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John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

SSTD-8070-0097-TEST
Revision F
APRIL 2023

COMPLIANCE IS MANDATORY

John C. Stennis Space Center **Relief Devices – Inspection and Testing**

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Document History Log

Revision Change	Date	Originator / Phone	Description
Basic	8/11/03	D. Dike Ext. 8-2803	Initial release - supersedes SSC STD 97-008 Rev. C, with the following changes: New document number and format per SPG 1400.1; Reorganized and edited for continuity; 1.0: title changed from “Scope” to “Purpose and Applicability”; para. 2 moved to 4.0 para. 2 “NOTE”; added exception for reseat pressure of field-tested items; 6.2-c-1: change “actual” to “system design”; 6.2-d: add new for recording of actual relief pressure on form SSC-368, ref STD 99-011; 8.0: change term “media” to “systems” in both definitions for “relief devices”; Table1 add hydrogen peroxide (H ₂ O ₂).
A	4/17/09	D. Dike Ext. 8-2803	Updated referenced documents throughout. Formatted in accordance with SPR 1400.1. Section 4.2: Revised verbiage for clarity. Section 4.2.1 (c): Changed “actual relief” to “set” and changed “fizz” to “simmer.” Section 4.2.1 (h): Changed “reworked” to “repaired.” Updated Table 1.
A-1 Issued CEF 07/14/09	07/14/09	N. Wells Ext. 8-2765	Administrative change in Section 6.1.b to clarify testing and recertification intervals shall be in accordance with Tables 1 and 2.
B	1/17/2013	S. Le Ext. 8-3816	Updated paragraph 4.2.1.f.1 to ±2 from +2. Updated paragraph 4.2.1.f.2 to ±3% from +3%. Replaced referenced standard SSTD-8070-0089 with RPTSTD-8070-0001. Revised paragraph 6.1.a- deleted “for actual relief pressure”. Added 4.2.1.g: End-users shall be responsible for specifying set and reseat pressure and their tolerances in work orders/requests if they differ from those stated in 4.2.1.f. Added 4.2.1.h: Set pressures shall be within tolerances stated in 4.2.1.f.1 and 4.2.1.f.2. <i>However, more stringent tolerances are permitted.</i> and CAUTION after paragraph 4.2.1.h.

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C	4/29/14	S. Le Ext. 8-3816	<p>Deleted measurement of reseal pressure from Section 1.0</p> <p>Added paragraph 4.1.f</p> <p>Added notes to paragraphs 4.2.1.c and 4.21.d. Added note to paragraph 4.2</p> <p>Changed “fizzed” to “simmered” in paragraph 4.2.1 (l)</p> <p>Paragraph 4.2.3, original paragraph moved to 4.2.3.a</p> <p>Revised Paragraph 4.2.3 with added note and guidance on rupture disc calibration interval</p> <p>Added paragraph 4.2.4</p> <p>Paragraph 4.4, changed “valves” to “devices”</p> <p>Added paragraph 4.4.a</p> <p>Added paragraph 5.1</p> <p>Added “MAXIMO” and “VR” to Appendix B</p> <p>Added Table 1 for hydrogen inline relief devices, RP-1, IPA, Tea-Teb and pressure vessels lift plates</p>
D	2/27/18	S. Le (3816)	<p>Major rewrite to align requirements with industry standards.</p> <p>Added “(RECERTIFICATION)” to applicable headings within Section 4.0; and added “(RECALIBRATION)” to Section 4.8 heading.</p> <p>Updated Responsible Organization to NASA Safety and Mission Assurance.</p> <p>Added steam and water boiler relief valves to Table 1.</p> <p>Aligned RV calibration for Shop Inspection only.</p> <p>Updated references, acronyms, and definitions.</p>
E	2/27/23	S. Le (3816)	<p>Five-year review.</p> <p>Updated directorate title on cover sheet.</p> <p>Updated references, acronyms, and definitions.</p> <p>4.0: Added notes clarifying VR and non-VR work performed.</p> <p>4.1.2.2: Added “or A-1 Test Stand.”</p> <p>4.1.2.4.5 and 4.2.2.8: Added requirements for relief valves not meeting the requirements of bench testing.</p> <p>4.3.2 changed to 4.3.1.4.</p> <p>4.4.2 updated to provide detailed instructions for bench testing.</p> <p>4.7, 4.8.6.3, and 7.2.4: Replaced in their entirety.</p> <p>Updated 4.8.6, 4.8.7, and 4.8.8 to clarify reseal pressure requirements per NB-23 (see Appendix D).</p>

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E (continued)			Appendix D: Added External References 1 and 2. Table 1: Modified to add Shop Air Relief Valve and DOT-4L requirements and revised Inspection and Testing Interval (years) to read “3 – Above 200 psig, 5 – 200 psig & lower” for the following Service Media: Gaseous Helium, Gaseous Nitrogen, Compressed Air, and Missile Grade Air and Dry Air.
F	4/26/23	S. Le (3816)	Added reference to DOP-M-01-0006-FAC for A-1 Test Stand.

