LOW-TEMPERATURE OPERATIONS SAFETY MANUAL

Polar Dynamics Robotics, Inc.

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Version 3.2

1. PURPOSE AND SCOPE

1. This Low-Temperature Operations Safety Manual ("Manual") establishes mandatory safety protocols and operational procedures for all personnel involved in the testing, deployment, maintenance, and operation of Polar Dynamics Robotics, Inc. ("Company") autonomous mobile robots in low-temperature environments.

2. This Manual applies to all Company facilities, field operations, and customer sites where ambient temperatures fall below 0 C (32 F).

2. DEFINITIONS

1. "Low-Temperature Environment" means any operational area with ambient temperatures below 0 C (32 F).

2. "Critical Temperature Zone" means operational areas with temperatures below -30 C (-22 F).

3. "IceNav System" means the Company's proprietary cold-environment navigation and operation platform.

4. "Qualified Personnel" means employees who have completed the Company's Cold Environment Safety Training Program (CESTP-2024).

3. GENERAL SAFETY REQUIREMENTS

1. Personnel Authorization

- Only Qualified Personnel may access Critical Temperature Zones
- Minimum two-person team requirement for all maintenance operations
- Valid CESTP-2024 certification must be maintained and verified quarterly

2. Personal Protective Equipment (PPE)

- Company-approved cold-weather gear rated for operational temperature
- Electronic personal safety devices with emergency notification capability
- Anti-fog safety goggles and insulated safety gloves
- Non-slip, insulated safety boots rated for -40 C

4. OPERATIONAL PROCEDURES

1. Pre-Operation Checks

- Complete IceNav System diagnostic protocol
- Verify thermal management system functionality
- Conduct battery capacity assessment for cold conditions
- Document all pre-operation readings in the digital log

2. Emergency Protocols

- Immediate evacuation procedures for system failures
- Emergency shutdown sequences for robotic units
- Communication protocols for safety incidents
- Backup power system activation procedures

5. SPECIFIC SAFETY PROTOCOLS

1. Robot Deployment

- Minimum 30-minute acclimation period for units entering cold zones
- Verification of cold-resistant actuator functionality
- Confirmation of sensor operation in low-temperature conditions
- Testing of emergency stop systems before activation

2. Maintenance Operations

- Maximum work duration limits in Critical Temperature Zones
- Mandatory rest periods and warm-up intervals
- Tool and equipment temperature ratings verification
- Documentation requirements for maintenance activities

6. COMPLIANCE AND MONITORING

1. Safety Audits

- Weekly safety inspections of all low-temperature operations
- Monthly compliance reviews of safety documentation
- Quarterly third-party safety assessments
- Annual comprehensive safety system evaluation

2. Incident Reporting

- Immediate reporting of all safety incidents
- Documentation requirements for near-misses
- Investigation procedures for system failures
- Corrective action implementation protocols

7. TRAINING REQUIREMENTS

1. Initial Certification

- Completion of CESTP-2024 training program
- Practical assessment in simulated cold environment
- Emergency response procedure demonstration
- Written examination with minimum 85% passing score

2. Ongoing Training

- Annual recertification requirement
- Quarterly safety procedure reviews
- Updated training for system modifications
- Emergency response refresher courses

8. LEGAL COMPLIANCE

1. This Manual complies with:

- OSHA Cold Stress Guidelines
- ANSI/RIA R15.06-2012 Safety Requirements
- ISO 10218-2:2011 Robot Safety Standards
- Applicable state and local regulations

9. DISCLAIMER AND LIMITATIONS

1. This Manual is confidential and proprietary to Polar Dynamics Robotics, Inc.

2. The Company reserves the right to modify these procedures at any time to maintain safety standards and regulatory compliance.

3. Failure to comply with these procedures may result in disciplinary action up to and including termination of employment.

10. AUTHORIZATION

This Manual is hereby authorized and approved:

Dr. Elena Frost

Chief Executive Officer

Polar Dynamics Robotics, Inc.

Sarah Nordstrom

Chief Operating Officer

Polar Dynamics Robotics, Inc.

Date: January 15, 2024

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