

Shelfbot Site Acceptance Test

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Shelfbot Goods-to-Person Automated Storage & Retrieval System (ASRS)

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1. Introduction

1.1 Scope

This document defines a systematic and documented procedure for the Site Acceptance Test (SAT) of a completed Shelfbot installation. The SAT verifies critical devices and functions of the Shelfbot system prior to hand-over to the customer.

The SAT is undertaken to assure that:

- The Shelfbot system is installed in accordance with the customer's approved Project Plan and the applicable Shelfbot specifications.
- The Shelfbot system operates safely and in compliance with the functional description set out in the Shelfbot User Manual.

This document is the test procedure. The per-site record (every result, measurement, deficiency and signature) is captured digitally against each item, following the section numbering used here.

1.2 Test Instructions

1. Before starting, confirm that all documents required to witness the testing (*Required Documents*) are available on site.
2. Each test must be witnessed on site by a representative of both Shelfbot and the Client.
3. Each result is recorded against its item as the test is performed, with the observed values entered where the test calls for them, together with who recorded it and when.

4. Where the result of a test does not meet the acceptance criteria, the item is marked as an issue with a note describing the deficiency (*Deficiency Management*), and the issue rectified before final sign-off, where applicable.
5. On completion, once all tests and checklists are approved, the SAT is signed off by the Customer, the racking supplier and Shelfbot (*Sign-off*).

Before beginning, verify that the following set-up conditions have been met:

- Installation of the Shelfbot system has been completed and verified by qualified, authorised Shelfbot personnel.
- All system components and services have been electrically tested at the required VAC levels (refer Shelfbot Electrical Specification).
- WMS / e-commerce integration has been pre-completed and is available for the operational tests in *Operational Acceptance*.

Note

Every test is performed and witnessed in person at the Client's site. The record captures what was witnessed; it does not replace the on-site witnessing of each test by both parties.

1.3 Required Documents

Both parties should have on hand the Shelfbot specifications and site documents for the installation, which describe the installation and operation of the system and apply as reference throughout this SAT.

2. Installation

This section confirms the installation is complete and correct before commissioning. Responsibility is split: structural compliance of the racking is certified by the racking supplier and confirmed by the Client (*Racking — Structural Compliance (Client / Racking Supplier)*); the robot interface and system installation are verified by Shelfbot (*Robot Interface & System Installation (Shelfbot)*); the site network and the system's connectivity are confirmed by both parties (*Network and Connectivity (Client / Shelfbot)*).

2.1 Racking — Structural Compliance (Client / Racking Supplier)

The racking system is a structural component supplied, installed and certified by the racking supplier in accordance with the Shelfbot Racking Specification. Shelfbot does not certify the structural design or installation of the racking. This check confirms that the supplier's certification has been issued and is held with this SAT.

- Racking supplier's AS 4084-2023 Certificate of Conformance has been issued, sighted and attached to this SAT.
- Racking is installed plumb and square, with floor fixings, bracing and ancillary devices consistent with the certified design.
- SWL / load signage is installed at aisle entry points (or as otherwise required) per AS 4084.

2.2 Robot Interface & System Installation (Shelfbot)

Shelfbot verifies that the installation matches the Client's approved layout and the Shelfbot interface requirements of the Racking Specification, and that the system is installed to a sound, safe and tidy standard ready for commissioning:

- Shelfbot units, cars and platforms are positioned per the approved layout, with aisle width and clearances within the robot operating envelope.
- The top rail and rack upright caps are installed as fabricated by Shelfbot, with no unapproved substitution of profile, material or height.
- Beam levels and bay pitch are within the positioning tolerance required for ASRS coordinate accuracy (± 3 mm per bay, Grade III per AS 4084.2-2023).
- Racking guards, perimeter guards and panels are permanently fixed, straight and undamaged, maintaining the required safe distance from the robot.
- The Server / Safety Cabinet is installed on the designated row with power, network and UPS connected.

2.3 Network and Connectivity (Client / Shelfbot)

The Client's site network and the system's connectivity are confirmed as installed, per the Shelfbot IT Integration document. Each item is confirmed and recorded with the results:

- Dedicated VLAN configured and tested, and the wired network point live at the Server / Safety Cabinet position (Client).
- Outbound connectivity confirmed from the Shelfbot Server for every flow in the IT Integration document's *Data flows and firewall rules* section (Client / Shelfbot).
- 4G signal tested at the cabinet position; where the signal is inadequate, the external antenna is installed at the agreed position (Shelfbot).
- Support VPN established and verified from the Shelfbot Server (Shelfbot).
- WMS API connectivity confirmed in both directions on the production environment: the WMS reaches the deployment's Shelfbot API hostname, and a test delivery from the Shelfbot cloud is received at the Client's event endpoint with its signature verified by the WMS (Client confirms).