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1.0 PURPOSE AND APPLICABILITY

This John C. Stennis Space Center (SSC) standard (SSTD) establishes requirements for the inspection, recertification, and recalibration of relief devices used at SSC. Proper calibration of these devices is necessary to maintain the safety and reliability of SSC pressure systems.

2.0 REFERENCES AND APPLICABLE DOCUMENTS

All documents are assumed to be the latest version unless otherwise specified.

API 527, *Seat Tightness of Pressure Relief Valves*

API 576, *Inspection of Pressure-Relieving Devices*

DOP-M-01-0006-FAC, *A-1 Relief Valve Recertification Panel Operation*

DOP-M-10-0003-FAC, *E-1 Relief Valve Recertification Panel Operation*

KDR-2022-0003, *Material Review Board (MRB) Standard Repair for Relief Valves with Missing/Damaged Integrity Seals*

NASA Standard (STD) 8719.17, *NASA Requirements for Ground-Based Pressure Vessels and Pressurized Systems (PVS)*

NB-18, *Pressure Relief Device Certification*

RPTSTD-8070-0001, *Surface Cleanliness Standard of Fluid Systems for Rocket Engine Test Facilities of the NASA Rocket Propulsion Test Program*

SPR 1440.1, *Records Management Program Requirements*

SPR 8730.1, *Control of Nonconforming Product*

SSTD 8070-0005-CONFIG, *Preparation, Review, Approval, and Release of SSC Standards*

SSTD-8070-0006-CONFIG, *Component Servicing Processes and Documentation*

SSTD-8070-0095-PRESSUR, *SSC Pressurization Standard in Support of the Recertification of Pressure Vessels and Pressure Systems*

SWI-8730-0006, *SSC Institutional Nonconformance Processing*

FORMS:

SSC-368, *Component Processing Control Sheet*

SSC-861, *Certification of Extension for Ground-Based Pressure Vessels and Pressurized Systems*

3.0 RESPONSIBILITIES

This standard shall be used and maintained in accordance with the requirements of SSTD-8070-0005-CONFIG.

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4.0 RELIEF VALVE MAINTENANCE

NOTE: Paragraphs 4.1-4.7 apply to work performed that is not part of the VR program.

4.1 IN-SERVICE INSPECTION AND BENCH TESTING OF SPECIALTY SERVICE RELIEF VALVES (RECERTIFICATION)

4.1.1 IN-SERVICE INSPECTION

4.1.1.1 The frequency of inspection shall be performed according to Table 1 of this SSTD.

4.1.1.2 For specialty service relief devices, inspection shall include:

- 4.1.1.2.1 Review of the identification tag data and the manufacturer's nameplate to ensure agreement with schematic drawings, component specifications, and component database (CDB) information.
- 4.1.1.2.2 A visual inspection to check the overall condition of the valve and leak tightness (a check for external leakage around the relief device with soap or leak detection fluid, for gas service relief devices; and an auditory check for hissing or vibration).
- 4.1.1.2.3 Verification that the integrity seal is intact (i.e., the wire is not broken, the lead seal is installed) with a valid imprint. (See Figures 1 and 2.)



Figure 1. Contractor seal



Figure 2. SSC Seal

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- 4.1.1.3 For inline relief valve, the outlet shall be inspected to ensure there is no blockage or any situation that may prevent the relief valve from discharging properly (attaining full lift of poppet or stem-plug).
- 4.1.1.4 Relief valves not meeting the inspection requirements of paragraph 4.1.1.1, 4.1.1.2, or 4.1.1.3 shall be documented as non-conformance.
- 4.1.1.5 Upon inspection and/or recertification of specialty service relief devices, the date inspected, actual relief pressure, actual reseal pressure, and serial number of the device shall be recorded and maintained in MAXIMO.

4.1.2 TESTING (BENCH TESTING)

Testing to verify the set points of pressure relief valves may be performed in-place or on a test panel.

- 4.1.2.1 The frequency of testing shall be performed according to Table 1 of this SSTD.
- 4.1.2.2 Tests using the Test Panel at E-Complex or A-1 Test Stand shall be performed in accordance with DOP-M-10-0003-FAC or DOP-M-01-0006-FAC.
- 4.1.2.3 When it is impractical to remove a relief valve for bench testing, the relief valve may be tested in-place per a work authorizing document and shall include Section 14 (Consistency Rule Acceptance 1% Rule) worksheet from DOP-M-10-0003-FAC or DOP-M-01-0006-FAC.
- 4.1.2.4 The marked set pressure and the actual set pressure shall be within the following tolerance:
 - 4.1.2.4.1 Actual set pressure shall be within ± 2 psig (14 kPa) of marked set pressure for marked set pressures between 0 psig (0 kPa) and 70 psig (483 kPa).
 - 4.1.2.4.2 Actual set pressure shall be within $\pm 3\%$ of marked set pressure for marked set pressures greater than 70 psig (483 kPa).
 - 4.1.2.4.3 End-users shall be responsible for specifying set pressures and their tolerances in work orders/requests if they differ from those stated in 4.1.2.4.

