

SYSTEM INTEGRATION TEST PROCEDURES

Polar Dynamics Robotics, Inc.

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1. PURPOSE AND SCOPE

1. This document establishes the mandatory procedures for system integration testing of Polar Dynamics Robotics' Autonomous Mobile Robot (AMR) systems, specifically focusing on the IceNav(TM) platform and associated cold-environment operations.
2. These procedures apply to all production releases of AMR units designated for deployment in temperature-controlled environments operating between +25 C to -40 C.

2. DEFINITIONS

1. "System Integration Test" or "SIT" refers to the comprehensive testing process validating the complete AMR system functionality across all integrated subsystems.
2. "Test Environment" means the controlled testing facility maintaining specified temperature conditions for cold-environment validation.
3. "Critical Operational Parameters" or "COPs" refers to the key performance metrics defined in Schedule A attached hereto.

3. PRE-INTEGRATION TEST REQUIREMENTS

1. Component Verification
 - a) All thermal management systems must pass individual component testing
 - b) Cold-resistant actuators must demonstrate specified torque at -40 C
 - c) Battery systems must maintain minimum 80% capacity at test temperature
2. Environmental Controls
 - a) Test chamber temperature stability within 1 C
 - b) Humidity control between 20-80% RH

- c) Air flow patterns documented and verified

4. INTEGRATION TEST PROCEDURES

1. Basic System Operations

- a) Power-up sequence verification at specified test temperature
- b) Communication systems check across all integrated modules
- c) Emergency stop functionality validation
- d) Sensor calibration confirmation

2. Navigation and Control Systems

- a) IceNav(TM) platform initialization procedures
- b) Obstacle detection accuracy verification
- c) Path planning algorithm validation
- d) Dynamic route optimization testing

3. Performance Testing

- a) Load capacity verification under thermal stress
- b) Battery life validation at operating temperature
- c) Movement precision measurements
- d) Response time documentation

5. ACCEPTANCE CRITERIA

1. System Performance

- a) Navigation accuracy within 5mm at all test temperatures
- b) Battery performance minimum 6 hours continuous operation
- c) Zero critical system failures during 72-hour endurance test

2. Safety Systems

- a) Emergency stop activation under 100ms
- b) Collision avoidance system 100% detection rate
- c) Thermal management system maintaining specified tolerances

6. DOCUMENTATION REQUIREMENTS

1. Test Results Documentation

- a) Complete test logs with time stamps
- b) Environmental condition recordings
- c) System performance metrics
- d) Deviation reports if applicable

2. Certification Documentation

- a) Test engineer sign-off
- b) Quality assurance verification
- c) Technical compliance certification

7. QUALITY ASSURANCE

- 1. All testing must be conducted by certified test engineers in accordance with ISO 9001:2015 standards.
- 2. Test results require independent verification by Quality Assurance department.
- 3. Any deviations from specified parameters must be documented and approved by Chief Robotics Officer.

8. CONFIDENTIALITY

- 1. All test procedures, results, and documentation are considered Confidential Information as defined in the company's Master Confidentiality Agreement.
- 2. Access to test data restricted to authorized personnel only.

9. REVISION CONTROL

- 1. This document shall be reviewed annually and updated as required.
- 2. All revisions must be approved by the Technical Review Board.

AUTHORIZATION

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