

ICE DETECTION SYSTEM TECHNICAL SPECIFICATIONS

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Classification: CONFIDENTIAL

1. OVERVIEW

1 This document specifies the technical requirements and operational

2 These specifications are proprietary and confidential to the Company

2. SYSTEM ARCHITECTURE

1 **Core Components**

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Dual-spectrum infrared sensors (operating range: -40 C to +5 C)

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Multi-point capacitive detection array

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Thermal imaging processor (BlueCore(TM) Series 4)

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Environmental condition monitoring suite

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Neural network processing unit (NNPU-X2)

2 ****Sensor Configuration****

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Primary sensor array: 8 distributed contact points

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Secondary array: 4 proximity sensors

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Tertiary system: 2 thermal imaging cameras

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Sampling rate: 120Hz nominal

3. DETECTION SPECIFICATIONS

1 ****Performance Parameters****

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Ice detection threshold: 0.1mm accumulation

- - 3 -

False positive rate: <0.1%

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Detection latency: <50ms

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Operating temperature range: -40 C to +5 C

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Humidity tolerance: 0-100% RH

2 **Detection Modes**

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Surface ice accumulation

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Black ice formation

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Frost development

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Condensation monitoring

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Temperature gradient mapping

4. SYSTEM INTEGRATION

1 ****Hardware Interface****

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Power requirements: 24VDC 10%

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Current draw: 2.1A maximum

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Communication protocol: CAN-FD

- - 5 -

Backup power system: Li-ion battery pack (4 hour capacity)

2 **Software Integration**

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API Version: BlueCore(TM) 4.2

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Data output format: JSON/Binary

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Update frequency: 10Hz nominal

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Diagnostic reporting interval: 60 seconds

5. SAFETY FEATURES

1 ****Fail-Safe Operations****

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Automatic system health monitoring

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Redundant sensor cross-validation

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Emergency shutdown protocols

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Fault isolation mechanisms

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Error logging and reporting

2 ****Compliance****

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IEC 61508 SIL 2 certified

- - 7 -

IP67 environmental protection

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CE/UL certified components

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RoHS compliant

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ISO/TS 15066 compliant

6. MAINTENANCE REQUIREMENTS

1 ****Scheduled Maintenance****

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Calibration interval: 6 months

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Sensor cleaning: Monthly

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Software updates: Quarterly

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Physical inspection: Monthly

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Component replacement: 24 months

2 ****Performance Verification****

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Daily self-test routines

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Weekly calibration checks

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Monthly performance validation

- - 9 -

Quarterly full system audit

7. DATA MANAGEMENT

1 **Storage Requirements**

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Local storage: 256GB SSD

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Data retention period: 90 days

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Backup frequency: Daily

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Encryption: AES-256

2 ****Reporting Capabilities****

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Real-time status monitoring

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Historical trend analysis

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Performance metrics

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Incident logging

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Environmental condition tracking

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10. CERTIFICATION

The undersigned hereby certifies that these technical specifications have been reviewed and approved for implementation.

APPROVED BY:

—

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Date: December 15, 2023

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