3. Safety Device Check

3.1 Safety Device Inventory

This test confirms the presence and correct mounting of the safety devices that must be installed on and around the Shelfbot system. With reference to the itemised list below and the Client's Project Plan, the Client inspects and verifies each device is present:

- Emergency Stop buttons — Safety Cabinet and at the front of each Shelfbot (beside the Roller Door).
- Emergency Stop button — rear of each set of Shelfbots.
- Automatic Roller Door — two independent non-latching coded magnetic interlocks at the bottom of the door, dual-channel (Cat 3 / PL d), at each Station.
- Blue Reset button on Safety Cabinet.

- Safety Cabinet enclosure — key-locked, IP66, isolator fitted.
- Perimeter guards, racking guards and panels installed and fixed.
- Back Door panels secured with security bolts.
- SWL and Safe Work Procedure (SWP) signage present and securely mounted in view.
- Forklift bollards and barriers (if applicable).

4. Safety Functions

This section verifies the safety strategies and interlocks executed by the control system to keep the system in a safe condition during normal operation. The Shelfbot safety-related parts of the control system (SRP/CS) comply with Category 3, PLd.

4.1 Mains Isolator

The Client tests the supply disconnecting device by switching it off and on. In the OFF position, all electrical supply to the controlled equipment is isolated; selected points are visually confirmed to carry no voltage. In the ON position, all components are supplied.

4.2 Emergency Stops

Activating any Emergency Stop initiates a Category 0 Stop, applies the motor brakes and removes motor power. A protective stop is initiated on all adjacent Shelfbots within the system, where applicable. Each Emergency Stop button is tested.

4.3 Roller Door Interlocks (Safeguarded Stop)

The Roller Door at each Station is monitored by two independent, non-latching coded magnetic interlocks in a dual-channel configuration (Category 3, PL d). Lifting the door beyond the safe switch-off distance (~20 mm) trips both channels and initiates a Category 0 Stop — motor power removed and brakes applied — protecting an operator who attempts to reach toward the robot.

Tests:

- Confirm the interlocks initiate a Category 0 Stop (motor power removed, brakes applied) and the carriage comes to a complete stop before reaching the open doorway / operator reach zone — a visual pass/fail, no measurement required.
- Confirm that lowering the door restores the interlock signal but does not, by itself, resume motion; resumption requires the deliberate operator action in *No Automatic Restart*.

4.4 No Automatic Restart

Because the interlocks are non-latching, lowering the door restores the interlock permissive on its own. Protection against an unexpected restart therefore depends on the control system requiring a separate, deliberate operator action — lowering the door must never resume motion by itself.

- Confirm the robot does not resume on the door closing alone; resumption requires the blue Reset button and technical support to re-initialise the system.
- Confirm the Shelfbot does not restart automatically following an Emergency Stop, power failure, or switching off the mains isolator. A deliberate, manual action is always required to resume.

4.5 Access to Safeguarded Area

During operation, the safeguarded area cannot be accessed without first triggering an Emergency Stop or a safeguarded stop of the system (i.e. there is no path to the hazard zone while motors are powered).

4.6 Fire Interface (only where installed)

Where a fire panel interface to the Shelfbot system is installed at the site, this test verifies the system's response to a fire signal. The test is coordinated with the Client's fire contractor, with the fire panel in test mode. Where no fire interface is installed at the site, the items in this section are marked Not Applicable.

Tests:

- On activation of the fire signal: every robot performs a Category 0 Stop, and every Automatic Roller Door opens.
- On clearing of the fire signal: no automatic restart occurs, the Roller Doors remain open, and a manual reset is required to resume operation.
- Open circuit at the interface terminals: the line-break is detected and produces the same stop and door-open response (fails safe).

5. Training

5.1 Operation

All approved operating staff on the Client's site have completed training on the Shelfbot system covering the following:

- Introduction to the Shelfbot system, basic componentry and the Safety Control Panel.
- PPE to be worn during operation of the Shelfbot system.
- Login and logout using an operator ID and PIN on the Shelfbot App (operator mobile computer).
- Safely picking an active order: selecting, picking from the presented tote, and returning the tote.
- Performing a putaway at the put-to-light (PTL) destination installed at the site: inducing a line, loading items into the lit PTL slot, scanning the slot QR, and depositing items into the storage tote when it arrives.
- Operating the PTL destination: inducing order totes, sequential put-to-light picking and removing completed totes.
- Safety components and resetting the safety system during a pick cycle.
- Initiating an Emergency Stop and the correct procedures to follow afterwards (including contacting Shelfbot Support).

