

PAYLOAD HAZARD REPORT		a. NO: GHR-AMS02-009
b. PAYLOAD: Alpha Magnetic Spectrometer-02 (AMS-02) GSE		c. PHASE: III
d. SUBSYSTEM: GHE Lifting Equipment	e. HAZARD GROUP: Structures	f. DATE: August 2010
g. HAZARD TITLE: Structural failure of hardware during ground handling/moving/operations.		i. HAZARD CATEGORY <input checked="" type="checkbox"/> CATASTROPHIC <input type="checkbox"/> CRITICAL
h. APPLICABLE SAFETY REQUIREMENTS: KHB1700.7C For Structural Failure of Flight Hardware, see AMS- 02-F01. There are no unique ground structural hazards for the flight hardware.		
j. DESCRIPTION OF HAZARD: Structural failure or inadvertent separation of the AMS-02 lifting equipment could result in injury to personnel and/or damage to STS/ISS equipment, payloads, ground support equipment and/or facilities. (Note: The eyebolts on the Lower USS-02 Shipping Cover are not permanently attached.)		
k. HAZARD CAUSES: 1. Inadequate structural design of the AMS-02 lifting equipment. 2. Structural deterioration of the AMS-02 lifting equipment due to use or aging. 3. Improper attachment of the AMS-02 swivel hoist rings. 4. Overload of the AMS-02 lifting equipment. 5. Improper assembly of the AMS-02 lifting equipment. 6. Personnel error.		
l. HAZARD CONTROLS: (See continuation sheet)		
m. SAFETY VERIFICATION METHODS: (See continuation sheet)		
n. STATUS OF VERIFICATION: (See continuation sheet)		
o. APPROVAL	PAYLOAD ORGANIZATION	SSP/ISS
PHASE I		
PHASE II		
PHASE III	<i>J. M. TREWIS MARDY 8/16/10</i>	<i>[Signature] 8/25/10</i>

PAYLOAD HAZARD REPORT CONTINUATION SHEET		a. NO: GHR-AMS02--009
b. PAYLOAD: Alpha Magnetic Spectrometer-02 (AMS-02) GSE		c. Phase III
k. HAZARD CAUSES:		
1. Inadequate structural design of the AMS-02 lifting equipment.		
l. HAZARD CONTROLS:		
1.1. The AMS-02 lifting equipment is being designed to a safety factor of 5:1 against ultimate for all crane lifting operations. For forklift operations, the Lower USS-02 Support Fixture is being designed to a safety factor of 3:1 against yield. Lifting equipment will be load tested to 1.25 times the rated load within one year prior to use. (See attached AMS-02 Ground Support Lifting/Handling Equipment Matrix)		
m. SAFETY VERIFICATION METHODS:		
1.1.1 Stress analyses will be performed to verify the proper safety factors defined in KHB 1700.7C were used.		
1.1.2 Proof load testing (2.0) and tagging of all AMS-02 lifting hardware.		
n. STATUS OF VERIFICATION:		
1.1.1 Closed. 1. ESCG-4450-06-STAN-DOC-0049, Strength Assessment of the AMS-02 Primary Lifting Fixture, 10/2006 2. ESCG-4005-05-STAN-DOC-0102, Strength Assessment of the AMS-02 Lower USS Ground Handling Equipment, 01/2007 3. ESCG-4005-05-STAN-DOC-0103, Strength Assessment of the AMS-02 Multi-Purpose Lifting Fixture (MPLF), 01/2007 4. ESCG-4450-06-STAN-DOC-0091, Strength Assessment of the AMS-02 Primary Lifting Fixture (SEG38120143-301 and -302), 09/2009		
1.1.2 Closed to SVTL.		