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4.1.2.4.4 Set pressures shall be within tolerances stated in 4.1.2.4.1 and 4.1.2.4.2. *More stringent tolerances are permitted.*

4.1.2.4.5 Relief valves not meeting the requirements of paragraph 4.1.2.4 shall be documented as non-conformance.

4.2 IN-SERVICE INSPECTION AND BENCH TESTING OF PILOT OPERATED RELIEF VALVES (RECERTIFICATION)

4.2.1 IN-SERVICE INSPECTION

4.2.1.1 The frequency of inspection shall be performed according to Table 1 of this SSTD.

4.2.1.2 Review the identification tag data and the manufacturer's nameplate to ensure agreement with schematic drawings, component specifications, and CDB information.

4.2.1.3 Perform a visual inspection to check the overall condition of the valve; a check for external leakage around the relief device with soap or leak detection fluid, for gas service relief devices; and an auditory check for hissing or vibration.

4.2.1.4 Verify the integrity seal is intact (i.e., the wire is not broken, the lead seal is installed).

4.2.1.5 Relief valves not meeting the inspection requirements of paragraph 4.2.1 shall be documented as non-conformance.

4.2.2 TESTING (BENCH TESTING)

4.2.2.1 The frequency of testing shall be performed according to Table 1 of this SSTD.

4.2.2.2 For pilot operated relief valves (PORVs), only the PORV pilot valve needs to be tested at the required set pressure of the PORV.

4.2.2.3 When it is impractical to remove a relief valve for bench testing, the relief valve may be tested in-place per a work authorizing document and shall include Section 14 (Consistency Rule Acceptance 1% Rule) worksheet from DOP-M-10-0003-FAC or DOP-M-01-0006-FAC.

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4.2.2.4 The marked set pressure and the actual set pressure shall be within the following tolerance:

4.2.2.4.1 Actual set pressure shall be within ± 2 psig (14 kPa) of marked set pressure for marked set pressures between 0 psig (0 kPa) and 70 psig (483 kPa).

4.2.2.4.2 Actual set pressure shall be within $\pm 3\%$ of marked set pressure for marked set pressures greater than 70 psig (483 kPa).

4.2.2.4.3 End-users shall be responsible for specifying set pressures and their tolerances in work orders/requests if they differ from those stated in 4.2.2.4.

4.2.2.4.4 Set pressures shall be within tolerances stated in 4.2.2.4.1 and 4.2.2.4.2. *More stringent tolerances are permitted.*

4.2.2.5 When possible, the main valve shall be tested to verify that it will lift when unloaded or activated by the pilot valve.

NOTE: To perform this test, a "test PORV pilot valve" with a set pressure equal to or lower than the specified PORV pilot may be attached to the PORV main valve followed by pressurization of the PORV inlet to the set pressure of the "test PORV pilot valve."

4.2.2.6 When required, the PORV main valve shall be repaired, adjusted, or replaced, followed by a retest until the test demonstrates that lift is achieved by the PORV main valve when activated.

4.2.2.7 Seat leakage tests are not required for PORV main valves when the PORV is tested in place (while installed in its respective system).

4.2.2.8 Relief valves not meeting the requirements of paragraph 4.2.2.1 through 4.2.2.7 shall be documented as a non-conformance.

4.3 IN-SERVICE INSPECTION AND BENCH TESTING OF RUPTURE DISCS (RECERTIFICATION)

4.3.1 IN-SERVICE INSPECTION

4.3.1.1 The frequency of inspection shall be performed according to Table 1 of this SSTD.

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- 4.3.1.2 Review the identification tag data and the manufacturer's nameplate to ensure agreement with schematic drawings, component specifications, and CDB information.
- 4.3.1.3 Perform a visual inspection to check the overall condition of the rupture; and check to ensure the vent space (internal volume of lines downstream of the rupture discs) are unrestricted (e.g., free of debris).
- 4.3.1.4 Rupture discs not meeting the inspection requirements of paragraph 4.3.1.1 through 4.3.1.3 shall be documented as non-conformance.

4.3.2 TESTING (BENCH TESTING)

- 4.3.2.1 Rupture discs need not be replaced periodically at the intervals listed in Table 1, provided their vent spaces are inspected and confirmed unrestricted.

NOTE: Since the normal failure of a rupture disc is to fail below rated burst pressure, if it has been determined that such a failure will not result in an increased risk, manufacturer's recommended replacement periods may be increased. During inspection of vent spaces (the internal volume of lines) downstream of rupture discs, visible surfaces of the rupture disc should also be inspected for damage including fatigue, and damaged rupture discs should be replaced to prevent inadvertent or undesired rapid depressurization and venting of system during normal operations.

