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01 November 2008

Contract Number: NNJ06TA25C

# Project Orion

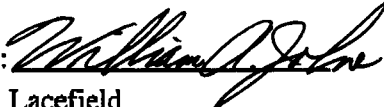
## Spacecraft Test & Verification Facility Certification Plan for the Kennedy Space Center Operations and Checkout Building


Prepared by:  
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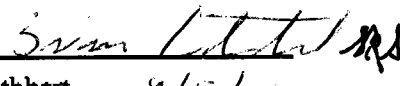
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# Spacecraft Test & Verification Facility Certification Plan for the Kennedy Space Center Operations and Checkout Building


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## **FOREWORD**

This document has been prepared for and is being submitted to the National Aeronautics and Space Administration (NASA) at Johnson Space Center (JSC) in Houston, Texas in accordance with Data Requirements Description (DRD) CEV-T-084, Spacecraft Test & Verification Facility Certification Plan, and Contract Number NNJ06TA25C.

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## **REVISION LOG**

<b>Revision</b>	<b>Revision Date</b>	<b>Page</b>	<b>Change Item</b>	<b>Approved DCR Number</b>
000	10 July 2007	All	Initial Submittal @ SDR	N/A
001	01 November 2008	All	PDR Submittal	N/A

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# 1 SCOPE

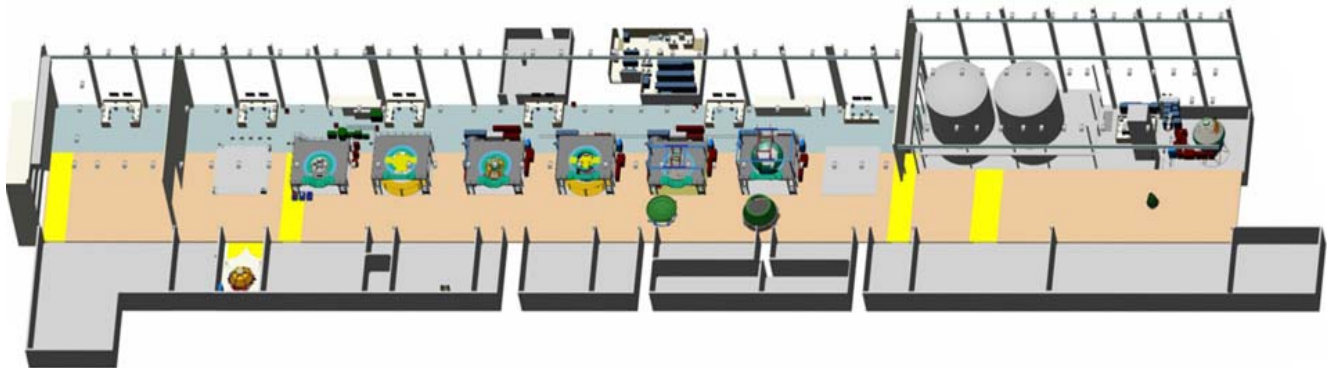
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## 1.1 PURPOSE

The purpose of the Spacecraft Test & Verification Facility Certification Plan for the Kennedy Space Center (KSC) Operations and Checkout Building (O&C) (DRD CEV-T-084400) is to provide the Contractor's plan(s) for certifying the O&C facility and facility systems that are needed to support the module and spacecraft-level qualification, certification, and acceptance test activities for the Constellation Program's (CxP) Crew Exploration Vehicle (CEV). This certification plan will address all requirements identified in DRD CEV-T-082400, Spacecraft Test and Verification Facility System Requirements Document (SRD).

## 1.2 OVERVIEW

The O&C was initially completed in 1964 for the Apollo program and has continuously provided support to NASA manned space flight (MSF) programs to the present day. The portion of the O&C that will be refurbished and utilized for Assembly Integration and Production (AI&P) of the CEV Spacecraft is called the Industrial Operating Zone (IOZ) Figure 1. The IOZ area is defined in the CEV/Orion Contract, NNJ06TA25C, Attachment J-12, Appendix 1 and is located within the O&C Checkout building and is dedicated for Lockheed Martin manufacturing operations.



**Figure 1: O&C Industrial Operating Zone**

Facilities and Facilities Subsystems that are being installed as part of the IOZ refurbishment will be verified by Lockheed Martin, the General Contractor or the Specialty Contractor using Facilities Certification Test Procedures. All Facilities Certification Test Procedures used will be developed by Lockheed Martin, the Contractor or a designated representative. Requirements that will be verified as part of

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the facilities refurbishment are generally contained in the Operations and Checkout Facilities Design Criteria (FDC) document LMSSC-ORION-KSC-003. The FDC is the lower level requirements document that decomposes system level requirements found in the SRD. The FDC is utilized by the Architectural and Engineering (A&E) firm and the General Contractor to develop facility drawings and other specifications. Many facility and facility system requirements identified in the SRD and Certification Plan trace to FDC requirements. When requirements trace to FDC requirements, verification of the FDC requirement will also satisfy the Certification Plan requirement. These requirements are identified as FDC requirements in the Test Requirements Section 3.2 and are traced in the verification cross reference matrix Section 4, Table 5 in the "Maps to FDC" column.

LMSSC-ORION-KSC-003 Operations and Checkout Facility Design Criteria (FDC) was initially base-lined at Rev. 3 (ERB-07-0056 - 08 May 2007). Changes as a result of Program Changes (CEV 606C baseline) and funding restructuring resulted in a re-baseline at Revision 4 (ERB-08-0216 - 22 Apr 2008). The Operations and Checkout Facility renovation effort is unique in that in order to meet the Flight Test Article Assembly Integration and Production schedule, commencement of the facility work precedes the final delivery of the SRD. Therefore in the event of a requirements conflict between the SRD (DRD CEV-T-082400) or Certification plan (DRD CEV-T-084400) and FDC (LMSSC-ORION-KSC-003) occurs, FDC shall take precedence and the SRD and Certification Plan will be updated to reflect the approved changes.

## 2 APPLICABLE DOCUMENTS

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### 2.1 *FEDERAL*

#### 2.1.1 Parent

Table 1: Parent Documents

Document ID	Title	Revision	Date
CxP 70036	Constellation Program Environmental Qualification and Acceptance Testing Requirements (CEQATR)	Rev A	05 Sep 2007
CEV-T-082400	Spacecraft Test & Verification Facility System Requirements Document for the Kennedy Space Center Operations	001	29 Aug 2008



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	and Checkout Building		
CEV-T-088000	CEV Imagery Plan	001	PDR

## 2.1.2 Applicable Documents

**Table 2: Applicable Documents**

Document ID	Title	Revision	Date
MIL-HDBK-454B	General Guidelines for Electronic Equipment	Rev B	15 April 2007
MIL-STD 1472F	Human Engineering	-	05 Dec 2003
NFPA 70	National Electric Code	-	15 Aug 2007
NFPA 101	Life Safety Code	-	18 Aug 2005
NFPA 780	Standard for the Installation of Lightning Protection Systems	-	15 Aug 2007
MIL-PRF-27401	Propellant - Pressurizing Agent Nitrogen	-	10 Jan 2008

## 2.1.3 Guidance Documents

**Table 3: Guidance Documents**

Document ID	Title	Revision	Date
AFM 91-201	Explosives Safety Manual	-	18 Oct 2001
ASME B30.2	Overhead and Gantry Cranes	-	2005
ASME/ANSI 17.1	Specification for Refurbishment of Elevators	-	2004
MIL-STD-1542B	Electromagnetic Compatibility and Grounding Requirements for Space System Facilities	Rev B	15 Nov 1991
OSHA 29 CFR 1910.179	Overhead and Gantry Cranes	-	2008
STP-72115	Cleanliness Controls for Spacecraft/Systems	-	14 Aug 2007
MIL-PRF-27407	Propellant - Pressurizing Agent Helium	-	29 Nov 2006

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## 2.2 LOCKHEED MARTIN

**Table 4: Lockheed Martin Reference Documents**

Document ID	Title	Revision	Date
CPS 565	Workplace Security – Maintaining a Safe and Respectful Workplace Free From Threats and Violence	Rev 3	14 Jan 2008
CPS 569	Security	Rev 3	18 Aug 2005
LMSSC-ORION-KSC-003	O&C Facility Design Criteria	Rev 3	08 May 2007
LMSSC-ORION-KSC-008	Operations and Checkout Building, Facilities Concept of Operations	Rev Basic	28 Mar 2008
1.3.3-T1-ESH-12.0-S	Overhead Cranes	Rev 0	27 Nov 2007
2.3.5-T2-SysSec-1.0-P	System Security Engineering	Rev 0	25 May 2005
2.3.6-T1-ProdProt-1.0-G	Packaging, Handling, Storage and Transportation Guidebook	Rev 0	19 Dec 2006
2.3.8.1-T1-Test-1.1-G	Test Engineering Guidebook	Rev 2	25 Sept 2007
2.3.8-T1-Test-2.0-D	Video Monitoring of Critical Operations (Directive)	Rev 0	12 July 2005
2.3.8.1-T1-Test-7.0-P	FFMEA for Ground Processing Equipment	Rev 3	28 Nov 2006
2.4-T1-Ops-1.1-P	Foreign Object Elimination (FOE) Process	Rev 0	24 Apr 2005

## 2.3 NASA

**Table 5: NASA Reference Documents**

Document ID	Title	Revision	Date
KNPR-8500.1	Kennedy Space Center Environmental Requirements	Rev A	05 Nov 2005
KNPR-8715.3	Kennedy Space Center Practices Procedural Requirements	Rev B	04 Apr 2007
KSC-C-123H	Specification for Cleanliness of Fluid Systems	Rev H	25 Sep 1995
KSC-DE-512-SM	Facility, System and Equipment General Design Requirements	Rev K	30 Sep 2004

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KSC-STD-E-0012E	Standard for Facility Grounding and Lightning Protection	Rev. E	01 Aug 2001
NASA-STD-5005B	Ground Support Equipment	Rev B	15 Sep 2003
NASA-STD-8719.9	Standard for Lifting Devices and Equipment	-	
NASA-STD-8719.11	Safety Standard for Fire Protection	Change 3	6 Apr 2006

## ***2.4 United Space Alliance (USA)***

None Applicable

## ***2.5 OTHER PUBLICATIONS***

**Table 6: Other Documents**

<b>Document ID</b>	<b>Title</b>	<b>Revision</b>	<b>Date</b>
CMAA 70	Crane Manufacturer's Association of America, Specification Number 70-2000	-	2004
IESNA HB-9-2000	Illumination Engineering Society of North America, Lighting Handbook	9 <sup>th</sup> Edition	01 Dec 2000

## **3 CERTIFICATION PLAN**

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### **3.1 CERTIFICATION METHOD**

The following methods are used for certification. While all are acceptable, test is preferable to other methods that do not specifically demonstrate behavior. The requirements and nature of the test also constrain the type of certification method implemented.

#### **3.1.1 Test (T)**

Any program or procedure which is designed to obtain, verify, or provide data for the evaluation of any of the following: 1) progress in accomplishing developmental objectives, 2) the performance, operational capability and suitability of systems, subsystems, components, and equipment items, and 3) the vulnerability and lethality of systems, subsystems, components, and equipment items.

#### **3.1.2 Analysis (A)**

Analysis is the use of calculations or comparisons to show that a system or one of its elements satisfies its functional or design requirements. Mathematical models representing the system or element under study, using data from tests or other analyses, are often employed. Comparison of the item with others that are substantially similar or identical in design, manufacturing processes and quality control and have been tested or used to equivalent or more stringent criteria is an acceptable form of verification analysis.

#### **3.1.3 Demonstration (D)**

Demonstration is the observation of functional operation to determine compliance with requirements. Demonstration is often used to show that a proper response results from a specific stimulus or interrogation. It is also well suited to proving compliance with human factors and maintenance requirements.

#### **3.1.4 Inspection (I)**

Visual examination of the item (hardware and software) and associated descriptive documentation which compares appropriate characteristics with predetermined standards to determine conformance to requirements without the use of special laboratory equipment or procedures.

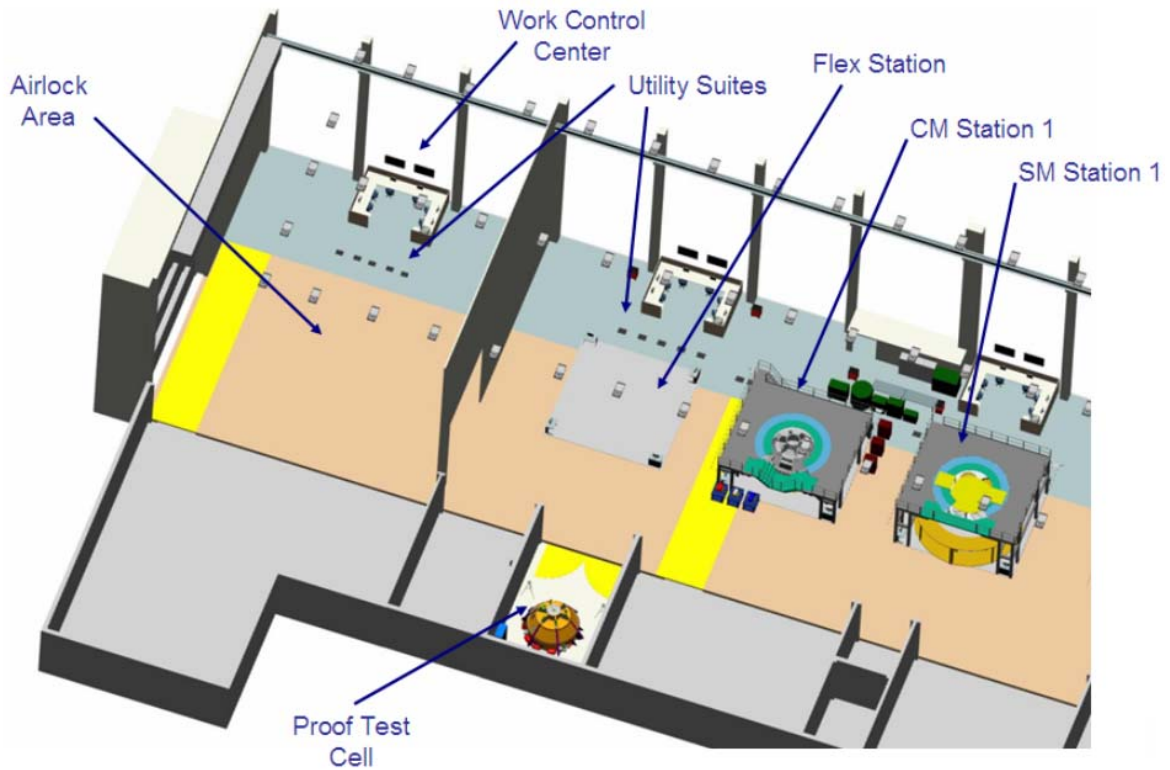
### **3.2 TESTING REQUIREMENTS**

This section identifies the testing requirements necessary to ensure that the facility meets the requirements detailed in the SRD (CEV-T-082400). Requirements are presented with their requirement name, SRD requirement number, FDC requirement number, requirement description, requirement rationale, verification method, and the verification plan.

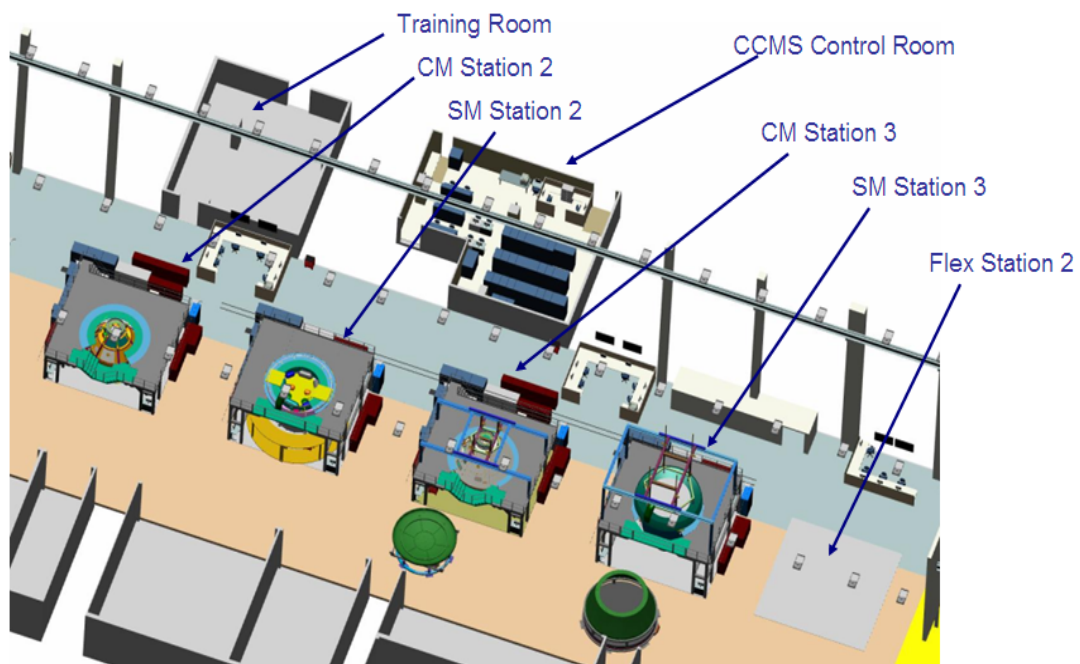
Requirements from the SRD that do not have a corresponding FDC requirement number will be clearly identified with a "N/A" in the "FDC Requirement Number" designation. These requirements are primarily not associated with facility systems but are more aligned with establishment of the facility operational infrastructure with such items as scheduling requirements, configuration management requirements, maintenance requirements, and sustaining engineering requirements. The verification plan associated with each of these requirements will provide salient details of the verification approach.

Many requirements detailed in this section identify specific areas within the Facility. For clarity, the overview of the IOZ shown in Figure 1 has been decomposed into three additional views which provide additional detail to the IOZ layout.

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**Figure 2: IOZ Detailed View West Sector**



**Figure 3: IOZ Detailed View Center Sector**

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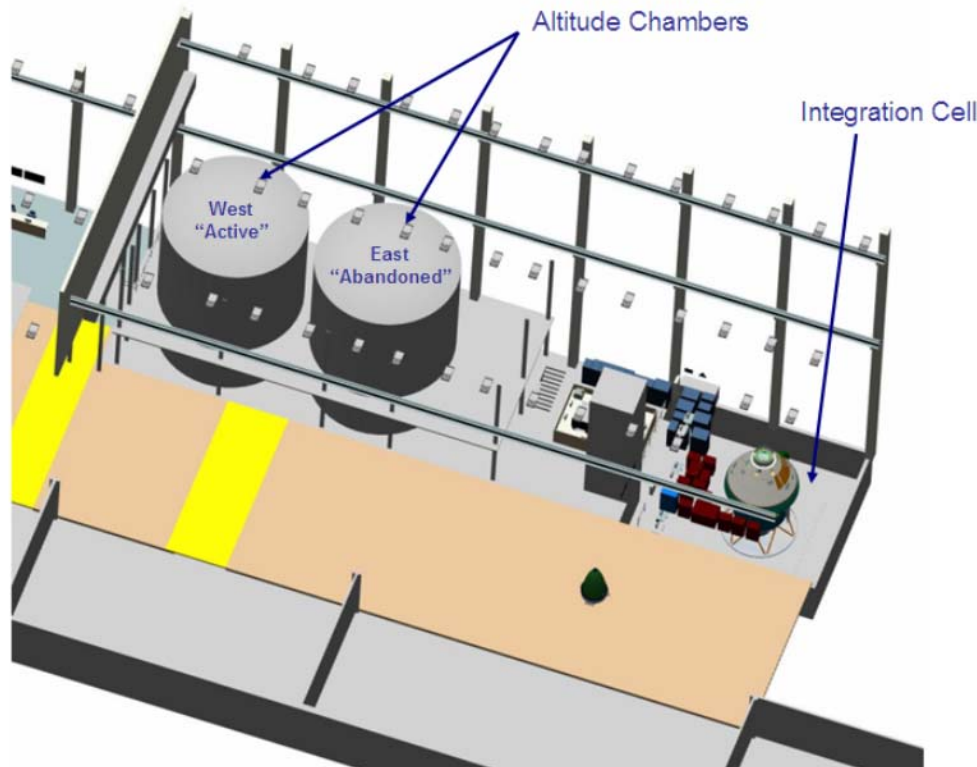


Figure 4: IOZ Detailed View East Sector

### CEV-T-082400 Section 3.3 Environmental Requirements

Environmental requirement verification will include heat load analysis, inspection, demonstration and test included HVAC load, temperature, humidity, filtration, pressure, and particulate count. The verification will include the Computer Room Areas, Basement Areas, Clean Work Areas, the Airlock Areas, and the Battery Laboratory.

#### Computer Room Air Conditioning Independence

**SRD Requirement Number:** 3.3.1.1

**FDC Requirement Numbers:** 3.3.1.27 and 3.3.1.32

**Description:** Computer Room air conditioning system shall be independent to the CWA system.

**Rationale:** To maintain environmental requirements Control Room, Server Room and Training Rooms needs to have dedicated unit.

**Verification Method:** Test

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**Verification Plan:** Testing will be performed on Computer Room Air Conditioners, as defined in CEV-T-082400. Each of the areas noted in the requirement Rational will be tested to satisfy SRD requirements 3.3.1.2 through 3.3.1.6. These tests will be performed by the HVAC Contractor using test procedures developed by Lockheed Martin or a designated representative. Each of these systems will be tested separately from the Basement and CWA acceptance testing. Stand alone testing of Computer Room air conditioner systems during verification will provide satisfactory objective test evidence of the independence of the systems. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Computer Room Air Conditioning Temperature Requirements**

**SRD Requirement Number:** 3.3.1.2

**FDC Requirement Numbers:** 3.3.1.27 and 3.3.1.32

**Description:** Computer Room air conditioning system shall maintain temperature at 71° F ± 6°F.

**Rationale:** Temperature must be maintained for proper CCMS operation.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified temperature ranges. Test is considered successful if operating ranges are maintained throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **CCMS Control Room Air Conditioning Humidity Requirements**

**SRD Requirement Number:** 3.3.1.3

**FDC Requirement Number:** 3.3.1.27

**Description:** CCMS Control Room air conditioning system shall maintain relative humidity at  $35\% \leq RH \leq 60\%$ .

**Rationale:** Relative Humidity (RH) must be maintained to prevent condensation and minimize potential ESD effects.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified humidity ranges. Test is considered successful if operating ranges are maintained



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throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **CCMS Control Room Air Conditioning Filtration Requirements**

**SRD Requirement Number:** 3.3.1.4

**FDC Requirement Number:** 3.3.1.27

**Description:** CCMS Control Room air conditioning system shall provide filtration at MERV 11 (ASHRAE 52, 60-65%).

**Rationale:** Filtration must be provided to maintain cleanliness.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various conditions and verify that the Air Conditioning System can maintain the specified cleanliness. Test is considered successful if cleanliness ranges can be maintained. The cleanliness ranges as well as the duration that they must be maintained will be specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Server and Training Room Air Conditioning Humidity Requirements**

**SRD Requirement Number:** 3.3.1.5

**FDC Requirement Number:** 3.3.1.32

**Description:** Server and Training Room air conditioning system shall maintain relative humidity at  $30\% \leq RH \leq 60\%$ .

**Rationale:** Relative Humidity (RH) must be maintained to prevent condensation and minimize potential ESD effects.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified humidity ranges. Test is considered successful if operating ranges are maintained throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Server and Training Room Air Conditioning Filtration Requirements**

**SRD Requirement Number:** 3.3.1.6

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**FDC Requirement Number: 3.3.1.32**

**Description:** Server and Training Room air conditioning system shall provide filtration at MERV 11 (ASHRAE 52, 60-65%).

**Rationale:** Filtration must be provided to maintain cleanliness.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various conditions and verify that the Air Conditioning System can maintain the specified cleanliness. Test is considered successful if cleanliness ranges can be maintained. The cleanliness ranges as well as the duration that they must be maintained will be specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Computer Room Air Conditioning Pressure Requirements**

**SRD Requirement Number: 3.3.1.7**

**FDC Requirement Numbers: 3.3.1.27 and 3.3.1.32**

**Description:** Computer Room air conditioning system pressure shall be less than the CWA and greater than adjacent spaces.

**Rationale:** Pressures less than CWA ensures no contamination towards CWA; Pressure greater than adjacent spaces prevents contamination to Computer Room Area.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure and verify that the Computer Room air conditioning system maintains the correct delta pressures to adjacent areas. Test is considered successful if proper pressures are obtained.

This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**CCMS Control Room Door Sealing Requirements**

**SRD Requirement Number: 3.3.1.8**

**FDC Requirement Number: 3.3.1.28**

**Description:** CCMS Control Room doors shall automatically close and seal when closed.

**Rationale:** Necessary to maintain environmental requirements.

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**Verification Method:** Demonstration

**Verification Plan:** Lockheed Martin or a designated representative will perform a demonstration to verify that the doors automatically close. Requirement is successfully verified if door automatically closes and seals. Closure device operation will be visually verified when door closure mechanism is demonstrated. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**CCMS Control Room Equipment Load Sizing Requirements**

**SRD Requirement Number:** 3.3.1.9

**FDC Requirement Number:** 3.3.1.29

**Description:** CCMS Control Room air conditioner shall be sized for a 154KBTU/HR equipment cooling load and 15 people within space.

**Rationale:** Air Conditioner sizing must be adequate to support CCMS.

**Verification Method:** Analysis

**Verification Plan:** Lockheed Martin will verify analysis was performed by the HVAC Contractor or qualified entity, such as a Professional Engineer, to size the Control Room air conditioner for the specified loading. Verification is considered satisfactory if analysis was performed and is documented in Control Room HVAC Documentation. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Server Room Equipment Load Sizing Requirements**

**SRD Requirement Number:** 3.3.1.10

**FDC Requirement Number:** 3.3.1.33

**Description:** Server Room Air Conditioner shall be sized for a 50KBTU/HR equipment cooling load.

**Rationale:** Air Conditioner sizing must be adequate to support Server Racks.

**Verification Method:** Analysis

**Verification Plan:** Lockheed Martin will verify analysis was performed by the HVAC Contractor or qualified entity, such as a Professional Engineer, to size the Server Room air conditioner for the specified loading. Verification is considered satisfactory if analysis was performed and is documented in Server Room HVAC engineering. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

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## **Basement Air Conditioning Temperature Requirements**

**SRD Requirement Number:** 3.3.2.1

**FDC Requirement Number:** 3.3.1.11

**Description:** The air conditioning system shall maintain a temperature at 71° F ± 6°F in the Basement.

**Rationale:** Temperature must be controlled to preclude condensation on hardware.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified temperature ranges. Test is considered successful if operating ranges are maintained throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Basement Air Conditioning Humidity Requirements**

**SRD Requirement Number:** 3.3.2.2

**FDC Requirement Number:** 3.3.1.11

**Description:** The air conditioning system shall maintain a relative humidity at 35% ≤ RH ≤ 60% in the Basement.

**Rationale:** Relative Humidity must be maintained to prevent condensation and minimize potential ESD effects.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified humidity ranges. Test is considered successful if operating ranges are maintained throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Basement Air Conditioning Filtration Requirements**

**SRD Requirement Number:** 3.3.2.3

**FDC Requirement Number:** 3.3.1.11

**Description:** The air conditioning system shall provide filtration at MERV 16 (ASHRAE 52, 90-95%) in the Basement.

**Rationale:** Filtration must be provided to maintain cleanliness.

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**Verification Method: Test**

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various conditions and verify that the Air Conditioning System can maintain the specified cleanliness. Test is considered successful if cleanliness ranges can be maintained. The cleanliness ranges as well as the duration that they must be maintained will be specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Basement Air Conditioning Pressure Requirements**

**SRD Requirement Number:** 3.3.2.4

**FDC Requirement Number:** 3.3.1.11

**Description:** The air conditioning system pressure shall be 0.05 in-H<sub>2</sub>O (adjustable) in the Basement.

**Rationale:** Must maintain proper pressure balance to prevent contamination.

**Verification Method: Test**

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure and verify that the Basement air conditioning system maintains the correct pressure. Test is considered successful if proper pressure is obtained. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**CWA Air Conditioning Temperature Requirements**

**SRD Requirement Number:** 3.3.3.1

**FDC Requirement Number:** 3.3.1.7

**Description:** The air conditioning system shall maintain a temperature at 71° F ± 6°F in the CWA.

**Rationale:** Temperature must be controlled to preclude condensation on hardware.

**Verification Method: Test**

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified temperature ranges. Test is considered successful if operating ranges are maintained throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

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## **CWA Air Conditioning Humidity Requirements**

**SRD Requirement Number:** 3.3.3.2

**FDC Requirement Number:** 3.3.1.7

**Description:** The air conditioning system shall maintain a relative humidity at  $35\% \leq RH \leq 60\%$  in the CWA.