5.2 Inspections

The on-site supervisor has received additional training on performing the monthly visual inspection of the Shelfbot system and racking, in accordance with the Inspection Checklist in the Shelfbot User Manual, to keep the system in technically sound condition.

6. Operational Acceptance

This section verifies that data flows correctly in both directions between the Client's WMS / ERP / e-commerce system and Shelfbot, that the Client's designated operator can safely execute the full putaway → order → pick lifecycle (*Product Sync (WMS → Shelfbot)*, *Putaway Cycle (WMS → Shelfbot → WMS)* and *Pick Cycle (WMS → Shelfbot → WMS)*), and that the system demonstrates the committed performance under automated test (*Stress Test (Automated PPH Demonstration, Randomised Run)* and *LOAD NEXT (Full-Grid Sequential Load/Unload)*). Each step performed on the WMS side is confirmed on Shelfbot, and each step performed on Shelfbot is confirmed back in the WMS, to demonstrate end-to-end synchronisation of product, putaway, order and inventory data.

Before each test in this section, send all robots to sleep and wake them, so every robot starts from the sleep position. This gives a consistent, repeatable starting point for the operational tests and timings.

The designated operator who performs these tests is recorded with the results.

6.1 Product Sync (WMS → Shelfbot)

The Client adds two new products with unique SKUs (and optional product images) into their WMS, ERP or e-commerce system that is integrated with Shelfbot. Initial inventory in Shelfbot is zero — stock is added via the putaway cycle (*Putaway Cycle (WMS → Shelfbot → WMS)*).

The two SKUs and product names are recorded with the results. Confirm the two new products are reflected in Shelfbot once the integration sync completes: each visible in the Shelfbot product list with the WMS SKU, name, and zero on-hand inventory.

6.2 Putaway Cycle (WMS → Shelfbot → WMS)

This test verifies a putaway order issued in the WMS flows through to Shelfbot, is executed physically by the operator at the destination, and the resulting inventory increase is reflected back in the WMS.

Where the integration sends putaway orders from the WMS, perform this test as described. Where putaway is operator-initiated, start at step 3: after login the operator scans the SKU on Shelfbot to create the putaway job locally, then continues from step 4. Step 7 does not apply (there is no WMS-side putaway order to mark complete); only step 8 — the resulting stock-up is reported back to the WMS for inventory reconciliation — is verified.

1. The Client raises a putaway order in the WMS for each of the two products added in *Product Sync (WMS → Shelfbot)*, with a nominated quantity per SKU.
2. Confirm each putaway order appears in Shelfbot.
3. The operator logs in to the Shelfbot App with their operator ID and PIN (if authentication is configured).
4. The operator inducts the putaway line at the trolley.
5. Shelfbot dispatches a robot to fetch a storage tote. When the tote arrives at the Station and the Roller Door opens (safeguarded stop) and the operator deposits the items into the tote. The platform scales verify the weight.
6. Press the blue Reset button; the Roller Door closes and the tote returns to the assigned storage slot.
7. Confirm each putaway order is marked COMPLETE in the WMS.

8. Confirm the WMS inventory (stock-on-hand) for each SKU is incremented by the quantity put away.

For each SKU, the quantity put away, the assigned storage slot (x, y), the WMS order completion and the resulting WMS inventory are recorded.

Acceptance: the putaway is executed at Shelfbot, the tote is returned to storage, and the WMS inventory is incremented — and, where the WMS initiated the putaway, the order is marked complete in the WMS.

6.3 Pick Cycle (WMS → Shelfbot → WMS)

This test verifies a customer order placed in the WMS flows through to Shelfbot, is picked physically by the operator, and the resulting inventory decrease and order fulfilment are reflected back in the WMS.

1. The supervisor places a test order in the WMS containing both products from *Product Sync (WMS → Shelfbot)*, one unit of each, using a test customer account.
2. Confirm the order appears in Shelfbot (visible in the orders list with the WMS order ID and line items).
3. The operator inducts an empty order tote onto the PTL destination by scanning it; Shelfbot assigns the order to the slot and dispatches a robot to fetch the first source tote.
4. When the source tote arrives and the Roller Door opens (safeguarded stop), the PTL slot for the order tote lights up with the quantity to pick (put-to-light). The operator scans the item from the source tote (inclusive of any available serialised item data); the platform scales verify the weight; the operator scans the order tote in the lit PTL slot to confirm the pick into the correct order.
5. Press the blue Reset button; the Roller Door closes and the source tote returns to storage. Repeat for the second SKU.
6. Scan the completed order tote out; confirm the order is marked ready for packing on Shelfbot.
7. Confirm the order is marked FULFILLED in the WMS once both items are picked.
8. Confirm the WMS inventory for each SKU is decremented by one.