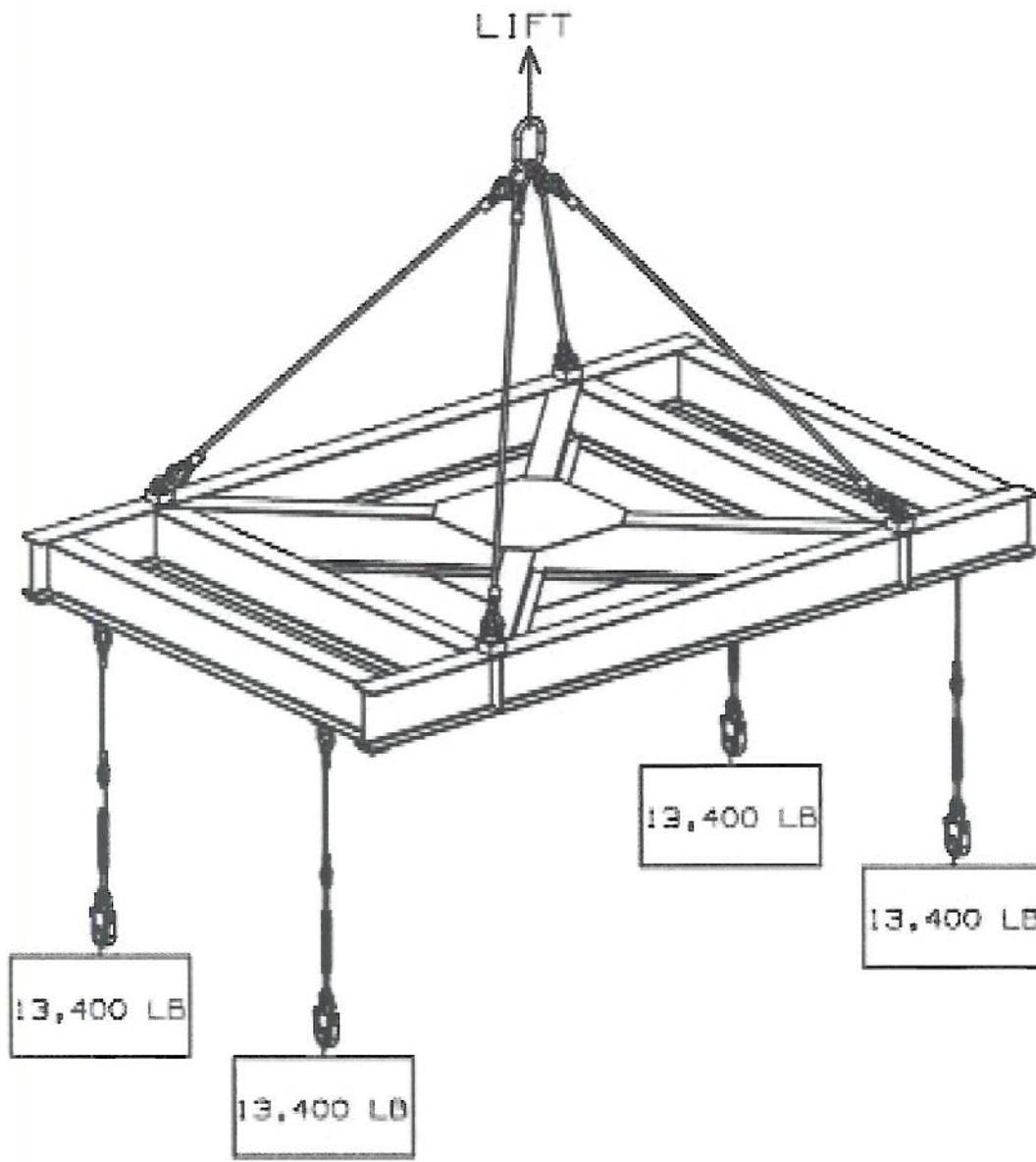
<p align="center">PAYLOAD HAZARD REPORT CONTINUATION SHEET</p>	<p>a. NO: GHR-AMS02-009</p>
<p>b. PAYLOAD: Alpha Magnetic Spectrometer-02 (AMS-02) GSE</p>	<p>c. Phase III</p>
<p>k. HAZARD CAUSES:</p> <p>2. Structural deterioration of the AMS-02 lifting equipment due to use or aging.</p>	
<p>l. HAZARD CONTROLS:</p> <p>2.1 Nondestructive Inspection (NDI) will be performed on AMS-02 shackles, swivel hoist rings, eyebolts that are not permanently attached, and master link assemblies.</p> <p>2.2 The AMS-02 lifting equipment will be visually inspected each day prior to use and structural inspections for proper identification of load rating and expiration date will be performed per KHB 1700.7C, Section 4.5.1.2.d.</p> <p>2.3 Lifting equipment will be load tested to 1.25 times the rated load within one year prior to use.</p>	
<p>m. SAFETY VERIFICATION METHODS:</p> <p>2.1.1 Review AMS-02 records to ensure NDI was performed.</p> <p>2.2.1 Review of AMS-02 lifting procedures to ensure inspections are included.</p> <p>2.3.1 Load testing will be completed to 1.25 times the rated load within one year prior to use.</p>	
<p>n. STATUS OF VERIFICATION:</p> <p>2.1.1 Closed to SVTL.</p> <p>2.2.1 Closed to SVTL.</p> <p>2.3.1 Closed to SVTL.</p>	
<p>JSC Form 542B (Rev November 22, 1999) (MS Word September 1997)</p>	