**Rationale:** Relative Humidity must be maintained to prevent condensation and minimize potential ESD effects as specified in the ORION Contamination Control Plan

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified humidity ranges. Test is considered successful if operating ranges are maintained throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **CWA Air Conditioning Filtration Requirements**

**SRD Requirement Number:** 3.3.3.3

**FDC Requirement Number:** 3.3.1.7

**Description:** The air conditioning system shall provide filtration at HEPA MERV 18 (99.99%; non-DOP tested HEPA filters; Dioctylphthalate) in the CWA.

**Rationale:** Filtration must be provided to maintain the ISO Class 8.5 environment in the CWA.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various conditions and verify that the Air Conditioning System can maintain the specified cleanliness. Test is considered successful if cleanliness ranges can be maintained. The cleanliness ranges as well as the duration that they must be maintained will be specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **CWA Air Conditioning Pressure Requirements**

**SRD Requirement Number:** 3.3.3.4

**FDC Requirement Number:** 3.3.1.7

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**Description:** The air conditioning system pressure shall be 0.05 in-H<sub>2</sub>O (adjustable) in the CWA, including all spaces connected to clean work area.

**Rationale:** Must maintain proper pressure balance to prevent contamination.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure and verify that the CWA air conditioning system maintains the correct pressure. Test is considered successful if proper pressure is obtained. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **CWA Air Conditioning Air Change Requirements**

**SRD Requirement Number:** 3.3.3.5

**FDC Requirement Number:** 3.3.1.7

**Description:** The air conditioner shall accommodate a maximum of 2 air changes per hour in the CWA.

**Rationale:** Necessary to maintain CWA environment.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure and verify that the CWA conditioning system can accommodate the specified number of air changes per hour. Test is considered successful if specified number can be met. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **CWA Air Conditioning Particulate Count Requirements**

**SRD Requirement Number:** 3.3.3.6

**FDC Requirement Number:** 3.3.1.7

**Description:** The air conditioner shall maintain a particulate count per ISO 14644-1 Class 8 (as-built, at rest, operational) in the CWA.

**Rationale:** Necessary to maintain CWA environment.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure and verify that the CWA conditioning particulate counts are acceptable. Test is considered successful if particulate counts can be met. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

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## **CWA Air Conditioning Cleanliness Certification Requirements**

**SRD Requirement Number:** 3.3.3.7

**FDC Requirement Number:** 3.3.1.7

**Description:** CWA air conditioner Cleanliness shall be Certified by an independent third party.

**Rationale:** Independent evaluation ensures compliance with requirements.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor or Lockheed Martin will commission independent third party such as National Environmental Balancing Bureau to perform a certification test of the air conditioning system cleanliness. If results are satisfactory the independent evaluator will issue a Cleanroom Performance Testing Certification certificate. Requirement is satisfied by completion of the Test and issuance of certificate. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **CWA Equipment Load Sizing Requirements**

**SRD Requirement Number:** 3.3.3.8

**FDC Requirement Number:** 3.3.1.30.1

**Description:** CWA air conditioner shall be sized for a 50KBTU/HR equipment cooling load from the CCMS Front End Hardware.

**Rationale:** Air Conditioner sizing must take in to account CCMS Front End Loading.

**Verification Method:** Analysis

**Verification Plan:** Lockheed Martin will verify analysis was performed by the HVAC Contractor or qualified entity, such as a Professional Engineer, to size the CWA air conditioner for the specified loading. Verification is considered satisfactory if analysis was performed and is documented in CWA HVAC engineering. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **CWA Equipment Load Sizing Requirements**

**SRD Requirement Number:** 3.3.3.9

**FDC Requirement Number:** 3.3.1.1

**Description:** CWA air conditioner shall be sized for one person per 300 square feet.

**Rationale:** Air Conditioner sizing must take in to account personnel. 300 square foot estimate is based on 300 people.

**Verification Method:** Analysis



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**Verification Plan:** Lockheed Martin will verify analysis was performed by the HVAC Contractor or qualified entity, such as a Professional Engineer, to size the CWA air conditioner for the specified personnel loading. Verification is considered satisfactory if analysis was performed and is documented in CWA HVAC engineering. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Receiving and Inspection Door Requirements**

**SRD Requirement Number:** 3.3.3.10

**FDC Requirement Number:** 3.3.1.9

**Description:** Receiving and Inspection Room shall be equipped with door that can be closed when exterior doors are open.

**Rationale:** Receiving and Inspection environmental requirements are the same as for the CWA. Interior door shall remain closed when exterior doors are opened. Environmental excursions are allowed when the exterior doors are opened.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin will perform an inspection on facility drawings or as-built configuration to confirm door is present and design permits closure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Airlock Temperature Requirements**

**SRD Requirement Number:** 3.3.4.1

**FDC Requirement Number:** 3.3.1.7

**Description:** The air conditioning system shall maintain a temperature at 71° F ± 6°F in the Airlock.

**Rationale:** Temperature must be controlled to preclude condensation on hardware.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified temperature ranges. Test is considered successful if operating ranges are maintained throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

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## **Airlock Air Conditioning Humidity Requirements**

**SRD Requirement Number:** 3.3.4.2

**FDC Requirement Number:** 3.3.1.7

**Description:** The air conditioning system shall maintain a relative humidity at  $35\% \leq RH \leq 60\%$  in the Airlock.

**Rationale:** Relative Humidity must be maintained to prevent condensation and minimize potential ESD effects.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various load conditions and verify that the Air Conditioning System can maintain the specified humidity ranges. Test is considered successful if operating ranges are maintained throughout duration of test as specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Airlock Air Conditioning Filtration Requirements**

**SRD Requirement Number:** 3.3.4.3

**FDC Requirement Number:** 3.11.24

**Description:** The air conditioning system shall provide filtration at HEPA MERV 18 Non-DOP tested ISO 14644-1 Class 5 delivered at HEPA filters in the Airlock Area.

**Rationale:** Filtration must be provided to maintain CWA.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various conditions and verify that the Air Conditioning System can maintain the specified cleanliness. Test is considered successful if cleanliness ranges can be maintained. The cleanliness ranges as well as the duration that they must be maintained will be specified in the detailed test procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Airlock Air Conditioning Pressure Requirement (During Refurbishment)**

**SRD Requirement Number:** 3.3.4.4

**FDC Requirement Number:** 3.11.24

**Description:** The air conditioning system pressure shall be less than remainder of low bay and greater than ambient within the Airlock during vehicle refurbishment mode of operation.

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**Rationale:** Must maintain proper pressure balance to prevent contamination to remainder of CWA during refurbishment.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure and verify that the Airlock air conditioning system maintains the correct pressure. Test is considered successful if proper pressure is maintained. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Airlock Air Conditioning Pressure Requirement (During Airlock Mode)**

**SRD Requirement Number:** 3.3.4.5

**FDC Requirement Number:** 3.11.25

**Description:** The air conditioning system pressure shall be 0.05 in-H<sub>2</sub>O (adjustable) within the Airlock during airlock mode of operation.

**Rationale:** Must maintain proper pressure balance to prevent contamination.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure and verify that the Airlock air conditioning system maintains the correct pressure. Test is considered successful if proper pressure is maintained. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Airlock Air Conditioning Air Change Requirements**

**SRD Requirement Number:** 3.3.4.6

**FDC Requirement Numbers:** 3.11.24 and 3.11.25

**Description:** The air conditioner shall accommodate a maximum of 2 air changes per hour in the Airlock.

**Rationale:** Necessary to maintain CWA environment.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure and verify that the Airlock air conditioning system can accommodate the specified number of air changes per hour. Test is considered successful if specified number can be met. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

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## **Airlock Air Conditioning Particulate Count Requirements**

**SRD Requirement Number:** 3.3.4.7

**FDC Requirement Number:** 3.11.25

**Description:** The air conditioner shall maintain a particulate count per ISO 14644-1 Class 8 (as-built, at rest, operational) in the Airlock

**Rationale:** Necessary to maintain CWA environment.

**Verification Method:** Test

**Verification Plan:** HVAC Contractor will perform a test of the air conditioning system using a Lockheed Martin or a LM representative generated test procedure under various conditions and verify that the Air Conditioning System can maintain the specified particulate count. Test is considered successful if particulate count can be obtained. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **CEV-T-082400 Section 3.4 Environmental Pollution Control Requirements**

Environmental Pollution Control Compliance will be verified by satisfactory inspection of the Facility, including training records, by NASA KSC Environmental Program Branch. Examples of required routine inspections include weekly inspection of secondary containment for storage tanks and weekly inspections of hazardous waste storage facilities. Inspections should specifically identify that the facility is in compliance of KSC Environmental Policy Requirements as set forth in KSC KNPR 8500.1 Revision A. Artifacts will consist of Letters of Compliance from KSC EPB.

## **Waste Material Management**

**SRD Requirement Number:** 3.4.1.1

**FDC Requirement Number:** N/A

**Description:** The IOZ waste material management shall follow the IOZ Environmental, Safety and Health Plan as well as the KSC Environmental Policy Requirements as set forth in KSC KNPR 8500.1 Revision A.

**Rationale:** IOZ is located on KSC Property, KSC Policy directs LM follow existing KSC Waste Management Policy.

**Verification Method:** Inspection

**Verification Plan:** Verified by satisfactory inspection of the Facility, by NASA KSC Environmental Program Branch. Inspections should specifically identify that the facility

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is in compliance of KSC Environmental Policy Requirements a set forth in KSC KNPR 8500.1 Revision A. Inspection artifact will consist of Letter of Compliance from KSC EPB. This requirement has no FDC counterpart and will be verified independently from the FDC requirements.

### **Waste Material Management Internal Inspections**

**SRD Requirement Number:** 3.4.1.2

**FDC Requirement Number:** N/A

**Description:** LM Environmental Safety and Health (ESH) shall implement a process for weekly internal inspections.

**Rationale:** Internal inspections ensure readiness for compliance inspections by KSC Environmental Program Branch (EPB).

**Verification Method:** Inspection

**Verification Plan:** Verified by satisfactory inspection of the Facility Weekly LM Internal Inspection Reports, by NASA KSC Environmental Program Branch. Inspections should specifically identify that the facility is in compliance of KSC Environmental Policy Requirements a set forth in KSC KNPR 8500.1 Revision A. Inspection artifact will consist of Letter of Compliance from KSC EPB. This requirement has no FDC counterpart and will be verified independently from the FDC requirements.

### **CEV-T-082400 Section 3.5 Power, Grounding, and Lighting Requirements**

The O&C facility's electrical power, grounding, and lighting systems requirements will be verified by analysis, inspection, demonstration, and test by Lockheed Martin and the Electrical Contractor. Special or unique system requirements are detailed in specific sub-sections appropriate for each system. Power, Grounding, and Lighting requirements map directly to Facilities Design Criteria requirements. Artifacts gathered to verify the requirements per the FDC will also serve to validate SRD requirements for the Environmental Requirements.

#### **Facility Power Utility Source Connection**

**SRD Requirement Number:** 3.5.1.1.1

**FDC Requirement Number:** 3.4.7.16.1.1

**Description:** Facility power shall be provided directly from the utility source.

**Rationale:** No local generated power available at KSC.

**Verification Method:** Inspection

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**Verification Plan:** Lockheed Martin will inspect the facilities electrical drawing and perform a walk down inspection of the as-built facility to verify that the facility power is provided directly from the utility source. Requirement is satisfied if inspections verify utility source feeds facility power directly. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Facility Power Base Power Grid**

**SRD Requirement Number:** 3.5.1.1.2

**FDC Requirement Number:** 3.4.7.14.1

**Description:** The Primary power system to the O&C substation shall consist of 13.2KV, 3 phase, 3 wire 60 Hz service provided from the base power grid.

**Rationale:** O&C must be compatible with Utility Grid.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin will inspect the O&C substation electrical drawing and perform a walk down inspection of the substation to verify that the base power grid supports the voltage, phasing, and frequency requirements. Requirement is satisfied if inspections verify that the base power grid supplied primary power specifications are 13.2KV, 3 phase, 3 wire 60 Hz. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Facility Power Utility Source Independence**

**SRD Requirement Number:** 3.5.1.1.3

**FDC Requirement Number:** 3.4.7.14.1

**Description:** The primary power system to the IOZ shall be independent of other O&C areas.

**Rationale:** The IOZ area is independent facility and requires a dedicated power source

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin will inspect the facilities electrical drawing and perform a walk down inspection of the as-built facility to verify that the facility power is independent of other O&C users. Requirement is satisfied if inspections verify primary power system independence. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Facility Power Utility HVAC Pressurization**

**SRD Requirement Number:** 3.5.1.1.4

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**FDC Requirement Number: 3.4.7.14.1**

**Description:** A failure of one of the primary power system shall not cause the building to lose its HVAC pressurization criteria.

**Rationale:** Tie Breaker will switch during loss of a single power supply feed to the IOZ maintaining power to all HVAC units.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** Lockheed Martin will inspect the facilities electrical drawings to verify that the facility substation is a double ended unit with a dual transformer. A demonstration will be performed or led by Lockheed Martin showing that the HVAC pressurization can be maintained using either end of the substation unit. Requirement is satisfied if inspections and demonstration confirm HVAC can operate on either substation end. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Facility Power Nominal Voltage Level**

**SRD Requirement Number: 3.5.1.1.5**

**FDC Requirement Number: 3.4.7.16.1.2**

**Description:** The nominal facility power voltage level shall be maintained to  $\pm 5\%$ .

**Rationale:** Maximum acceptable power fluctuation.

**Verification Method:** Test

**Verification Plan:** Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification that the facility power voltage level fluctuations are within the described specification. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**CM and SM Test Station 480V Power**

**SRD Requirement Number: 3.5.1.2.1**

**FDC Requirement Numbers: 3.9.6 and 3.9.7.12**

**Description:** Three phase, 480V, 100 A, 5 wire receptacle shall be provided to the CM and SM test stations.

**Rationale:** 480V Facility Power for UPS.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the CM and SM Test Station. Lockheed Martin or the designated Contractor will include in

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the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

#### **CM and SM Test Station 208V Power**

**SRD Requirement Number:** 3.5.1.2.2

**FDC Requirement Numbers:** 3.9.6 and 3.9.7.13

**Description:** Three phase, 208V, 100 A, 4 wire receptacle shall be provide to the CM and SM test stations.

**Rationale:** 208V Facility Power for GSE.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the CM and SM Test Station. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

#### **CM and SM Test Station 120/208V 100A Power**

**SRD Requirement Number:** 3.5.1.2.3

**FDC Requirement Numbers:** 3.9.6 and 3.9.7.14

**Description:** Three phase, 120/208V, 100A, 5 wire receptacle shall be provided to the CM and SM test stations.

**Rationale:** 120/208V Facility Power for GSE.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the CM and SM Test Station. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

#### **CM and SM Test Station 120/208V 50A Power**

**SRD Requirement Number:** 3.5.1.2.4



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**FDC Requirement Numbers:** 3.9.6 and 3.9.7.15

**Description:** Three phase, 120/208 50A, 5 wire receptacle shall be provided to the CM and SM test stations.

**Rationale:** 120/208V Facility Power for GSE.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the CM and SM Test Station. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

**Integration Cell 480V Power**

**SRD Requirement Number:** 3.5.1.3.1

**FDC Requirement Numbers:** 3.9.3 and 3.9.7.12

**Description:** Three phase, 480V, 100 A, 5 wire receptacle shall be provided to the Integration Cell.

**Rationale:** 480V Facility Power for UPS.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the Integration Cell. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Integration Cell 208V Power**

**SRD Requirement Number:** 3.5.1.3.2

**FDC Requirement Numbers:** 3.9.3 and 3.9.7.13

**Description:** Three phase, 208V, 100 A, 4 wire receptacle shall be provide to the Integration Cell.

**Rationale:** 208V Facility Power for GSE.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the Integration Cell. Lockheed Martin or the designated Contractor will include in the

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Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Integration Cell 120/208V 100A Power**

**SRD Requirement Number:** 3.5.1.3.3

**FDC Requirement Numbers:** 3.9.3 and 3.9.7.14

**Description:** Three phase, 120/208V, 100A, 5 wire receptacle shall be provided to the Integration Cell.

**Rationale:** 120/208V Facility Power for GSE.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the Integration Cell. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### **Integration Cell 120/208V 50A Power**

**SRD Requirement Number:** 3.5.1.3.4

**FDC Requirement Numbers:** 3.9.3 and 3.9.7.15

**Description:** Three phase, 120/208 50A, 5 wire receptacle shall be provided to the CM and SM test stations.

**Rationale:** 120/208V Facility Power for GSE.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the Integration Cell. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Proof Pressure Cell Power**

**SRD Requirement Number:** 3.5.1.4.1

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**FDC Requirement Number: 3.4.7.25.1**

**Description:** Technical power to the proof pressure cell will be via the proof pressure control room.

**Rationale:** Control room will be primary interface to test cell.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the electrical facilities drawings and a physical as-built inspection will verify that the power to the proof pressure cell is fed from the control room. Technical power to the cell may be in the form of a dedicated UPS. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Proof Pressure Cell 480V Power**

**SRD Requirement Number: 3.5.1.4.2**

**FDC Requirement Numbers: 3.4.7.25.2**

**Description:** Three phase 480V, 100A, 60 Hz shall be provided to the Proof Pressure Cell Control room.

**Rationale:** 480V Facility Power for GSE.

**Verification Method:** Test

**Verification Plan:** A test will verify that the proper voltages and current is available in the Proof Pressure Cell Control Room. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Proof Pressure Cell Control Room 120/208V 30A Power**

**SRD Requirement Number: 3.5.1.4.3**

**FDC Requirement Numbers: 3.4.7.25.4**

**Description:** Three phase 120/208V, 30A 5 wire technical power with load center shall feed the Proof Pressure Cell and Control room outlets.

**Rationale:** 120/208V Facility Power for GSE.

**Verification Method:** Test

**Verification Plan:** A test will verify that the proper receptacles are located in the Proof Pressure Cell and Control Room. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle

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to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Proof Pressure Cell Control Room 120/208V 100A Power**

**SRD Requirement Number:** 3.5.1.4.4

**FDC Requirement Numbers:** 3.4.7.25.3

**Description:** Three phase 120/208V, 100A, 60Hz shall be provided to the Proof Pressure Cell Control room.

**Rationale:** 120/208V Facility Power for GSE.

**Verification Method:** Test

**Verification Plan:** A test will verify that the proper receptacle is located in the Proof Pressure Cell Control Room. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **CCMS Control Room Power Service Disconnect**

**SRD Requirement Number:** 3.5.1.5.1

**FDC Requirement Number:** 3.4.7.26.2

**Description:** Three phase 480 VAC, 225A, 60 Hz Service disconnect shall be provided to the CCMS control room.

**Rationale:** 480V Facility Power for UPS.

**Verification Method:** Test

**Verification Plan:** Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure a test to verify that the proper voltages are present at the service disconnect. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **TPS/Chemical Dispensing Room Power**

**SRD Requirement Number:** 3.5.1.6.1

**FDC Requirement Number:** 3.4.7.27.1

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**Description:** Two 120V, 20A, 4-cluster convenience outlets shall be provided to the TPS/Chemical Dispensing Room.

**Rationale:** Facility Power for TPS/Chemical dispensing equipment.

**Verification Method:** Test

**Verification Plan:** Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure a test to verify that the proper voltages are present at the convenience outlets. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **TPS/Chemical Dispensing Power Outlet Spacing**

**SRD Requirement Number:** 3.5.1.6.2

**FDC Requirement Number:** 3.4.7.27.1

**Description:** TPS/Chemical Dispensing Room convenience outlets shall be located approximately 20 feet apart on the west wall.

**Rationale:** 120V Facility Power for TPS/Chemical Dispensing equipment

**Verification Method:** Inspection

**Verification Plan:** An inspection by Lockheed Martin or the designated Contractor will verify that the outlets located in the TPS/Chemical Dispensing Room spacing is per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Perimeter Lighting Power**

**SRD Requirement Number:** 3.5.1.7.1

**FDC Requirement Number:** 3.4.7.16.2.5

**Description:** Perimeter lighting shall be powered by Facility power.

**Rationale:** Critical and emergency lighting will be provided by battery and generator backup supplied systems upon loss of perimeter lighting.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that perimeter lighting is connected to facility power. A demonstration will then be performed by execution of a Lockheed Martin or Contractor developed Test Procedure to verify that perimeter lighting is connected to facility power. The demonstration may be performed by Lockheed Martin or the Electrical Contractor using a Lockheed Martin or

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Contractor developed Test Procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Data Systems Power**

**SRD Requirement Number:** 3.5.1.7.2

**FDC Requirement Number:** 3.4.7.16.2.5

**Description:** IOZ Server Room communications racks shall be powered by Technical Power provided by the Facility.

**Rationale:** Integrity of critical test data needs to be maintained during power failures or other outages.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that equipment is connected to Technical Power or a dedicated UPS. A demonstration will then be performed by execution of a Lockheed Martin or Contractor developed Test Procedure to verify that equipment continues to operate on technical power or dedicated UPS following removal of facility power. The demonstration may be performed by Lockheed Martin or the Electrical Contractor using a Lockheed Martin or Contractor developed Test Procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Electronic Security System Power**

**SRD Requirement Number:** 3.5.1.7.3

**FDC Requirement Number:** 3.4.7.16.2.5

**Description:** Electronic Security system shall be powered by Technical Power provided by existing O&C Building system UPS outside the IOZ.

**Rationale:** Required during outages for security monitoring.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that the security system is connected to technical power by existing O&C Building system UPS. A demonstration will then be performed by execution of a Lockheed Martin or Contractor developed Test Procedure to verify the Electronic Security System operates on technical power following removal of facility power. The demonstration may be performed by Lockheed Martin or the Electrical Contractor using a Lockheed Martin or

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Contractor developed Test Procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Building Lighting Power**

**SRD Requirement Number:** 3.5.1.7.4

**FDC Requirement Number:** 3.4.7.16.2.5

**Description:** Building High and Low Bay Emergency Lighting shall be powered by Facility power with generator backup.

**Rationale:** During Facility Power outages High and Low Bay is a critical area that needs additional lighting due to height. This requirement is in addition to standard battery backup emergency lighting per SDR 3.5.3.2.2.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that the high and low bay emergency lighting is connected to facility power with a generator for backup. A demonstration will then be performed by execution of a Lockheed Martin or Contractor developed Test Procedure to verify that the emergency lighting in the high and low bay stay illuminated upon removal of facility power. The demonstration may be performed by Lockheed Martin or the Electrical Contractor using a Lockheed Martin or Contractor developed Test Procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **General Purpose Receptacle Power**

**SRD Requirement Number:** 3.5.1.7.5

**FDC Requirement Number:** 3.4.7.16.2.5

**Description:** General Purpose Receptacles shall be powered by Facility power.

**Rationale:** General use receptacles will not be used for critical hardware and do not require Technical Power.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that general purpose receptacles are connected to facility power. A demonstration will then be performed by execution of a Lockheed Martin or Contractor developed Test Procedure to verify that the Building General purpose receptacles are connected to

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facility power. The demonstration may be performed by Lockheed Martin or the Electrical Contractor using a Lockheed Martin or Contractor developed Test Procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Communications Power**

**SRD Requirement Number:** 3.5.1.7.6

**FDC Requirement Number:** 3.4.7.16.2.5

**Description:** Communications shall be powered by Technical Power provided by existing O&C Building system UPS outside the IOZ.

**Rationale:** Communications required during outages for safety and security reasons.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that all communications systems are on technical power provided by the O&C Building system UPS outside the IOZ. A demonstration will then be performed by execution of a Lockheed Martin or Contractor developed Test Procedure to verify that the Voice Communications continue to operate on technical power following removal of facility power. The demonstration may be performed by Lockheed Martin or the Electrical Contractor using a Lockheed Martin or Contractor developed Test Procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Critical GSE Power**

**SRD Requirement Number:** 3.5.1.7.7

**FDC Requirement Number:** 3.4.7.16.2.5

**Description:** Utility Suite receptacles used to energize GSE shall be powered by Technical Power.

**Rationale:** GSE specifications states GSE that interfaces to flight hardware must be on UPS/Technical power.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that GSE receptacles are connected to technical power. A demonstration will then be performed by execution of a Lockheed Martin or Contractor developed Test Procedure to verify that technical power is present following removal of facility power. The demonstration may be performed by Lockheed Martin or the Electrical Contractor using a Lockheed



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Martin or Contractor developed Test Procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Critical CCMS Power**

**SRD Requirement Number:** 3.5.1.7.8

**FDC Requirement Number:** 3.4.7.16.2.5

**Description:** Receptacles or panels used to energize CCMS hardware shall be powered by Technical Power.

**Rationale:** GSE specifications states GSE that interfaces to flight hardware must be on UPS/Technical power.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that CCMS receptacles or panels are connected to technical power. A demonstration will then be performed by execution of a Lockheed Martin or Contractor developed Test Procedure to verify that technical power is present following removal of facility power. The demonstration may be performed by Lockheed Martin or the Electrical Contractor using a Lockheed Martin or Contractor developed Test Procedure. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Secondary Power Systems**

**SRD Requirement Number:** 3.5.1.8.1

**FDC Requirement Number:** 3.4.7.15.1

**Description:** The secondary power distribution system shall consist of a 480/277VAC, 3 $\Phi$ , 60 Hz system.

**Rationale:** Secondary power distribution requires compatibility with Primary capability.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the O&C facility electrical drawings by Lockheed Martin or the Contractor will verify that the secondary power from the substation is same as the primary capability. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Secondary Power Distribution Systems**

**SRD Requirement Number:** 3.5.1.8.2

**FDC Requirement Number:** 3.4.7.15.2

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**Description:** Secondary power shall be distributed to the various building load centers for distribution as 480VAC or reduced through transformers for lower voltage usage.

