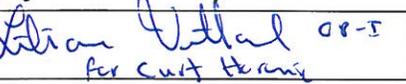
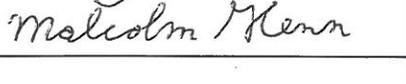


# Non-Load-Test Sling Request Form

## REVISION LOG

REV	DESCRIPTION	DATE
	Nitrogen Oxygen Recharge System (NORS) KSC Hoisting Equipment	7-24-13

## APPROVALS

TITLE	NAME	ORG	SIGNATURE	DATE
Design Engineer	Jay Balzer	Boeing FES		7/24/13
Design Engineer Manager	Scott Strickland	Boeing FES		7/24/13
Safety Engineering	Bill Jones	Boeing FES		7/24/13
Safety	Joe Degano	Jacobs TOSC		7/24/13
S&MA Manager	James Minnear	NASA		7/24/13
UB ORU Project Manager	Steve Bigos	NASA		7/24/13
GP ORU Project Manager	Curt Horanic	NASA	 William Vittal OR-I for Curt Horanic	7/24/13
GP O6 Fluids Mechanical Engineer	Martin Boyd	NASA		7/24/13
Lifting Device Equipment Manager (LDEM)	Malcolm Glenn	NASA		7/24/13

## SLING INFORMATION

<b>SLING NAME:</b> NORS Recharge Tank Assembly Hoist Beam Assembly	
<b>PMN:</b> See Sling Description	<b>S/N:</b> See Sling Description
<b>OTHER IDENTIFIER (e.g. DWG #):</b> See Sling Description	
<b>DATE OF REQUEST:</b> 7/19/13	<b>REQUESTING ORG:</b> Boeing Florida Engineering Services

**DESCRIPTION OF THE PERIODIC LOAD TEST THAT WILL NOT BE PERFORMED**

NASA Lifting Standard NASA-STD-8719.9 Paragraph 10.3.2

**10.3.2 Periodic Load Test.** Slings shall undergo periodic load tests at least every 4 years at a specific load test factor of the design rated load as given in Table 10-3. All components shall be tested together as a system, if practical. **Slings used for critical lifts shall be load tested at least once per year.** Slings used infrequently for critical lifts shall be load tested before each critical lift if it has been over a year since the last load test. Lifting interfaces such as eyebolts, D-rings, and lifting lugs permanently attached to the load are exempt from periodic load testing.

Table 10-3 Periodic Load Test Factors. (Based on Manufacturers' Rated Load)

Equipment Periodic Load Test Factor

Alloy Steel Chain Slings 1.00

Wire Rope Slings 1.00

Metal Mesh Slings 1.00

Synthetic Rope Slings 1.00\*

Synthetic Web Slings 1.00

Linear Fiber Slings 1.00

Structural Slings 1.00

Shackles, D-rings, Turnbuckles, Eye Bolts, Lifting Lugs, Safety Hoist Rings, etc. 1.00

\* Critical lift rope slings of synthetic material shall not be used beyond 50 percent of the manufacturer's rating to maintain an equivalent design factor in the load system.

**NOTE:**

The NORS KSC Lifting Equipment has been deemed non-load test hardware as described in NASA Lifting Standard NASA-STD-8719.9 Paragraph 10.3.3, Non-Load Test Slings. Such slings do not require periodic load tests. Inspections shall be conducted in accordance with paragraph NASA-STD-8719.9 Paragraph 10.4.

**SLING DESCRIPTION**

**SLING DESCRIPTION****General:**

The following lifting items are to be used for KSC ground processing operations for NORS and apply to this request:

- 82K08082-1 (PMN S70-1534-03), NORS Vehicle Interface Assembly (VIA) Lift Sling Assembly
- 82K08083-1 (PMN S70-1534-03), NORS Recharge Tank Assembly (RTA) Hoist Beam Assembly
- 683-98197-2, Lift Assembly, Port, RTA
- 683-98197-3, Lift Assembly, Rear, RTA

Each item is to operate in controlled environments such as clean rooms. These KSC assets are to be used to support Ground Processing of NORS flight hardware at each launch site for the entire NORS program (estimated to conclude in CY 2020): the Florida launch site (Kennedy Space Center and Space X complex at CCAFS), Wallops Flight Facility, and The Tanegashima Space Center (TNSC, Japan). These items will be used by KSC lift-certified personnel at these sites.