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b. PAYLOAD: Alpha Magnetic Spectrometer-02 (AMS-02) GSE	c. Phase III
k. HAZARD CAUSES: 3. Improper attachment of the AMS-02 swivel hoist rings.	
l. HAZARD CONTROLS: 3.1 Torque values and visual inspections for AMS-02 swivel hoist rings and removable eyebolts will be specified on AMS-02 drawings to ensure full thread engagement after mounting.	
m. SAFETY VERIFICATION METHODS: 3.1.1 Review of AMS-02 drawings and procedures to ensure requirements (torque values and visual inspections) are called out on them. 3.1.2 QA reports documenting that installed hardware meet requirements.	
n. STATUS OF VERIFICATION: 3.1.1 Closed. MPLF drawing SEG38117075 and PLF drawing SEG38117100. TPS#2A1020127-Swivel Hoist Installation on the PSS. 3.1.2 Closed to SVTL.	

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k. HAZARD CAUSES: 4. Overload of the AMS-02 lifting equipment.	
l. HAZARD CONTROLS: 4.1 The AMS-02 lifting equipment will be posted with the equipment identification, next required test date, quality control stamp, rated load, proof load and proof load date.	
m. SAFETY VERIFICATION METHODS: 4.1.1 QA inspections/verifications that the AMS-02 lifting equipment is properly posted/tagged.	
n. STATUS OF VERIFICATION: 4.1.1 Closed to SVTL.	

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k. HAZARD CAUSES: 5. Improper assembly of the AMS-02 lifting equipment.	
l. HAZARD CONTROLS: 5.1. Part and serial numbers for components of the AMS-02 lifting equipment that are normally disassembled will be specified on drawings and in procedures to assure proper reassembly. Slings which have components that are normally disassembled shall be marked, to assure proper assembly of verified hardware. 5.2. Approved drawings and procedures will be used for reassembly of the AMS-02 lifting equipment. 5.3. Lower USS Shipping Assembly cover has removable eyebolts with shoulders to ensure proper determination of full thread engagement. 5.4. The PSS Top Cover detachable lifting points are torqued to specified measurements to ensure proper engagement.	
m. SAFETY VERIFICATION METHODS: 5.1.1 Review of AMS-02 drawings and procedures for the AMS-02 lifting equipment. 5.1.2. Inspection of sling components to ensure that normally disassembled components are either marked, coded or tethered. 5.2.1 Review of AMS-02 procedures for reassembly instructions and QA inspections/verifications of proper reassembly. 5.3.1 Inspection of eyebolt insertion to ensure proper engagement. 5.4.1. Inspection of PSS Top Cover torque measurements to ensure they match what is in the assembly procedures and assembly drawings, ensuring proper engagement.	
n. STATUS OF VERIFICATION: 5.1.1 Closed to SVTL. 5.2.1 Closed to SVTL. <i>5.1.2 Closed to SVTL</i> 5.3.1 Closed to SVTL 5.4.1 Closed to SVTL	

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k. HAZARD CAUSES: 6. Personnel error.	
l. HAZARD CONTROLS: 6.1 All lifts will be accomplished by approved procedures.	
m. SAFETY VERIFICATION METHODS: 6.1.1 AMS-02 will participate in lift procedure development.	
n. STATUS OF VERIFICATION: 6.1.1 Closed to SVTL.	