**Rationale:** Secondary power distribution required at same locations and voltages as Primary power distribution.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the O&C facility electrical drawings by Lockheed Martin or the Contractor will verify that the secondary power from the substation is distributed at the proper voltage same as the primary capability. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Secondary Power Distribution Systems**

**SRD Requirement Number:** 3.5.1.8.3

**FDC Requirement Number:** 3.4.7.15.3

**Description:** Secondary power shall be distributed from the O&C site substation locations.

**Rationale:** Secondary power distributed from same location as Primary.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the O&C facility electrical drawings by Lockheed Martin or the Contractor will verify that the secondary power from the substation is distributed from the O&C site substation to the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Technical Power UPS Systems**

**SRD Requirement Number:** 3.5.1.9.1

**FDC Requirement Number:** 3.4.7.16.2.1

**Description:** Technical power shall be provided with the addition of Uninterruptible Power Supplies (UPS).

**Rationale:** UPS support required to critical circuits, systems, GSE, and power distribution to spacecraft.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the O&C facility electrical drawings by Lockheed Martin or the Contractor will verify that the Technical Power is supplied by UPS. Physical inspections will verify as-built configuration includes an UPS. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

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## **Technical Power UPS System Backup Time**

**SRD Requirement Number:** 3.5.1.9.2

**FDC Requirement Number:** 3.4.7.16.2.2

**Description:** The UPS shall be fed by facility power with a minimum full load battery backup time of 15 minutes.

**Rationale:** Minimal time required to safely perform controlled shutdown of GSE, spacecraft, and IOZ from test.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by applying an actual or simulated full load on UPS batteries. Demonstration will be successful if UPS continues to supply Technical Power for the specified interval. Demonstrations will be performed by Lockheed Martin or a LM selected Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Technical Power UPS System Backup Time**

**SRD Requirement Number:** 3.5.1.9.3

**FDC Requirement Number:** 3.4.7.16.2.3

**Description:** The UPS shall also contain a separately powered static bypass switch, which will transfer the UPS output load to an alternate power feed if the UPS unit should fail.

**Rationale:** Automatic switchover required to maintain power to critical circuits.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of facility drawings will be performed to verify that the UPS contains a separately powered static bypass switch. A demonstration will then be performed that exercises the static bypass switch causing the UPS to switch to an alternate power feed. Demonstration will be successful if UPS switches and power is transferred. Demonstrations will be performed by Lockheed Martin or a LM selected Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Technical Power UPS System Period of Usage**

**SRD Requirement Number:** 3.5.1.9.4

**FDC Requirement Number:** 3.4.7.16.2.4

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**Description:** UPS output power shall be continuous throughout specified period of backup usage.

**Rationale:** UPS output power must be maintained for period of backup usage (15 minutes minimum) regardless of UPS input conditions.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed that monitors the output power levels during the period of backup usage. This demonstration may be performed in conjunction with verification of DRD requirement 3.5.1.10.2. Demonstration will be successful if UPS maintains continuous power. Demonstrations will be performed by Lockheed Martin or a LM selected Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Technical Power UPS System Voltage Tolerance**

**SRD Requirement Number:** 3.5.1.9.5

**FDC Requirement Number:** 3.4.7.16.2.4

**Description:** Technical UPS Power nominal voltage tolerance shall be  $\pm 5\%$ .

**Rationale:** Maximum acceptable power fluctuation UPS output power shall be continuous throughout specified period of backup usage.

**Verification Method:** Test

**Verification Plan:** A test will be performed by Lockheed Martin or a designated representative to verify that the UPS can maintain a voltage tolerance of  $\pm 5\%$ . This test may be performed in conjunction with the demonstration of DRD requirement 3.5.1.10.2. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Technical Power UPS System Frequency Tolerance**

**SRD Requirement Number:** 3.5.1.9.6

**FDC Requirement Number:** 3.4.7.16.2.4

**Description:** Technical UPS Power nominal frequency tolerance shall be  $\pm 1$  Hz.

**Rationale:** Maximum acceptable frequency tolerance in Hertz (Hz).

**Verification Method:** Test

**Verification Plan:** A test will be performed by Lockheed Martin or a designated representative to verify that the UPS can maintain a frequency tolerance of  $\pm 1$  Hz. This test may be performed in conjunction with the demonstration of DRD requirement

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3.5.1.10.2. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Technical Power UPS System Harmonic Distortion Tolerance**

**SRD Requirement Number:** 3.5.1.9.7

**FDC Requirement Number:** 3.4.7.16.2.4

**Description:** Technical UPS Power total harmonic distortion tolerance shall be < 5%.

**Rationale:** Maximum acceptable harmonic distortion.

**Verification Method:** Test

**Verification Plan:** A test will be performed by Lockheed Martin or a designated representative to verify that the UPS can maintain a total harmonic distortion tolerance of < 5%. This test may be performed in conjunction with the demonstration of DRD requirement 3.5.1.10.2. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **General Receptacle Polarization**

**SRD Requirement Number:** 3.5.1.10.1

**FDC Requirement Number:** 3.4.7.9.1

**Description:** Receptacles shall be polarized.

**Rationale:** National Electric Code (NFPA 70) general requirement to ensure receptacle is designed for application.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor of connector vendor documentation and as-built configuration to ensure that all receptacles are polarized. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **General Receptacle Environmental**

**SRD Requirement Number:** 3.5.1.10.2

**FDC Requirement Number:** 3.4.7.9.1

**Description:** Receptacles shall be of a type suitable for the environment in which they are installed.

**Rationale:** National Electric Code (NFPA 70) general requirement to ensure receptacle is designed for application.

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**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor of connector vendor documentation and as-built configuration to ensure that all receptacles are suitable for their intended environment. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**General Receptacle Environmental**

**SRD Requirement Number:** 3.5.1.10.3

**FDC Requirement Number:** 3.4.7.9.2

**Description:** It shall not be possible to insert a plug of one voltage rating into a receptacle of another voltage rating.

**Rationale:** National Electric Code (NFPA 70) general requirement to ensure receptacle is designed for application.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor of connector vendor documentation and as-built configuration to ensure that all receptacles are unique in that it is not possible to insert a plug of one voltage rating into a receptacle of another voltage rating. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**General Technical Power Receptacle Labeling**

**SRD Requirement Number:** 3.5.1.10.4

**FDC Requirement Number:** 3.4.7.9.3

**Description:** Each technical power receptacle shall be marked with circuit number and panel number.

**Rationale:** National Electric Code (NFPA 70) general requirement to properly identify circuit.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor for each receptacle to verify that it is labeled per the requirement. Facility electrical drawing will be utilized as a circuit reference. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**General Receptacle Labeling**

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**SRD Requirement Number: 3.5.1.10.5**

**FDC Requirement Number: 3.4.7.9.4**

**Description:** All receptacles, except 120-Volt general-purpose convenience outlets, shall be marked with amperage rating, voltage, frequency characteristics, and panel of origin.

**Rationale:** National Electric Code (NFPA 70) general requirement to ensure receptacle is properly sized for circuit.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor for each receptacle to verify that it is labeled per the requirement. Facility electrical drawing will be utilized as a circuit reference. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Convenience Outlet Labeling**

**SRD Requirement Number: 3.5.1.10.6**

**FDC Requirement Number: N/A**

**Description:** General purpose, 120-Volt convenience outlets, shall be marked with panel source and circuit number using black lettering and white background per KSC-SPEC-E-0026(A).

**Rationale:** KSC Specification for Electrical Facilities Installation Electric Code (NFPA 70).

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor of convenience outlets to verify that it is labeled per the requirement. Facility electrical drawing will be utilized as a circuit reference. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Grounding and Lightning Protection**

**SRD Requirement Number: 3.5.2.1.1**

**FDC Requirement Number: 3.7.1.1**

**Description:** The grounding and lightning protection systems shall comply with Article 250 of NFPA 70 and NFPA 780 as a minimum.

**Rationale:** Applicable National Standards are National Electric Code (NFPA 70) Article 250 for grounding and NFPA 780 for Installation of Lightning Protection.

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**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin, the Electrical Contractor, or the Authority Having Jurisdiction of the legacy and refurbished Grounding and Lightning Protection System drawings and as-built installation using the listed NFPA Standards. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Grounding System Separation**

**SRD Requirement Number:** 3.5.2.1.2

**FDC Requirement Number:** 3.7.1.3

**Description:** The grounding systems shall incorporate three separate systems including, Facility ground system, Technical ground system, and Lightning protection system.

**Rationale:** Requirement separates grounding system into three distinct systems.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation separate the grounding system into three distinct systems. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Grounding System Isolation**

**SRD Requirement Number:** 3.5.2.1.3

**FDC Requirement Number:** 3.7.1.4

**Description:** Grounding System Isolation: The technical and facility ground systems shall be isolated from each other except at connection to the single point ground.

**Rationale:** Requirement specifies isolation between the three distinct systems

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation separate the grounding system into three distinct systems except with the connection at the single point ground. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.



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## **Grounding System Return Conductors**

**SRD Requirement Number:** 3.5.2.1.4

**FDC Requirement Number:** 3.7.1.5

**Description:** Grounding System Return Conductors: Ground return conductors shall be a minimum of a #4/0 bare stranded copper conductor and connected to the building ground counterpoise.

**Rationale:** Requirement specifies minimum conductor size for all grounding systems.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation ground return conductors are a minimum of a #4/0 bare stranded copper conductor and connected to the building ground counterpoise. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Grounding System Counterpoise Resistance**

**SRD Requirement Number:** 3.5.2.2.1

**FDC Requirement Number:** 3.7.2.1

**Description:** Facility Ground System maximum ground counterpoise resistance shall be 5 ohms.

**Rationale:** Facility specific requirement identifying counterpoise resistance per NFPA Code.

**Verification Method:** Test

**Verification Plan:** A test will be performed by Lockheed Martin or the Electrical Contractor using Lockheed Martin or a LM representative generated test procedures to ensure that the facility ground system maximum ground counterpoise resistance shall be 5 ohms. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Grounding System Bonding Resistance**

**SRD Requirement Number:** 3.5.2.2.2

**FDC Requirement Number:** 3.7.2.3

**Description:** Facility Ground System maximum electrical bonding resistance between metal facility structural members shall be 1.0 ohm.

**Rationale:** Facility specific requirement identifying maximum bonding resistance per NFPA Code.

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**Verification Method: Test**

**Verification Plan:** A test will be performed by Lockheed Martin or the Electrical Contractor using Lockheed Martin or a LM representative generated test procedures to ensure that the maximum electrical bonding resistance between metal facility structural members shall be 1.0 ohm. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Grounding System Technical Ground Plate Identification**

**SRD Requirement Number:** 3.5.2.3.1

**FDC Requirement Number:** 3.7.3.1

**Description:** Technical Ground System plates shall be identified on the ground plate as "Technical Ground" to distinguish them from the Facility Ground System ground plates.

**Rationale:** Technical Ground System labeling requirement to eliminate confusion with Facility Ground System.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the Technical Ground System plates are properly identified per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Grounding System Technical Ground Isolation**

**SRD Requirement Number:** 3.5.2.3.2

**FDC Requirement Number:** 3.7.3.2

**Description:** The feeders from the Technical Ground System to the various areas shall be electrically isolated from all other grounds except at the single point connection.

**Rationale:** Technical Ground System isolation requirement per NFPA Code.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation technical ground feeders are electrically isolated as identified in the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Grounding System Technical Ground Insulation**

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**SRD Requirement Number:** 3.5.2.3.3

**FDC Requirement Number:** 3.7.3.3

**Description:** Technical Ground System ground cables shall have 600V type insulation.

**Rationale:** Technical Ground System isolation requirement per NFPA.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the ground cable insulation is rated per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

#### **Grounding System Technical Ground Riser**

**SRD Requirement Number:** 3.5.2.3.4

**FDC Requirement Number:** 3.7.3.4

**Description:** Technical Ground System ground riser shall be an insulated stranded copper cable routed inside a 2-inch rigid conduit.

**Rationale:** Technical Ground System conduit requirement to protect cable.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation are per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

#### **Grounding System Technical Ground Riser Stub**

**SRD Requirement Number:** 3.5.2.3.5

**FDC Requirement Number:** 3.7.3.5

**Description:** The Technical Ground System riser conduit shall stub up 6 inches above the floor with the cable at least 18 inches longer than the conduit.

**Rationale:** Technical Ground System service loop requirement.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation are

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per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Grounding System Technical Ground Facility Isolation**

**SRD Requirement Number:** 3.5.2.3.6

**FDC Requirement Number:** 3.7.3.7

**Description:** The Technical Ground shall be isolated from all other facility users.

**Rationale:** Technical Ground System isolation requirement.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation technical ground feeders are electrically isolated as identified in the requirement. This requirement is specifically for the feeders. Technical ground does terminate with facility ground at the single point ground (Ref. SRD 3.5.2.1.3 and FDC 3.7.1.4). This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### **Grounding System Technical Ground Resistance**

**SRD Requirement Number:** 3.5.2.3.7

**FDC Requirement Number:** 3.7.3.6

**Description:** Technical Ground System ground resistance shall not exceed 1 ohm from the technical ground plate to the earth ground grid.

**Rationale:** Technical Ground System maximum ground resistance requirement per NFPA Code.

**Verification Method:** Test

**Verification Plan:** A Test will be performed by Lockheed Martin or the Electrical Contractor using Lockheed Martin or a LM representative generated test procedures to ensure the technical ground plate to the earth ground grid resistance is not exceeded per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Lightning System Installation**

**SRD Requirement Number:** 3.5.2.4.1

**FDC Requirement Number:** 3.7.1.1

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**Description:** The O&C facility shall have lightning protection in accordance with NFPA 780 "Standard for the Installation of Lightning Protection Systems, Chapter 4, Protection for Ordinary Structures.

**Rationale:** Applicable NFPA Standards for Lightning Protection.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation conforms to lightning protection codes. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### **Ground System Bonding**

**SRD Requirement Number:** 3.5.2.5.1

**FDC Requirement Number:** 3.7.4.1

**Description:** Grounding System bonding practices utilized shall be in accordance with NFPA 70, Article 250, Section G.

**Rationale:** National Electric Code specifies bonding practices.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility electrical drawings and as-built implementation of grounding system bonding conforms to the applicable NFPA code as listed in the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Ground System Bonding**

**SRD Requirement Number:** 3.5.2.5.2

**FDC Requirement Number:** 3.7.4.2

**Description:** All bonding and grounding wire shall be insulated or protected above grade.

**Rationale:** Bonding and grounding wire require protection.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility as-built implementation of bonding and grounding wire is per the requirement. The inspection will consist of a facility walk down to insure that all wire is insulated or protected above grade. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

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## **Ground System Bond Sealing**

**SRD Requirement Number:** 3.5.2.5.3

**FDC Requirement Number:** 3.7.4.4

**Description:** Bonds, which are located not reasonable accessible for maintenance, shall be sealed with permanent waterproof compound.

**Rationale:** Bonding and grounding wire require sealing for protection.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility as-built implementation of bond sealing is per the requirement. The inspection will consist of a facility walk down to insure that bonds that are not reasonably accessible are sealed per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

## **Facility Bonding**

**SRD Requirement Number:** 3.5.2.5.4

**FDC Requirement Number:** 3.7.4.6

**Description:** All metal non-current carrying parts of the facility shall be electrically bonded together.

**Rationale:** Electric Code (NFPA 70).

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility as-built implementation is per the requirement. The inspection will consist of a facility walk down. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

## **Facility Bond Ground Cables**

**SRD Requirement Number:** 3.5.2.5.5

**FDC Requirement Number:** 3.7.4.7

**Description:** Bonding of ground cables to the counterpoise shall be by exothermic weld.

**Rationale:** Electric Code (NFPA 70).

**Verification Method:** Inspection

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**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility as-built implementation is per the requirement. The inspection will consist of verification that the ground cables are exothermically welded to the counterpoise. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### **Ground Plate Bond Resistance**

**SRD Requirement Number:** 3.5.2.5.6

**FDC Requirement Number:** 3.7.4.9

**Description:** Ground Plate Bond Resistance shall not exceed 1 milliohm.

**Rationale:** National Electric Code (NFPA 70).

**Verification Method:** Test

**Verification Plan:** A Test will be performed by Lockheed Martin or the Electrical Contractor using Lockheed Martin or a LM representative generated test procedures to ensure the technical ground plate bond resistance is not exceeded per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Conductor Ground Plate Bond Resistance**

**SRD Requirement Number:** 3.5.2.5.7

**FDC Requirement Number:** 3.7.4.8

**Description:** Bonds for ground conductors (power circuits, control circuits, signal circuits or lightning protection) shall be 2.5 milliohms or less.

**Rationale:** National Electric Code (NFPA 70).

**Verification Method:** Test

**Verification Plan:** A Test will be performed by Lockheed Martin or the Electrical Contractor using Lockheed Martin or a LM representative generated test procedures to ensure the technical ground conductor bond resistance is not exceeded per the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Conduit Material Selection**

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**SRD Requirement Number:** 3.5.2.6.1

**FDC Requirement Number:** 3.4.7.7.1

**Description:** Conduit installed in the IOZ shall be grounded metallic conduit to provide EMI shielding at the IOZ.

**Rationale:** National Electric Code (NFPA 70).

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility as-built implementation is per the requirement. The inspection will consist of a facility walk down to verify that all conduits are metallic. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### Conduit Isolation

**SRD Requirement Number:** 3.5.2.6.2

**FDC Requirement Number:** 3.4.7.7.1

**Description:** Except for solid conduit shields, shields will be isolated from each other and from any metallic component by at least 1.0 megohms (DC) when shield grounds are lifted.

**Rationale:** National Electric Code (NFPA 70) isolation specification.

**Verification Method:** Test

**Verification Plan:** A test will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility as-built implementation is per the requirement.

The test will consist of removing shield grounds and verifying isolation per the specification. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### Conduit Shields

**SRD Requirement Number:** 3.5.2.6.3

**FDC Requirement Number:** 3.4.7.7.1

**Description:** Solid conduit shields shall not be isolated from each other or from structure.

**Rationale:** To minimize EMI, conduit may not float.

**Verification Method:** Inspection



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**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility as-built implementation is per the requirement. The inspection will consist of a facility walk down to verify that solid conduit shields are not isolated from each other. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### **Lighting System Design**

**SRD Requirement Number:** 3.5.3.1.1

**FDC Requirement Number:** 3.6.1.1

**Description:** Illumination and recommended lighting levels for all areas of the IOZ shall conform to Illumination Engineering Society of North America, Lighting Handbook.

**Rationale:** Illumination Engineering Society (IES) is Industry Standard for Illumination Levels. Specific level will be defined for each area in the IOZ by area type.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility lighting implementation is per IES recommendations as detailed in the facility drawings. The inspection will consist of review of IES Lighting Handbook and correlation of recommendations per engineering drawings. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Lighting System Illumination Levels**

**SRD Requirement Number:** 3.5.3.1.2

**FDC Requirement Number:** 3.6.1.1

**Description:** Lighting in the CWA of the IOZ shall be 35 -50 foot candle 3ft above floor, mid-range correlated color temperature (white light), 3500- 5500 degree Kelvin, color rendering index 65-70 – true color.

**Rationale:** Based on IES Standards.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that the facility lighting implementation is per IES recommendations as detailed in the facility drawings. The inspection will consist of review of IES Lighting Handbook and correlation of recommendations per engineering drawings. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

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### **Critical Emergency Lighting**

**SRD Requirement Number:** 3.5.3.2.1

**FDC Requirement Number:** 3.6.2.1

**Description:** Emergency lighting shall be provided at critical areas to protect personnel and secure operations in the event of power failure in accordance with NFPA 101 and NFPA 70.

**Rationale:** Emergency Backup Lighting needed for safe egress and facility/GSE/spacecraft securing.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that emergency lighting is in accordance with the referenced standards. The inspection will consist of review standards and correlation of recommendations per engineering drawings on the emergency lighting system. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Critical Emergency Lighting Battery Backup**

**SRD Requirement Number:** 3.5.3.2.2

**FDC Requirement Number:** 3.6.2.2

**Description:** Emergency lighting units with battery back up shall be used in offline, basement, and stair areas.

**Rationale:** Emergency Backup Lighting needed for safe egress and facility/GSE/spacecraft securing.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Electrical Contractor to ensure that emergency lighting does contain a battery for backup power. A demonstration will be performed to show that emergency lights operate in the backup battery mode. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **CEV-T-082400 Section 3.6 Backup and Contingency Requirements**

Backup and Contingency Requirements will be verified by inspection, test and demonstration by Lockheed Martin and applicable Contractor. Back-up power and fail-safe securing may be demonstrated by the Electrical Contractor and or the Crane

Contract Number: NNJ06TA25C

Contractor utilizing Lockheed Martin or Contractor generated test procedures. Contingency environmental requirement verification will be performed by the HVAC Contractor and may be performed in conjunction with the HVAC functional Checkout. SRD Requirements that map directly to FDC requirements may be utilized to verify SRD requirements.

## **Fail-Safe Operation**

**SRD Requirement Number:** 3.6.1.1

**FDC Requirement Numbers:** 3.16.9 and 3.19.3.16

**Description:** Any electrical powered system that supports personnel safety shall have back-up power or secure itself in a fail-safe manner.

**Rationale:** Backup power required or fail-safe securing required for personnel safety.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by Lockheed Martin or the Contractor to verify fail-safe crane operation per FDC Requirement 3.16.9. Backup power for critical systems in FDC 3.19.3.16 will include verification of emergency lighting such as the high and low bay generator backed up lighting (SRD 3.5.1.7.4) and the basement, stairway, and offline area battery backed up lighting (SRD 3.5.3.2.2). This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and may be satisfied by completion of aforementioned requirements.

## **Backup GSE Power**

**SRD Requirement Number:** 3.6.1.2

**FDC Requirement Number:** N/A

**Description:** Any electrical powered system that supports flight hardware or GSE that interfaces to flight hardware shall have back-up power.

**Rationale:** Backup power required to protect flight hardware assets by allowing orderly shutdown of assets and preserving test/vehicle configuration during testing.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that UPS have been installed to provide backup power at each utility suite. A demonstration will be performed by Lockheed Martin, the Electrical Contractor, or the UPS Contractor to verify that the UPS are operating within the UPS Manufacturers specification. This verification will be performed independent of the FDC.

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## **Backup HVAC Power**

**SRD Requirement Number:** 3.6.1.3

**FDC Requirement Number:** 3.4.7.15.3

**Description:** Backup power with automatic switching shall be provided to the HVAC system.

**Rationale:** Maintain clean room during loss of primary power feed to O&C.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that automatically switched power from the substation is being provided to the IOZ and the HVAC units. This requirement may be verified in conjunction of verification of SRD Requirement 3.5.1.1.4 (Inspection, Demonstration). SRD Requirement 3.5.1.1.4 confirms HVAC can operate on either substation end. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Backup Batteries**

**SRD Requirement Number:** 3.6.1.4

**FDC Requirement Number:** N/A

**Description:** Batteries utilized for all IOZ backup systems shall be rated for human occupancy areas.

**Rationale:** OSHA, NASA, and LM requirement for personnel safety.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that batteries contained in all backup systems inside the IOZ are rated for human occupancy areas. This requirement does not have a corresponding FDC Requirement.

## **Environmental Data Backup**

**SRD Requirement Number:** 3.6.2.1

**FDC Requirement Number:** N/A

**Description:** Environmental data parameters including temperature and humidity at a minimum shall be continuously monitored and maintained in the event of failure of the primary HVAC monitoring system.

**Rationale:** Need to capture environmental conditions at all times.

Contract Number: NNJ06TA25C

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by Lockheed Martin or the HVAC Contractor to verify that environmental data is continuously monitored and captured following a loss of the primary HVAC monitoring system. The demonstration will consist of verification that the backup HVAC monitoring system continues to monitor and record, at a minimum, temperature and humidity data. This verification will be performed independent of the FDC and may consist of portable humidigraphs.

**CEV-T-082400 Section 3.7 Plumbing/Venting and Commodities for Test Operations Activities Requirements**

Plumbing and Venting requirements will be verified by inspection, demonstration and test by Lockheed Martin and the Mechanical or General Contractor. Lockheed Martin or the Contractor will develop acceptance test procedures that will include inspections, proof tests, flow tests, as well as cleanliness certification. Testing will be performed by the Contractor. All requirements in this section will map directly to Facilities Design Criteria requirements and may be utilized to verify SRD requirements.

**Proof Cell Venting**

**SRD Requirement Number:** 3.7.1.1

**FDC Requirement Number:** 3.5.7.1.2

**Description:** The Proof Test Cell (Room 1486) vent shall be rated for 6000 psi maximum initial vent pressure.

**Rationale:** Based on maximum facility rated inlet pressure.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that pipe is rated for the required pressure. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin generated test procedure will perform a proof test on the system to verify the system meets the rated initial vent pressure requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Vendor Support Area Venting**

**SRD Requirement Number:** 3.7.1.2

**FDC Requirement Number:** 3.5.7.2.2

Contract Number: NNJ06TA25C

**Description:** The Vendor Support (Room 1449) vent shall be rated for 6000 psi maximum initial vent pressure.

**Rationale:** Based on maximum facility rated inlet pressure.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that pipe is rated for the required pressure. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin generated test procedure will perform a proof test on the system to verify the system meets the rated initial vent pressure requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### Utility Suite GHe Venting

**SRD Requirement Number:** 3.7.1.3

**FDC Requirement Number:** 3.5.7.3.1

**Description:** Provide GHe vent for each utility suite to outside of facility above roofline for pneumatic venting.

**Rationale:** Utility suite vent required to support purges.

**Verification Method:** Inspection

**Verification Plan:** An inspection of facilities drawings and the as-built configuration will be performed by Lockheed Martin or the Contractor to verify that the utility suit vent is designed and installed per the requirement. GHe and GN<sub>2</sub> share the utility suite vent. Therefore this requirement will be verified in conjunction with SRD 3.7.1.4. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### Utility Suite GN<sub>2</sub> Venting

**SRD Requirement Number:** 3.7.1.4

**FDC Requirement Number:** 3.5.7.3.1

**Description:** Provide GN<sub>2</sub> vent for each utility suite to outside of facility above roofline for pneumatic venting.

**Rationale:** Utility suite vent required to support purges.

**Verification Method:** Inspection

**Verification Plan:** An inspection of facilities drawings and the as-built configuration will be performed by Lockheed Martin or the Contractor to verify that the utility suit vent is designed and installed per the requirement. GHe and GN<sub>2</sub> share the utility suite vent.