- 4.3.2.2 When used in systems that operate at pressures greater than 90% of the rupture disc burst pressure, rupture discs shall be replaced at the earliest convenience. If a disc cannot be replaced due to operational complexities of the pressure system, the rupture disc may be left in place and shall be replaced during the next system outage.

4.4 IN-SERVICE INSPECTION AND BENCH TESTING OF INLINE RELIEF VALVES (RECERTIFICATION)

4.4.1 IN-SERVICE INSPECTION

- 4.4.1.1 The frequency of inspection shall be performed according to Table 1 of this SSTD.
- 4.4.1.2 Review the identification tag data and the manufacturer's nameplate to ensure agreement with schematic drawings, component specifications, and

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CDB information, all of which are housed in the Design and Data Management System (DDMS).

- 4.4.1.3 Perform a visual inspection to check the overall condition of the valve; a check for external leakage around the relief device with soap or leak detection fluid, for gas service relief devices; and an auditory check for hissing or vibration.
- 4.4.1.4 Relief valves not meeting the inspection requirements of paragraph 4.4.1 shall be documented as non-conformance.

4.4.2 TESTING (BENCH TESTING)

NOTE: It is often more economical to replace inline relief valves than to inspect and test them.

Testing to verify the set points of pressure relief valves may be performed in-place or on a test panel.

- 4.4.2.1 The frequency of testing shall be performed according to Table 1 of this SSTD.
- 4.4.2.2 Tests using the Test Panel at E-Complex or A-1 Test Stand shall be performed in accordance with DOP-M-10-0003-FAC or DOP-M-01-0006-FAC.
- 4.4.2.3 When it is impractical to remove a relief valve for bench testing, the relief valve may be tested in-place per a work authorizing document and shall include Section 14 (Consistency Rule Acceptance 1% Rule) worksheet from DOP-M-10-0003-FAC or DOP-M-01-0006-FAC.
- 4.4.2.4 The marked set pressure and the actual set pressure shall be within the following tolerance:
 - 4.4.2.4.1 Actual set pressure shall be within ± 2 psig (14 kPa) of marked set pressure for marked set pressures between 0 psig (0 kPa) and 70 psig (483 kPa).
 - 4.4.2.4.2 Actual set pressure shall be within $\pm 3\%$ of marked set pressure for marked set pressures greater than 70 psig (483 kPa).

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4.4.2.4.3 End-users shall be responsible for specifying set pressures and their tolerances in work orders/requests if they differ from those stated in 4.4.2.4.

4.4.2.4.4 Set pressures shall be within tolerances stated in 4.4.2.4.1 and 4.4.2.4.2 *More stringent tolerances are permitted.*

4.4.2.4.5 Relief valves not meeting the requirements of paragraph 4.1.2.4 shall be documented as non-conformance.

4.5 IN-SERVICE INSPECTION OF UTILITY SERVICE RELIEF DEVICES (RECERTIFICATION)

4.5.1 IN-SERVICE INSPECTION

4.5.1.1 The frequency of inspection shall be performed according to Table 2 of this SSTD.

4.5.1.2 Review the identification tag data and the manufacturer's nameplate to ensure agreement with schematic drawings, component specifications, and CDB information.

4.5.1.3 Perform a visual inspection to check the overall condition of the valve; a check for external leakage around the relief device with soap or leak detection fluid, for gas service relief devices; and an auditory check for hissing or vibration.

NOTE: In most cases, the cost of inspecting these valves may exceed the cost of replacement; in these cases, the device can simply be replaced. When possible, relief valves can be manually unloaded in place to verify that it unseats properly. The valve shall be repaired, adjusted, or replaced as required until proper unseating is attained.

4.6 IN-SERVICE INSPECTION AND TEST OF VACUUM SERVICE RELIEF DEVICES (RECERTIFICATION)

4.6.1 IN-SERVICE INSPECTION

4.6.1.1 The frequency of inspection shall be performed according to Table 1 of this SSTD.

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4.6.1.2 Review the identification tag data and the manufacturer's nameplate to ensure agreement with schematic drawings, component specifications, and CDB information.

4.6.1.3 Perform a visual inspection to check the overall condition of the valve.

4.6.2 TESTING (BENCH TESTING)

The frequency of testing shall be performed according to Table 1 of this SSTD, in accordance with manufacturer specifications.

NOTE: Current vacuum maintenance procedures require sampling of vacuum pump discharge effluent gases, pumping at vacuum pull down ports, and recording of vacuum gage readings to measure, check and record leakage into vacuum systems.

4.7 QUALIFICATION OF PERSONNEL CONDUCTING THE TEST

Bench Testing of relief valve shall be performed by competent personnel (see definition in Appendix B).

NOTE: Section 4.8 applies to work that is to be performed by a VR Stamp holder.