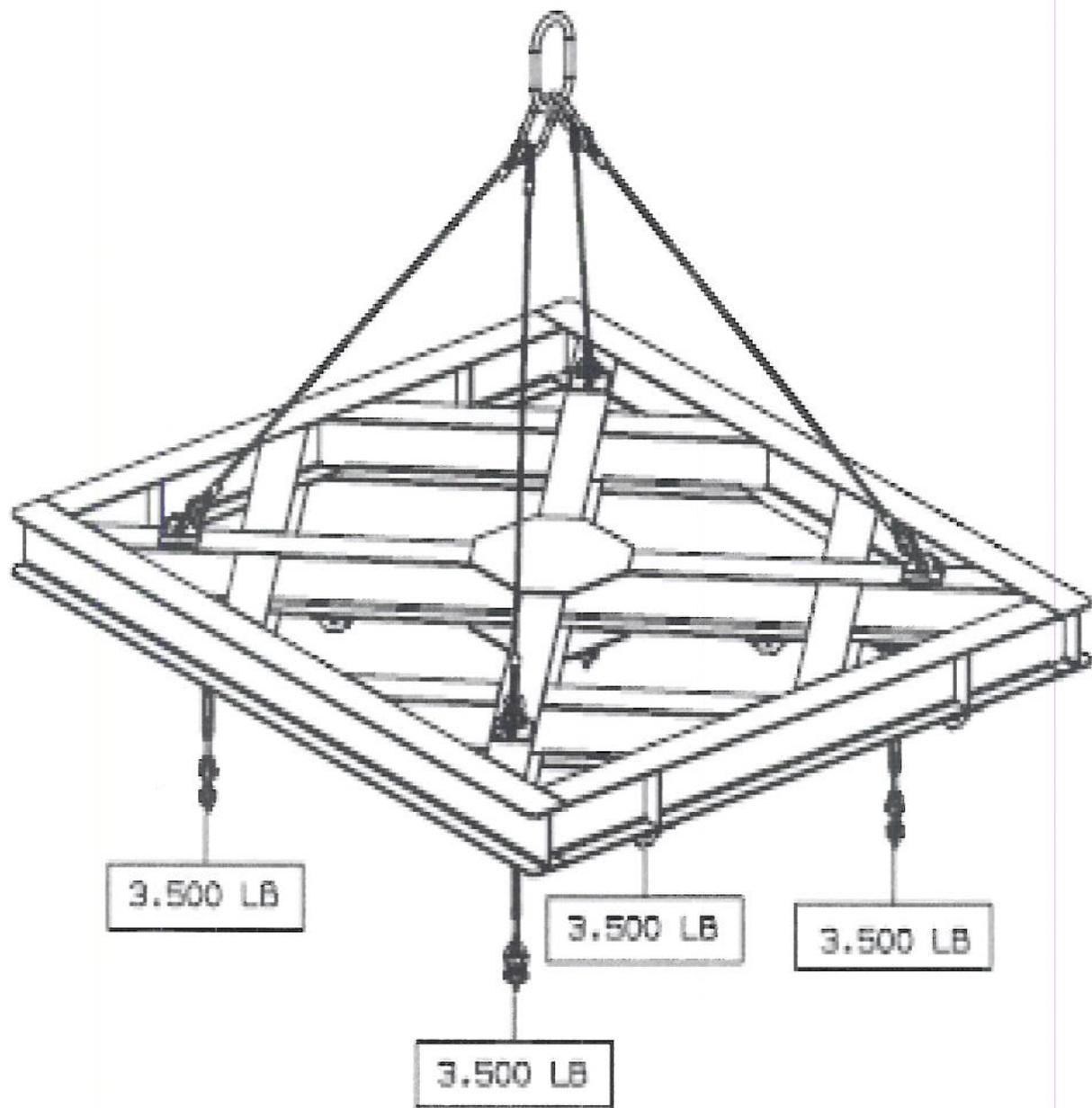


Primary Lifting Fixture (PLF)

GROUND SUPPORT LIFTING/HANDLING EQUIPMENT MATRIX

DESIGNATOR NUMBER	ITEM NAME	SLING (Note 1)		CRIT WELDS (Note 2)		ACTUAL LOADS (lbs)	RATED LOADS (lbs)	PROOF LOAD (lbs)	SAFETY FACTOR (Note 3)		VERIFICATION STATUS
		Met	Syn	Yes	No				Ult	Yield	
	Primary Lifting Fixture Hoist Assembly										
	<u>Overall Structure</u>										
SEG38117112-303	(PSS Inner Lifting Configuration – Converts mid to high)	X			X	25,600	26,800	53,600	> 5	> 3	Stress analysis completed per document ESCG-4450-06-STAN-DOC-0049
SEG38117112-307	(Top PSS Lifting Configuration – Lifts PSS in mid or high)	X			X	25,600	26,800	53,600	> 5	> 3	
SEG38117112-309	(USS-02 Lifting Configuration Short – Lifts AMS-02 out of PSS)	X			X	25,600	26,800	53,600	> 5	> 3	
									The minimum margin of safety for all the PLF lifting configurations is MSu = 0.27	The minimum margin of safety for all the PLF lifting configurations is MSy = 1.67	Note: The PLF was originally proof loaded to 2X WLL prior to initial use and load tested annually to 1X WLL. The PLF was load tested to 1.25X WLL on 23-Jul-10.