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Therefore this requirement will be verified in conjunction with SRD 3.7.1.4. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Compressed Air**

**SRD Requirement Number:** 3.7.2.1

**FDC Requirement Number:** 3.5.1.4

**Description:** Each utility suite shall have access to compressed air.

**Rationale:** Needed to drive GSE.

**Verification Method:** Inspection

**Verification Plan:** An inspection of engineering drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that compressed air is installed in utility suite. This requirement is only for verification that the commodity is present in the suite. Additional requirements will verify the cleanliness SRD Requirement 3.7.2.2 and pressures SRD Requirement 3.16.1.2.2. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Compressed Air Cleanliness**

**SRD Requirement Number:** 3.7.2.2

**FDC Requirement Number:** 3.5.1.9

**Description:** Compressed air cleanliness requirements shall meet KSC-C-123 level VC.

**Rationale:** Based on NASA cleanliness specifications.

**Verification Method:** Test

**Verification Plan:** A test will be performed by Lockheed Martin or Subcontractor to sample facilities compressed air and certify it to the applicable requirement. Compressed air will be certified to NASA standards as defined in requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Utility Suite GHe Availability**

**SRD Requirement Number:** 3.7.2.3

**FDC Requirement Number:** 3.5.3.2

**Description:** Each utility suite shall have access to the GHe system.

Contract Number: NNJ06TA25C

**Rationale:** GHe needed for purges and leak checks.

**Verification Method:** Inspection

**Verification Plan:** An inspection of engineering drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that GHe is installed in utility suite. This requirement is only for verification that the commodity is present in the suite. Additional requirements will verify the cleanliness SRD Requirement 3.7.2.5 and pressure/volume SRD Requirement 3.7.2.4. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### **Utility Suite GHe Pressure/Volume**

**SRD Requirement Number:** 3.7.2.4

**FDC Requirement Number:** 3.5.3.3

**Description:** GHe system shall provide 3000 psi nominal facility (200 scfm minimum), 6000 psi capability.

**Rationale:** Pressure and flow sized to accommodate supply requirements. Higher capability piping for future growth, components will be validated to maximum capability

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that pipe is rated for the required pressure. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin or Contractor generated test procedure will perform a proof test on the system to verify the system meets the rated pressure requirement (Proof to maximum capability). The GHe system will be charged and flow rates confirmed as part of the test. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Utility Suite GHe Cleanliness**

**SRD Requirement Number:** 3.7.2.5

**FDC Requirement Number:** 3.5.3.8

**Description:** GHe system cleanliness requirements shall meet KSC-C-123 level 300A.

**Rationale:** Based on NASA cleanliness specifications.

**Verification Method:** Test

**Verification Plan:** A test will be performed by Lockheed Martin or Subcontractor to sample facilities GHe system and certify it to the applicable requirement. GHe system will be certified to NASA standards as defined in requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.



Contract Number: NNJ06TA25C

### **Utility Suite GN<sub>2</sub> Availability**

**SRD Requirement Number:** 3.7.2.6

**FDC Requirement Number:** 3.5.2.2

**Description:** Each utility suite shall have access to a GN<sub>2</sub> system.

**Rationale:** GN<sub>2</sub> needed for purges and leak checks.

**Verification Method:** Inspection

**Verification Plan:** An inspection of engineering drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that GN<sub>2</sub> is installed in utility suite. This requirement is only for verification that the commodity is present in the suite. Additional requirements will verify the cleanliness SRD Requirement 3.7.2.8 and pressure/volume SRD Requirement 3.7.2.7. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement

### **Utility Suite GN<sub>2</sub> Pressure/Volume**

**SRD Requirement Number:** 3.7.2.7

**FDC Requirement Number:** 3.5.2.3

**Description:** GN<sub>2</sub> system shall provide 3000 psi nominal facility (200 scfm minimum), 6000 psi capability.

**Rationale:** Pressure and flow sized to accommodate supply requirements. Higher capability piping for future growth, components will be validated to maximum capability.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that pipe is rated for the required pressure. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin or Contractor generated test procedure will perform a proof test on the system to verify the system meets the rated pressure requirement (Proof to maximum capability). The GN<sub>2</sub> system will be charged and flow rates confirmed as part of the test. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Utility Suite GN<sub>2</sub> Cleanliness**

**SRD Requirement Number:** 3.7.2.8

**FDC Requirement Number:** 3.5.2.8

**Description:** GN<sub>2</sub> system cleanliness requirements shall meet KSC-C-123 level 300A.

Contract Number: NNJ06TA25C

**Rationale:** Based on NASA cleanliness specifications.

**Verification Method:** Test

**Verification Plan:** A test will be performed by Lockheed Martin or Subcontractor to sample facilities GN<sub>2</sub> system and certify it to the applicable requirement. GN<sub>2</sub> system will be certified to NASA standards as defined in requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Compressed Air Service Outlets**

**SRD Requirement Number:** 3.7.2.9

**FDC Requirement Number:** 3.5.1.10

**Description:** Provide compressed air service outlets along south IOZ wall sized and spaced to accommodate air bearing pallet operation.

**Rationale:** South transfer aisle is where air bearing transport will be utilized.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or Subcontractor to verify that the service outlets have been placed on the south wall. The actual placement and capacity will be detailed in the FDC and the Facility drawings. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Potable Water Supply**

**SRD Requirement Number:** 3.7.3.1

**FDC Requirement Number:** 3.5.4.2

**Description:** Potable water supply shall be provided for fixed eye wash, sinks and emergency showers in TPS/Chemical Dispensing Area.

**Rationale:** Safety requirement around hazardous chemicals.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of engineering drawings and the physical facility will be performed by Lockheed Martin or the Contractor to verify that potable water is provided in the TPS/Chemical Dispensing Area for fixed eye wash, sinks and emergency showers. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin or Contractor generated test procedure will perform a demonstration to verify the functionality of the systems meets the stated requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

Contract Number: NNJ06TA25C

## **CEV-T-082400 Section 3.8 Fire and Hazard Protection**

Fire and Hazard requirements will be verified by inspections, demonstrations and tests by Lockheed Martin, KSC NASA Fire Department, the Fire Alarm Contractor, and or the General Contractor. Since the IOZ is located on NASA property compliance with NASA Safety Standards will be verified by NASA Fire Department with Lockheed Martin Support. Tests and demonstrations of fire alarm and suppression systems will be performed by the Fire Alarm Contractor or General Contractor using test procedures developed by Lockheed Martin or the Contractor. Testing may include use of the NASA Fire Alarm infrastructure during integrated tests. The majority of the requirements in this section map to FDC requirements and may be utilized to verify SRD requirements.

### **Alarm Notification**

**SRD Requirement Number:** 3.8.1.1

**FDC Requirement Number:** 3.14.1.1

**Description:** The IOZ fire detection and alarm system shall interface to existing KSC Central Fire Alarm System.

**Rationale:** NASA Standards for alarm notification identified in NASA-STD-8719.11.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of engineering drawings will be performed by Lockheed Martin or the Contractor to verify interface from the IOZ to KSC Central Fire Alarm System. Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform a demonstration to verify the functionality of the systems meets the stated requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Alarm Backup Power**

**SRD Requirement Number:** 3.8.1.2

**FDC Requirement Number:** 3.14.1.3

**Description:** The fire alarm system shall have battery backup with battery charger.

**Rationale:** System needs a battery backup to function during power failures.

**Verification Method:** Inspection

**Verification Plan:** An inspection of alarm system will be performed by Lockheed Martin or the Contractor to verify a battery backup and charging system. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

Contract Number: NNJ06TA25C

## **Alarm Audio Warning System**

**SRD Requirement Number:** 3.8.1.3

**FDC Requirement Number:** 3.14.1.5

**Description:** Unique general fire alarm audio warning devices shall be located throughout the facility for general alarm signal and be distinguishable from other alarms.

**Rationale:** Personnel need to be able to hear and easily distinguish fire alarm per NASA-STD-8719.11.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of alarm system will be performed by Lockheed Martin or the Contractor to verify warning devices are located throughout the facility. A demonstration of the system will be performed by Lockheed Martin or the Contractor to verify that the general alarm signal can easily be heard and distinguishable from other alarms. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Fire Alarm Manual Pull**

**SRD Requirement Number:** 3.8.1.4

**FDC Requirement Number:** 3.14.1.6

**Description:** Manual pull stations shall be located at exit routes.

**Rationale:** Personnel need way to actuate alarm.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection to verify that manual pulls are located throughout the facility. The inspection will verify that manual pulls are installed wherever specified per the Facility Engineering Fire Drawings. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Electrical Device Ratings**

**SRD Requirement Number:** 3.8.1.5

**FDC Requirement Number:** 3.14.1.7

**Description:** Electrical devices shall be rated for the appropriate commodity for the area they are installed in.

**Rationale:** NFPA 72 requirement.

Contract Number: NNJ06TA25C

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection to verify that all devices located throughout the facility are rated for the environment. Currently no Class 1, Division 2 concerns in facility, however prior to inspection all area review will identify areas/commodities of concern. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Alarm Notification Interface**

**SRD Requirement Number:** 3.8.1.6

**FDC Requirement Number:** 3.14.1.8

**Description:** The fire detection and alarm systems shall provide or be tied into existing central interface panels with provision for remote monitor and transmitter for alarm signals to the KSC Central Fire Alarm Systems.

**Rationale:** NASA Standards for notification per NASA-STD-8719.11.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of engineering drawings will be performed by Lockheed Martin or the Contractor to verify interface from the IOZ to KSC Central Fire Alarm System Interface Panels. Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform a demonstration to verify the functionality of the systems meets the stated requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Alarm Device Replacement**

**SRD Requirement Number:** 3.8.1.7

**FDC Requirement Number:** 3.14.1.9

**Description:** Existing fire detection and alarm system components removed shall be replaced with new components that conform to most current NFPA 72 and NFPA 90A Standards.

**Rationale:** Restoration of detection and alarm capabilities to conform to NASA-STD-8719.11.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection of the facility to ensure that components removed are replaced with new components. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

Contract Number: NNJ06TA25C

## **Code Compliance**

**SRD Requirement Number:** 3.8.2.1

**FDC Requirement Number:** 3.14.2.1

**Description:** All areas of the IOZ shall comply with the most current NFPA 72, NFPA 90A codes and NASA-STD-8719.11 regarding fire suppression systems.

**Rationale:** Current codes applicable at IOZ.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection of the facility drawings and physical facility to ensure that the IOZ complies with the latest applicable codes. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **CWA Water Line Routing**

**SRD Requirement Number:** 3.8.2.2

**FDC Requirement Number:** 3.14.2.2

**Description:** Water lines shall not be routed above ceiling in CWA.

**Rationale:** CWA low and high bay will not have fire suppression. Ceiling height prohibits effective water spray of sprinkler system. No active suppression lines in ceiling, eliminates risk of water on flight hardware.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection of the facility drawings to ensure that the suppression system water lines are not run over the CWA ceilings. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Supply and Return Smoke Detectors**

**SRD Requirement Number:** 3.8.2.3

**FDC Requirement Number:** 3.14.2.3

**Description:** HVAC supply and return smoke detectors shall be installed and interlocked as a system.

Contract Number: NNJ06TA25C

**Rationale:** NFPA 72 requirement.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of engineering drawings will be performed by Lockheed Martin or the Contractor to verify that supply and return smoke detectors are installed and interlocked. Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform a demonstration to verify that detectors are functionally interlocked. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Air Handler Operation**

**SRD Requirement Number:** 3.8.2.4

**FDC Requirement Number:** 3.14.2.3

**Description:** Air handlers shall shut down in the event of smoke detection.

**Rationale:** NFPA 72 requirement.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of engineering drawings will be performed by Lockheed Martin or the Contractor to verify that smoke detectors are configured to send an override to the HVAC system causing the affected air handlers to shut down in the event of an alarm. System is designed to shut down the air handlers in the HVAC system that detects the smoke. Remaining air handlers continue to operate if no smoke is detected in that system. Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated procedure will perform a demonstration verify this operation. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Room Suppression Code Compliance**

**SRD Requirement Number:** 3.8.2.5

**FDC Requirement Number:** 3.14.2.4

**Description:** Specific suppression design for each room/area will be provided in Facility Drawing and approved by KSC Authority Having Jurisdiction and Lockheed Martin.

**Rationale:** System details, including code compliance, will be contained in Facility Drawings.

**Verification Method:** Inspection

Contract Number: NNJ06TA25C

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection of the facility drawings to ensure that specific suppression designs are incorporated for each room. Additional artifacts may include written approval of system design by KSC Safety. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Class D Fire Extinguishers**

**SRD Requirement Number:** 3.8.2.6

**FDC Requirement Number:** N/A

**Description:** Class D fire extinguishers shall be provided where the fire hazard is due to Lithium Ion Spacecraft Batteries.

**Rationale:** NASA 8719.11 Standard for metal fires such as from lithium ion batteries.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin will perform an inspection of the facility to ensure that Class D fire extinguishers are available in areas where Lithium Ion batteries will be used. This requirement must be satisfied prior to Lithium Ion batteries arriving at the IOZ and should be coordinated with KSC Safety. This requirement is not part of the Facilities Certification Test Procedure and does not have an associated FDC Requirement.

### **Environmental Policy**

**SRD Requirement Number:** 3.8.3.1

**FDC Requirement Number:** 3.19.3.19

**Description:** The hazard material/waste management shall follow LMSSC Command Media and KSC Environmental Policy Requirements as set forth in KSC KNPR 8500.1 Revision A.

**Rationale:** NASA Environmental Policy must be adhered to at all Centers.

**Verification Method:** Inspection

**Verification Plan:** This requirement satisfied by inspection of artifacts associated with successful verification of SRD 3.4.1.1, SRD 3.8.3.2, SRD 3.8.3.3, SRD 3.8.3.4, and SRD 3.8.3.5. This requirement will be verified by stand alone artifact as well as by the Facilities Certification Test Procedure as an FDC Requirement.

### **Environmental Organic Compounds**



Contract Number: NNJ06TA25C

**SRD Requirement Number:** 3.8.3.2

**FDC Requirement Number:** 3.19.3.19

**Description:** The use of low volatile organic compounds for surface coatings shall be used.

**Rationale:** KSC Environmental Policy Requirements.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection of the facility drawings to ensure that materials/components selected conform to KSC Environmental Policy. Additional artifacts for verification may include written approval by KSC EPD. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Ozone Depleting Compounds**

**SRD Requirement Number:** 3.8.3.3

**FDC Requirement Number:** 3.19.3.19

**Description:** No Class I or Class II Ozone Depleting Substances (i.e. Freon or other halogenated hydrocarbons) will be used.

**Rationale:** KSC Environmental Policy Requirements.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection of the facility drawings to ensure that materials/components selected conform to KSC Environmental Policy. Additional artifacts for verification may include written approval by KSC EPD. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Asbestos Materials**

**SRD Requirement Number:** 3.8.3.4

**FDC Requirement Number:** 3.19.3.19

**Description:** No asbestos containing material (i.e. drywall, mastic, tile, felt, sealants, caulk, coatings, insulation, etc.) will be used.

**Rationale:** KSC Environmental Policy Requirements.

**Verification Method:** Inspection

Contract Number: NNJ06TA25C

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection of the facility drawings to ensure that materials/components selected conform to KSC Environmental Policy. Additional artifacts for verification may include written approval by KSC EPD. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Lead, Chromium and Mercury Materials**

**SRD Requirement Number:** 3.8.3.5

**FDC Requirement Number:** 3.19.3.19

**Description:** No lead, chromium or mercury based coatings shall be used.

**Rationale:** KSC Environmental Policy Requirements.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin or the Contractor using a Lockheed Martin or Contractor generated test procedure will perform an inspection of the facility drawings to ensure that materials/components selected conform to KSC Environmental Policy. Additional artifacts for verification may include written approval by KSC EPD.

This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **CEV-T-082400 Section 3.9 Communications and Data Networking System Requirements Verification**

Communications and Data Network Systems will be verified by inspection and demonstration. As part of the IOZ refurbishment, the Operational Voice System (OISD) and phone systems are being upgraded in the facility. The Contractor is performing the connectivity modifications and the Base Operations Contractor will perform the device installation. Verification of all Communication and Data Network Systems will be performed by Lockheed Martin or the responsible Contractor using procedures developed by Lockheed Martin or the Contractor. Requirements that map directly to the Facilities Design Criteria requirements may be utilized to verify DRD requirements.

### **OISD System Installation**

**SRD Requirement Number:** 3.9.1.1.1

**FDC Requirement Number:** 3.8.2.1

**Description:** KSC supplied OISD shall be provided in the IOZ.

Contract Number: NNJ06TA25C

**Rationale:** OISD communications system is essential for safe activities during normal day- to-day as well as critical operations.

**Verification Method:** Inspection

**Verification Plan:** Requirement is for inspection to verify OISD system installation in IOZ. Plan is to review OISD Facility drawings to facility as-built to verify installation of OISD per engineering. Requirement is inspection only, OISD performance verified by demonstration in SRD requirement 3.9.1.1.2. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **OISD System Performance**

**SRD Requirement Number:** 3.9.1.1.2

**FDC Requirement Number:** 3.8.2.1

**Description:** As a minimum, KSC supplied OISD shall be provided to the IOZ CCMS Control Room (Room 1255), High/Low Bay and Airlock (Rooms 1400 and 1492), Integration Cell (Room 1415), Tool Crib (Room 1463), Proof Test Cell (Room 1486), TPS/Chemical Dispensing Area (Room 1461), and Proof Test Control Room (Room 1493).

**Rationale:** OISD system is required to ensure communications during normal day- to-day activities as well as critical operations.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that OISD boxes are located per engineering. A demonstration will be performed by Lockheed Martin or the Contractor to verify the functionality of the OISD System. Requirement inspection will be verified in the Facilities Certification Test Procedure as an FDC Requirement. The demonstration will be performed in addition to the FDC requirement verification and may be performed by the base communications contractor, Lockheed Martin, or a designated Lockheed Martin representative.

### **OISD Specific Installation Locations**

**SRD Requirement Number:** 3.9.1.1.3

**FDC Requirement Number:** N/A

**Description:** Specific OISD box locations will be detailed in facilities drawings and approved by Lockheed Martin prior to installation.

**Rationale:** OISD details will be contained in Architectural and Engineering (A&E) Drawings.

**Verification Method:** Inspection

Contract Number: NNJ06TA25C

**Verification Plan:** Requirement written to identify that specific implementation details will be included in facilities drawings and not in the functional SRD. This requirement is not included in the Facilities Certification Test Procedure as an FDC Requirement. Satisfaction of SRD requirement 3.9.1.1.1 and SRD requirement 3.9.1.1.2 will satisfy this requirement.

### **Phone System Installation**

**SRD Requirement Number:** 3.9.1.2.1

**FDC Requirement Number:** 3.8.3.2

**Description:** A telephone system shall be provided in the IOZ.

**Rationale:** Telephone system is required for internal and external communications.

**Verification Method:** Inspection

**Verification Plan:** Requirement is for inspection to verify Phone system installation in IOZ. Plan is to review Facility drawings to facility as-built to verify installation of Phones per engineering. Requirement is inspection only, Phone performance verified by demonstration in SRD requirement 3.9.1.2.2. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Phone System Performance**

**SRD Requirement Number:** 3.9.1.2.2

**FDC Requirement Number:** 3.8.3.2

**Description:** As a minimum, Telephones shall be provided to the IOZ East and West Basement Areas (Room 0108), CCMS Control Room (Room 1255), High/Low Bay and Airlock (Rooms 1400 and 1492), Integration Cell (Room 1415), Vendor Areas (Room 1449), Conference Room (Room 1465), Office Areas (Room 1465), Personnel Prep Area (Room 1456), Tool Crib (Room 1463), Flight Inventory Area (Room 1480), Proof Test Cell (Room 1486), TPS/Chemical Dispensing Area (Room 1461), and Proof Test Control Room (Room 1493).

**Rationale:** Telephone system is required for internal and external communications.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that Phones are located per engineering. A demonstration will be performed by Lockheed Martin or the Contractor to verify the functionality of the Phone System. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

Contract Number: NNJ06TA25C

### **Phone Specific Installation Locations**

**SRD Requirement Number:** 3.9.1.2.3

**FDC Requirement Number:** N/A

**Description:** Specific Telephone locations will be detailed in facilities drawings and approved by Lockheed Martin prior to installation.

**Rationale:** Telephone details will be contained in A&E Drawings.

**Verification Method:** Inspection

**Verification Plan:** Requirement written to identify that specific implementation details will be included in facilities drawings and not in the functional SRD. This requirement is not included in the Facilities Certification Test Procedure as an FDC Requirement. Satisfaction of SRD requirement 3.9.1.2.1 and SRD requirement 3.9.1.2.2 will satisfy this requirement.

### **Phone Audio Paging**

**SRD Requirement Number:** 3.9.1.2.4

**FDC Requirement Number:** 3.8.6.1

**Description:** The IOZ telephone system shall include an audio paging system.

**Rationale:** Audio paging is required to provide local audible alerts.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that the phone system has an audio paging capability. A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by the Contractor or Lockheed Martin to verify the functionality of the Audio paging system. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Public Address System**

**SRD Requirement Number:** 3.9.1.3.1

**FDC Requirement Number:** 3.8.7.1

**Description:** A public address system shall be provided in the IOZ.

**Rationale:** Public address is required to provide KSC area warnings.

**Verification Method:** Inspection, Demonstration

Contract Number: NNJ06TA25C

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that the public address system is built per facilities drawings. A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by the Contractor or Lockheed Martin to verify the functionality of the Public Address System. This requirement will require an integrated test with KSC existing All Area Paging system to verify that warnings, such as Lightning or other Meteorological Watches, are capable of being output on the new Paging System. The demonstration will be considered successful if Public Address System is audible in all areas of the IOZ. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Public Address System Performance**

**SRD Requirement Number:** 3.9.1.3.2

**FDC Requirement Number:** N/A

**Description:** The public address service shall be audible in all areas of the IOZ.

**Rationale:** Warnings need to be audible to all personnel.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by the Contractor or Lockheed Martin to verify the Public Address System is audible within all areas of the IOZ. This requirement may be verified in conjunction with SRD requirement 3.9.1.3.1. This requirement is in does not have a direct FDC mapping requirement and may require a separate demonstration.

### **Aural Warning System Performance**

**SRD Requirement Number:** 3.9.1.4.1

**FDC Requirement Number:** 3.8.4

**Description:** An aural warning system shall be provided for use during critical move and hazardous operations.

**Rationale:** Aural warnings needed during operations to alert personnel.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by the Contractor or Lockheed Martin to verify the Aural Warning System. The demonstration will consist of verification that the Aural Warning System can be audibly heard throughout the areas of the facility where the hazardous operation is taking place. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

Contract Number: NNJ06TA25C

## **Visual Warning System Performance**

**SRD Requirement Number:** 3.9.1.4.2

**FDC Requirement Number:** 3.8.5

**Description:** A visual warning system shall be provided for use during critical move and hazardous operations.

**Rationale:** Visual warnings needed during operations to alert personnel.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by the Contractor or Lockheed Martin to verify the Visual Warning System. The demonstration will consist of verification that the Visual Warning System can be clearly visibly seen throughout the areas of the facility where the hazardous or critical operation is taking place. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Work Imaging System**

**SRD Requirement Number:** 3.9.1.5.1

**FDC Requirement Number:** 3.17.1

**Description:** A Work Imaging System shall be provided to visually document the CEV spacecraft configuration during IOZ assembly, integration, and closeout.

**Rationale:** Imaging required by CEV Imagery Plan CEV-T-088.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin will perform an inspection to verify the necessary components have been procured to support the Work Imaging System (WIS) as defined in the FDC and the CEV Imagery Plan. Components include but are not limited to still cameras, tripods, and motion imagery cameras.

## **Work Imaging System Cameras**

**SRD Requirement Number:** 3.9.1.5.2

**FDC Requirement Number:** 3.17.2

**Description:** The Work Imaging System will document required events, as defined in the CEV Imagery Plan, using a combination of digitally formatted still and motion imagery.

**Rationale:** Still and motion imagery required per CEV Imagery Plan CEV-T-088.

**Verification Method:** Inspection

Contract Number: NNJ06TA25C

**Verification Plan:** Lockheed Martin will perform an inspection to verify the necessary digital still and motion imagery cameras have been procured to support the Work Imaging System (WIS) as defined in the FDC and the CEV Imagery Plan.

### **Work Imaging System Digital Cameras**

**SRD Requirement Number:** 3.9.1.5.3

**FDC Requirement Number:** 3.17.3

**Description:** Work Imagery System will include four portable digital cameras for still photographs that meet the requirements of the CEV Imagery Plan for format, resolution, storage size, and storage portability.

**Rationale:** Still photos must be of sufficient detail as well as be compatible with existing NASA Imagery infrastructure as defined in the CEV Imagery Plan.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin will perform an inspection of cameras and associated documentation to verify portable digital cameras meet all specifications as defined in the CEV Imagery Plan.

### **Work Imaging System Digital Cameras**

**SRD Requirement Number:** 3.9.1.5.4

**FDC Requirement Number:** 3.17.10.1

**Description:** The Work Imagery System will include two high definition portable motion imagery cameras with tripods.

**Rationale:** Required to capture detailed images during critical operations per the CEV Imagery Plan.

**Verification Method:** Inspection

**Verification Plan:** Lockheed Martin will perform an inspection of portable motion cameras, tripods, and associated documentation to verify cameras meet all specifications, including high definition, as defined in the CEV Imagery Plan.

### **Work Control System Installation**

**SRD Requirement Number:** 3.9.1.6.1

**FDC Requirement Number:** 3.18

**Description:** The IOZ shall have a Work Control System (Data Communication Network).



Contract Number: NNJ06TA25C

**Rationale:** Data Communications Network required for Work Order Control system implementation.

**Verification Method:** Inspection

**Verification Plan:** Requirement is for inspection to verify Work Control System installation in IOZ. Plan is to review OISD Facility drawings to facility as-built to verify installation of Work Control System per engineering. Requirement is inspection only, Work Control System performance verified by demonstration in SRD requirements 3.9.1.6.2 and 3.9.1.6.3. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement. FDC requirement 3.18.10 defines the phased approach for data network installation. SRD requirements 3.9.1.6.1 through 3.9.1.6.3 will be satisfied when FDC Section 3.18 is satisfied in its entirety as defined in the phased approach.

## **Work Control System Work Control Implementation**

**SRD Requirement Number:** 3.9.1.6.2

**FDC Requirement Number:** 3.18.10

**Description:** As a minimum, Network drops shall be provided to the IOZ CCMS Control Room (Room 1255), Server Room (Room 1460), Low Bay Assembly Station Utility Suites (Room 1400), Integration Cell (Room 1415), Vendor Areas (Room 1449), Conference Room (Room 1465), Office Areas (Room 1465), Tool Crib (Room 1463), Receiving and Inspection (Room 1469), Flight Inventory Area (Room 1480), Proof Test Cell (Room 1486), TPS/Chemical Dispensing Area (Room 1461), and Proof Test Control Room (Room 1493).

**Rationale:** Data Communications Network is required to support Work Order Control in these areas.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that Work Control System drops are located per engineering.

A demonstration will be performed by Lockheed Martin or the Contractor to verify the connectivity of Work Control System. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement. FDC requirement 3.18.10 defines the phased approach for data network installation. SRD requirements 3.9.1.6.1 through 3.9.1.6.3 will be satisfied when FDC Section 3.18 is satisfied in its entirety as defined in the phased approach.

## **Work Control System Work Control Office Implementation**

Contract Number: NNJ06TA25C

**SRD Requirement Number: 3.9.1.6.3**

**FDC Requirement Number: 3.18**

**Description:** The Data Communication Network shall be provided to all Lockheed Martin occupied office areas as designated by NASA.

