

**SUMMARY OF  
(RE)CERTIFICATION REQUIREMENTS FOR  
LIFTING DEVICES AND EQUIPMENT (LDE) AND  
GROUND-BASED PRESSURE VESSELS AND PRESSURIZED SYSTEMS (PV/S)  
ASSOCIATED WITH FLIGHT PROJECTS**

LDE and PV/S Recertification Program (RECERT)  
Mechanical Systems Division, Code 540  
Goddard Space Flight Center  
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I. INTRODUCTION

- A. This document is provided as a guide for advance planning purposes for any flight project that plans to undergo environmental test, integration and other ground operations at GSFC involving the use of LDE and/or PV/S. It provides a summary of the (re)certification requirements that owners must meet in order to use their equipment in GSFC facilities. The requirements listed herein apply to all lifting devices (LD), lifting equipment (LE), and ground-based pressure vessels and pressurized systems (PV/S) used on GSFC property regardless of owner or user. Goddard policy mandates that only LDE and PV/S certified by the GSFC Recertification Program (RECERT) may be used onsite at Greenbelt and Wallops. The requirements are identical for in-house and out-of-house flight projects. In order to preclude unnecessary schedule delays and potential Quality Management System (QMS) Nonconformance Reports (NCR's), owners are urged to meet these requirements in a timely manner. For requirement clarification pertaining to items not covered in this guide and/or assistance, please contact the RECERT personnel listed at the end of this document.
- B. For equipment that was designed, fabricated, and tested by the owner prior to arrival at GSFC, provide to Code 540/RECERT:
1. confirmation of compliance in writing, and
  2. a copy of compliance documentation, or substantiating that the item(s) meets the applicable requirements of Section II and/or III, below.
- C. Reference Governing Documents:
1. NASA-STD-8719.9, "Standard for Lifting Devices and Equipment"  
<http://www.hq.nasa.gov/office/codeq/doctree/87199.pdf>
  2. NPD 8710.5A, "NASA Safety Policy for Pressure Vessels and Pressurized Systems"  
[http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal\\_ID=N\\_PD\\_8710\\_005A\\_&page\\_name=main](http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal_ID=N_PD_8710_005A_&page_name=main)
  3. NPG 1700.6A, "Guide for Inservice Inspection of Ground-Based Pressure Vessels and Systems"  
[http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal\\_ID=N\\_PG\\_1700\\_](http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal_ID=N_PG_1700_)

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4. NPG 8715.3, "NASA Safety Manual"  
[http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal\\_ID=N\\_PG\\_8715\\_0003\\_&page\\_name=main](http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal_ID=N_PG_8715_0003_&page_name=main)
5. Goddard Management Instruction (GMI) 1710.6, "Certification and Recertification of Lifting Devices and Equipment, and Critical Lift Requirements";  
[http://msc-docsrv.gsfc.nasa.gov/GDMS\\_docs/GMI1000/GMI-1710.6B.pdf](http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/GMI1000/GMI-1710.6B.pdf)
6. Goddard Management Instruction (GMI) 1710.4, "Certification and Recertification of Ground-Based Pressure Vessels and Pressurized Systems"  
[http://msc-docsrv.gsfc.nasa.gov/GDMS\\_docs/GMI1000/GMI-1710.4B.pdf](http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/GMI1000/GMI-1710.4B.pdf)
7. QMS ISO 540-PG-8072.1.1, "Certification and Recertification of Lifting Devices and Equipment and Ground-Based Pressure Vessels and Pressurized Systems (Recertification Program)"  
[http://msc-docsrv.gsfc.nasa.gov/GDMS\\_docs/pgwi500/540-PG-8072.1.1A.pdf](http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/pgwi500/540-PG-8072.1.1A.pdf)
8. QMS ISO 540-WI-8072.1.1, "Certification of New or Modified Lifting Devices (LD) and Equipment (LE)"  
[http://msc-docsrv.gsfc.nasa.gov/GDMS\\_docs/Pgwi500/540-WI-8072.1.1-.pdf](http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/Pgwi500/540-WI-8072.1.1-.pdf)
9. QMS ISO 540-WI-8072.1.2, "Recertification of Lifting Devices (LD) and Equipment (LE)"  
[http://msc-docsrv.gsfc.nasa.gov/GDMS\\_docs/Pgwi500/540-WI-8072.1.2-.pdf](http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/Pgwi500/540-WI-8072.1.2-.pdf)
10. QMS ISO 540-WI-8072.1.3, "Certification of New or Modified Ground-Based Pressure Vessels and Pressurized Systems (PV/S)"  
[http://msc-docsrv.gsfc.nasa.gov/GDMS\\_docs/Pgwi500/540-WI-8072.1.3-.pdf](http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/Pgwi500/540-WI-8072.1.3-.pdf)
11. QMS ISO 540-WI-8072.1.4, "Recertification of Ground-Based Pressure Vessels and Pressurized Systems (PV/S)"  
[http://msc-docsrv.gsfc.nasa.gov/GDMS\\_docs/Pgwi500/540-WI-8072.1.4-.pdf](http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/Pgwi500/540-WI-8072.1.4-.pdf)
12. QMS ISO 540-PG-8730.1.1, "Calibration and Control of Recertification Program Inspection, Measuring, and Test Equipment"  
[http://msc-docsrv.gsfc.nasa.gov/GDMS\\_docs/Pgwi500/540-PG-8730.1.1A.pdf](http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/Pgwi500/540-PG-8730.1.1A.pdf)
13. 5405-048-98, "GSFC Mechanical Systems Center Safety Manual"  
<http://www549.gsfc.nasa.gov/safety/ManualHome.htm>
14. OSHA 29 CFR 1910, 1926, 1960