The WMS order ID, the quantity picked per SKU, the order fulfilment status and the resulting WMS inventory are recorded.

Acceptance: the order is created in the WMS, picked at Shelfbot, marked fulfilled and the inventory decrease synchronised back to the WMS.

6.4 Stress Test (Automated PPH Demonstration, Randomised Run)

This test demonstrates that the system achieves the committed Presentations Per Hour (PPH) agreed for the site. The test is fully automated and hands off.

The system runs a randomised presentation routine: it repeatedly selects a tote from a randomly chosen storage position, presents it at an operator station, holds the presentation for the agreed average dwell time (simulating the operator clearing time the committed PPH assumes), automatically confirms, and returns the tote to storage. Presentations are distributed across all operator stations. Because positions are selected at random across the whole grid, the run exercises the full travel envelope and is a conservative demonstration of the committed rate.

The test is run one time with the following steps:

1. Confirm totes are in place across the grid as required for the routine.
2. Configure the simulated dwell to the agreed average dwell time and record the configured value.

3. Sleep and wake all robots so they start from the sleep position.
4. Start the randomised presentation routine from the Shelfbot service interface and start the timer.
5. The routine runs unattended for one (1) continuous hour. Presentations per minute, robot round-trip times and any system events are logged throughout.
6. At the end of the run, record the results: committed PPH, dwell applied, run duration, presentations completed, achieved PPH, faults requiring manual intervention, and unrecovered faults at end of run.

Pass criterion — all of the following:

- Achieved PPH meets or exceeds the Committed PPH;
- The routine runs for the full one (1) hour period;
- No unrecovered faults at the end of the run, and no fault requiring manual intervention that stopped throughput for a sustained period.

The same randomised presentation routine is used for the PPH self-test performed at scheduled preventive maintenance and reported under the Service Level & Performance Specification, so the acceptance demonstration and the ongoing self-check are the same measurement.

6.5 LOAD NEXT (Full-Grid Sequential Load/Unload)

The LOAD NEXT routine sequentially loads and unloads every tote position across the grid, advancing from one position to the next and stopping automatically once all positions have been cycled. It validates that every storage location is reachable and that the robot reliably extracts and re-inserts a tote at each. A failure on any single load or unload halts the routine immediately and fails the test.

1. Confirm totes are in place across the grid as required for the routine.
2. Start the LOAD NEXT routine from the Shelfbot service interface.
3. The system sequentially loads (extracts) and unloads (re-inserts) each tote, advancing through the entire grid unattended.
4. The routine stops automatically when all positions have been cycled, or halts on the first failed load/unload.
5. Record the outcome: positions cycled, failed loads/unloads, and the first-failure location (x, y) if any, against the total tote positions agreed for the grid.

Pass criterion — all of the following:

- Every tote position in the grid is loaded and unloaded successfully;
- Zero failed loads or unloads (any failure halts and fails the test);
- The routine stops automatically on completion.

7. Deficiency Management

Any incomplete work or non-conformity is recorded against the item that failed, by marking that item as an issue with a note describing the deficiency and its category:

- (a) To be cleared on the spot; SAT continues after rectification.
- (b) Ongoing rectification during SAT.
- (c) SAT to be repeated.

- (d) Modifications to be made after SAT.
- (e) Remaining work to be rectified on site.

Recording the deficiency against the failed item keeps the test number, the description, the responsible party and the rectification date together in one place, and the edit history preserves the sequence of events from the deficiency being raised to it being rectified and re-tested. Outstanding issues are visible on the document's progress view, and all issues must be resolved before sign-off.

8. Sign-off

Sign-off certifies, for the Shelfbot system at the project and customer reference recorded for the installation, that:

1. The Site Acceptance Test commenced and concluded on the recorded dates.
2. The system was tested and passed all tests and checks specified in this document.
3. All deficiencies detected in the system have been rectified and re-tested.
4. All tests were conducted in the presence of the customer.
5. The tested system is acceptable and has been handed over to the customer.

The SAT is signed by the Customer, the racking supplier and Shelfbot. Each signature records the signing party, the person signing and the timestamp, together with the identity and version of this specification as pinned to the document. The three signatures lock the document; the generated artifact bundles this specification with the completed record of the test.

9. Revision History

Version	Date	Change
3.1	18/08/2026	Published to Web Site