**Rationale:** Offices require connectivity for Work Order Control as well as administrative functions.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that Work Control System drops are located per engineering. A demonstration will be performed by Lockheed Martin or the Contractor to verify the connectivity of Work Control System in Office Areas. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement. FDC requirement 3.18.10 defines the phased approach for data network installation. SRD requirements 3.9.1.6.1 through 3.9.1.6.3 will be satisfied when FDC Section 3.18 is satisfied in its entirety as defined in the phased approach.

**Detailed Network Architecture**

**SRD Requirement Number: 3.9.1.6.4**

**FDC Requirement Number: N/A**

**Description:** Network Architecture details will be provided in facilities drawings and approved by Lockheed Martin prior to installation.

**Rationale:** Network analysis and architecture needs to be developed based on bandwidth needs.

**Verification Method:** Inspection

**Verification Plan:** Requirement written to identify that specific implementation details will be included in facilities drawings and not in the functional SRD. This requirement is not included in the Facilities Certification Test Procedure as an FDC Requirement. Satisfaction of SRD requirements 3.9.1.6.2 and 3.9.1.6.3 will satisfy this requirement.

**LMI Backbone Connectivity**

**SRD Requirement Number: 3.9.2.1**

**FDC Requirement Number: N/A**

**Description:** The IOZ shall have LMI connectivity to the LM backbone.

Contract Number: NNJ06TA25C

**Rationale:** Connection needed to other LM facilities for Work Order Control, CCMS to EDL communications, and day-to-day administrative functions.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by Lockheed Martin or the Contractor to verify the connectivity to the LMI backbone. This requirement may be verified by Lockheed Martin information technology group. Requirement does not have a corresponding FDC requirement.

### **Control Room IRIG B**

**SRD Requirement Number:** 3.9.2.2

**FDC Requirement Number:** N/A

**Description:** Range IRIG B input shall be provided to the CCMS Control Room (Room 1255).

**Rationale:** CCMS and other EGSE require range timing for time data correlation.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by Lockheed Martin or the Contractor to verifying the IRIG B interface. Demonstration may be performed in conjunction with EGSE validations in the Control Room. Requirement does not have a corresponding FDC requirement.

### **CEV-T-082400 Section 3.10 Special Structural Requirements Verification**

A minimal amount of structural modifications will be made in the IOZ. Any changes to the previously established floor load limits will be captured in the O&C Main level Floor Plan drawing. Verification of observance of these established floor load limits for tooling stands and tooling transporters will be by analysis and will be performed by Lockheed Martin. Analysis will consist of review of USA Tooling designs to insure that point and uniform load limits do not exceed established IOZ Limits. The Proof Test Chamber (Room 1486) design will be verified by analysis and inspection. Analysis will consist of review of the Architectural and Engineering analysis that determined design based on instantaneous overpressure and shrapnel release based on the required volume vs. pressure. Inspection will consist of verification that proof test cell wall, ceiling, and doors are built per engineering. Flooring requirements will primarily be verified by inspection. Leveling and smoothness flooring requirements will be verified by testing at various points in the IOZ as determined by Lockheed Martin Facilities.

### **Main Level Floor Load Limits**

Contract Number: NNJ06TA25C

**SRD Requirement Number: 3.10.1.1**

**FDC Requirement Number: N/A**

**Description:** Floor load limits as detailed in O&C Main Level Floor Plan drawing 82K007806 shall be observed in the IOZ.

**Rationale:** Minimal structural changes to IOZ floor are being made however all users need to be cognizant that potentially revised limits need to be observed.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin of USA tooling design documentation to verify that main floor load limits were observed in the tooling design. Tooling engineering should specifically call out load limits and these limits should not exceed established limits per the existing facility drawings. This requirement does not have a corresponding FDC requirement.

**Tooling Stand Floor Load Limits**

**SRD Requirement Number: 3.10.1.2**

**FDC Requirement Number: N/A**

**Description:** Tooling Stands shall observe uniform and point floor load limits as detailed in O&C Main Level Floor Plan drawing 82K007806.

**Rationale:** Minimal structural changes to IOZ floor are being made however all users need to be cognizant that potentially revised limits need to be observed.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin of USA tooling stand design documentation to verify that main floor load limits were observed in the tooling design. Tooling engineering should specifically call out load limits and these limits should not exceed established limits per the existing facility drawings. This requirement does not have a corresponding FDC requirement.

**Transportation Floor Load Limits**

**SRD Requirement Number: 3.10.1.3**

**FDC Requirement Number: N/A**

**Description:** Transportation tooling design shall observe uniform and point floor load limits as detailed in O&C Main Level Floor Plan drawing 82K007806.

**Rationale:** Minimal structural changes to IOZ floor are being made however all users need to be cognizant that potentially revised limits need to be observed.

**Verification Method:** Inspection

Contract Number: NNJ06TA25C

**Verification Plan:** An inspection will be performed by Lockheed Martin of USA transportation tooling design documentation to verify that main floor load limits were observed in the tooling design. Tooling engineering should specifically call out load limits and these limits should not exceed established limits per the existing facility drawings. This requirement does not have a corresponding FDC requirement.

### **Proof Test Cell Design**

**SRD Requirement Number:** 3.10.2.1

**FDC Requirement Number:** 3.2.4.13.1

**Description:** The Proof Test Cell shall have wall, ceiling, and doors capable of withstanding overpressure and shrapnel release conditions associated with instantaneous rupture of pressure vessel of 20 ft<sup>3</sup> volume at 6750 pounds per square inch gauge (psig).

**Rationale:** Based on 606C SM design with additional margin added to allow for spacecraft design changes.

**Verification Method:** Analysis, Inspection

**Verification Plan:** An analysis will be performed by the A&E to determine the structural requirements based on the stated pressures and volumes. Inspection will be performed by Lockheed Martin or the Contractor to the Facility drawings and the as-built configuration to verify that the design and implementation conform to the A&E recommendation. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Proof Test Cell Door CM**

**SRD Requirement Number:** 3.10.2.2

**FDC Requirement Number:** 3.2.4.13.2

**Description:** The Proof Test Cell door shall be sized to accommodate a CM including its associated transportation tooling stand.

**Rationale:** Proof Test door needs to be sized to be large enough to accommodate UUT.

**Verification Method:** Inspection

**Verification Plan:** Inspection will be performed by Lockheed Martin or the Contractor to the Facility drawings, tooling drawings and the as-built configuration to verify that the design and implementation will accommodate a CM and associated transportation tooling stand. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

Contract Number: NNJ06TA25C

### **Proof Test Cell Door SM**

**SRD Requirement Number:** 3.10.2.3

**FDC Requirement Number:** 3.2.4.13.2

**Description:** The Proof Test Cell door shall be sized to accommodate an SM including its associated transportation tooling stand.

**Rationale:** Proof Test door needs to be sized to be large enough to accommodate UUT.

**Verification Method:** Inspection

**Verification Plan:** Inspection will be performed by Lockheed Martin or the Contractor to the Facility drawings, tooling drawings and the as-built configuration to verify that the design and implementation will accommodate a SM and associated transportation tooling stand. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Flooring Patching**

**SRD Requirement Number:** 3.10.3.1

**FDC Requirement Number:** 3.2.3.3.3

**Description:** All holes and other penetrations in the high and low bays shall be patched and sealed.

**Rationale:** Preparation of flooring to receive new coating.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that all holes and penetrations are properly patched and prepared for the new floor coating. Flooring may be applied as part of the refurbishment process prior to initiation of Facility Verification. If flooring installation precedes documented flooring inspection of patching, requirement may be verified by an informal Lockheed Martin walk down or the Facility prior to flooring installation. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Flooring Variations**

**SRD Requirement Number:** 3.10.3.2

**FDC Requirement Number:** 3.2.3.3.5

**Description:** Variations in floor smoothness shall be no greater than 5/16" in 10 feet.

Contract Number: NNJ06TA25C

**Rationale:** Required to support air bearing operations.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection and test will be performed by Lockheed Martin or the Contractor to verify the floor smoothness per the stated requirement. Testing does not need to be performed on the entire Facility. Testing should be performed where air bearing pallet will be utilized and wherever visual inspections indicate possible variations that are out of specification as determined by Lockheed Martin Facilities. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Flooring Coatings Replacement**

**SRD Requirement Number:** 3.10.3.3

**FDC Requirement Number:** 3.2.3.3.5

**Description:** Replace floor coatings in High Bay, Low Bay, Integration Cell, and Offline Areas with clean room compatible industrial standard floor coating.

**Rationale:** Support CWA Operations.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify the floor coatings are applied as specified in the applicable areas. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Flooring Coating Loading**

**SRD Requirement Number:** 3.10.3.4

**FDC Requirement Number:** 3.2.3.3.5

**Description:** Floor coatings in High Bay, Low Bay, Integration Cell, and Offline Areas shall maintain current floor load.

**Rationale:** Floors need to resist deterioration caused by dynamic and static stresses.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify the floor coatings selected can maintain the current floor loading as specified in the Facilities drawings. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

Contract Number: NNJ06TA25C

## **Basement Sealing**

**SRD Requirement Number:** 3.10.3.5

**FDC Requirement Number:** 3.12.3

**Description:** Basement floor shall be sealed to minimize water intrusion.

**Rationale:** Floor has history of water intrusion that requires mitigation.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify the basement floor has been sealed to prevent water intrusion. Requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **CEV-T-082400 Section 3.11 Security Requirement Verification**

Security requirements will be verified by inspection and demonstrations by Lockheed Martin and or the General Contractor. Since the IOZ is located on NASA property, an integrated test may be required. Tests and demonstrations of door entry and alarm systems will be performed by the Alarm Contractor, General Contractor, or Lockheed Martin using test procedures developed by Lockheed Martin. Testing may include use of the KSC Security Forces infrastructure during integrated tests. As run test procedures will serve as the verification artifact. Verification of Security Plans will be by inspection of the Security Plan and System Security Plans following approval of the artifact by all necessary stakeholders.

## **KSC Access**

**SRD Requirement Number:** 3.11.1.1

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin will adopt and or comply with existing local KSC policy for access to KSC.

**Rationale:** IOZ is located within existing KSC Facility (O&C).

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin to verify that all permanent Lockheed Martin employees are issued KSC NASA badges and that a process is in place to coordinate temporary badging through KSC Security for temporary visitors. This requirement does not have a corresponding FDC requirement.



Contract Number: NNJ06TA25C

## **KSC Alarm Interface**

**SRD Requirement Number:** 3.11.1.2

**FDC Requirement Number:** N/A

**Description:** IOZ Security System will interface with existing O&C and KSC Protective Services.

**Rationale:** IOZ exists within existing KSC Facilities and must have interface capability with KSC infrastructure.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of Facilities Drawings will be performed by Lockheed Martin or the Contractor to verify that the IOZ Facility has an interface to KSC Protective Services. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate the connectivity of the IOZ Security System to KSC Protective Services central monitoring system. This requirement does not have a corresponding FDC requirement.

## **Door Alarms**

**SRD Requirement Number:** 3.11.1.3

**FDC Requirement Number:** N/A

**Description:** All external IOZ access shall have alarms connected to the Facility Security System.

**Rationale:** Alarms needed to detect unauthorized entry.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of Facilities Drawings will be performed by Lockheed Martin or the Contractor to verify that the all IOZ Facility doors are alarmed. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate the functionality of the alarms. This requirement does not have a corresponding FDC requirement.

## **Passage and Conduit Alarms**

**SRD Requirement Number:** 3.11.1.4

**FDC Requirement Number:** N/A

Contract Number: NNJ06TA25C

**Description:** All HVAC passages and underground conduits that lead into the IOZ large enough for a person to crawl through shall be grated and securely locked in a closed position.

**Rationale:** Alarms needed to detect unauthorized entry.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the as-built facility will be performed by Lockheed Martin or the Contractor to verify that all possible entry points as detailed in the requirement are secured. This requirement does not have a corresponding FDC requirement.

### **Alarm Notification**

**SRD Requirement Number:** 3.11.1.5

**FDC Requirement Number:** N/A

**Description:** Upon alarm detection, Facility Security System shall automatically notify KSC Protective Services.

**Rationale:** KSC Protective Services is the Physical Plant Security that needs to respond.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of Facilities Drawings will be performed by Lockheed Martin or the Contractor to verify that the IOZ Facility has an interface to KSC Protective Services. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate that the IOZ Security System automatically notifies KSC Protective Services central monitoring system. This requirement does not have a corresponding FDC requirement.

### **Training Room Door Lock**

**SRD Requirement Number:** 3.11.1.6

**FDC Requirement Number:** N/A

**Description:** The Training Room shall be equipped with a keyed and cipher lock.

**Rationale:** LMI Present in Room, LMI Corporate Requirement.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of the door will be performed by Lockheed Martin or the Contractor to verify that the door has a cipher lock that may also be key lock. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate the functionality of the cipher and keyed operation of the lock. This requirement does not have a corresponding FDC requirement.

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### **Server Room Door Lock**

**SRD Requirement Number:** 3.11.1.7

**FDC Requirement Number:** N/A

**Description:** The Server Room shall be equipped with a keyed and cipher lock.

**Rationale:** LMI Present in Room, LMI Corporate Requirement.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of the door will be performed by Lockheed Martin or the Contractor to verify that the door has a cipher lock that may also be key lock. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate the functionality of the cipher and keyed operation of the lock. This requirement does not have a corresponding FDC requirement.

### **Facility Memorandum of Agreement**

**SRD Requirement Number:** 3.11.1.8

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin shall develop a Facility Memorandum of Agreement for facility use with KSC.

**Rationale:** Roles and responsibilities need to be identified.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin to validate that a Memorandum of Agreement has been generated and signed by NASA and Lockheed Martin for use of the IOZ. This requirement does not have a corresponding FDC requirement.

### **KSC Access Badging**

**SRD Requirement Number:** 3.11.2.1

**FDC Requirement Number:** N/A

**Description:** All Lockheed Martin and subcontractors/vendors will be cleared and badged to KSC.

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**Rationale:** LM controls access to IOZ, but IOZ personnel require KSC access to get to IOZ.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin to verify that all permanent Lockheed Martin employees are issued KSC NASA badges and that a process is in place to coordinate temporary badging through KSC Security for temporary visitors. This requirement will be verified in conjunction with SRD requirement 3.11.1.1. This requirement does not have a corresponding FDC requirement.

### **KSC Foreign Visitors**

**SRD Requirement Number:** 3.11.2.2

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin will establish a foreign national visitor program.

**Rationale:** Foreign visitors require additional security requirements.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin to verify that Security has implemented a process for visiting foreign nationals. The process or plan should address or observe all Lockheed Martin and NASA processes. This requirement does not have a corresponding FDC requirement.

### **Violence Free Workplace**

**SRD Requirement Number:** 3.11.2.3

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin will ensure security Corporate Policy Statements are met to include CPS-569 (Security) and CPS-565 (Workplace Security-Maintaining a Safe and Respectful Workplace Free from Threats and Violence).

**Rationale:** Maintaining safe and respectful violence-free workplace paramount in LM and NASA cultures.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin to verify that Security has implemented a compliance process for implementation of Corporate Command media as identified in the requirement. This requirement does not have a corresponding FDC requirement.

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### **Access Control System**

**SRD Requirement Number:** 3.11.3.1

**FDC Requirement Number:** N/A

**Description:** LMSSC will provide an IOZ external access system design, procurement, and installation.

**Rationale:** Need to limit access to facility, May utilize existing or future KSC electronic access as provided for in the memorandum of agreement for facility use.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of Facilities Drawings and or as-built facility will be performed by Lockheed Martin or the Contractor to verify that the IOZ Facility has implemented an access control system for access to the IOZ. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate the functionality of the system. This requirement may be verified in conjunction with SRD requirement 3.11.3.2. This requirement does not have a corresponding FDC requirement.

### **IOZ Access Control Badging**

**SRD Requirement Number:** 3.11.3.2

**FDC Requirement Number:** N/A

**Description:** Access Control Badge will be required by Personnel to enter the IOZ.

**Rationale:** Restricted access to critical electrical and HVAC systems that affect production of the CEV and or other flight hardware.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of Facilities Drawings and or as-built facility will be performed by Lockheed Martin or the Contractor to verify that the IOZ Facility has implemented an access control system requiring a badge for access to the IOZ. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate the functionality of the system. This requirement may be verified in conjunction with SRD requirement 3.11.3.1. This requirement does not have a corresponding FDC requirement.

### **CCMS Control Room Access Control Badging**

**SRD Requirement Number:** 3.11.3.3

**FDC Requirement Number:** N/A

**Description:** Access Control Badge will be required by Personnel to enter the CCMS Control Room.

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**Rationale:** Restricted access needs to be limited to authorized personnel only.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of Facilities Drawings and or as-built facility will be performed by Lockheed Martin or the Contractor to verify that the IOZ Facility has implemented an access control system requiring a badge for access to the CCMS Control Room. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate the functionality of the system. This requirement may be verified in conjunction with SRD requirement 3.11.3.1. This requirement does not have a corresponding FDC requirement.

### **Maintenance Areas Access Control Badging**

**SRD Requirement Number:** 3.11.3.4

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin will ensure all external maintenance areas adjacent to the IOZ are controlled access and are integrated in the external access control system.

**Rationale:** Allows continuous access monitoring of individuals that have access to critical electrical and HVAC systems that affect production of the CEV and or other flight hardware.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of Facilities Drawings and or as-built facility will be performed by Lockheed Martin or the Contractor to verify that the IOZ Facility has implemented an access control system requiring a badge for access for all Maintenance Areas. A demonstration will be performed by Lockheed Martin or the Contractor to demonstrate the functionality of the system. This requirement may be verified in conjunction with SRD requirement 3.11.3.1. This requirement does not have a corresponding FDC requirement.

### **Computer System Security**

**SRD Requirement Number:** 3.11.4.1

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin shall develop a System Security Plan.

**Rationale:** Lockheed Martin CIPS requirement per 2.3.4-T2-SysSec-1.0-P.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin to verify that Systems Security has developed a Computer Systems Security Plan per applicable

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Lockheed Martin Command Media. This requirement does not have a corresponding FDC requirement.

### **CEV-T-082400 Section 3.12 Material Handling Requirement Verification**

The O&C facility's Material Handling crane requirements will be verified by analysis, inspection, demonstration, and test by Lockheed Martin, the Crane Contractor, and or the General Contractor. Tests procedures for the crane will be developed by Lockheed Martin or the applicable Contractor and may be based on procedures provided by the Crane Contractor. Artifacts gathered to verify the requirements per the FDC will also serve to validate DRD requirements for the Crane.

Elevator refurbishment will be verified by inspection, test and demonstration. Refurbished elevators will not be rated for personnel and will be utilized as equipment and hardware lifts only. Inspections of elevators and engineering will validate that upgrades were performed to ASME/ANSI 17.1 requirements. These inspections will be performed by Lockheed Martin or the Contractor. Demonstrations and tests of the elevators will verify performance requirements and will be performed by Lockheed Martin or the Elevator Contractor.

### **Crane Rating**

**SRD Requirement Number:** 3.12.1.1

**FDC Requirement Number:** 3.16.1

**Description:** One, top-running double girder, bridge crane with a minimum rating of 25 tons shall be provided in the IOZ.

**Rationale:** Based on maximum rating of existing rails, capacity well exceeds 606C CEV Stack weight including lifting fixtures and tooling.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that crane rating is per the stated requirement. Lockheed Martin or the Crane Contractor using a Lockheed Martin or Contractor generated test procedure will perform a complete acceptance test on the crane. Crane is a production unit and procedure will be based on factory acceptance test. This test requirement is an overarching requirement and will not be satisfied until all detailed crane test and demonstration requirements as defined in the FDC (3.16 Series) and SRD (3.12.1 Series) are satisfied. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

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## **Crane Location**

**SRD Requirement Number:** 3.12.1.2

**FDC Requirement Number:** 3.16.1.2

**Description:** The bridge crane will be located on the existing lower runway rails and will travel the length of the high and low bays.

**Rationale:** Crane required throughout IOZ, lower rails travel length of IOZ.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that crane is installed on the lower set of rails. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**SRD Requirement Number:** 3.12.1.3

**FDC Requirement Number:** 3.16.3

**Description:** Design, fabrication, test and installation of the new crane shall comply with the following documents: ASME B30.2 "Overhead and Gantry Cranes", CMAA 70 "Crane Manufacturer's Association of America", OSHA 29 CFR 1910.179 "Overhead and Gantry Cranes", and NASA-STD-8719.9 "Standard for Lifting Devices and Equipment".

**Rationale:** To ensure safety crane needs to comply with Industry and Government Standards.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Crane Contractor to verify that the crane design and installation complies with the referenced media. An alternative verification is inspection by Lockheed Martin of a Letter of Compliance from the Crane Manufacturer or qualified third party certifying that the installed Crane is in compliance with the referenced media. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

## **Crane FFMEA**

**SRD Requirement Number:** 3.12.1.4

**FDC Requirement Number:** 3.16.4

**Description:** A Functional Failure Modes and Effects Analysis (FFMEA) shall be performed on each crane.

**Rationale:** Performed per Lockheed Martin CIPS requirement FFMEA for Ground Processing Equipment 2.3.8.1-T1-Test-7.0-P.



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**Verification Method:** Analysis

**Verification Plan:** Analysis will consist of Lockheed Martin performing an FFMEA on the crane. FFMEA will be reviewed for clarity and completeness and including it as an artifact for the verification. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Existing Low Bay Crane**

**SRD Requirement Number:** 3.12.1.5

**FDC Requirement Number:** 3.16.5

**Description:** The east side existing crane, located on the lower runway rails shall be removed and replaced with a new crane.

**Rationale:** One low bay crane being replaced with new, legacy crane needs to be removed.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that legacy low bay crane was removed and replaced with a new crane. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Existing High Bay Crane**

**SRD Requirement Number:** 3.12.1.6

**FDC Requirement Number:** 3.16.5.2

**Description:** The existing crane on the upper runway will remain for future use without modifications.

**Rationale:** No new high bay crane, High bay capability needs to remain.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that legacy high bay crane remains. Crane will not be used for lifting of flight hardware. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**New Low Bay Crane**

**SRD Requirement Number:** 3.12.1.7

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**FDC Requirement Number: 3.16.6**

**Description:** The new crane shall be suitable for operation in Class 100k Clean Work Area.

**Rationale:** Crane needs to be compatible with CWA.

**Verification Method:** Inspection

**Verification Plan:** An inspection of vendor drawings will be performed by Lockheed Martin or the Contractor to verify that new low bay crane is compatible with the 100K CWA. An alternative verification for this requirement is an inspection by Lockheed Martin of a Letter of Compliance from the Crane Manufacturer or qualified third party certifying that the installed Crane is in compliance with the referenced media. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Crane Fail Safe Design**

**SRD Requirement Number: 3.12.1.8**

**FDC Requirement Number: 3.16.9**

**Description:** The crane shall be fail safe design to maintain load position during all power, control and mechanical failures.

**Rationale:** Fail safe design required for personnel and hardware protection.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed to verify that the crane maintains load position during a series of tests including power failures, control system failures, and mechanical failures. The Demonstration will be performed by Lockheed Martin or the Crane Contractor using procedures developed by Lockheed Martin or the Crane Contractor. These procedures may be part of the crane acceptance test performed by the Crane Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Crane Contingency Design**

**SRD Requirement Number: 3.12.1.9**

**FDC Requirement Number: 3.16.9.1**

**Description:** Crane design shall allow loads to be safely lowered under emergency conditions due to crane component/system failures.

**Rationale:** Contingency emergency control required for personnel and hardware protection.

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**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed to verify that the crane can safely lower loads under emergency conditions. This verification may be integrated with fail-safe testing but will be verified as an individual requirement. The Demonstration will be performed by Lockheed Martin or the Crane Contractor using procedures developed by Lockheed Martin or the Crane Contractor. These procedures may be part of the crane acceptance test performed by the Crane Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Crane Variable Speed Design**

**SRD Requirement Number:** 3.12.1.10

**FDC Requirement Number:** 3.16.10

**Description:** Hoist, trolley and bridge motion shall all be variable speed and provide micro inching capability.

**Rationale:** Protection of flight hardware and personnel safety.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed on the hoist, trolley and bridge motors to verify that motion can be controlled at variable speed. Speeds at the low end will demonstrate a micro inching capability. The Demonstration will be performed by Lockheed Martin or the Crane Contractor using procedures developed by Lockheed Martin or the Crane Contractor. These procedures may be part of the crane acceptance test performed by the Crane Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Crane Control Feature Design**

**SRD Requirement Number:** 3.12.1.11

**FDC Requirement Number:** 3.16.11

**Description:** The controls for trolley hoist and bridge motion shall employ control features to limit acceleration and deceleration forces imparted to the load.

**Rationale:** Protection of flight hardware and personnel safety.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed on the trolley hoist and bridge motor controls to verify that maximum acceleration and decelerations are limited by the control logic. The Demonstration will be performed by Lockheed Martin or the Crane Contractor using procedures developed by Lockheed Martin or the Crane Contractor.

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These procedures may be part of the crane acceptance test performed by the Crane Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Crane RF Controls**

**SRD Requirement Number:** 3.12.1.12

**FDC Requirement Number:** 3.16.12

**Description:** New crane operations shall utilize radio frequency (RF) controls for primary control system.

**Rationale:** Provides greater flexibility and control.

**Verification Method:** Inspection

**Verification Plan:** An inspection of vendor drawings and the as-built crane will be performed by Lockheed Martin or the Contractor to verify that new low bay crane is equipped with RF Controls. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Crane RF EMI Controls**

**SRD Requirement Number:** 3.12.1.13

**FDC Requirement Number:** 3.16.12.1

**Description:** Crane operations are to be protected from radio interference and the radio frequency control system shall be in compliance with and licensed under FCC Part 90 Rules.

**Rationale:** Federal Communications Commission requirement.

**Verification Method:** Inspection

**Verification Plan:** An inspection of vendor drawings or specifications will be performed by Lockheed Martin or the Contractor to verify that new low bay crane is in compliance with FCC Part 90 Rules. Alternative verification method is inspection by Lockheed Martin of Certificate of Compliance or FCC License provided by Crane Contractor. These procedures may be part of the crane acceptance test performed by the Crane Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Crane RF Control Operating Frequency**

**SRD Requirement Number:** 3.12.1.14

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**FDC Requirement Number: 3.16.12.2**

**Description:** Selection of the radio control operating frequency shall be coordinated with the KSC Radio Frequency Spectrum Management office. A Radio Frequency Authorization will be approved by the KSC Spectrum Manager prior to procurement of the cranes.

