Deviation	Max ±5 mm difference between top and bottom measurements
Vertical Upright Deviation	Racking uprights must comply with AS4084 plumbness tolerances
Minimum Height	4 m
Maximum Height	10 m
Maximum Aisle Length	48 m (18 bays @ 2,691 mm)
Bottom Shelf Height	300 mm
Top Shelf Clearance	≥800 mm
Shelf Levels	Up to 21 levels at 10 m

7.2 Hole Pitch Compatibility

- 50 mm pitch → ~400 mm shelf spacing
- 76.2 mm (3") pitch → ~381 mm shelf spacing

7.3 Storage Density

Configuration	Capacity
Single Row	105 bins/bay × 18 bays = 1,890 bins
Double Row	2 × 1,890 bins = 3,780 bins

8. Bin Specifications

Parameter	Specification
Dimensions	720 mm (L) × 420 mm (W) × 285 mm (H)
Max Payload	20 kg
Max Item Weight	5 kg
Bins per Level	5

Optional Steel Bins
Steel fire-rated bins are available where required to support fire-engineering designs or to reduce fire loading. Use of steel bins may eliminate in-rack sprinklers subject to approval by the appointed fire engineer.

9. Electrical Requirements

Refer to Shelfbot Electrical Specification for more details.

Parameter	Specification
Supply Voltage	240 VAC ±10%
Frequency	50–60 Hz
Circuit Protection	16A user-supplied breaker or inline fuse
Per-Robot Circuit	Dedicated 16A circuit (must not be shared)
Server Power	Separate 10A outlet
Idle current	~2 A
Operational current	up to ~12 A

10. Environmental Conditions

Parameter	Specification
Operating Temperature	5°C to 55°C
Humidity	5–90% non-condensing
Maximum Altitude	2,000 m

11. Safety Systems

Shelfbot incorporates a Category 3, PL d safety architecture compliant with:

- ISO 13849
- ISO 12100
- ISO 13857
- AS/NZS 4024

Safety Features

- Safety PLC with redundant contacts
- Emergency Stop (Category 0 stop)
- Interlocked Front Door and Access Hatch
- Safeguarded Stop applied during every pick cycle
- Perimeter guarding surrounding all robot aisles
- Safety signage per AS4084 and AS4024

For operational safety procedures, refer to the Shelfbot User Manual.

12. Software & Integration Requirements

12.1 Interfaces

Shelfbot integrates with external systems via secure API supporting:

- product creation and update,
- inventory transactions,
- order ingestion and status updates.

12.2 Operator Interface

- iPad-based application
- Guided workflows for pick, replenish, search, and diagnostics

- Real-time bin tracking and job allocation

13. Maintenance & Service

13.1 Scheduled Intervals

Component	Interval
Platform Service	~250 km or ~6 months
Platform Overhaul	~2,500 km or ~24 months
Car Service	~6,000 km or ~12 months

Shelfbot provides SLA-based support with remote diagnostics and optional onsite service.

14. Compliance

Shelfbot is designed in accordance with:

- AS4084:2023 Steel Storage Racking
- ISO 13849 Safety Control Systems
- IEC 60204-1 Machine Electrical Safety
- ISO 12100 Machinery Safety Principles
- ISO 14120 & ISO 13857 Guarding and safety distances

15. Customer Responsibilities

To ensure correct installation and ongoing compliance, the customer is responsible for:

- providing dedicated electrical circuits per robot,
- ensuring racking is installed per AS4084 and Shelfbot specifications,
- maintaining safe working loads and bin clearances,
- ensuring accurate WMS inventory prior to enabling picking,
- undertaking monthly racking and guarding inspections,
- ensuring no hazardous or flammable materials are stored unless approved.

16. Contact

Shelfbot, 156 Highbury Road, Burwood, VIC 3125, Australia
+61 3 9069 5000
support@shelfbot.com
www.shelfbot.com

Revision History

Version	Date	Notes
v2	10/12/2025	Full rewrite aligned with Electrical Specification v2