- Notes:
- 1 Identify whether slings are Metallic (Met) or Synthetic (Syn) by placing an "X" in the appropriate column. For synthetic slings, see Table 4-1 of KHB 1700.7 for the required safety factors and proof load test criteria.
 - 2 Denote whether to the device has a critical weld by placing an "X" in the appropriate column. If there are critical welds, other test may to applicable (see KHB 1700.7 para. 4.5.1.1.D). A critical weld is a weld, which constitutes a single point of failure. Where feasibly, critical welds should be eliminated.
 - 3 Per KHB 1700.7, Table 4-1, the safety factor shall be given in Ultimate:Rated. For structural members, a 3:1 safety factor against worst case failure mode that will result in local yielding is acceptable.



Multi-Purpose Lifting Fixture

GROUND SUPPORT LIFTING/HANDLING EQUIPMENT MATRIX

DESIGNATOR NUMBER	ITEM NAME	SLING (Note 1)		CRIT WELDS (Note 2)		ACTUAL LOADS (lbs)	RATED LOADS (lbs)	PROOF LOAD (lbs)	SAFETY FACTOR (Note 3)		VERIFICATION STATUS
		Met	Syn	Yes	No				Ult	Yield	
SEG38117125-307	<p style="text-align: center;">Multi-Purpose Lifting Fixture Hoist Assembly</p> <p style="text-align: center;"><u>Overall Structure</u></p> <p style="text-align: center;">(Lower USS Hoist Configuration – Lifts Lower USS GHE for PAS installation)</p>	X			X	3,051	7,000	14,000	> 5	> 3	<p style="text-align: center;">Stress analysis completed per document ESCG- 4005-05-STAN- DOC-0103 (As per pg 1-7 in report, analysis was done for 7000 lbs)</p> <p style="text-align: center;">The minimum margin of safety is MSu = 0.73</p> <p style="text-align: center;">The minimum margin of safety is MSy = 0.91</p> <p style="text-align: center;">Note: The MPLF was originally proof loaded to 2X WLL prior to initial use and load tested annually to 1X WLL. The MPLF was load tested to 1.25X WLL on 23- Jul-10.</p>

- Notes:
- 1 Identify whether slings are Metallic (Met) or Synthetic (Syn) by placing an "X" in the appropriate column. For synthetic slings, see Table 4-1 of KHB 1700.7 for the required safety factors and proof load test criteria.
 - 2 Denote whether to the device has a critical weld by placing an "X" in the appropriate column. If there are critical welds, other test may to applicable (see KHB 1700.7 para. 4.5.1.1.D). A critical weld is a weld, which constitutes a single point of failure. Where feasibly, critical welds should be eliminated.
 - 3 Per KHB 1700.7, Table 4-1, the safety factor shall be given in Ultimate:Rated. For structural members, a 3:1 safety factor against worst case failure mode that will result in local yielding is acceptable.

GROUND SUPPORT LIFTING/HANDLING EQUIPMENT MATRIX

DESIGNATOR NUMBER	ITEM NAME	SLING (Note 1)		CRIT WELDS (Note 2)		ACTUAL LOADS (lbs)	RATED LOADS (lbs)	PROOF LOAD (lbs)	SAFETY FACTOR (Note 3)		VERIFICATION STATUS
		Met	Syn	Yes	No				Ult	Yield	
SEG38117000-301	<u>Swivel Hoist Attachment on PSS</u> (Used when lifting PSS)	X			X	4X 6,400	4X 6,700	53,600	>5 The minimum margin of safety is MSy = 0.28	> 3 The minimum margin of safety is MSy = 1.27	Stress analysis completed per documents ESCG-4450-09-STAN-DOC-0128 and ESCG-4450-06-STAN-DOC-0003
SEG38117000-305	<u>Swivel Hoist Attachment on PSS Trunnion Cap</u> (Used when converting from mid to high)	X			X	4X 6,400	4X 6,700	53,600	>5 The minimum margin of safety is MSy = 0.28	> 3 The minimum margin of safety is MSy = 1.27	