**Rationale:** KSC Radio Frequency Spectrum Management requirement.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin of the Radio Frequency Authorization issued by KSC Spectrum Manager. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Crane Backup Control**

**SRD Requirement Number: 3.12.1.15**

**FDC Requirement Number: 3.16.13**

**Description:** Pendant control shall be provided as a backup control system in case of RF control system failure.

**Rationale:** Backup control required in event of primary control failure.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of vendor drawings or as-built crane will be performed by Lockheed Martin or the Contractor to verify that new low bay crane contains a backup pendant control system. Demonstration will consist of verification by Lockheed Martin or the Contractor of crane operations being controlled by the backup pendant control. These procedures may be part of the crane acceptance test performed by the Crane Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

**Crane Backup Control Selectability**

**SRD Requirement Number: 3.12.1.16**

**FDC Requirement Number: 3.16.13.1**

**Description:** Primary versus backup controls shall be selectable on the crane.

**Rationale:** Ease of use.

**Verification Method:** Demonstration

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**Verification Plan:** A demonstration will be performed by Lockheed Martin or the Contractor verifying that crane operations can be controlled by the backup pendant control. The control will then be switched to RF Control to demonstrate that the controls are selectable. These procedures may be part of the crane acceptance test performed by the Crane Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Crane Lower Rail Survey**

**SRD Requirement Number:** 3.12.1.17

**FDC Requirement Number:** 3.16.14

**Description:** The existing lower crane runway girders and rails shall be reused. A survey of the runway rails shall be conducted to verify proper alignment and compliance with CMAA 70 requirements.

**Rationale:** Reuse of rails contingent upon compliance with industry standards.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be conducted by the General Contractor or Crane Contractor to verify the lower rail alignment. Lockheed Martin or the Crane Contractor will verify the inspection and perform and determine if the existing rails conform to the referenced requirements. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Emergency Crane Stop**

**SRD Requirement Number:** 3.12.1.18

**FDC Requirement Number:** 3.16.19

**Description:** Remote emergency E-Stop controls shall be provided where required to comply with NASA-STD-8719.9.

**Rationale:** NASA Safety Requirement.

**Verification Method:** Demonstration

**Verification Plan:** A demonstration will be performed by Lockheed Martin or the Contractor that the crane operation ceases upon actuation of the emergency stop. These procedures may be part of the crane acceptance test performed by the Crane Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Existing Low Bay Crane**

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**SRD Requirement Number:** 3.12.1.19

**FDC Requirement Number:** N/A

**Description:** Existing Low Bay Crane will remain in Airlock for future use.

**Rationale:** Will maintain future low bay capability.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor that the existing low bay crane has been left in the airlock. The crane will not be used for critical flight hardware moves and is being left for a future capability if required. This requirement does not have a corresponding FDC requirement.

### **Existing Shipping and Receiving Hoist**

**SRD Requirement Number:** 3.12.1.20

**FDC Requirement Number:** N/A

**Description:** Existing Hoist in Shipping and Receiving Area will remain for future use.

**Rationale:** Will maintain future low bay capability. Hoist will require recertification prior to use.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor that the existing hoist has been left in the shipping and receiving area. The hoist will not be used for critical flight hardware moves and is being left for a future capability if required. This requirement does not have a corresponding FDC requirement.

### **Lift #9 Upgrade**

**SRD Requirement Number:** 3.12.2.1

**FDC Requirement Number:** 3.2.6.3.2

**Description:** Lift #9 (Former Elevator #9 - West End of IOZ Basement) shall be upgraded to comply with ASME/ANSI 17.1 requirements.

**Rationale:** Society of Mechanical Engineers lift/elevator refurbishment standards.

**Verification Method:** Inspection

**Verification Plan:** An inspection of engineering drawings and the as-built configuration of upgraded Lift #9 will be conducted by Lockheed Martin or the Elevator Contractor to verify that all modifications conform to the standards referenced in the standards. This

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requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Lift #11 Upgrade**

**SRD Requirement Number:** 3.12.2.2

**FDC Requirement Number:** 3.2.6.4.2

**Description:** Lift #11 (Former Elevator #11 - East Platform Area) shall be upgraded to comply with ASME/ANSI 17.1 requirements.

**Rationale:** Society of Mechanical Engineers lift/elevator refurbishment standards.

**Verification Method:** Inspection

**Verification Plan:** An inspection of engineering drawings and the as-built configuration of upgraded Lift #11 will be conducted by Lockheed Martin or the Elevator Contractor to verify that all modifications conform to the standards referenced in the standards. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Lift General Upgrade**

**SRD Requirement Number:** 3.12.2.3

**FDC Requirement Numbers:** 3.2.6.3.1 and 3.2.6.4.1

**Description:** All elevators to be upgraded and utilized as lifts will be refurbished to support an additional 20 years of serviceable life.

**Rationale:** ASME recommendation.

**Verification Method:** Inspection

**Verification Plan:** An inspection of specifications and the as-built configuration of will be conducted by Lockheed Martin or the Elevator Contractor to verify that all upgrades are designed to support the referenced serviceable life. An alternative verification method is inspection of a certificate of compliance from the Elevator Contractor. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **CEV-T-082400 Section 3.13 Human Engineering Requirement Verification**

Upgrades to the existing IOZ will consider where feasible human engineering requirements using KSC-DE-512-SM and MIL-STD-1472F as guidelines. Verification of guidelines will be by inspection by Lockheed Martin of newly added items to the IOZ



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and will consider illumination, noise, HVAC, seating, windows, ingress/egress, signage, steps and ladders, filters, hazards, stairs, walks/pathways, handrails, emergency exits, storage, personnel shelter, and equipment arrangement.

## **Human Engineering**

**SRD Requirement Number:** 3.13.1.1

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin will create a Human Engineering checklist using KSC-DE-512-SM and MIL-STD-1472F as guidelines and evaluate IOZ new and modified facilities and facilities systems using the checklist.

**Rationale:** Need to consider Human Engineering requirements in IOZ upgrades and retrofits.

**Verification Method:** Inspection

**Verification Plan:** An inspection of specifications and the as-built configuration of be conducted by Lockheed Martin to verify that all newly added items considered human engineering in their implementation per the referenced media. The inspection will be documented using a Human Engineering checklist that will be retained as an artifact in the Facility Acceptance Test Procedure. This requirement does not have a corresponding FDC requirement.

## **CEV-T-082400 Section 3.14 Configuration Management Requirement Verification**

Operations and Checkout Building, Facility Concept of Operation, LMSSC-ORION-KSC-008, Revision Basic, identifies the means and methods for the IOZ facility operation, maintenance, and modifications including Configuration Management. LM Facilities will be responsible for the Configuration Management of the IOZ facility. Verification will consist of inspection of the Configuration management Plan as detailed in the O&C Facilities Concept of Operation LMSSC-Orion-KSC-008

## **Configuration Management Requirements**

**SRD Requirement Number:** 3.14.1.1

**FDC Requirement Number:** N/A

**Description:** Configuration of the IOZ will be managed by Lockheed Martin Facilities Engineering.

**Rationale:** The IOZ is a LM controlled facility.

**Verification Method:** Inspection

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**Verification Plan:** An inspection will be performed to verify that Lockheed Martin has in place a process for Configuration Management. The inspection will consist of review of the IOZ Facility CONOP (LMSSC-ORION-KSC-008) and the Facility Change Request (FCR) process as documented in the CONOP. This requirement does not have a corresponding FDC requirement.

### **CEV-T-082400 Section 3.15 Scheduling Requirement Verification**

The AI&P Project Planning organization will capture IOZ Facilities activities during the refurbishment of the O&C for the Orion Program. Verification of scheduling requirements will be by inspection of the Integrated Master Schedule and Contractor Working schedules developed by Lockheed Martin and the Contractor.

#### **Scheduling IMS Requirements**

**SRD Requirement Number:** 3.15.1.1

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin Planning Department shall develop a Facility Integrated Master Schedule that identifies facility milestones, dependencies, and durations using Microsoft Project.

**Rationale:** To effectively manage the Facility a comprehensive schedule is required.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed to verify that Lockheed Martin has in place a process for capturing an Integrated Master Schedule of facilities refurbishment activities. The inspection will consist of review by Lockheed Martin of the IMS to ensure that it captures major milestones, dependencies, and task durations. This requirement does not have a corresponding FDC requirement.

#### **Scheduling Process Requirements**

**SRD Requirement Number:** 3.15.1.2

**FDC Requirement Number:** N/A

**Description:** Lockheed Martin Planning Department shall follow established Lockheed Martin standard operating process for schedule development per 2.1.3-T1-PgmMgt-1.0-P.

**Rationale:** Schedule guidance is captured in existing command media. To effectively manage the Facility a comprehensive schedule is required.

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**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed to verify that Lockheed Martin IMS follows the referenced Corporate Process as detailed in the requirement.

The inspection will consist of review by Lockheed Martin of the IMS to ensure that it follows media guidelines. This requirement does not have a corresponding FDC requirement.

**Working Schedule Requirements**

**SRD Requirement Number:** 3.15.1.3

**FDC Requirement Number:** N/A

**Description:** Working schedules (shifts, days, and hours) will be developed by the Contractor that map to the Lockheed Martin Integrated Master Schedule.

**Rationale:** Detailed activities are decomposed and captured by lower level working schedules.

**Verification Method:** Inspection

**Verification Plan:** An inspection will be performed to verify that Contractor has in place a process for capturing day-to-day construction activities for facilities refurbishment activities on detailed working schedules. The inspection will consist of review by Lockheed Martin of the to ensure that the working schedules capture construction activities on a daily basis. This requirement does not have a corresponding FDC requirement.

**CEV-T-082400 Section 3.16 Functional Capabilities Requirement Verification**

Functional Capabilities verification will be accomplished by inspection, demonstration and test. Inspections will be conducted by Lockheed Martin and will verify that utility suites are located in the proper location and are configured per released engineering. Tests and demonstrations will be performed using test procedures developed by Lockheed Martin or the Contractor and performed by Lockheed Martin or the applicable Contractor.

High Pressure Gas Utility Suite requirements will be verified by inspection, demonstration and test by Lockheed Martin and the Mechanical or General Contractor. Lockheed Martin or the Contractor will develop acceptance test procedures that will include inspections, proof tests, flow tests, as well as cleanliness certification. Testing will be performed by the Contractor.

In some cases Utility Suite verification may be accomplished in conjunction with other Facility Testing. For example the Electrical Utility Suit interfaces may be verified during

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execution of test procedures for the Power, Facility, and Technical Grounding testing performed by the Contractor. Utility Suite requirements that map directly to Facilities Design Criteria requirements may be utilized to verify DRD requirements.

### **Utility Suite Locations**

**SRD Requirement Number:** 3.16.1.1.1

**FDC Requirement Number:** 3.9.1

**Description:** Eight Utility Suites shall be installed in the Low Bay to support the six Processing Stations and two Flex Stations.

**Rationale:** Provide commodities, power, and communications in each station.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that utility suites are installed in the specified locations. This requirement is to verify that the utility suite is present. Performance requirements will not be verified in this step and will be verified in appropriate SRD Section (Power, Grounding and Lighting 3.5, Plumbing/Venting and Commodities 3.7, Communication and Data Networking 3.9). This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Utility Suite Covers**

**SRD Requirement Number:** 3.16.1.1.2

**FDC Requirement Number:** 3.9.9

**Description:** Processing Station and Flex Station Utility Suites shall have flush mounted covers.

**Rationale:** Minimize trip hazards on floor mounted suites.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that utility suites installed in the specified location have flush mounted covers to eliminate trip hazards. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Vendor Support Utility Suite Locations**

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**SRD Requirement Number:** 3.16.1.1.3

**FDC Requirement Number:** 3.9.2

**Description:** Two Utility Suites shall be installed in the Vendor Support Area.

**Rationale:** Support Environmental Control Life Support System Vendor.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that utility suites are installed in the specified locations. This requirement is to verify that the utility suite is present. Performance requirements will not be verified in this step and will be verified in appropriate SRD Section (Power, Grounding and Lighting 3.5, Plumbing/Venting and Commodities 3.7, Communication and Data Networking 3.9). This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

#### **Integration Cell Utility Suite Location**

**SRD Requirement Number:** 3.16.1.1.4

**FDC Requirement Number:** 3.9.3

**Description:** One Utility Suite shall be installed in the Integration Cell Area.

**Rationale:** Provide commodities, power, and communications in vehicle stack area.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that a utility suite is installed in the specified location. This requirement is to verify that the utility suite is present. Performance requirements will not be verified in this step and will be verified in appropriate SRD Section (Power, Grounding and Lighting 3.5, Plumbing/Venting and Commodities 3.7, Communication and Data Networking 3.9). This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

#### **Airlock Area Utility Suite Location**

**SRD Requirement Number:** 3.16.1.1.5

**FDC Requirement Number:** 3.9.5

**Description:** One Utility Suite shall be installed in the Airlock Area.

**Rationale:** Provide purge gas, power, and communications in refurbishment area.

**Verification Method:** Inspection

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**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that a utility suite is installed in the specified location. This requirement is to verify that the utility suite is present. Performance requirements will not be verified in this step and will be verified in appropriate SRD Section (Power, Grounding and Lighting 3.5, Plumbing/Venting and Commodities 3.7, Communication and Data Networking 3.9). This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Proof Test Cell Utility Suite Location**

**SRD Requirement Number:** 3.16.1.1.6

**FDC Requirement Number:** 3.9.4

**Description:** One Utility Suite shall be installed in the Proof Test Cell.

**Rationale:** Provide commodities for pressurization and leak check.

**Verification Method:** Inspection

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that a utility suite is installed in the specified location. This requirement is to verify that the utility suite is present. Performance requirements will not be verified in this step and will be verified in appropriate SRD Section (Power, Grounding and Lighting 3.5, Plumbing/Venting and Commodities 3.7, Communication and Data Networking 3.9). This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Utility Suite Debris Vacuum**

**SRD Requirement Number:** 3.16.1.2.1

**FDC Requirement Number:** 3.9.7.1

**Description:** Utility Suites shall contain a debris vacuum connection.

**Rationale:** Vacuum utilized to maintain cleanliness around tooling stand.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that utility suites contain a debris vacuum connection. A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by Lockheed Martin or the Contractor to verify the functionality per the vendor specs of the vacuum.. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Utility Suite Compressed Air**

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**SRD Requirement Number: 3.16.1.2.2**

**FDC Requirement Number: 3.9.7.2**

**Description:** Utility Suites shall contain a 120 psi (minimum) compressed air connection with a 5 micron filter.

**Rationale:** Compressed air required to support GSE.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that utility suites contain a compressed air connection which includes a 5 micron filter. A test will be performed by Lockheed Martin or the Contractor using procedures developed by Lockheed Martin or the Contractor to verify that compressed air is available at the correct pressure as described in the requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and may be performed in conjunction with verification of FDC 3.5.1 series and SRD 3.7.2 series requirements.

**Utility Suite LAN Connection**

**SRD Requirement Number: 3.16.1.2.3**

**FDC Requirement Number: 3.9.7.3**

**Description:** Utility Suites shall contain one LAN connection.

**Rationale:** Provide Network Communications.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that utility suites contain a LAN connection. A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by Lockheed Martin or the Contractor to verify the LAN connection functionality. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and may be performed in conjunction with verification of FDC 3.18 series and SRD 3.9.1.6 series requirements.

**Utility Suite Telephone Connection**

**SRD Requirement Number: 3.16.1.2.4**

**FDC Requirement Number: 3.9.7.4**

**Description:** Utility Suites shall contain one telephone connection.

**Rationale:** Provide Voice Communications.

**Verification Method:** Inspection, Demonstration

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**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that utility suites contain a telephone connection. A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by Lockheed Martin or the Contractor to verify the telephone connection functionality. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and may be performed in conjunction with verification of FDC 3.8.3 series and SRD 3.9.1.2 series requirements.

### **Utility Suite Building Automation LAN Connection**

**SRD Requirement Number:** 3.16.1.2.5

**FDC Requirement Number:** 3.9.7.5

**Description:** Utility Suites shall contain two Building Automation LAN connections dedicated to particle counters.

**Rationale:** Necessary to evaluate and regulate CWA.

**Verification Method:** Inspection, Demonstration

**Verification Plan:** An inspection of the facility drawings and as-built configuration will be performed by Lockheed Martin or the Contractor to verify that utility suites contain a two dedicated LAN connections for Building Automation. A demonstration will be performed by Lockheed Martin or the Contractor using procedures developed by Lockheed Martin or the Contractor to verify the LAN connection functionality. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and may be performed in conjunction with verification of FDC 3.18 series and SRD 3.9.1.6 series requirements.

### **Utility Suite GN<sub>2</sub> Capability**

**SRD Requirement Number:** 3.16.1.2.6

**FDC Requirement Number:** 3.9.7.7

**Description:** Utility Suites shall contain one GN<sub>2</sub>, 3000 PSI connection. Piping shall be rated for 6000 psi (MAWP) to allow for future system capability.

**Rationale:** GN<sub>2</sub> required as a purge gas.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that gas connection is contained in the utility suite. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin or Contractor generated test procedure will perform a proof test on the system to verify the system meets the rated pressure requirement. The GN<sub>2</sub> system will be charged and pressures confirmed as



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part of the test. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and may be performed in conjunction with verification of FDC 3.5.3 series and SRD 3.7.2 series requirements.

### **Utility Suite GHe Capability**

**SRD Requirement Number:** 3.16.1.2.7

**FDC Requirement Number:** 3.9.7.8

**Description:** Utility Suites shall contain one GHe, 3000 PSI connection. Piping shall be rated for 6000 psi (MAWP) to allow for future system capability.

**Rationale:** GHe required for purge gas and leak check.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify that gas connection is contained in the utility suite. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin or Contractor generated test procedure will perform a proof test on the system to verify the system meets the rated pressure requirement. The GHe system will be charged and pressures confirmed as part of the test. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and may be performed in conjunction with verification of FDC 3.5.3 series and SRD 3.7.2 series requirements.

### **Utility Suite Technical Ground Connection**

**SRD Requirement Number:** 3.16.1.2.8

**FDC Requirement Number:** 3.9.7.9

**Description:** Utility Suites shall contain one ground connection tied to technical ground system.

**Rationale:** Provides technical grounding capability.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify technical ground connection is contained in the utility suite. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin or Contractor generated test procedure will perform testing verify that the integrity of the Technical Ground in the Utility Suite. Specific Technical Ground specifications are contained in FDC 3.7.2 series and SRD 3.5.2.2 series requirements. Testing of SRD requirement 3.16.1.2.8 will be performed in conjunction with these related requirements.

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## **Utility Suite Facility Ground Connection**

**SRD Requirement Number:** 3.16.1.2.9

**FDC Requirement Number:** 3.9.7.10

**Description:** Utility Suites shall contain one ground connection tied to the facility ground system.

**Rationale:** Provides facility grounding capability.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will be performed by Lockheed Martin or the Contractor to verify facility ground connection is contained in the utility suite. Lockheed Martin or the Mechanical Contractor using a Lockheed Martin or Contractor generated test procedure will perform testing verify that the integrity of the Facility Ground in the Utility Suite. Specific Facility Ground specifications are contained in FDC 3.7.3 series and SRD 3.5.2.3 series requirements. Testing of SRD requirement 3.16.1.2.9 will be performed in conjunction with these related requirements.

## **Utility Suite 480V Power**

**SRD Requirement Number:** 3.16.1.2.10

**FDC Requirement Numbers:** 3.9.7.12

**Description:** Utility Suites shall contain one 480 VAC, 100 Amp, 3 phase, 5 wire receptacle.

**Rationale:** Provides power for UPS System.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the utility suites. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and will be performed in conjunction with FDC series 3.9.6 and SRD series 3.5.1.2 requirements.

## **Utility Suite 208V Power**

**SRD Requirement Number:** 3.16.1.2.11

**FDC Requirement Numbers:** 3.9.7.13

**Description:** Utility Suites shall contain one 208VAC, 100 Amp, 3 phase, 4 wire receptacle.

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**Rationale:** Provides technical power for GSE.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the utility suites. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and will be performed in conjunction with FDC series 3.9.6 and SRD series 3.5.1.2 requirements.

### **Utility Suite 120/208V 100A Power**

**SRD Requirement Number:** 3.16.1.2.12

**FDC Requirement Numbers:** 3.9.7.14

**Description:** Utility Suites shall contain one 120/208 VAC, 100 Amp, 3 phase, 5 wire receptacle.

**Rationale:** Provides technical power for GSE and tooling.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the utility suites. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and will be performed in conjunction with FDC series 3.9.6 and SRD series 3.5.1.2 requirements.

### **Utility Suite 120/208V 50A Power**

**SRD Requirement Number:** 3.16.1.2.13

**FDC Requirement Numbers:** 3.9.7.15

**Description:** Utility Suites shall contain one 120/208 VAC, 50 Amp, 3 phase, 5 wire receptacle.

**Rationale:** Provides technical power for GSE and tooling.

**Verification Method:** Inspection, Test

**Verification Plan:** An inspection will verify that the proper receptacle is located in the utility suites. Lockheed Martin or the designated Contractor will include in the Facilities Certification Test Procedure verification a test of the receptacle to verify that the proper voltages are present. The procedure will be executed by the electrical contractor as

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part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and will be performed in conjunction with FDC series 3.9.6 and SRD series 3.5.1.2 requirements.

### **Utility Suite Chilled Water**

**SRD Requirement Number:** 3.16.1.2.14

**FDC Requirement Numbers:** 3.9.7.17

**Description:** One set of chilled water supply and return connections shall be provided in Processing and Flex Utility Suites.

**Rationale:** Provides chilled water for ground cooling unit.

**Verification Method:** Inspection

**Verification Plan:** An inspection will verify that chilled water, supply and return, is located in the utility suites. The procedure will be executed by the Contractor as part of the acceptance of the IOZ. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement.

### **Particle Counters**

**SRD Requirement Number:** 3.16.1.3.1

**FDC Requirement Numbers:** 3.9.7.18.1 through 3.9.7.18.7

**Description:** Particle Counters shall be located throughout the Facility.

**Rationale:** Necessary to evaluate and regulate CWA.

**Verification Method:** Inspection

**Verification Plan:** An inspection will verify that particle counters are located throughout the facility to provide adequate coverage for environmental monitoring. Specific locations of particle counters is not fully defined at this time. Specific locations will be identified in Facilities Drawings. SRD requirement 3.16.1.3.2 verifies particle counter installation per Facilities Drawings and will be verified in conjunction with this requirement. This requirement will be verified in the Facilities Certification Test Procedure as an FDC Requirement and in conjunction of verification of SRD requirement 3.16.1.3.2.

### **Particle Counters Specific Location**

**SRD Requirement Number:** 3.16.1.3.2

**FDC Requirement Numbers:** N/A

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**Description:** Specific location and capability of particle counters will be shown on the Facilities drawing and approved by Lockheed Martin.

**Rationale:** Need to be integrated into facility based on layout and HVAC flows.

**Verification Method:** Inspection

**Verification Plan:** An inspection will verify that particle counters are installed per the LM approved Facilities Drawing. Inspection will be performed by Lockheed Martin and will consist of review of the Facilities Drawing and the as-built configuration. This requirement does not have a corresponding FDC requirement, however SRD requirement 3.16.1.3.1 does map to an FDC requirement and will provide partial verification to SRD requirement 3.16.1.3.2.

### **CEV-T-082400 Section 3.17 FACILITY, FACILITY SYSTEMS, AND SUPPORT EQUIPMENT CERTIFICATION REQUIREMENT VERIFICATION**

The Operations and Checkout Building, IOZ refurbishment effort is a Facilities and Facilities Systems Modification. LM Facilities Engineering will establish the standards for facilities systems, generate test procedures to validate the systems, and maintain an archive of pertinent artifacts.

#### **Facility and Facility Systems Minimum Standards**

**SRD Requirement Number:** 3.17.1.1

**FDC Requirement Numbers:** N/A

**Description:** Lockheed Martin Facilities Engineering will establish minimum standards of performance for the facility and facilities systems.

**Rationale:** IOZ is a LM controlled facility. Facilities assets must be validated to Government and LM Standards that have been established in LMSSC-ORION-KSC-003 Operations and Checkout Facility Design Criteria.

**Verification Method:** Inspection

**Verification Plan:** Minimal standards for the Facility have been established in the FDC baseline. The FDC is a decomposition of SRD requirements, Government and Spacecraft specifications and provides the A&E and Contractor the necessary information to develop facility drawings and other specifications that conform to all applicable Federal, State, and Local Codes and Ordinances. The verification of the establishment of minimum standards will be inspection of the Engineer Review Board (ERB) approved FDC. This requirement does not have a corresponding FDC requirement.

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## **Facility and Facility Systems Test Procedures**

**SRD Requirement Number:** 3.17.1.2

**FDC Requirement Numbers:** N/A

**Description:** Lockheed Martin Facilities Engineering or a designated Representative shall develop test procedures to validate the performance of the facility and facilities systems.

**Rationale:** Subject Matter Expert (SME) expertise on IOZ resides in LM Facilities Engineering.

**Verification Method:** Inspection

**Verification Plan:** The verification of the referenced requirement will be by inspection of test procedures used by Lockheed Martin or the LM designated Representative used to verify the facility and facility systems performance. Procedures should reference minimum performance standards established in the FDC and provide accountability to the FDC verification matrix. This requirement does not have a corresponding FDC requirement.

## **Facility and Facility Systems Test Artifacts**

**SRD Requirement Number:** 3.17.1.3

**FDC Requirement Numbers:** N/A

**Description:** A database will be maintained by LM Facilities Engineering to capture all relevant parametric performance data for the facility and facilities systems validation.

**Rationale:** Artifacts qualifying facility and facilities systems need to be archived and available for review.

**Verification Method:** Inspection

**Verification Plan:** The verification of the referenced requirement will be by inspection of as run test procedures and supporting artifacts gathered during testing used by Lockheed Martin or the LM designated Representative to verify the facility and facility systems performance. This requirement does not have a corresponding FDC requirement.

## **High Bay East Door FFMEA**

**SRD Requirement Number:** 3.17.1.4

**FDC Requirement Numbers:** N/A

**Description:** An FFMEA will be performed on the High Bay East door.

**Rationale:** Performed per Lockheed Martin CIPS 2.3.8.1-T1-Test-7.0-P.

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**Verification Method:** Analysis, Inspection

**Verification Plan:** Analysis will consist of performance by Lockheed Martin or a Lockheed Martin designated Representative of a Functional Failure Modes and Effects Analysis on the door. The inspection portion of the referenced requirement will be verified by inspection of the FFMEA. This requirement does not have a corresponding FDC requirement.

### **Low Bay West Door FFMEA**

**SRD Requirement Number:** 3.17.1.5

**FDC Requirement Numbers:** N/A

**Description:** An FFMEA will be performed on the Low Bay West door.

**Rationale:** Performed per Lockheed Martin CIPS 2.3.8.1-T1-Test-7.0-P.

**Verification Method:** Analysis, Inspection

**Verification Plan:** Analysis will consist of performance by Lockheed Martin or a Lockheed Martin designated Representative of a Functional Failure Modes and Effects Analysis on the door. The inspection portion of the referenced requirement will be verified by inspection of the FFMEA. This requirement does not have a corresponding FDC requirement.

### **CEV-T-082400 Section 3.18 OPERATIONS REQUIREMENT VERIFICATION**

The Operations and Checkout Building, Facility Concept of Operation, LMSSC-ORION-KSC-008, will identify the means and methods for the IOZ facility operations and maintenance. Within the facilities, CONOP Lockheed Martin Facilities Engineering will identify how the facility will manage, schedule, and coordinate all services such as scheduled maintenance, janitorial services, and non-scheduled maintenance. The facilities CONOP will identify the types of personnel and services required to operationally support the facility. The AI&P CONOP will identify the roles and responsibilities of the various AI&P disciplines such as Test Operations, Manufacturing Engineering, Quality Engineering, and Safety. Verification of the Operations requirements will consist of inspection of the plans and procedures identified in the CONOP.

