MACHINE GUARDING COMPLIANCE DOCUMENTATION

Polar Dynamics Robotics, Inc.

Effective Date: January 11, 2024

Document Reference: PDR-MG-2024-001

1. PURPOSE AND SCOPE

1 This Machine Guarding Compliance Documentation ("Documentation") establishes the standards, procedures, and compliance requirements for machine guarding systems implemented across all autonomous mobile robot ("AMR") products manufactured by Polar Dynamics Robotics, Inc. ("Company").

2 This Documentation applies to all Company AMR models, including but not limited to the Arctic Series (AS-100, AS-200, AS-300) and Tundra Series (TS-500, TS-750) autonomous mobile robots.

2. REGULATORY COMPLIANCE FRAMEWORK

1 The Company's machine guarding systems comply with:

a) OSHA 29 CFR 1910.212 (General Requirements for All Machines)

b) ANSI/RIA R15.06-2012 (Industrial Robots and Robot Systems Safety Requirements)

c) ISO 10218-1:2011 (Robots and Robotic Devices Safety Requirements)

d) ISO 13849-1:2015 (Safety of Machinery - Safety-related Parts of Control Systems)

3. MACHINE GUARDING SPECIFICATIONS

1 Physical Guarding Systems

- Reinforced polycarbonate enclosures (12mm thickness)
- Impact-resistant barriers rated for -40 C to +50 C
- Interlocked access panels with safety switches (PLe per ISO 13849-1)
- Emergency stop mechanisms accessible from all quadrants

2 Electronic Safety Systems

- Dual-channel safety controllers (Siemens 3SK1)
- Redundant proximity sensors with cold-environment certification
- Safety-rated area scanners (240 detection field)

- Fail-safe brake systems with thermal compensation

4. RISK ASSESSMENT AND VALIDATION

1 The Company conducts comprehensive risk assessments for all machine guarding systems:

- Quarterly validation of guard integrity
- Monthly testing of safety interlocks
- Continuous monitoring of electronic safety systems
- Documentation of all testing results in the Company's compliance database

2 Third-party validation is performed annually by T V S D America Inc.

5. MAINTENANCE AND INSPECTION PROTOCOLS

1 Scheduled Maintenance Requirements

- Daily visual inspections of physical guards
- Weekly functional testing of safety interlocks
- Monthly calibration of electronic safety systems
- Quarterly comprehensive system evaluation

2 Documentation Requirements

- Maintenance logs maintained for 5 years
- Incident reports retained indefinitely
- Calibration certificates archived digitally
- Training records updated annually

6. TRAINING AND CERTIFICATION

1 Required Personnel Training

- Initial safety system operation training (8 hours)
- Annual refresher courses (4 hours)
- Emergency response procedures training
- Documentation review and updates

2 Certification Requirements

- All maintenance personnel must maintain current safety certifications
- Operators must complete Company-specific safety training
- Annual recertification required for all personnel

7. COMPLIANCE VERIFICATION

1 Internal Audit Procedures

- Quarterly compliance audits
- Monthly safety system reviews
- Documentation of all findings
- Corrective action tracking

2 External Verification

- Annual third-party safety certification
- Regulatory compliance reviews
- Customer audit support
- Insurance carrier inspections

8. RESPONSIBILITY AND AUTHORITY

1 The Chief Robotics Officer maintains ultimate responsibility for machine guarding compliance.

2 The Safety Compliance Committee, consisting of:

- Chief Robotics Officer
- Safety Engineering Manager
- Quality Assurance Director
- Manufacturing Operations Manager

9. DOCUMENT CONTROL

1 This Documentation shall be reviewed annually and updated as required.

2 Revision History:

- Rev. 1.0: January 11, 2024 (Initial Release)
- Next Review Date: January 11, 2025

10. CERTIFICATION

The undersigned hereby certifies that this Documentation accurately reflects the Company's machine guarding compliance programs and meets all applicable regulatory requirements.

POLAR DYNAMICS ROBOTICS, INC.

By: _

Dr. James Barrett

Chief Robotics Officer

Date: January 11, 2024

By: _

Sarah Nordstrom

Chief Operating Officer

Date: January 11, 2024