**82K08082-1 (SN 001, 002, 003, and 004) and 82K08083-1 (SN 001, 002, 003, and 004):** each assembly is a KSC-designed GSE structural sling. The 82K08082-1 NORS VIA Lift Sling Assembly is dedicated to hoisting a flight VIA (a launch soft-pack containing a Recharge Tank Assembly COPV over-packed with solid foam). The 82K08083-1 NORS RTA Hoist Beam Assembly is dedicated to hoisting a flight RTA. One of each assembly is to be re-located to and stored at TNSC and Wallops Island launch sites to support on-site NORS ground processing.

**683-98197-2 (Multiple Serial Numbers) and 683-98197-3 (Multiple Serial Numbers):** Each assembly is Boeing – Huntsville-designed lifting equipment developed to meet NASA-STD-8719.9 – NASA Standard for Lifting Devices and Equipment. Each item mounts to each end of the NORS RTA (a COPV) and serves as the connection between the RTA and the 82K08083-1 RTA Hoist Beam Assembly for hoisting. Each item is installed on a filled RTA and is to remain mounted to the RTA until removed for flight at off-KSC launch sites (TNSC and Wallops). One set of Lifting Ring Assemblies is manufactured per RTA (estimated 35 RTAs).

**Design Standards:** The hardware meets the design requirements of the NASA Standard for Lifting Devices and Equipment, NASA-STD-8719.9.

**Design Factors:**

This hardware is designed in accordance with NASA GSE standards and the NASA Lifting Standard. Design factors for such hardware are 3:1 yield and 5:1 ultimate.

**SLING DESCRIPTION****Material/Construction Properties:**

Hardware is a structural sling manufactured from steel and aluminum. The hardware was designed per SSP 50004.

**SLING USAGE****Operational History:**

None to date

**Maintenance History:**

**82K08082-1 and 82K08083-1:** All Sling Assemblies are to be operated and maintained in accordance with 82K08084, Operations and Maintenance Requirements and Specifications (OMRSD) NORS Lift Equipment which includes visual inspections prior to use. No outstanding maintenance issues to date.

**683-98197-2 and 683-98197-3:** Items to remain installed with RTA flight hardware, maintained with flight hardware, clean and contained in controlled environments. KSC procedures require visual inspections prior to use. No outstanding maintenance items to date.

**Test History:**

**82K08082-1 and 82K08083-1:** Completed initial 200% SWL proof-load at 1000lb on January 2013. The SWL for each sling is 500lb.

**683-98197-2 and 683-98197-3:** Completed initial 200% SWL proof-load (250lb each) in 2013. There is one each lift collar with a SWL of 125lb on a RTA.

All hardware will be proof-loaded again if there are any design/configuration changes.

**Sling Rated Load versus Actual Load:**

This hardware is rated to lift the applicable safe working load (500lb), with design factors in accordance with the NASA Lifting Standard. The actual flight hardware lifts do not exceed 50 percent of the SWL of 500lbs. The actual flight hardware lifts are approximately 180lb for the stand alone RTA and 250lb for the fully integrated in the VIA.

**Storage Provisions:** This hardware is stored in a clean and humidity controlled environment.

**Planned Future Use:** These KSC assets are to be used to support Ground Processing of NORS flight hardware at the Florida launch site (Kennedy Space Center and Space X complex at CCAFS), Wallops Flight Facility, and The Tanegashima Space Center (TNSC, Japan) for the entire NORS program (estimated to conclude in CY 2020).

**RATIONALE FOR NON-PERFORMANCE**

**NOTE: If any of this rationale changes after approval, it is the responsibility of the requesting organization to contact the LDEM, re-submit a non-load-test request form and/or request removal of the sling from the non-load test sling list. Additionally any item on the non-load test sling list is subject to periodic review by the LDEM.**

1. Use is infrequent with some equipment used off-site from KSC.
2. Each item is a structural sling designed for a specific payload.
3. Each item is maintained and inspected prior to use.
4. Each item is stored in controlled environments.

**Describe the risks, if any, of not performing the load test and how they will be mitigated:**

The risk of not performing the load test is unexpected failure of the hardware. The risk mitigations are:

- Before use inspection
- Storage in a clean and humidity controlled environment
- The initial proof load test conducted well above working load
- Good margin on design factors
- Future identified issues will be documented as non conformances and resolved prior to use.