### **IOZ Facility Operation and Maintenance**

**SRD Requirement Number:** 3.18.1.1

**FDC Requirement Numbers:** N/A

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**Description:** Lockheed Martin Facilities Engineering shall develop an IOZ Concept of Operations that identifies the means and methods for facility operation, maintenance, and modifications.

**Rationale:** CONOP specifies the IOZ facility operation.

**Verification Method:** Inspection

**Verification Plan:** Inspection will be performed by Lockheed Martin of the IOZ Concept of Operation document developed by LM Facilities Engineering. This requirement does not have a corresponding FDC requirement.

### **IOZ AI&P Operation and Maintenance**

**SRD Requirement Number:** 3.18.1.2

**FDC Requirement Numbers:** N/A

**Description:** Lockheed Martin Assembly, Integration, and Production shall develop an IOZ Concept of Operations that identifies the roles and responsibilities of the AI&P Team.

**Rationale:** CONOP specifies the IOZ facility manufacturing operation.

**Verification Method:** Inspection

**Verification Plan:** Inspection will be performed by Lockheed Martin of the IOZ AI&P Concept of Operation document developed by LM AI&P. This requirement does not have a corresponding FDC requirement.

### **IOZ FOE Plan**

**SRD Requirement Number:** 3.18.1.3

**FDC Requirement Numbers:** N/A

**Description:** Lockheed Martin Assembly, Integration, and Production shall develop an FOE Plan.

**Rationale:** Lockheed Martin CIPS requirement per 2.4-T1-Ops-1.1-P "FOE Process".

**Verification Method:** Inspection

**Verification Plan:** Inspection will be performed by Lockheed Martin of the FOE Plan document developed by LM AI&P. This requirement does not have a corresponding FDC requirement.

## **CEV-T-082400 Section 3.19 MAINTENANCE VERIFICATION**



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Maintenance of this facility will be performed by the facility maintenance contractor to contract requirements. Verification of Maintenance requirements will be by inspection of the process to request maintenance for the facility maintenance contractor. This process will be identified in the Operations and Checkout Building, Facility Concept of Operation, LMSSC-ORION-KSC-008. Verification of the Maintenance requirements will consist of inspection of the plans and procedures identified in the CONOP.

### **IOZ Facility Maintenance**

**SRD Requirement Number:** 3.19.1.1

**FDC Requirement Numbers:** N/A

**Description:** Maintenance of this facility will be managed by Lockheed Martin Facilities Engineering.

**Rationale:** IOZ is a LM controlled facility.

**Verification Method:** Inspection

**Verification Plan:** Inspection will be performed by Lockheed Martin of the IOZ Concept of Operation document developed by LM Facilities Engineering. The CONOP should address the process for IOZ Facility Maintenance. This requirement does not have a corresponding FDC requirement.

### **IOZ Facility Maintenance Contractor**

**SRD Requirement Number:** 3.19.1.2

**FDC Requirement Numbers:** N/A

**Description:** Maintenance of this facility will be performed by a NASA approved facility maintenance contractor to contract requirements.

**Rationale:** The IOZ is a NASA owned facility.

**Verification Method:** Inspection

**Verification Plan:** Inspection will be performed by Lockheed Martin of the IOZ Concept of Operation document developed by LM Facilities Engineering. The CONOP should address the process for selection of a NASA approved facility maintenance contractor. This requirement does not have a corresponding FDC requirement.

## **CEV-T-082400 Section 3.20 SUSTAINING ENGINEERING AND OBSOLESCENCE PLANNING REQUIREMENT VERIFICATION**

CEV-T-084  
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Change Legend: 001  
01 November 2008

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Operations and Checkout Building, Facility Concept of Operation, LMSSC-ORION-KSC-008, Revision Basic, identifies the means and methods for the IOZ facility operation, maintenance, and modifications. Verification of sustaining engineering requirements will be by inspection of the sustaining engineering process by the facility maintenance contractor. This process will be identified in the Operations and Checkout Building, Facility Concept of Operation, LMSSC-ORION-KSC-008. Verification of the Sustaining Engineering requirements will consist of inspection of the plans and procedures identified in the CONOP.

### **Sustaining Engineering and Obsolescence**

**SRD Requirement Number:** 3.20.1.1

**FDC Requirement Numbers:** N/A

**Description:** Sustaining Engineering and Obsolescence Planning of this facility will be managed by Lockheed Martin Facilities Engineering.

**Rationale:** The IOZ is a LM controlled facility.

**Verification Method:** Inspection

**Verification Plan:** Inspection will be performed by Lockheed Martin of the IOZ Concept of Operation document developed by LM Facilities Engineering. The CONOP should address the process for sustaining engineering requirements. This requirement does not have a corresponding FDC requirement.

### **3.3 TEST CONFIGURATIONS**

Testing configuration of the installed IOZ systems will be established to perform all testing in the final end-state of the installed Facility and Facility Systems. Systems will be in their operational configuration with all units and subsystems connected except as needed to perform testing. The detailed Test Procedures will identify the specific Test Configuration as defined by the facility drawings and specifications. Any deviations from the designated configurations will be identified in the detailed Test Procedure.

Preparation of support equipment will establish the initial configuration for test equipment and hardware. Procedure preparations include the detailed step-by-step instructions required to configure the hardware, software, and support equipment for the operation. This includes any set-up operation that configures hardware for the main operation and, when voice nets are used, a voice check of all required stations. The interrelationship of the facility system under test to the test equipment and personnel interaction requirements will be established and supported throughout the test. These relationships may be defined in terms of mechanical and electrical connections, initial control settings, or test article special configuration requirements. In steps that are crucial for mission or operational success, care shall be taken to avoid the potential for single-person errors and other human error conditions.

During the testing any deviations to the Test Configuration will be identified on a Procedure History Sheet (PHS). PHS will also serve as an index and document the status (open or closed) of all as-run items that are applicable to the procedure. The PHS will also include the procedure closure approval disciplines whose signatures indicate they have reviewed the as-run procedure and all items on the PHS have been satisfactorily closed. The disciplines listed on the PHS shall reflect the program requirements and shall be documented in the program's procedure template.

### **3.4 TEST CONDITIONS**

All testing of systems at the IOZ will be performed at interior ambient temperatures. No specialized environmental conditions are required to be simulated. Some test conditions related to testing will have potentially hazardous conditions present during testing. Examples are high voltages or high pressure gases present in the utility suites. The detailed Test Procedures will identify these hazards on the title page of test procedures by visibly marking "THIS PROCEDURE CONTAINS POTENTIALLY

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HAZARDOUS OPERATIONS.” The procedure will also follow NASA formatting convention for hazardous operations in the procedure by indicating both the “START OF HAZARDOUS OPERATIONS” and the “END OF HAZARDOUS OPERATIONS”, throughout the procedure as applicable.

The detailed Test Procedure will also contain an Emergency Operations section containing detailed steps to effectively deal with test conditions or other problems that may occur. Emergency operations will be concerned with protecting personnel, test article, facilities, and test equipment. Emergency operations (as applicable to the type of procedure being developed) shall contain or reference the operational steps required to place personnel, hardware, and support equipment in a safe condition should an emergency occur. If the procedure deals with hazardous materials or commodities, the applicable Material Safety Data Sheet (MSDS) containing the emergency response for that item shall be referenced and available at the test location. In lieu of reference sheets, the MSDS emergency responses may be written directly into the Emergency Operation section of the detailed Test Procedure.

The following standard Safety Requirements statements (or equivalents) will be included in all test procedures:

*When an unsafe condition exists, the Certified Test Conductor shall take whatever action is necessary to prevent injury to personnel and/or equipment damage.*

*A “STOP” command will be issued if anyone observes any unsafe or potentially unsafe condition. All personnel involved in the operation shall obey the “STOP” command. The operation may be resumed only after the condition has been corrected or the test team determines that no unsafe condition exists.*

### **3.5 TEST METHODS**

Specific Test Methods used to support IOZ verification will be contained in the detailed Test Procedure for each system under test. In general demonstrations and tests will verify the function of all units, primary and redundant, and exercise all commands and operational modes to the extent practicable. The operation of all thermally controlled units, such as heaters and thermostats, will be verified. Where sensors, electrical or electronic devices, coded algorithms, or a computer implements control of such units, end-to-end performance testing will be conducted. The test will demonstrate that all commands having precondition requirements (such as enable, disable, a specific equipment configuration, and a specific command sequence) cannot be executed unless the preconditions are satisfied.

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Where possible, equipment performance parameters that might, affect end-to-end performance (such as power, voltage, gain, frequency, command and data rates) will be varied over specification ranges to demonstrate the performance. Autonomous functions, such as a crane fail-safe mechanism, will be verified to occur when the conditions exist for which they are designed. The system will be in the operational configuration with all units and subsystems connected whenever practical.

The proof pressure test of pressurized components will assure that the design and fabrication of pressure vessels, pressure lines, fittings, and valves has an adequate factor of safety against structural failure or excessive deformation when used in a high-pressure application. Maximum Expected Operating Pressure (MEOP) as defined in LM and NASA Command Media relative to design load limits, container material, and operating temperatures will be specified in the test procedure. Range Safety requirements will be considered and may be different than above, in all case the most conservative will be utilized. Following proof pressure test, the cleanliness of pressurized components will be certified and the systems energized.

### **3.6 TEST SCHEDULES**

The AI&P Planning Department will utilize industry standard scheduling tools to develop a high fidelity Integrated Master Schedule (IMS) to allow stakeholders to accurately gauge IOZ progress, view upcoming milestones, and coordinate recovery actions. Schedules will be developed using internal Lockheed Martin standard operating processes in accordance with 2.1.3-T1-PgmMgt-1.0-P. The Contractor will develop working schedules for each facility work package that capture higher fidelity details than the IMS. Each of these working schedules will include the details necessary to perform the appropriate system refurbishment including the testing schedule for each system. The working schedules, including testing details, are independent schedules. Working schedule milestones will be tracked by the IMS to identify test dependencies, deconflict test schedules, and track completion dates as required.

### **3.7 DATA RECORDING METHODS**

Data recorded during the system verification will be captured by a number of methods. The primary method to record data will be manual entries in the as-run detailed Test Procedures. Although automated entries are preferable, the IOZ verification is being performed on a non-recurring basis and it is not cost effective to develop automated data recording methods in support of the testing. Manual entries will consist of requirement pass/fail buyoff steps, tabular entries, and flag items of information or anomalies. These entries will contain sufficient detail to provide complete accountability of requirement compliance. Test procedures will capture additional detailed information

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about the test including the test dates and times, procedure revision, facility, and personnel assignments. Data will also be recorded in test conductor log entries, and data acquisition and recording by test equipment or other recording devices. However the as-run Test procedure will serve as the official test artifact for requirement verification. Hard copy tabular displays or plots generated by test equipment or monitoring devices used to gather data during the test will be included in the acceptance data package. The following paragraphs provide additional detail of how data will be recorded and artifacts maintained for each certification method (Demonstration, Test, Analysis, and Inspection).

Test execution of detailed steps and sequences in the procedures will be the primary verification method for requirements with “demonstration” and “test” certification methods. Procedures will be written with sufficient detail to provide complete accountability for each requirement including clear identification of pass/fail criteria. Procedure buy-offs and manual data entries of performance parameters in the procedure will be the data recording method for “demonstration” and “test” requirements.

Requirements with “analysis” certification methods will also be verified by Test Procedure verification. In the case of “analysis” requirements the Test Procedure step will contain a buy-off verifying that the analysis was performed and is satisfactory. Documents supporting the analysis, which may include the actual analysis, such as cooling load calculations, power load calculations, proof test wall size calculations, and FFMEA’s will serve as the verification artifact for the requirement buy-off. The individual requirement buyoff will be contained in the detailed Test Procedure and the artifacts supporting the analysis will be included in the acceptance data package as a permanent record.

Requirements with “inspection” certification methods will also be verified by Test Procedure verification. In the case of “inspection” requirements the Test Procedure step will contain a buy-off verifying that the inspection was performed and is satisfactory. Documents supporting the inspection may consist of specifications, drawings, and NASA/LM/Government standards. These documents are identified in the specific test requirement and will not be maintained in the acceptance data package. The individual requirement buyoff will be contained in the detailed Test Procedure. Any deviations or pertinent findings during the inspections will be documented and dispositioned on a flag item in the Test Procedure.

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### **3.8 REQUIRED TEST EQUIPMENT AND SOFTWARE**

The detailed Test Procedures will list all test equipment, tools, equipment, and materials required to perform the procedure. In many cases tools and test equipment, and their associated software, will be provided by the responsible Contractor performing the IOZ Facility or Facilities System Verification. For test equipment used to take verification data the accuracy of the equipment in comparison with the specified tolerance for the measurement will meet the requirements of 1.3.2-T1-ProdAssr-11.0-P, Accuracy Requirements for General Measuring and Test Equipment (M&TE), Test Systems and Calibration Standards and SSM PMP 4.05-5, Control of Measuring and Test Equipment

All calibrated test equipment shall be identified, and the specific identification number recorded in the test procedure, and or on the applicable data sheet. The test procedures will be developed with proper recording provisions to ensure that all calibrated equipment is properly tracked in the event of an Out-of-Tolerance Notification (OTN) condition. If any equipment substitution occurs, a Flag Sheet to the procedure will be generated and the equipment information entered into M&TE. Identifying every piece of M&TE used during a test allows the system to identify Out-of-Tolerance Equipment (OTE) and generate an OTN should an issue with the calibrated equipment occur during the calibration process.

As appropriate, steps will be added to verify that equipment calibration and certification has been accomplished prior to performing the test. Where appropriate, steps shall be added to the test procedure for the test engineer/Certified Test Conductor verification that, prior to use, the equipment has the appropriate Electrical Designated Qualified Representative (EDQR) or National Test Laboratory (NTL) certification. Buy-offs will be provided in the detailed Test Procedure as "second set of eyes" verification that the calibration/certification requirements and inspection tags are appropriate and the equipment is ready to use.

### 3.9 REQUIREMENTS TRACEABILITY

Table 5 contains the verification cross reference matrix for all IOZ requirements. Requirements are presented in seven columns corresponding to the FDC Paragraph Number, SRD Paragraph Number, Requirement Description, Verification Method (Analysis, Inspection, Demonstration, or Test). Complete descriptions of the verification methods were presented in Section 3.1 Certification Methods. The O&C Facilities System Requirements Document, DRD CEV-T-082, contains a similar matrix. The major difference between the verification matrix in the SRD is that the SRD version does not contain a cross reference column to FDC requirements.

Table 7: DRD CEV-T-082 Verification Cross Reference Matrix

FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.3.1.27 3.3.1.32	3.3.1.1	Computer Room air conditioning system shall be independent to the CWA system.				X
3.3.1.27 3.3.1.32	3.3.1.2	Computer Room air conditioning system shall maintain temperature at 71° F ± 6°F.				X
3.3.1.27	3.3.1.3	CCMS Control Room air conditioning system shall maintain relative humidity at 35%≤RH≤60%.				X
3.3.1.27	3.3.1.4	CCMS Control Room air conditioning system shall provide filtration at MERV 11 (ASHRAE 52, 60-65%).				X
3.3.1.32	3.3.1.5	Server and Training Room air conditioning system shall maintain relative humidity at 30%≤RH≤60%.				X
3.3.1.32	3.3.1.6	Server and Training Room air conditioning system shall provide filtration at MERV 11 (ASHRAE 52, 60-65%).				X



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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.3.1.27 3.3.1.32	3.3.1.7	Computer Room air conditioning system pressure shall be less than the CWA and greater than adjacent spaces.				X
3.3.1.28	3.3.1.8	CCMS Control Room doors shall automatically close and seal when closed.			X	
3.3.1.29	3.3.1.9	CCMS Control Room air conditioner shall be sized for a 154KBTU/HR equipment cooling load and 15 people within space.	X			
3.3.1.33	3.3.1.10	Server Room air conditioner shall be sized for a 50KBTU/HR equipment cooling load.	X			
3.3.1.11	3.3.2.1	The air conditioning system shall maintain a temperature at 71° F ± 6°F in the Basement.				X
3.3.1.11	3.3.2.2	The air conditioning system shall maintain a relative humidity at 35%≤RH≤60% in the Basement.				X
3.3.1.11	3.3.2.3	The air conditioning system shall provide filtration at MERV 16 (ASHRAE 52, 90-95%) in the Basement.				X
3.3.1.11	3.3.2.4	The air conditioning system pressure shall be 0.05 in-H <sub>2</sub> O (adjustable) in the Basement.				X
3.3.1.7	3.3.3.1	The air conditioning system shall maintain a temperature at 71° F ± 6°F in the CWA.				X
3.3.1.7	3.3.3.2	The air conditioning system shall maintain a relative humidity at 35%≤RH≤60% in the CWA.				X
3.3.1.7	3.3.3.3	The air conditioning system shall provide filtration at HEPA MERV 18 (99.99%; non-DOP tested HEPA filters; Dioctylphthalate) in the CWA.				X

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.3.1.7	3.3.3.4	The air conditioning system pressure shall be 0.05 in-H <sub>2</sub> O (adjustable) in the CWA, including all spaces connected to clean work area.				X
3.3.1.7	3.3.3.5	The air conditioner shall accommodate a maximum of 2 air changes per hour in the CWA.				X
3.3.1.7	3.3.3.6	The air conditioner shall maintain a particulate count per ISO 14644-1 Class 8 (as-built, at rest, operational) in the CWA				X
3.3.1.7	3.3.3.7	CWA air conditioner Cleanliness shall be Certified by an independent third party.				X
3.3.1.30.1	3.3.3.8	CWA air conditioner shall be sized for a 50KBTU/HR equipment cooling load from the CCMS Front End Hardware.	X			
3.3.1.1	3.3.3.9	CWA air conditioner shall be sized for one person per 300 square feet.	X			
3.3.1.9	3.3.3.10	Receiving and Inspection Room shall be equipped with door that can be closed when exterior doors are open.		X		
3.3.1.7	3.3.4.1	The air conditioning system shall maintain a temperature at 71° F ± 6°F in the Airlock.				X
3.3.1.7	3.3.4.2	The air conditioning system shall maintain a relative humidity at 35%≤RH≤60% in the Airlock.				X
3.11.23	3.3.4.3	The air conditioning system shall provide filtration at HEPA MERV 18 Non-DOP tested ISO 14644-1 Class 5 delivered at HEPA filters in the Airlock Area.				X

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.11.23	3.3.4.4	The air conditioning system pressure shall be less than remainder of low bay and greater than ambient within the Airlock during vehicle refurbishment mode of operation.				X
3.11.25	3.3.4.5	The air conditioning system pressure shall be 0.05 in-H <sub>2</sub> O (adjustable) within the Airlock during airlock mode of operation.				X
3.11.23 3.11.25	3.3.4.6	The air conditioner shall accommodate a maximum of 2 air changes per hour in the Airlock.				X
3.11.25	3.3.4.7	The air conditioner shall maintain a particulate count per ISO 14644-1 Class 8 (as-built, at rest, operational) in the Airlock				X
N/A	3.4.1.1	The IOZ waste material management shall follow the IOZ Environmental, Safety and Health Plan as well as the KSC Environmental Policy Requirements as set forth in KSC KNPR 8500.1 Revision A.		X		
N/A	3.4.1.2	LM Environmental Safety and Health (ESH) shall implement a process for weekly internal inspections.		X		
3.4.7.16.1.1	3.5.1.1.1	Facility power shall be provided directly from the utility source.		X		
3.4.7.14.1	3.5.1.1.2	The Primary power system at the O&C shall consist of 13.2KV, 3 phase, 3 wire 60 Hz service provided from the base power grid.		X		
3.4.7.14.1	3.5.1.1.3	The primary power system to the IOZ shall be independent of other O&C areas.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.4.7.14.1	3.5.1.1.4	A failure of one of the primary power system shall not cause the building to lose its HVAC pressurization criteria.		X	X	
3.4.7.16.1.2	3.5.1.1.5	The nominal facility power voltage level shall be maintained to $\pm 5\%$ .				X
3.9.6 3.9.7.12	3.5.1.2.1	Three phase, 480V, 100 A, 5 wire receptacle shall be provided to the CM and SM test stations.		X		X
3.9.6 3.9.7.13	3.5.1.2.2	Three phase, 208V, 100 A, 4 wire receptacle shall be provide to the CM and SM test stations.		X		X
3.9.6 3.9.7.14	3.5.1.2.3	Three phase, 120/208V, 100A, 5 wire receptacle shall be provided to the CM and SM test stations.		X		X
3.9.6 3.9.7.15	3.5.1.2.4	Three phase, 120/208 50A, 5 wire receptacle shall be provided to the CM and SM test stations.		X		X
3.9.3 3.9.7.12	3.5.1.3.1	Three phase, 480V, 100 A, 5 wire receptacle shall be provided to the Integration Cell.		X		X
3.9.3 3.9.7.13	3.5.1.3.2	Three phase, 208V, 100 A, 4 wire receptacle shall be provide to the Integration Cell.		X		X
3.9.3 3.9.7.14	3.5.1.3.3	Three phase, 120/208V, 100A, 5 wire receptacle shall be provided to the Integration Cell.		X		X
3.9.3 3.9.7.15	3.5.1.3.4	Three phase, 120/208 50A, 5 wire receptacle shall be provided to the Integration Cell.		X		X
3.4.7.25.1	3.5.1.4.1	Technical power to the proof pressure cell will be via the proof pressure control room.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.4.7.25.2	3.5.1.4.2	Three phase 480V, 100A, 60 Hz shall be provided to the Proof Pressure Cell Control room.				X
3.4.7.25.4	3.5.1.4.3	Three phase 120/208V, 30A 5 wire technical power with load center shall feed the Proof Pressure Cell and Control room outlets.				X
3.4.7.25.3	3.5.1.4.4	Three phase 120/208V, 100A, 60Hz shall be provided to the Proof Pressure Cell Control room.				X
3.4.7.26.2	3.5.1.5.1	Three phase 480 VAC, 225A, 60 Hz Service disconnect shall be provided to the CCMS control room.				X
3.4.7.27.1	3.5.1.6.1	Two 120V, 20A, 4-cluster convenience outlets shall be provided to the TPS/Chemical Dispensing Room.				X
3.4.7.27.1	3.5.1.6.2	TPS/Chemical Dispensing Room convenience outlets shall be located approximately 20 feet apart on the west wall.		X		
3.4.7.16.2.5	3.5.1.7.1	Perimeter lighting shall be powered by Facility power.		X	X	
3.4.7.16.2.5	3.5.1.7.2	IOZ Server Room communications racks shall be powered by Technical Power provided by the Facility.		X	X	
3.4.7.16.2.5	3.5.1.7.3	Electronic Security system shall be powered by Technical Power provided by existing O&C Building system UPS outside the IOZ.		X	X	
3.4.7.16.2.5	3.5.1.7.4	Building High and Low Bay Emergency Lighting shall be powered by Facility power with generator backup.		X	X	
3.4.7.16.2.5	3.5.1.7.5	General Purpose Receptacles shall be powered by Facility power.		X	X	

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.4.7.16.2.5	3.5.1.7.6	Communications shall be powered by Technical Power provided by existing O&C Building system UPS outside the IOZ.		X	X	
3.4.7.16.2.5	3.5.1.7.7	Utility Suite receptacles used to energize GSE shall be powered by Technical Power.		X	X	
3.4.7.16.2.5	3.5.1.7.8	Receptacles or panels used to energize CCMS hardware shall be powered by Technical Power.		X	X	
3.4.7.15.1	3.5.1.8.1	The secondary power distribution system shall consist of a 480/277V, 3Φ, 60 Hz system.		X		
3.4.7.15.2	3.5.1.8.2	Secondary power shall be distributed to the various building load centers for distribution as 480V or reduced through transformers for lower voltage usage.		X		
3.4.7.15.3	3.5.1.8.3	Secondary power shall be distributed from the O&C site substation locations.		X		
3.4.7.16.2.1	3.5.1.9.1	Technical power shall be provided with the addition of Uninterruptible Power Supplies (UPS).		X		
3.4.7.16.2.2	3.5.1.9.2	The UPS shall be fed by facility power with a minimum full load battery backup time of 15 minutes.			X	
3.4.7.16.2.3	3.5.1.9.3	The UPS shall also contain a separately powered static bypass switch, which will transfer the UPS output load to an alternate power feed if the UPS unit should fail.		X	X	
3.4.7.16.2.4	3.5.1.9.4	UPS output power shall be continuous throughout specified period of backup usage.			X	
3.4.7.16.2.4	3.5.1.9.5	Technical UPS Power nominal voltage tolerance shall be ±5%.				X

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.4.7.16.2.4	3.5.1.9.6	Technical UPS Power nominal frequency tolerance shall be $\pm 1$ Hz.				X
3.4.7.16.2.4	3.5.1.9.7	Technical UPS Power total harmonic distortion tolerance shall be $< 5\%$ .				X
3.4.7.9.1	3.5.1.10.1	Receptacles shall be polarized.		X		
3.4.7.9.1	3.5.1.10.2	Receptacles shall be of a type suitable for the environment in which they are installed.		X		
3.4.7.9.2	3.5.1.10.3	It shall not be possible to insert a plug of one voltage rating into a receptacle of another voltage rating.		X		
3.4.7.9.3	3.5.1.10.4	Each technical power receptacle shall be marked with circuit number and panel number.		X		
3.4.7.9.4	3.5.1.10.5	All receptacles, except 120-Volt general-purpose convenience outlets, shall be marked with amperage rating, voltage, frequency characteristics, and panel of origin.		X		
N/A	3.5.1.10.6	General purpose, 120-Volt convenience outlets, shall be marked with panel source and circuit number using black lettering and white background per KSC-SPEC-E-0026(A).		X		
3.7.1.1	3.5.2.1.1	The grounding and lightning protection systems shall comply with Article 250 of NFPA 70 and NFPA 780 as a minimum.		X		
3.7.1.3	3.5.2.1.2	The grounding systems shall incorporate three separate systems including, Facility ground system, Technical ground system, and Lightning protection system.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.7.1.4	3.5.2.1.3	The technical and facility ground systems shall be isolated from each other except at connection to the single point ground.		X		
3.7.1.5	3.5.2.1.4	Ground return conductors shall be a minimum of a #4/0 bare stranded copper conductor and connected to the building ground counterpoise.		X		
3.7.2.1	3.5.2.2.1	Facility Ground System maximum ground counterpoise resistance shall be 5Ω.				X
3.7.2.3	3.5.2.2.2	Facility Ground System maximum electrical bonding resistance between metal facility structural members shall be 1.0Ω.				X
3.7.3.1	3.5.2.3.1	Technical Ground System plates shall be identified on the ground plate as "Technical Ground" to distinguish them from the Facility Ground System ground plates.		X		
3.7.3.2	3.5.2.3.2	The feeders from the Technical Ground System to the various areas shall be electrically isolated from all other grounds except at the single point connection.		X		
3.7.3.3	3.5.2.3.3	Technical Ground System ground cables shall have 600V type insulation.		X		
3.7.3.4	3.5.2.3.4	Technical Ground System ground riser shall be an insulated stranded copper cable routed inside a 2-inch rigid conduit.		X		
3.7.3.5	3.5.2.3.5	The Technical Ground System riser conduit shall stub up 6 inches above the floor with the cable at least 18 inches longer than the conduit.		X		