4.8 SHOP INSPECTION AND TESTING (RECALIBRATION)

4.8.1 Shop inspection and testing of relief valves shall be performed by organizations with a National Board VR stamp certification, in accordance with the quality manual.

4.8.2 Functional test of cryogenic and gas relief valves shall be with gaseous nitrogen, air, or helium as the test gas.

4.8.3 For each functional test, the relief valve inlet shall be pressurized until the relief valve pops, unless otherwise specified by the manufacturer, or until 110% of specified set pressure is attained.

4.8.4 The relief valve shall be tested to verify its set pressure and actual reseal pressure. In the event that the relief valve does not relieve at the set pressure and/or does not reseal at the required blow down pressure, the relief valve inlet shall be depressurized followed by adjusting, reworking, or repairing of the relief valve.

4.8.5 The test shall be repeated until the relief valve pops and reseals at pressures within the tolerances specified below.

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- 4.8.6 The required tolerances, unless otherwise noted in system design drawings and specifications and in end-user work orders/requests, for set pressure and reseal (blow down) pressure are as follows:
- 4.8.6.1 Actual set pressure shall be within 14 kPa (± 2 psig) of target set pressure (set pressure specified by Engineering) for set pressures between 0 psig (0 kPa) and 70 psig (483 kPa).
 - 4.8.6.2 Actual set pressure shall be within $\pm 3\%$ of target set pressure for set pressures greater than 70 psig (483 kPa).
 - 4.8.6.3 Reseat pressure for all target set pressure ranges shall be between 80% and 95% of actual set pressure (See Appendix D, Reference 1).
- 4.8.7 The end-users shall be responsible for specifying set and reseal pressures and their tolerances in work orders/requests if they differ from those stated in 4.8.6.
- 4.8.8 Customer specified set and reseal pressures shall not be less stringent than the tolerances stated in 4.8.6.1, 4.8.6.2, and 4.8.6.3.

CAUTION

There may be selected cases where system designs or as-built configurations will dictate tighter set pressure tolerances or reduced reseal pressures as compared to what is stated above. For example, full flow line pressure drops from a pressure source/reservoir to the relief valve inlet that exceed 4% of the set pressure could cause relief valve chatter unless a reduced reseal pressure is specified. As another example, systems with limited design pressure margins and rapid pressure and flow transients may dictate tighter set pressure tolerances to prevent aborted tests due to inadvertent opening of relief devices. It is incumbent upon the system designer and end user to perform the necessary analyses and specify alternative set and reseal pressures and tolerances as needed to prevent relief valve chatter or undesired opening of relief devices.

- 4.8.9 The actual set pressure and reseal pressure data as well as the recertification due date and relief valve serial number shall be recorded for the first test performed.
- 4.8.10 If the valve is out of tolerance on the first test, the valve shall be adjusted and repaired as required.
- 4.8.11 The actual set pressure and actual reseal pressure for the first and final test (if required) shall be recorded in MAXIMO.

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- 4.8.12 When possible, the first and last test data shall indicate whether the valve "popped" open or if the valve just "simmered."

NOTE: For most relief valves at SSC, the actual set pressure is defined as an audible "pop". However, this is not always the case for all model relief valves at SSC; the engineer should consult the relief valve manufacturer to confirm the manufacturer's definition of set pressure for their particular model.

- 4.8.13 Relief valves may be recertified within the protected system (if this does not result in exceeding the design pressure of the system) or on a bench test apparatus after removal from the protected system.

- 4.8.14 When specialty service valves are tested in a valve shop environment, the valve shall be tested for seat leakage in accordance with applicable test procedures, vendor data, and specification control drawings.

5.0 INSPECTION AND TESTING INTERVALS FOR STORED RELIEF DEVICES

- 5.1 The inspection and testing intervals of relief valves that are in storage and maintained at RPTSTD-8070-0001 clean levels may be at intervals up to, but not exceeding, five (5) years. The relief valve shall be tagged to indicate that it is on a five-year inspection and testing interval.

- 5.2 When a relief valve is issued from storage, the Table 1 length of service begins.

6.0 EXTENDING RELIEF DEVICE INSPECTION AND TESTING INTERVALS

In the event that operational or test needs place constraints on system availability for certification functions, the Pressure System Manager may extend the certification period, without processing a waiver, provided:

- 6.1 The certification due date of the relief valve has not passed.
- 6.2 Certification extension period shall be the lesser of 5% of the safe remaining life or one hundred eighty (180) days.

NOTE: In the case of relief valves, the remaining safe life is considered to be the recertification interval of the relief valve.

- 6.3 The extension shall be processed through SSC Form-861. See Appendix A for Certification extension process.

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7.0 IDENTIFICATION TAG APPLICATION

7.1 GENERAL

Tags shall be attached to each relief valve upon completion of testing. The manufacturer's tag is sufficient for rupture disc and relief devices.

