# ARCTIC-GRADE MATERIAL SELECTION GUIDE

## ARCTIC-GRADE MATERIAL SELECTION GU

**Document No.: PDR-MSG-2023-001**

**Effective Date: January 1, 2024**

**Version: 3.0**

**Classification: Confidential & Proprietary**

## 1. PURPOSE AND SCOPE

1 This Material Selection Guide ("Guide") establishes mandatory requ

2 This Guide applies to all components utilized in the Company's Blue



## 2. DEFINITIONS

1 "Arctic-Grade Materials" refers to materials that meet or exceed the

2 "Critical Components" means any parts or materials used in mobility

3 "Operating Environment" refers to industrial cold storage facilities m

## 3. MATERIAL SPECIFICATIONS

1 Structural Materials

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Primary chassis components must utilize SAE 4340 alloy steel or equ

Minimum yield strength of 1,500 MPa at -40 C

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Maximum thermal expansion coefficient of 11.0  10^-6/ C

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Surface treatment must maintain integrity at specified temperatures

2 Electronic Component Housing

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Polycarbonate blend with minimum 15% glass fiber content

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UL94 V-0 flame rating

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Impact resistance: 15 ft-lbs at -40 C

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Thermal conductivity 0.20 W/m K

3 Seals and Gaskets

- Fluorosilicone or proprietary BlueCore(TM) elastomer compounds
- Shore A hardness: 60-70 at room temperature
- Compression set: 15% after 70 hours at -40 C
- Chemical resistance to industrial lubricants and cleaners

## 4. TESTING AND VALIDATION

1 All Arctic-Grade Materials must undergo the following validation:

Thermal cycling: 1,000 cycles between -40 C and +25 C

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Impact testing at minimum operating temperature

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Accelerated aging equivalent to 5 years of service

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Salt spray resistance per ASTM B117

2 Documentation Requirements

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Material certification from approved suppliers

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Test reports from ISO 17025 accredited laboratories

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Batch traceability documentation

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Conformance certificates for each material lot

## 5. SUPPLIER REQUIREMENTS

1 Approved suppliers must:

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Maintain ISO 9001:2015 certification

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Provide statistical process control data

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Submit to annual quality audits

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Maintain material traceability systems

2 Change Control

-

Material specification changes require written approval

-

Minimum 90-day notice for proposed changes

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Validation testing required for all substitutions

## 6. COMPLIANCE AND REVIEW

1 The Chief Robotics Officer shall:

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Review this Guide annually

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Approve exceptions to specifications

Maintain the Approved Materials List

- Authorize validation protocols

2 Quality Assurance shall:

- Audit material compliance quarterly
- Maintain testing records
- Issue non-conformance reports
- Track supplier performance metrics

## 7. PROPRIETARY INFORMATION

1 This Guide contains confidential and proprietary information of Pola

## 8. REVISION HISTORY

Version 3.0 - January 1, 2024

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Updated temperature specifications

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Added BlueCore(TM) material requirements

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Revised testing protocols

Version 2.0 - March 15, 2023

Added supplier requirements

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Enhanced validation criteria

Version 1.0 - June 1, 2022

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Initial release

## APPROVALS

APPROVED BY:

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Dr. James Barrett

Chief Robotics Officer

Date: December 15, 2023

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Date: December 15, 2023

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Date: December 15, 2023