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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.7.3.7	3.5.2.3.6	The Technical Ground shall be isolated from all other facility users.		X		
3.7.3.6	3.5.2.3.7	Technical Ground System ground resistance shall not exceed 1 $\Omega$ from the technical ground plate to the earth ground grid.				X
3.7.1.1	3.5.2.4.1	The O&C facility shall have lightning protection in accordance with NFPA 780 "Standard for the Installation of Lightning Protection Systems, Chapter 4, Protection for Ordinary Structures.		X		
3.7.4.1	3.5.2.5.1	Grounding System bonding practices utilized shall be in accordance with NFPA 70, Article 250, Section G.		X		
3.7.4.2	3.5.2.5.2	All bonding and grounding wire shall be insulated or protected above grade.		X		
3.7.4.4	3.5.2.5.3	Bonds, which are located not reasonable accessible for maintenance, shall be sealed with permanent waterproof compound.		X		
3.7.4.6	3.5.2.5.4	All metal non-current carrying parts of the facility shall be electrically bonded together.		X		
3.7.4.7	3.5.2.5.5	Bonding of ground cables to the counterpoise shall be by exothermic weld.		X		
3.7.4.9	3.5.2.5.6	Ground Plate Bond Resistance shall not exceed 1 milliohm.				X
3.7.4.8	3.5.2.5.7	Bonds for ground conductors (power circuits, control circuits, signal circuits or lightning protection) shall be 2.5 milliohms or less.				X
3.4.7.7.1	3.5.2.6.1	Conduit installed in the IOZ shall be grounded metallic conduit to provide EMI shielding at the IOZ.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.4.7.7.1	3.5.2.6.2	Except for solid conduit shields, shields will be isolated from each other and from any metallic component by at least 1.0 megohms (DC) when shield grounds are lifted.				X
3.4.7.7.1	3.5.2.6.3	Solid conduit shields shall not be isolated from each other or from structure.		X		
3.6.1.1	3.5.3.1.1	Illumination and recommended lighting levels for all areas of the IOZ shall conform to Illumination Engineering Society of North America, Lighting Handbook.	X	X		
3.6.1.1	3.5.3.1.2	Lighting in the CWA of the IOZ shall be 35 -50 foot candle 3ft above floor, mid-range correlated color temperature (white light), 3500- 5500 degree Kelvin, color rendering index 65-70 – true color	X	X		
3.6.2.1	3.5.3.2.1	Emergency lighting shall be provided at critical areas to protect personnel and secure operations in the event of power failure in accordance with NFPA 101 and NFPA 70.		X		
3.6.2.2	3.5.3.2.2	Emergency lighting units with battery back up shall be used in offline, basement, and stair areas.		X	X	
3.19.3.16	3.6.1.1	Any electrical powered system that supports personnel safety shall have back-up power or secure itself in a fail-safe manner.			X	
N/A	3.6.1.2	Any electrical powered system that supports flight hardware or GSE that interfaces to flight hardware shall have back-up power.		X		
3.4.7.15.3	3.6.1.3	Backup power with automatic switching shall be provided to the HVAC system.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
N/A	3.6.1.4	Batteries utilized for all IOZ backup systems shall be rated for human occupancy areas.		X		
N/A	3.6.2.1	Environmental data parameters including temperature and humidity at a minimum shall be continuously monitored and maintained in the event of failure of the primary HVAC monitoring system.			X	
3.5.7.1.2	3.7.1.1	The Proof Test Cell (Room 1486) vent shall be rated for 6000 psi maximum initial vent pressure.		X		X
3.5.7.2.2	3.7.1.2	The Vendor Support (Room 1449) vent shall be rated for 6000 psi maximum initial vent pressure.		X		X
3.5.7.3.1	3.7.1.3	Provide GHe vent for each utility suite to outside of facility above roofline for pneumatic venting.		X		
3.5.7.3.1	3.7.1.4	Provide GN <sub>2</sub> vent for each utility suite to outside of facility above roofline for pneumatic venting.		X		
3.5.1.4	3.7.2.1	Each utility suite shall have access to compressed air system.		X		
3.5.1.9	3.7.2.2	Compressed air cleanliness requirements shall meet KSC-C-123 level VC.				X
3.5.3.2	3.7.2.3	Each utility suite shall have access to the GHe system.		X		
3.5.3.3	3.7.2.4	GHe system shall provide 3000 psi nominal facility (200 scfm minimum) 6000 psi capability.		X		X
3.5.3.8	3.7.2.5	GHe system cleanliness requirements shall meet KSC-C-123 level 300A.				X
3.5.2.2	3.7.2.6	Each utility suite shall have access to the GN <sub>2</sub> system.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.5.2.3	3.7.2.7	GN2 system shall provide 3000 psi nominal facility (200 scfm minimum), 6000 psi capability.		X		X
3.5.2.8	3.7.2.8	GN2 system cleanliness requirements shall meet KSC-C-123 level 300A.				X
3.5.1.10	3.7.2.9	Provide compressed air service outlets along south IOZ wall sized and spaced to accommodate air bearing pallet operation		X		
3.5.4.2	3.7.3.1	Potable water supply shall be provided for fixed eye wash, sinks and emergency showers in TPS/Chemical Dispensing Area.		X	X	
3.14.1.1	3.8.1.1	The IOZ fire detection and alarm system shall interface to existing KSC Central Fire Alarm System.		X	X	
3.14.1.3	3.8.1.2	The fire alarm system shall have battery backup with battery charger.		X		
3.14.1.5	3.8.1.3	Unique general fire alarm audio warning devices shall be located throughout the facility for general alarm signal and be distinguishable from other alarms.		X	X	
3.14.1.6	3.8.1.4	Manual pull stations shall be located at exit routes.		X		
3.14.1.7	3.8.1.5	Electrical devices shall be rated for the appropriate commodity in the area they are installed in.		X		
3.14.1.8	3.8.1.6	The fire detection and alarm systems shall provide or be tied into existing central interface panels with provision for remote monitor and transmitter for alarm signals to the KSC central fire alarm systems.		X	X	

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.14.1.9	3.8.1.7	Existing fire detection and alarm system components removed shall be replaced with new components that conform to most current NFPA 72 and NFPA 90A Standards.		X		
3.14.2.1	3.8.2.1	All areas of the IOZ shall comply with the most current NFPA 72, NFPA 90A codes and NASA-STD-8719.22 regarding fire suppression systems.		X		
3.14.2.2	3.8.2.2	Water lines shall not be routed above ceiling in CWA.		X		
3.14.2.3	3.8.2.3	HVAC supply and return smoke detectors shall be installed and interlocked as a system.		X	X	
3.14.2.3	3.8.2.4	Air handlers shall shut down in the event of smoke detection.		X	X	
3.14.2.4	3.8.2.5	Specific suppression design for each room/area will be provided in Facility Drawing and approved by KSC Authority Having Jurisdiction and Lockheed Martin.		X		
N/A	3.8.2.6	Class D fire extinguishers shall be provided where the fire hazard is due to Lithium Ion Spacecraft		X		
3.19.3.19	3.8.3.1	The hazard material/waste management shall follow LMSSC Command Media and KSC Environmental Policy Requirements a set forth in KSC KNPR 8500.1 Revision A.		X		
3.19.3.19	3.8.3.2	The use of low volatile organic compounds for surface coatings shall be used.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.19.3.19	3.8.3.3	No Class I or Class II Ozone Depleting Substances (i.e. Freon or other halogenated hydrocarbons) will be used.		X		
3.19.3.19	3.8.3.4	No asbestos containing material (i.e. drywall, mastic, tile, felt, sealants, caulk, coatings, insulation, etc.) will be used.		X		
3.19.3.19	3.8.3.5	No lead, chromium or mercury based coatings shall be used.		X		
3.8.2.1	3.9.1.1.1	KSC supplied OISD shall be provided in the IOZ.		X		
3.8.2.1	3.9.1.1.2	As a minimum, KSC supplied OISD shall be provided to the IOZ CCMS Control Room (Room 1255), High/Low Bay and Airlock (Rooms 1400 and 1492), Integration Cell (Room 1415), Tool Crib (Room 1463), Proof Test Cell (Room 1486), TPS/Chemical Dispensing Area (Room 1461), and Proof Test Control Room (Room 1493).		X	X	
N/A	3.9.1.1.3	Specific KSC supplied OISD box locations will be detailed in facilities drawings and approved by Lockheed Martin prior to installation.		X		
3.8.3.2	3.9.1.2.1	A telephone system shall be provided in the IOZ.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.8.3.2	3.9.1.2.2	As a minimum, Telephones shall be provided to the IOZ East and West Basement Areas (Room 0108), CCMS Control Room (Room 1255), High/Low Bay and Airlock (Rooms 1400 and 1492), Integration Cell (Room 1415), Vendor Areas (Room 1449), Conference Room (Room 1465), Office Areas (Room 1465), Personnel Prep Area (Room 1456), Tool Crib (Room 1463), Flight Inventory Area (Room 1480), Proof Test Cell (Room 1486), TPS/Chemical Dispensing Area (Room 1461), and Proof Test Control Room (Room 1493).		X	X	
N/A	3.9.1.2.3	Specific Telephone locations will be detailed in facilities drawings and approved by Lockheed Martin prior to installation.		X		
3.8.6.1	3.9.1.2.4	The IOZ telephone system shall include an audio paging system.		X	X	
3.8.7.1	3.9.1.3.1	A public address system shall be provided in the IOZ.		X	X	
N/A	3.9.1.3.2	The public address service shall be audible in all areas of the IOZ.			X	
3.8.4	3.9.1.4.1	An aural warning system shall be provided for use during critical move and hazardous operations.			X	
3.8.5	3.9.1.4.2	A visual warning system shall be provided for use during critical move and hazardous operations.			X	
3.17.1	3.9.1.5.1	A Work Imaging System shall be provided to visually document the CEV spacecraft configuration during IOZ assembly, integration, and closeout.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.17.2	3.9.1.5.2	The Work Imaging System will document required events, as defined in the CEV Imagery Plan, using a combination of digitally formatted still and motion imagery.		X		
3.17.3	3.9.1.5.3	Work Imagery System will include four portable digital cameras for still photographs that meet the requirements of the CEV Imagery Plan for format, resolution, storage size, and storage portability.		X		
3.17.10.1	3.9.1.5.4	Work Imagery System will include two high definition portable motion imagery cameras with tripods.		X		
3.18	3.9.1.6.1	The IOZ shall have a Work Control System (Data Communication Network).		X		
3.18	3.9.1.6.2	As a minimum, Network drops shall be provided to the IOZ CCMS Control Room (Room 1255), Server Room (Room 1460), Low Bay Assembly Station Utility Suites (Room 1400), Integration Cell (Room 1415), Vendor Areas (Room 1449), Conference Room (Room 1465), Office Areas (Room 1465), Tool Crib (Room 1463), Receiving and Inspection (Room 1469), Flight Inventory Area (Room 1480), Proof Test Cell (Room 1486), TPS/Chemical Dispensing Area (Room 1461), and Proof Test Control Room (Room 1493).		X	X	
3.18	3.9.1.6.3	The Data Communication Network shall be provided to all Lockheed Martin occupied office areas as designated by NASA.		X	X	



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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
N/A	3.9.1.6.4	Network Architecture details will be provided in facilities drawings and approved by Lockheed Martin prior to installation.		X		
N/A	3.9.2.1	The IOZ shall have LMI connectivity to the LM backbone.			X	
N/A	3.9.2.2	Range IRIG B input shall be provided to the CCMS Control Room (Room 1255).			X	
N/A	3.10.1.1	Floor load limits as detailed in O&C Main Level Floor Plan drawing 82K007806 shall be observed in the IOZ.		X		
N/A	3.10.1.2	Tooling stands shall observe uniform and point floor load limits as detailed in O&C Main Level Floor Plan drawing 82K007806.		X		
N/A	3.10.1.3	Transportation tooling design shall observe uniform and point floor load limits as detailed in O&C Main Level Floor Plan drawing 82K007806.		X		
3.2.4.13.1	3.10.2.1	The Proof Test Cell shall have wall, ceiling, and doors capable of withstanding overpressure and shrapnel release conditions associated with instantaneous rupture of pressure vessel of 20 ft <sup>3</sup> volume at 6750 pounds per square inch gauge (psig).	X	X		
3.2.4.13.2	3.10.2.2	The Proof Test Cell door shall be sized to accommodate a CM including its associated transportation tooling stand.		X		
3.2.4.13.2	3.10.2.3	The Proof Test Cell door shall be sized to accommodate an SM including its associated transportation tooling stand.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.2.3.3.3	3.10.3.1	All holes and other penetrations in the high and low bays shall be patched and sealed.		X		
3.2.3.3.5	3.10.3.2	Variations in floor smoothness shall be no greater than 5/16" in 10 feet.		X		X
3.2.3.3.5	3.10.3.3	Replace floor coatings in High Bay, Low Bay, Integration Cell, and Offline Areas with clean room compatible industrial standard floor coating.		X		
3.2.3.3.5	3.10.3.4	Floor coatings in High Bay, Low Bay, Integration Cell, and Offline Areas shall maintain current floor load.		X		
3.12.3	3.10.3.5	Basement floor shall be sealed to minimize water intrusion.		X		
N/A	3.11.1.1	Lockheed Martin will adopt and or comply with existing local KSC policy for access to KSC.		X		
N/A	3.11.1.2	IOZ Security System will interface with existing O&C and KSC Protective Services.		X	X	
N/A	3.11.1.3	All external IOZ access shall have alarms connected to Facility Security System.		X	X	
N/A	3.11.1.4	All HVAC passages and underground conduits that lead into the IOZ large enough for a person to crawl through shall be grated and securely locked in a closed position.		X		
N/A	3.11.1.5	Upon alarm detection, Facility Security System shall automatically notify KSC Protective Services.		X	X	
N/A	3.11.1.6	The Training Room shall be equipped with a keyed and cipher lock.		X	X	
N/A	3.11.1.7	The Server Room shall be equipped with a keyed and cipher lock.		X	X	

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
N/A	3.11.1.8	Lockheed Martin shall develop a Facility Memorandum of Agreement for facility use with KSC.		X		
N/A	3.11.2.1	All Lockheed Martin and subcontractors/vendors will be cleared and badged to KSC		X		
N/A	3.11.2.2	Lockheed Martin will establish a foreign national visitor program.		X		
N/A	3.11.2.3	Lockheed Martin will ensure security Corporate Policy Statements are met to include CPS-569 (Security) and CPS-565 (Workplace Security-Maintaining a Safe and Respectful Workplace Free from Threats and Violence).		X		
N/A	3.11.3.1	LMSSC will provide an IOZ external access system design, procurement, and installation.		X	X	
N/A	3.11.3.2	Access Control Badge will be required by Personnel to enter the IOZ.		X	X	
N/A	3.11.3.3	Access Control Badge will be required by Personnel to enter the CCMS Control Room.		X	X	
N/A	3.11.3.4	Lockheed Martin will ensure all external maintenance areas adjacent to the IOZ are controlled access and are integrated in the external access control system.		X	X	
N/A	3.11.4.1	Lockheed Martin shall develop a System Security Plan.		X		
3.16.1	3.12.1.1	One, top-running double girder, bridge crane with a minimum rating of 25 tons shall be provided in the IOZ.		X		X

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.16.1.2	3.12.1.2	The bridge crane will be located on the existing lower runway rails and will travel the length of the high and low bays.		X		
3.16.3	3.12.1.3	Design, fabrication, test and installation of the new crane shall comply with the following documents: ASME B30.2 "Overhead and Gantry Cranes", CMAA 70 "Crane Manufacturer's Association of America", OSHA 29 CFR 1910.179 "Overhead and Gantry Cranes", and NASA-STD-8719.9 "Standard for Lifting Devices and Equipment".		X		
3.16.4	3.12.1.4	A Functional Failure Modes and Effects Analysis (FFMEA) shall be performed on each crane.	X			
3.16.5	3.12.1.5	The east side existing crane, located on the lower runway rails shall be removed and replaced with a new crane.		X		
3.16.5.2	3.12.1.6	The existing crane on the upper runway will remain for future use without modifications.		X		
3.16.6	3.12.1.7	The new crane shall be suitable for operation in Class 100k Clean Work Area.		X		
3.16.9	3.12.1.8	The crane shall be fail safe design to maintain load position during all power, control and mechanical failures.			X	
3.16.9.1	3.12.1.9	Crane design shall allow loads to be safely lowered under emergency conditions due to crane component/system failures.			X	
3.16.10	3.12.1.10	Hoist, trolley and bridge motion shall all be variable speed and provide micro inching capability.			X	

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.16.11	3.12.1.11	The controls for trolley hoist and bridge motion shall employ control features to limit acceleration and deceleration forces imparted to the load.			X	
3.16.12	3.12.1.12	New crane operations shall utilize radio frequency (RF) controls for primary control system.		X		
3.16.12.1	3.12.1.13	Crane operations are to be protected from radio interference and the radio frequency control system shall be in compliance with and licensed under FCC Part 90 Rules.		X		
3.16.12.2	3.12.1.14	Selection of the radio control operating frequency shall be coordinated with the KSC Radio Frequency Spectrum Management office. A Radio Frequency Authorization will be approved by the KSC Spectrum Manager prior to procurement of the cranes.		X		
3.16.13	3.12.1.15	Pendant control shall be provided as a backup control system in case of RF control system failure.		X	X	
3.16.13.1	3.12.1.16	Primary versus backup controls shall be selectable on the crane.			X	
3.16.14	3.12.1.17	The existing lower crane runway girders and rails shall be reused. A survey of the runway rails shall be conducted to verify proper alignment and compliance with CMAA 70 requirements.		X		
3.16.19	3.12.1.18	Remote emergency E-Stop controls shall be provided where required to comply with NASA-STD-8719.9.			X	

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
N/A	3.12.1.19	Existing Low Bay Crane will remain in Airlock for future use.		X		
N/A	3.12.1.20	Existing Hoist in Shipping and Receiving Area will remain for future use.		X		
3.2.6.3.2	3.12.2.1	Lift #9 (Former Elevator #9 - West End of IOZ Basement) shall be upgraded to comply with ASME/ANSI 17.1 requirements.		X		
3.2.6.4.2	3.12.2.2	Lift #11 (Former Elevator #11 - East Platform Area) shall be upgraded to comply with ASME/ANSI 17.1 requirements.		X		
3.2.6.3.1 3.2.6.4.1	3.12.2.3	All elevators to be upgraded and utilized as Lifts will be refurbished to support an additional 20 years of serviceable life.		X		
N/A	3.13.1.1	Lockheed Martin will create a Human Engineering checklist using KSC-512-SM and MIL-STD-1472F as guidelines and evaluate IOZ new and modified facilities and facilities systems using the checklist.		X		
N/A	3.14.1.1	Configuration of the IOZ will be managed by Lockheed Martin Facilities Engineering.		X		
N/A	3.15.1.1	Lockheed Martin Planning Department shall develop a Facility integrated master schedule that identifies facility milestones, dependencies, and durations using Microsoft Project.		X		
N/A	3.15.1.2	Lockheed Martin Planning Department shall follow established Lockheed Martin standard operating process for schedule development per 2.1.3-T1-PgmMgt-1.0-P.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
N/A	3.15.1.3	Working schedules (shifts, days, and hours) will be developed by the Contractor that map to the Lockheed Martin Integrated Master Schedule.		X		
3.9.1	3.16.1.1.1	Eight Utility Suites shall be installed in the Low Bay to support the six Processing Stations and two Flex Stations.		X		
3.9.9	3.16.1.1.2	Processing Station and Flex Station Utility Suites shall have flush mounted covers.		X		
3.9.2	3.16.1.1.3	Two Utility Suites shall be installed in the Vendor Support Area.		X		
3.9.3	3.16.1.1.4	One Utility Suite shall be installed in the Integration Cell Area.		X		
3.9.5	3.16.1.1.5	One Utility Suite shall be installed in the Airlock Area.		X		
3.9.4	3.16.1.1.6	One Utility Suite shall be installed in the Proof Test Cell.		X		
3.9.7.1	3.16.1.2.1	Utility Suites shall contain a debris vacuum connection.		X	X	
3.9.7.2	3.16.1.2.2	Utility Suites shall contain a 120 psi (minimum) compressed air connection with a 5 micron filter.		X		X
3.9.7.3	3.16.1.2.3	Utility Suites shall contain one LAN connection.		X	X	
3.9.7.4	3.16.1.2.4	Utility Suites shall contain one telephone connection		X	X	
3.9.7.5	3.16.1.2.5	Utility Suites shall contain two Building Automation LAN connections dedicated to particle counters.		X	X	
3.9.7.7	3.16.1.2.6	Utility Suites shall contain one GN2, 3000 PSI connection. Piping shall be rated for 6000 psi (MAWP) to allow for future system capability.		X		X

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
3.9.7.8	3.16.1.2.7	Utility Suites shall contain one GHe, 3000 PSI connection. Piping shall be rated for 6000 psi (MAWP) to allow for future system capability.		X		X
3.9.7.9	3.16.1.2.8	Utility Suites shall contain one ground connection tied to technical ground system.		X		X
3.9.7.10	3.16.1.2.9	Utility Suites shall contain one ground connection tied to the facility ground system.		X		X
3.9.7.12	3.16.1.2.10	Utility Suites shall contain one 480 VAC, 100 Amp, 3 phase, 5 wire receptacle.		X		X
3.9.7.13	3.16.1.2.11	Utility Suites shall contain one 208VAC, 100 Amp, 3 phase, 4 wire receptacle.		X		X
3.9.7.14	3.16.1.2.12	Utility Suites shall contain one 120/208 VAC, 100 Amp, 3 phase, 5 wire receptacle.		X		X
3.9.7.15	3.16.1.2.13	Utility Suites shall contain one 120/208 VAC, 50 Amp, 3 phase, 5 wire receptacle.		X		X
3.9.7.17	3.16.1.2.14	One set of chilled water supply and return connections shall be provided in Processing and Flex Utility Suites.		X		
3.9.7.18.1 Through 3.9.7.18.7	3.16.1.3.1	Particle Counters shall be located throughout the Facility.		X		
N/A	3.16.1.3.2	Specific location and capability of particle counters will be shown on the Facilities drawing and approved by Lockheed Martin.		X		
N/A	3.17.1.1	Lockheed Martin Facilities Engineering will establish minimum standards of performance for the facility and facilities systems.		X		



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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
N/A	3.17.1.2	Lockheed Martin Facilities Engineering or a designated Representative shall develop test procedures to validate the performance of the facility and facilities systems.		X		
N/A	3.17.1.3	A database will be maintained by LM Facilities Engineering to capture all relevant parametric performance data for the facility and facilities systems validation.		X		
N/A	3.17.1.4	An FFMEA will be performed on the High Bay East door	X	X		
N/A	3.17.1.5	An FFMEA will be performed on the Low Bay West door	X	X		
N/A	3.18.1.1	Lockheed Martin Facilities Engineering shall develop an IOZ Concept of Operations that identifies the means and methods for facility operation, maintenance, and modifications.		X		
N/A	3.18.1.2	Lockheed Martin Assembly, Integration, and Production shall develop an IOZ Concept of Operations that identifies the roles and responsibilities of the AI&P Team.		X		
N/A	3.18.1.3	Lockheed Martin Assembly, Integration, and Production shall develop an FOE Plan.		X		
N/A	3.19.1.1	Maintenance of this facility will be managed by Lockheed Martin Facilities Engineering.		X		
N/A	3.19.1.2	Maintenance of this facility will be performed by a NASA approved facility maintenance contractor to contract requirements.		X		

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FDC Revision 4 Paragraph Number	SRD 082 Paragraph Number	Requirement	Verification Method			
			A	I	D	T
N/A	3.20.1.1	Sustaining Engineering and Obsolescence Planning of this facility will be managed by Lockheed Martin Facilities Engineering.		X		

## 4 ACRONYMS

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A	Amperes
A&E	Architectural and Engineering
AI&P	Assembly Integration and Production
CAPPS	Checkout Assembly and Payload Processing Services
CCMS	Command Control and Monitor System
CCTV	Closed-Circuit Television
CEQATR	Constellation Program Environmental Qualification and Acceptance Testing Requirements
CEV	Crew Exploration Vehicle
CIPS	Lockheed Martin Common Integrated Processes
CLV	Crew Launch Vehicle
CM	Crew Module
CONOP	Concept of Operations
CWA	Clean Work Area
CxP	Constellation Program
DBA	Detonation Booster Assembly
DC	Direct Current
DFI	Developmental Flight Instrumentation
DRD	Data Requirements Description
ECLSS	Environmental Control and Life Support
EDQR	Electrical Designated Qualified Representative
EGSE	Electrical Ground Support Equipment
EMI	Electro Magnetic Interference
EPB	Kennedy Space Center Environmental Protection Branch
ESH	Environmental Safety and Health
F	Fahrenheit
FCC	Federal Communications Commission
FCDC	Flexible Confined Detonation Cord
FCR	Facilities Change Request
FDC	Facility Design Criteria
FFMEA	Functional Failure Modes and Effects Analysis
FOE	Foreign Object Elimination

Contract Number: NNJ06TA25C

FRD	Facilities Requirements Document
GHe	Gaseous Helium
GN <sub>2</sub>	Gaseous Nitrogen
GOx	Gaseous Oxygen
GSE	Ground Support Equipment
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilation and Air Conditioning
Hz	Hertz
IES	Illumination Engineering Society of North America
IOZ	Industrial Operating Zone
ITAR	International Traffic in Arms Reduction
JSC	Johnson Space Center
KSC	Kennedy Space Center
LAN	Local Area Network
LEL	Lower Exposure Level
LM	Lockheed Martin
LMI	Lockheed Martin Intranet
LMSSC	Lockheed Martin Space Systems Company
MAWP	Maximum Anticipated Working Pressure
MGSE	Mechanical Ground Support Equipment
MLI	Multi-Layer Insulation
MRB	Material Review Board
MSDS	Material Safety Data Sheet
MSF	Manned Space Flight
M&TE	Measurement and Test Equipment
N <sub>2</sub> H <sub>4</sub>	Hydrazine
NASA	National Aeronautics and Space Administration
NDE	Non-Destructive Evaluation
NEC	National Electric Code
NFPA	National Fire Protection Act
NSI	NASA Standard Initiator
NTL	National Test Laboratory
O&C	Operations and Checkout
OFI	Operational Flight Instrumentation

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OSHA	Occupational Safety and Health
OTE	Out of Tolerance Equipment
OTN	Out of Tolerance Notice
OISD	Operational Voice Communications
PHS	Procedure History Sheet
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Gauge
PC	Personal Computer
PDR	Preliminary Design Review
PPE	Personal Protective Equipment
PTCS	Passive Thermal Control System
RCS	Reaction Control System
RF	Radio Frequency
RH	Relative Humidity
SA	Spacecraft Adapter
SDR	System Design Review
SM	Service Module
SME	Subject Matter Expert
TPS	Thermal Protection System
UPS	Uninterruptible Power Supply
USA	United Space Alliance
UUT	Unit Under Test
VAC	Volt Alternating Current