PDR-OPS-050 EXTREME CONDITION QUALITY ASSURANCE STANDARDS

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Document Classification: Confidential

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1. PURPOSE AND SCOPE

1. This Quality Assurance Standard ("Standard") establishes mandato

2. This Standard applies to all Company products incorporating BlueC

2. DEFINITIONS

1. "Extreme Condition" means any operating environment with ambien

2. "Critical Components" means all BlueCore(TM) technology compon

3. "Quality Event" means any deviation from specified performance pa

3. QUALITY ASSURANCE REQUIREMENTS

1. Pre-Production Testing

a) All Critical Components must undergo minimum 168-hour cold cha
-30 C (-22 F)

b) Navigation systems must demonstrate 99.9% accuracy in simulate
conditions

c) Power systems must maintain minimum 85% efficiency at -25 C (-1

d) Mechanical systems must complete 10,000 cycle tests under full lo

(-4 F)

2. Production Quality Controls

a) 100% component inspection for cold-rated specifications

b) Thermal imaging verification of all electrical subsystems

c) Torque validation of all fasteners at specified cold-condition values

d) Calibration of all sensors at 5 C temperature intervals from -30 C to

3. Final Assembly Verification

a) Complete system testing in environmental chamber for minimum 24

b) Full navigation and obstacle avoidance testing at -25 C

c) Battery performance validation through three complete charge cycl

d) Verification of all emergency stop functions at extreme temperature

4. TESTING PROTOCOLS

1. Environmental Chamber Testing

a) Temperature ramp rate not to exceed 2 C per minute

b) Minimum 4-hour stabilization period at test temperature

c) Continuous monitoring of all critical parameters

d) Full performance validation at temperature extremes

2. Navigation System Validation

a) Minimum 1,000 meters of automated travel in test environment

b) Obstacle detection accuracy verification at specified temperatures

c) Path planning optimization confirmation

d) Signal integrity verification for all sensors

5. QUALITY EVENT MANAGEMENT

1. All Quality Events must be documented in the Company's quality m

2. Quality Events requiring immediate action:

a) Navigation accuracy below 99.5%

b) Battery performance below 80% of rated capacity

c) Mechanical binding or unusual resistance

d) Sensor calibration drift exceeding 2%

3. Corrective Action Requirements

a) Root cause analysis within 5 business days

b) Corrective action plan within 10 business days

c) Implementation verification within 30 days

d) Follow-up testing to confirm effectiveness

6. DOCUMENTATION AND RECORDS

1. Required Documentation

a) Complete test records for each unit

b) Component traceability documentation

c) Calibration certificates for all test equipment

d) Quality Event reports and resolutions

2. Record Retention

a) Production records: 7 years

b) Test data: 5 years

c) Quality Event documentation: 7 years

d) Calibration records: 3 years

7. COMPLIANCE AND REVIEW

1. This Standard shall be reviewed annually by the Quality Assurance

2. Deviations from this Standard must be approved in writing by the C

8. AUTHORIZATION

This Standard is hereby authorized and made effective as of the date written above.

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