7.2 PROCEDURE FOR MAKING IDENTIFICATION TAGS

7.2.1 The metal tags should be approximately 0.50 inch wide by .005 inch thick (nominal), preferably with rounded corners.

7.2.2 Information on the tag shall include at least the following:

1. Relief valve marked set pressure
2. Date of test
3. Quality control (Q.C.) certification stamp
4. Date of next test (Due Date)
5. Serial number
6. Part Number and/or Specification Control Drawing Number
7. Relief valve locator number, if applicable
8. "TEST ONLY" designation for bench testing (for set point verification only)

7.2.3 For shop inspection, the actual relief pressure shall be noted on the Component Processing Control Sheet in the Remarks box on the form (SSC-368). Reference SSTD-8070-0006-CONFIG.

7.2.4 For relief valve from Warehouse stock

The requirements of 7.2.1 and 7.2.2 shall be followed, in addition to the following additional requirements:

7.2.4.1 The CPF tag showing the Test Date shall be attached to the relief valve.

7.2.4.2 The *Date of Test* required in 7.2.2 can be mark with "NA".

8.0 NON-CONFORMING PRODUCTS

Discrepancies noted from inspections and testing shall be documented on a Problem Report in accordance with SPR 8730.1.

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9.0 RECORDS AND FORMS

Records and forms identified in this SSTD shall be maintained per SPR 1440.1. Quality Records are identified on the SSC Master Records Index. Forms shall be the latest edition unless otherwise specified and may be obtained from the SSC Electronic Forms repository or from the NASA SSC Forms Management Officer.

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APPENDIX A: ACRONYMS & ABBREVIATIONS

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
CDB	Component database
COTS	Commercial Off-the-Shelf
DDMS	Design and Data Management System
DOP	Detailed Operating Procedure
IPA	Isopropyl Alcohol
kPa	Kilopascal
MRB	Material Review Board
NASA	National Aeronautics and Space Administration
NBIC	National Board Inspection Code (NB-23)
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PORV	Pilot Operated Relief Valve
PR	Problem Report
PVS	Pressure Vessels and Pressurized Systems
Q.C.	Quality Control
RP	Rocket Propulsion
RPT	Rocket Propulsion Test
SPR	John C. Stennis Space Center Procedural Requirement
SSC	John C. Stennis Space Center
SSTD	John C. Stennis Space Center Standard
STD	Standard
STE	Special Test Equipment

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APPENDIX B: DEFINITIONS

Actual set pressure – Applicable to shop overhaul and bench testing, this is the pressure where the relief valve lifted (as defined by the relief valve manufacturer for set pressure).

Commercial Off-The Shelf - Commercial items that require no unique Government modification or maintenance over the life cycle of the product to meet the needs of the procuring agency. A commercial item is one customarily used for nongovernmental purposes that has been or will be sold, leased, or licensed (or offered for sale, lease, or license) in quantity to the general public. An item that includes modifications customarily available in the commercial marketplace or minor modifications made to meet NASA requirements is still a commercial item. A custom engineered system, whether supplied by others or constructed by NASA, is not considered COTS.

Competent Personnel – Employees with a working knowledge of pressure relief device operating characteristics, have practical experience in operating the test equipment in accordance with DOP-M-10-0003-FAC or DOP-M-01-0006-FAC, and follow written procedures.

Flight Weight Special Test Equipment (STE) – Pressure components and systems not designed in accordance with American Society of Mechanical Engineers (ASME), American National Standards Institute (ANSI) or other recognized industry standards. Burst pressure safety factors of system pressure boundaries are less than 3.0; normally 1.05 to 1.5 safety factors.

Inline relief valve – A compact, direct acting pressure relief valve. Factory preset to desired crack pressure and/or flow specifications. Internal adjustment provides tamper proof safety against inadvertent pressure changes.

Inspection – Examination of relief devices used to protect pressure systems. Field inspection includes a brief examination of the general condition of the device. Shop inspection includes a more detailed examination of the valve.

Lift plates – Weight loaded pressure relief valve used primarily in vacuum systems at SSC. As pressure increases, the plate rises to expose the discharge ports. The valve automatically reseats itself as the line pressure is reduced.

Marked Set Pressure – Applicable to shop overhaul and bench testing, this is the set pressure on the relief valve tag (usually designated as “set pressure”).

MAXIMO – SSC site-wide asset management database to track certification of SSC relief devices.

Pop – When testing relief valve, a loud noise generated when the relief valve moves rapidly to a full open position, indicating the relief valve has discharged.

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Relief devices – Valves, rupture discs, and other safety devices that relieve internal pressure when a system is over pressurized.

Rupture disc - A pressure-containing, pressure- and temperature-sensitive element of a rupture disc device.

Rupture disc device – A non-reclosing pressure-relief device actuated by static differential pressure between the inlet and outlet of the device and designed to function by the bursting of a rupture disc. A rupture disc device includes a rupture disc and a rupture disc holder.