II. REQUIREMENTS FOR LDE CERTIFICATION

For equipment that was designed, fabricated, and tested by the owner prior to arrival at GSFC, provide evidence to Code 540/RECERT for items delineated in Section I.B, above, that the item(s) meets the requirements in the following areas:

- A. Design Factor (Reference Governing Document I.C.1, Table 10-1, reproduced below)

| EQUIPMENT   | DESIGN LOAD SAFETY FACTOR                   |
|---|---|
| Alloy Steel Chain Slings  | 5   |
| Wire Rope Slings  | 5   |
| Metal Mesh Slings   | 5   |
| Synthetic Rope Slings   | 5   |
| Synthetic Web Slings  | 5   |
| Linear Fiber Slings   | 5   |
| Structural Slings   | Lesser of 3 times yield or 5 times ultimate |
| Shackles, D-rings, Turnbuckles, Eye Bolts, Lifting Lugs, Safety Hoist Rings, etc                  | 5   |
| Note: Design load safety factor based on ultimate material strength, except for structural slings |   |

- B. Proof Load Test Factor for initial Certification (Reference Governing Document I.C.1, Table 10-2 reproduced below):

| EQUIPMENT   | PROOF LOAD TEST FACTOR |
|---|------------------------|
| Alloy Steel Chain Slings  | 2.0                    |
| Wire Rope Slings  | 2.0                    |
| Metal Mesh Slings   | 2.0                    |
| Synthetic Rope Slings   | 2.0                    |
| Synthetic Web Slings  | 2.0                    |
| Linear Fiber Slings   | 2.0                    |
| Structural Slings   | 2.0*                   |
| Shackles, D-rings, Turnbuckles, Eye Bolts, Lifting Lugs, Safety Hoist Rings, etc.   | 2.0**                  |
| * Unless otherwise specified by design, due to material characteristics, geometry, safety factors, etc., but in any case, at least 125 percent of the sling's rated capacity.<br>** No Cooper turnbuckle products are permitted – See Attachment A. |                        |

- C. Periodic Load Test Factors for Recertification (Reference Governing Document I.C.1, Table 10-3 reproduced below). NOTE: Lifting interfaces such as eye bolts, pins, D-rings, and lifting lugs permanently attached to the load by welding are exempt from periodic load testing. The permanent lifting interfaces are considered as an integral part of the load, therefore, they do not fall within the RECERT requirements.

