# PDR-OPS-049 COLD ENVIRONMENT ASSEMBLY LINE CONFIGURATION

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**Standard Operating Procedure & Compliance Requirements**

*Document Version: 3.2*

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*Document Owner: Operations Department*

## 1. PURPOSE AND SCOPE

1. This document establishes mandatory configuration requirements a

2. These requirements apply to all Company manufacturing facilities a

## 2. DEFINITIONS

1. "Cold Environment Assembly Area" or "CEAA": A controlled manufa

2. "Temperature Transition Zone" or "TTZ": A regulated buffer zone be

3. "Critical Cold Components" or "CCCs": Any components designated

## 3. FACILITY REQUIREMENTS

1. Environmental Control Systems

a) Primary cooling systems must maintain CEAA temperatures within specified settings

b) Redundant cooling systems must activate within 180 seconds of pr

failure

c) Temperature monitoring systems must log data at minimum 5-minu

d) Humidity levels must be maintained between 35-45% relative humi

2. Zone Separation

a) CEAAs must be separated from standard temperature areas by TT

b) Airlocks required between all temperature zones

c) Minimum TTZ depth of 3 meters

d) Automated door closure systems with maximum 15-second open in

## 4. ASSEMBLY LINE CONFIGURATION

1. Workstation Requirements

a) Anti-static flooring rated for -20 C operation

b) Cold-rated LED lighting providing minimum 1000 lux at work surfac

c) Emergency power outlets every 3 meters

d) Compressed air stations with moisture removal systems

e) ESD-protected work surfaces rated for sub-zero operation

2. Material Handling

a) Temperature-monitored component storage units

b) Cold-rated conveyor systems with non-contracting belts

c) Automated guided vehicle paths with cold-weather sensors

d) Designated staging areas for temperature acclimation

## 5. QUALITY CONTROL MEASURES

1. Testing Requirements

a) All CCCs must undergo minimum 24-hour temperature stabilization

b) Calibration equipment must be certified for cold environment opera

c) Test stations must verify component performance at -30 C, -15 C, 0 C

d) Thermal imaging verification required for all powered assemblies

2. Documentation

a) Temperature logs must be maintained for all assembly operations

b) Component serial numbers must be recorded with corresponding e data

c) Quality control checkpoints must be documented at each temperatu

d) Non-conformance reports must include environmental condition de

## 6. SAFETY PROTOCOLS

1. Personnel Requirements

a) Maximum 4-hour continuous CEAA work periods

b) Mandatory 30-minute warm-up breaks between CEAA shifts

c) Cold-environment safety training certification required

d) Proper cold-weather PPE must be worn at all times

2. Emergency Procedures

a) Emergency warming stations required every 30 meters

b) Automated temperature monitoring with alert systems

c) Emergency evacuation routes must avoid thermal shock

d) First aid stations equipped for cold-weather injuries

## 7. COMPLIANCE AND AUDIT

1. The Company shall conduct quarterly audits of all CEAAs to ensure

2. Third-party validation of environmental control systems required an

3. Non-compliance must be reported to Quality Control within 24 hour

## 8. MODIFICATIONS AND UPDATES

1. This document may only be modified with written approval from bot

2. Review and updates required annually or upon significant process

## APPROVAL AND EXECUTION

APPROVED AND ADOPTED this 15th day of January, 2024.

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