Simmer – An audible or visible escape of fluid between the seat and disc at an inlet static pressure below the popping pressure with no measurable capacity. It applies to safety or safety relief valves on compressible fluid service.

Specialty service media – Fluids used as propellant, coolant, purge gas, and propellant pressurant in cryogenic and flight type hardware/systems.

Specialty service relief devices – Relief devices used in specialty service systems.

Standard STE – Pressure equipment and systems used in special configurations in close proximity to a test article and not classified as Flight Weight STE.

Target set pressure – Applicable to shop overhaul, this is the set pressure as specified by the owner of the relief valve.

Utility service media – Fluids that are not classified as Specialty Service Media. These include fluids used in utility equipment and in non-critical systems, such as industrial water, steam and gasoline.

Utility service relief devices – Relief devices used in utility service systems.

UV – Symbol designating ASME certification.

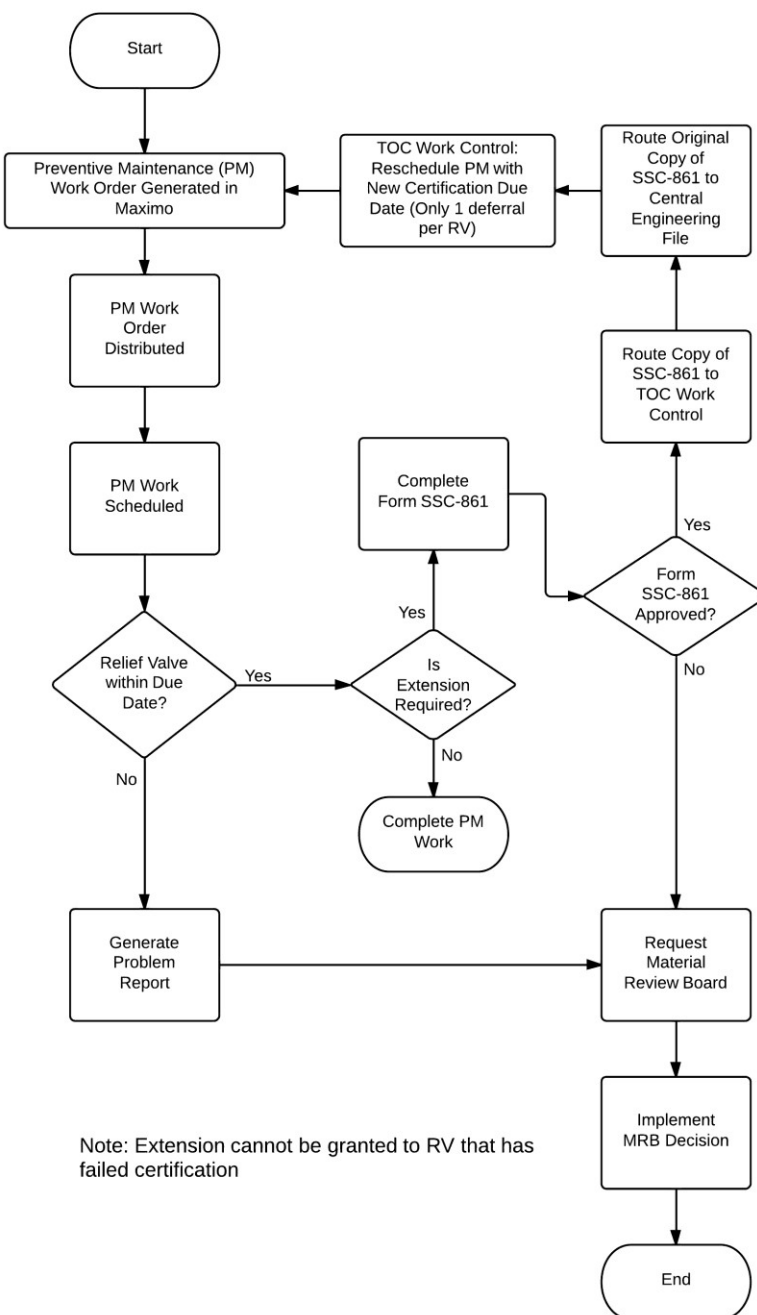
VR – Symbol indicating that an organization is certified to repair or rework relief valves.

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APPENDIX C: CERTIFICATION EXTENSION OF RELIEF VALVES

Implementation of Form
SSC-861
"Certificate of Extension"



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APPENDIX D: EXTERNAL REFERENCES

Reference 1 (National Board)

2019	NATIONAL BOARD INSPECTION CODE
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ensures reseating of the main valve. The pressure drop in connecting piping between the pilot and the main valve must not be excessive, otherwise the operation of the main valve will be adversely affected.