D.

| 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% of the manufacturer's rating to maintain an equivalent safety factor in the load system. |                           |

- D. Identify each component of the sling assembly to insure reassembly in the proof test configuration (Tethering, color coding, numbering, etc.).
- E. Provide a copy of the test and inspection procedure, and a copy of the report if available.
- F. Provide report(s) documenting that the nondestructive testing (NDT) required by Reference Governing Document I.C.1 has been performed on all load tested LDE (Critical welds, shackles, rings, turnbuckles, etc.). This includes visual testing (VT), surface testing (magnetic particle (MT), liquid penetrant (PT)), and volumetric testing (radiography (RT), ultrasonic (UT)). Personnel performing visual, surface, and/or volumetric NDT must be certified in accordance with guidelines contained within ASNT SNT-TC-1A, or equivalent.
- G. Attach a tag to each load tested LD or LE. Tags shall indicate: criticality category (Critical or Noncritical. Reference document I.C.5 for definitions.), rated load, certification expiration date, ID#, identity of the inspector and his/her organizational association who performed the post-load test inspection(s).
- H. LD and LE RECERT Tags

Once the above requirements are verified/validated, Code 540/RECERT Manager will apply a certification tag indicating compliance with GSFC Certification requirements and release the LD/LE to the owner for use.

- I. Only GSFC RECERT-certified LDE Operators are allowed to perform lifting operations on-site. If there is a need for owner personnel to operate LDE or direct a critical lift at Goddard, prior approval to do so must be obtained from the building Facility Operations Manager having jurisdiction. Once the required approval has been obtained, Code 540/RECERT will provide the requested certification training for both applications. A minimum of two weeks advance notice will be required for coordination of such training requests.
- J. It should be noted that LDE certification does not certify lifting stability. It is the owner's responsibility to assure that there are no outstanding lifting stability issues prior to commencement of lifting operations. A Safety Analysis and a Lift Stability Analysis as required by I.C.5 shall be performed and documented by the flight project representative who is responsible for the critical lift prior to lift operations.

### III. REQUIREMENTS FOR GROUND-BASED PV/S CERTIFICATION

For equipment that was designed, fabricated, and tested by the owner prior to arrival at GSFC, provide evidence to Code 540/RECERT for items delineated in Section I.B, above, that the item(s) meets the requirements in the following areas:

- A. PV/S and components, including flexible hoses, shall be designed, fabricated, installed, and tested in accordance with applicable national consensus codes and standards and/or federal codes. Some examples are: ANSI/ASME Section VIII, "Pressure Vessels"; ANSI/ASME B31.3, "Process Piping"; United States Air Force Technical Manual, T.O. 00-25-223, Integrated Pressure Systems and Components (Portable and Installed)", MIL-STD-1522A, "Standard General Requirements for Safe Design and Operation of Pressurized Missile and Space Systems".
- B. Proposed PV/S designs shall be submitted to Code 540/RECERT for review and approval.
- C. The following documentation shall be submitted in a timely manner to Code 540/RECERT.
  - 1. Manufacturer's Drawings and/or Supporting Documentation – For pressure vessels designed and fabricated to the rules of Section VIII of the ASME Boiler & Pressure Vessel Code, provide a copy of the Manufacturer's Data Report (Form U-1 or U-1A, as appropriate). For components such as flight-weight pressure vessels, piping, flex hoses, etc., provide either the certified shop fabrication drawings or as-built drawings/documentation containing the following, as applicable:
    - Manufacturer's name;
    - Date of manufacture;
    - Identification of component;

Configuration;  
Dimensions and details of construction;  
Design and operating conditions;  
Design code or design basis;  
Thicknesses;  
Corrosion allowance;  
Identification of materials and design properties;  
Efficiency of joints;  
Nondestructive Tests; and  
Types of tests (e.g., hydrostatic, pneumatic)