- Notes:
- 1 Identify whether slings are Metallic (Met) or Synthetic (Syn) by placing an "X" in the appropriate column. For synthetic slings, see Table 4-1 of KHB 1700.7 for the required safety factors and proof load test criteria.
 - 2 Denote whether to the device has a critical weld by placing an "X" in the appropriate column. If there are critical welds, other test may to applicable (see KHB 1700.7 para. 4.5.1.1.D). A critical weld is a weld, which constitutes a single point of failure. Where feasibly, critical welds should be eliminated.
 - 3 Per KHB 1700.7, Table 4-1, the safety factor shall be given in Ultimate:Rated. For structural members, a 3:1 safety factor against worst case failure mode that will result in local yielding is acceptable.

GROUND SUPPORT LIFTING/HANDLING EQUIPMENT MATRIX

DESIGNATOR NUMBER	ITEM NAME	SLING (Note 1)		CRIT WELDS (Note 2)		ACTUAL LOADS (lbs)	RATED LOADS (lbs)	PROOF LOAD (lbs)	SAFETY FACTOR (Note 3)		VERIFICATION STATUS
		Met	Syn	Yes	No				Ult	Yield	
SEG38120683-701	PSS Top Cover		X		X	500	N/A	N/A	> 5	> 3	Stress Analysis per documents ESCG-4450-06-STAN-DOC-0003 and ESCG-4450-10-STAN-DOC-0062 Note: The Working Load Limit on the Swivel Hoist is 1000 lbs.
	<u>Swivel Hoist Attachment on Cover</u> PSS Top Cover (Used when lifting cover)		X		X	500	4X 1000	8000	> 5	> 3	

- Notes:
- 1 Identify whether slings are Metallic (Met) or Synthetic (Syn) by placing an "X" in the appropriate column. For synthetic slings, see Table 4-1 of KHB 1700.7 for the required safety factors and proof load test criteria.
 - 2 Denote whether to the device has a critical weld by placing an "X" in the appropriate column. If there are critical welds, other test may to applicable (see KHB 1700.7 para. 4.5.1.1.D). A critical weld is a weld, which constitutes a single point of failure. Where feasibly, critical welds should be eliminated.
 - 3 Per KHB 1700.7, Table 4-1, the safety factor shall be given in Ultimate:Rated. For structural members, a 3:1 safety factor against worst case failure mode that will result in local yielding is acceptable.
 - 4 Margin of Safety greater than 2.0 is defined as "HIGH".

GROUND SUPPORT LIFTING/HANDLING EQUIPMENT MATRIX

DESIGNATOR NUMBER	ITEM NAME	SLING (Note 1)		CRIT WELDS (Note 2)		ACTUAL LOADS (lbs)	RATED LOADS (lbs)	PROOF LOAD (lbs)	SAFETY FACTOR (Note 3)		VERIFICATION STATUS
		Met	Syn	Yes	No				Ult	Yield	
SEG38116930	Lower USS Shipping Assembly	X			X	3051	N/A	N/A	> 3	> 3	Stress Analysis per document ESCG-4405-05-STAN-DOC-0102
SEG38116948-001	<u>Lower USS GHE Hoist Tee</u> (Used when lifting PAS)	X			X	3051	4X 1750	14,000	> 5	> 3	

- Notes:
- 1 Identify whether slings are Metallic (Met) or Synthetic (Syn) by placing an "X" in the appropriate column. For synthetic slings, see Table 4-1 of KHB 1700.7 for the required safety factors and proof load test criteria.
 - 2 Denote whether to the device has a critical weld by placing an "X" in the appropriate column. If there are critical welds, other test may to applicable (see KHB 1700.7 para. 4.5.1.1.D). A critical weld is a weld, which constitutes a single point of failure. Where feasibly, critical welds should be eliminated.
 - 3 Per KHB 1700.7, Table 4-1, the safety factor shall be given in Ultimate:Rated. For structural members, a 3:1 safety factor against worst case failure mode that will result in local yielding is acceptable.
 - 4 Margin of Safety greater than 2.0 is defined as "HIGH".