

Shelfbot Technical Data Sheet

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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,
- tote 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 totes, transports them along the aisle, and presents them at a Station for picking or putaway.

The system supports installations ranging from a single aisle to large multi-aisle deployments of up to 20 robots.

System Characteristics

- Retrofittable to existing racking
- Robots travel on fixed upper and lower rails
- Totes 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 totes 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
- Dual Row: One robot accesses two adjacent rows (left and right)

4.3 Rails, Caps and Drag Chain

Bottom Rail

- Material: Roll-formed steel profile, angle dimensions 100mm x 100mm
- Mounting: Screw-fixed to the concrete slab, fixing spacing per installation engineering drawings
- Spacing: Clear outside-to-outside distance between bottom rails 1050mm, sized to house the drag chain and to admit a narrow-aisle scissor lift up to 810 mm wide
- Fabricated: Shelfbot
- Supplied: Shelfbot
- Installed: Per the responsibility matrix in the Shelfbot Racking Specification

- Function: Provides lower running surface and stabilisation of Bottom Car; houses the drag chain

Top Rail

- Material: Custom roll-formed top rail (supplied by Shelfbot)
- Mounting: Fitted flush with the top of the upright to act as the robot running rail, fixed via rack upright caps
- Fabricated: Shelfbot
- Supplied: Shelfbot
- Installed: Per the responsibility matrix in the Shelfbot Racking Specification
- Function: Provides primary running surface and vertical support for Top Car and Platform hoisting

Rack Upright Cap

- Dimensions: 200 mm long × 80 mm deep × 100 mm high
- Mounting: Fitted to the top of the racking uprights
- Fabricated: Shelfbot
- Supplied: Shelfbot
- Installed: Per the responsibility matrix in the Shelfbot Racking Specification
- Function: Caps the racking upright and mounts the top rail

Drag Chain

- Position: Housed within the bottom rail profile
- 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 Totes

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

1. Standard plastic totes
2. Steel mesh totes, which may reduce or eliminate the requirement for in-rack sprinklers subject to fire engineer approval

4.5 Stations

Stations include:

- Automatic Roller Door (interlocked)
- Safety Control Panel
- Operator mobile computer running the Shelfbot App: a customer supplied handheld with an integrated barcode scanner (refer to *Customer Handheld Scanners*)

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	30 to 60

Maximum system capacity: 20 robots × 60 presentations/h ≈ 1,200 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 Station during tote presentation ~65 dBA.

6. Mechanical Specifications

6.1 Robot Mass

Component	Mass
Top Car	40 kg
Bottom Car	20 kg
Platform	20 kg
Masts	100 kg
Total Mass	200 kg

6.2 Payload

Item	Specification
Maximum Item Weight	10 kg
Maximum Tote Payload	30 kg

7. Racking Requirements

7.1 Dimensional Requirements

Parameter	Specification
Aisle Width	1200 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	Min 300 mm
Top Shelf Clearance	≥ 800 mm
Shelf Levels	Up to 23 levels at 10 m
Bottom Rail Spacing	1050 mm clear outside-to-outside, per the Shelfbot Racking Specification
Grid Clearance Zones	Min 3 m clear at front and rear of the grid for scissor lift access

7.2 Hole Pitch Compatibility

- Upright pitch options: 50 mm, 75 mm, 76.2 mm (3")
- Shelf spacing is set per tote height, providing a minimum 40 mm clearance between the top of the tote and the underside of the beam above

7.3 Storage Density

The figures below are theoretical maximum capacities at the largest supported rack geometry: 10 m rack height (23 levels $\times$ 5 totes per level = 115 totes per bay) and an 18-bay aisle. They are not a standard or committed capacity. Actual capacity for a deployment depends on rack height, aisle length and tote sizes, and is set out in the site design (Customer Site Drawings and Customer Equipment List).

Configuration	Maximum Capacity
Single Row Robot	115 totes/bay $\times$ 18 bays = 2,070 totes
Dual Row Robot	2 $\times$ 2,070 totes = 4,140 totes
Maximum System	20 robots $\times$ 4,140 totes = 82,800 totes

8. Tote Specifications

Parameter	Specification
Dimensions	Width 420 mm (fixed); Depth 700–980 mm; Height 150–350 mm
Max Payload	30 kg

Parameter	Specification
Max Shelf Load	150 kg UDL
Max Item Weight	10 kg
Totes per Level	5

Optional Steel Mesh Totes

Steel mesh totes are available where required to support fire-engineering designs or to reduce fire loading. Use of steel totes 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 $\pm 10\%$
Frequency	50–60 Hz
Circuit Protection	20A user-supplied RCBO (required)
Per-Robot Circuit	Dedicated 20A circuit (must not be shared)
Idle current	~2 A
Operational current	up to ~18 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 Automatic Roller Door (two interlocks)
- 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

- Runs on customer supplied handheld mobile computers with integrated barcode scanners, Zebra TC53 or equivalent (refer to *Customer Handheld Scanners*)
- Guided workflows for pick, putaway, search, and diagnostics
- Real-time tote tracking and job allocation

12.3 Customer Handheld Scanners

Customer-supplied handheld scanning devices used with the Shelfbot system must meet or exceed the specification of the **Zebra TC53**. Alternative scanner models must be sent to Shelfbot for compatibility testing prior to deployment.

13. Maintenance & Service

13.1 Scheduled Intervals

Component	Interval
Platform Service	100 km or 6 months
Car Service	10,000 km or 12 months
Platform Overhaul	2,000 km or 24 months

Shelfbot provides SLA-based support with remote diagnostics and 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
- AS 2118 Automatic Fire Sprinkler Systems
- FM Global DS 8-34 Protection for Automatic Storage & Retrieval Systems (ASRS)

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 tote 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. Revision History

Version	Date	Change
3.1	19/08/2026	Published to Web Site
3.2	10/09/2026	Operator iPads replaced by customer supplied handheld mobile computers with integrated barcode scanners (refer to <i>Customer Handheld Scanners</i>)