2. For components such as valves, gages, and relief devices, the drawings and/or supporting documentation shall show information such as make, model number, materials of construction, and design and operating data.
  3. Design Calculations – Design calculations for components such as pressure vessels and piping shall include pressure, temperature, wind, seismic, deadload, and any other applicable loadings. They shall specify the applicable code, standard, or other design basis.
  4. Manufacturer’s Data Report – Manufacturer’s Data Reports shall be furnished with all components built to the rules of the ASME Boiler and Pressure Vessel Code.
  5. Certificates of Compliance with appropriate material specifications or, if required, Mill Test Reports.
  6. Welding/Brazing Procedure and Procedure Qualification Records, and Welder/Brazer Performance Qualification Records (ANSI/ASME Section IX).
  7. Record of Nondestructive Tests.
  8. Pressure Test Record of tests performed by manufacturer.
  9. Record of Post-Weld Heat Treatment (if performed).
  10. Record of Impact Test (if required by the applicable Code).
- D. Upon conclusion of RECERT's review of the design (Section III.B above), the RECERT Manager may specify as-built tests and inspections to be performed prior to granting Certification for operation. Such as-built tests and inspections may be performed by any qualified organization provided that their qualifications, test procedures, and test results are submitted to Code 540/RECERT for review and acceptance.

#### IV. CONTACTS

For clarification of the above requirements or assistance, you may contact the following:

Greenbelt, MD:

RECERT Manager: Stanley Chan  
(301) 286-4209 (voice)  
(301) 286-1702 (FAX)  
e-mail: Stanley.Y.Chan@nasa.gov

RECERT Support/ManTech: Warren Thomas  
(301) 286-5183 (voice)  
(301) 286-1702 (FAX)  
e-mail: wthomas@mscmail.gsfc.nasa.gov

or Stratton Karahalias  
(301) 286-1179 (Voice)  
(301) 286-1702 (FAX)  
e-mail: skarahalias@mscmail.gsfc.nasa.gov

or Thom Schafer  
(301) 286-4802 (voice)  
(301) 286-1702 (FAX)  
e-mail: Thomas.P.Schafer.1@gsfc.nasa.gov

Wallops Flight Facility, VA:

Deputy RECERT Manager: Prasad Hanagud  
(757)824-1359 (voice)  
(757)824-1997 (FAX)  
e-mail: A.V.Hanagud@nasa.gov

RECERT Support/ManTech: Bill Hargrove  
(757)824-1797 (voice)  
(757)824-1865 (FAX)  
e-mail: William.T.Hargrove.1@gsfc.nasa.gov

**ATTACHMENT A**  
**Revised Policy - Turnbuckles in Lifting Assemblies**  
**GSFC Recertification Program, Code 540**

February 4, 2002

(NOTE: This document supersedes Recertification Program (RECERT) Interim Policy dated May 17, 2000, subject: Use of Turnbuckles in Lifting Assemblies.)

The use of any turnbuckles that contains an original equipment manufacturer (OEM) warning label "not recommended for lifting" is not allowed. Since some Cooper turnbuckles (marked "? C") contain such warning labels, their use is not allowed. In addition, at the current time, it is unclear whether the Cooper warning label is applicable to other Cooper brands including Brower-Titchener (marked "BTC"), Merrill (marked "MB"), Campbell (marked "CC"), trademarks etc. Until OEM clarification is obtained and proven otherwise, these brands of turnbuckles are not permitted.

Based on continuing investigation and written clarifications provided by lifting equipment manufacturers to-date, OEMs do not generally recommend the use of turnbuckles as part of the lifting assemblies. Turnbuckles are designed as a tensioning device. The inclusion of turnbuckles for overhead lifts is addressed by only one OEM with the following four conditions:

1. "Turnbuckles may be used in any attitude or angle as long as the load (tension) is in line and does not exceed the working load limit (WLL)."
2. "The load angle will increase the tension in the turnbuckle and the resultant load must not exceed the WLL."
3. "Turnbuckles are made to be adjusted up to the tension produced by the WLL. They are not designed to repeatedly lift the WLL thru the adjustments of the threads. Torqueing the thread at WLL cause the galvanizing to flake off and bind the threads."
4. "Alternatives:
  1. Ungalvanized turnbuckle with a better class of thread.
  2. Ungalvanized turnbuckle with an acme threads for continuous lifting at WLL.
  3. Ratchet load binders without hooks, ie. R-10."

Due to unknown conditions, use, tension developed, and torque needed, it is impossible to address each use. In light of the above OEM guidance, the use of turnbuckles for

overhead lifts is discouraged and alternate methods for lifting adjustment should be considered and developed.

For further clarifications, contact RECERT Support/Code/540.5 at (301) 286-5183, or the RECERT Manager/Code 540, at (301) 286-4209.