Tightness capability is another factor affecting valve selection, whether spring-loaded or pilot operated. Tightness varies somewhat depending on whether metal or resilient seats are specified and also on such factors as corrosion and temperature. The required tightness and test method should be specified to comply at a pressure not lower than the normal operating pressure of the process. It should be remembered that any degree of tightness obtained should not be considered permanent. Service operation of a valve almost invariably reduces the degree of tightness.

The following minimum pressure differentials are recommended unless the pressure relief valve has been designed or tested in a specific or similar service and a smaller differential has been recommended by the manufacturer:

Set Pressure	Recommended pressure differential
up to 70 psi (480 kPa)	5 psi (35 kPa)
70 – 1000 psi (480 kPa – 6.89 MPa)	10% of set pressure
Above 1000 psi (6.89 MPa)	7% of set pressure

Reference 2

NASA-STD-8719.17C – 2017-08-09

4.2.3.3 Control, instrument, shop air, or inert gas piping systems with Maximum Allowable Working Pressure (MAWP) not to exceed 150 psig and line sizes not to exceed Nominal Pipe Size (NPS) 2 inch. Relief valves and pressure vessels (air receivers, tanks, etc.) are not included in this exclusion. This exclusion does not apply to higher pressure or larger size PVS that supply the lower pressure PVS.

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TABLE 1: Inspection and Testing Intervals For Specialty Service Relief Devices

System Type Protected by Device	Service Media	Inspection & Testing Interval (years)
Flight Weight STE/Flight Hardware	All	1
Facility/Standard STE Pipe	Deionized Water	5
Facility/Standard STE Pipe	Non-Flammable Hydraulic Fluid	5
Facility/Standard STE Pipe	Flammable Hydraulic Fluid	2
Facility/Standard STE Pipe	Liquid Argon	2
Facility/Standard STE Pipe	Gaseous Argon	3
Facility/Standard STE Pipe	Gaseous Helium	3 – Above 200 psig 5 – 200 psig & lower
Facility/Standard STE Pipe	Liquid Nitrogen	2
Facility/Standard STE Pipe	Gaseous Nitrogen	3 – Above 200 psig 5 – 200 psig & lower
Facility/Standard STE Pipe	Liquid and Gaseous Oxygen with System Design Pressure > 500 psia	1
Facility/Standard STE Pipe	Liquid and Gaseous Oxygen with System Design Pressure <= 500 psia	2
Facility/Standard STE Pipe	Liquid and Gaseous Fluorine	1
Facility/Standard STE Pipe	Gaseous Hydrogen, Components with piece part materials susceptible to or of unknown resistance to Hydrogen embrittlement	2
Facility/Standard STE Pipe	Gaseous Hydrogen components with all piece part materials resistant to Hydrogen embrittlement	2
Facility/Standard STE Pipe	Liquid Hydrogen	2
Facility/Standard STE Pipe (Inline Relief Valves)	Gaseous/Liquid Hydrogen	2
Facility/Standard STE Pipe	Liquefied Natural Gas or Liquid Methane	2

Continued on next page.

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System Type Protected by Device	Service Media	Inspection & Testing Interval (years)
Facility/Standard STE Pipe	Natural Gas (Aerospace Test Facility Propellant Systems Only)	3
Facility/Standard STE Pipe	Gaseous Methane	3
Facility/Standard STE Pipe	Compressed Air	3 – Above 200 psig 5 – 200 psig & lower
Facility/Standard STE Pipe*	Vacuum Service	1
Facility/Standard STE Pipe	Missile Grade Air and Dry Air	3 – Above 200 psig 5 – 200 psig & lower
Facility/Standard STE Pipe	Hydrogen Peroxide (H ₂ O ₂)	2
Facility/Standard STE Pipe	High Pressure Steam (Aerospace Test Facility Propellant Systems Only)	1
Facility/Standard STE Pipe	RP-1	2
Facility/Standard STE Pipe	Isopropyl Alcohol (IPA)	2
Facility/Standard STE Pipe	Tea-Teb	1
Facility/Pressure Vessels PHPK Style Removable Lift Plate	Vacuum	1 – Inspection 5 – Testing Interval
Facility/Pressure Vessel Integral Type Lift Plates*	Vacuum	1
Facility/Standard STE Pipe	Potable Water/Industrial Water	5
Facility Boilers	Water	5
Facility Boilers	Steam	1
Facility Pipe	Steam	1
COTS Compressor/Vessel Integrated Skid (Shop Air)**	Air	5 - Replacement
DOT-4L Cryogenic dewars	Liquid Nitrogen	5 - Replacement

*Bench Testing not required

** Appendix, Reference 2

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TABLE 2: Inspection Intervals For Utility Service Relief Valves

System Type Protected by Device	Service Media	Inspection Interval (years)**
Facility Heaters	Water	1
Facility	Natural Gas (Systems Other Than Aerospace Test Facility Propellant Systems)	2
Facility Pipe	Potable, Deluge and Fire Extinguishing Water	1
Facility	Petroleum Products (Gasoline, Diesel, etc.)	5

** Reference Section 4.5.

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