Testing of Non-Code Pressure Relief Valves

Tank Farm Maintenance Procedure

USQ # GCX-2

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for testing of non-code pressure relief valves.

1.2 Scope

This procedure includes the testing of safety valves, safety relief valves, relief valves, and vacuum relief valves.

2.0 INFORMATION

2.1 Terms and Definitions

- CGI - Commercial Grade Item
- SC - Safety Class
- SS - Safety Significant
- NON-CODE PRESSURE RELIEF VALVE - valve not in an American Society of Mechanical Engineers (ASME) code system.
- PRESSURE RELIEF VALVE - an internal pressure relieving device actuated by upstream pressure. This term includes relief valves, safety valves, and safety relief valves.
- RELIEF VALVE - a pressure relief valve actuated by inlet static pressure having a gradual lift generally proportional to the increase in pressure over opening pressure. It may be provided with an enclosed spring housing suitable for closed discharge system applications and primarily used for liquid service.
- SAFETY VALVE - a pressure relief valve characterized by rapid full opening or “POP” action. It is used for gas or vapor service (i.e. steam, air, carbon dioxide, etc.).
- SAFETY RELIEF VALVE - a pressure relief valve characterized by “POP” action or by opening generally proportional to the increase in pressure over the opening pressure. It may be used for either liquid or air, depending on design, adjustment, or application.
- VACUUM RELIEF VALVE/VACUUM VENT VALVE – a vacuum relieving device that prevents the build-up of excessive vacuum which can unbalance or damage the component, system, or storage vessel. Throughout this procedure, this device will be referred to as vacuum relief valve.
2.2 General Information

2.2.1 Gaseous or vapor pressure relief valves are not to be tested on hydraulic, deadweight, or liquid test systems.

2.2.2 This procedure may require a facility specific work instruction to address issues such as system configuration, over pressure protection during testing, test medium/quality, and other aspects as it relates to facility.

2.2.3 Safety hazards of any discharge must be considered. Refer to work package, if applicable, for any specific instruction.

2.2.4 If during in-system testing, a NON-CODE valve does not lift without exceeding the maximum operating system pressure specified in the Data Sheet, valve is considered "FAILED". "FAILED" NON-CODE valve MUST be repaired, removed or replaced per direction of Engineering.

2.2.5 Prior to the performance of this procedure A Pre-Job Safety meeting is required.

2.2.6 Relief valve may be removed from installed location and checked on a separate test apparatus.
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

WARNING - Ear muffs, or ear plugs shall be worn during testing to prevent hearing loss/damage.

3.1.1 If a lock and tag is required during the performance of this procedure, comply with DOE-0336, Hanford Site Lockout/Tagout Procedure.

3.1.2 Personal protective equipment consisting of leather gloves, safety glasses, with side shields, and face shield shall be worn during the performance of this procedure in compliance with TFC-ESHQ-S_IS-C-02.

3.2 Equipment Safety

CAUTION - Test pressures shall not exceed maximum operating system pressure specified within tolerances specified on Data Sheet. Exceeding pressure may result in equipment failure or damage.

3.3 Radiation and Contamination Control

3.3.1 Work in radiological areas will be performed using a radiation work permit following review by Radiological Control per the ALARA work planning procedure TFC-ESHQ-RP_RWP-C-03.

3.3.2 The opening of any system or component within a Radiological Area requires the presence of a Health Physics Technician to verify contamination control.

3.3.3 Venting and relieving of pressure from test rig or system within a Radiological Area requires HEPA filtration for air or collection container for liquids, HPT coverage and radiological surveys.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:
- Pressure relief valve test equipment
- Calibrated pressure gauges or standards
- Stopper assembly for vacuum relief testing
- Plastic wrap sheeting
- Safety glasses, face shield, and leather gloves
- Hearing Protection
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.

4.2 Field Preparation

4.2.1 IF during performance of this procedure any of the following conditions are found, PERFORM the following:
- Any equipment malfunction which could prevent fulfillment of its functional requirements
- Personnel error or procedural inadequacy which could prevent fulfillment or procedural requirements.

4.2.1.1 IMMEDIATELY STOP work.

4.2.1.2 PLACE equipment in a safe condition.

4.2.1.3 NOTIFY Supervisor/Lead.

4.2.1.4 RECORD any directions received from Supervisor/Lead on Data Sheet 1.

4.2.1.5 PROCEED as directed.

4.2.2 CONTACT FWS for additional instructions if changing plant conditions affect work or delays in work extend past end of shift.

4.2.3 IF Lockout/Tagout is required, COMPLY with DOE-0336, Hanford Site Lockout/Tagout Procedure. Refer to Work Package for specific lock and tag instructions.
4.2 Field Preparation (Cont.)

4.2.4 REQUEST Shift Manager/OE to have system/equipment configured to allow performance of this procedure.

4.2.5 IF any waste is generated during performance of this procedure, CONSULT Facility/Plant/Area Hazardous Waste Coordinator for specific instructions to ensure compliance with applicable environmental standards for disposal.

4.2.6 CHECK Operations personnel have configured system or equipment to allow performance of this procedure.
5.0 PROCEDURE

NOTE - The purpose of Figure 1 and Figure 3 is to indicate types of components and configuration of a possible test equipment setup. They are intended to be used for guidance.

- This procedure is limited to NON-CODE relief valves.

5.1 Test Set-Up and Visual Inspection

5.1.1 IF Performance of any step(s) in this procedure is/are not required for procedure completion, MARK N/A for steps not performed in appropriate Data Sheet signoff space AND EXPLAIN in Comments/Remarks section of Data Sheet.

5.1.2 CHECK Engineering has filled in all applicable sections of Data Sheet AND IF not completed, REQUEST Engineering do so.

5.1.3 RECORD the following test equipment information on Data Sheet:
   • Gauge type
   • Calibration number
   • Calibration due date.

NOTE - Step 5.1.4 deals with out-of-system testing ONLY.

5.1.4 PERFORM visual inspection of the valve under test AND RECORD on Data Sheet.

5.1.4.1 IF deficiencies are noted during the visual inspection, NOTIFY FWS.

5.1.5 CONFIRM OR RECORD nameplate data listed in Specification Table on Data Sheet.

5.1.6 IF testing safety relief valves, safety valves, or relief valves, GO TO Section 5.2.

5.1.7 IF testing vacuum relief valves, GO TO Section 5.3.
Testing of Non-Code Pressure Relief Valves

5.2 Safety Relief Valves, Safety Valves, and Relief Valves

5.2.1 IF Performance of any step(s) in this procedure is/are not required for procedure completion, MARK N/A for steps not performed in appropriate Data Sheet signoff space AND EXPLAIN in Comments/Remarks section of Data Sheet.

5.2.2 REMOVE valve from system.

5.2.3 CONNECT test equipment.

5.2.4 IF valve is designed with discharge connections (s), CONNECT any discharge lines.

WARNING

Ear muffs, or ear plugs shall be worn during testing to prevent hearing loss/damage.

CAUTION

Test pressures shall not exceed maximum operating system pressure specified within tolerances specified on Data Sheet. Exceeding pressure may result in equipment failure or damage.

5.2.5 SLOWLY INCREASE pressure until valve lifts AND

RECORD lift pressure value in testing and calibration As-Found column of Data Sheet.
5.2 Safety Relief Valves, Safety Valves, and Relief Valves (Cont.)

5.2.6 LOWER pressure until valve reseats AND

RECORD estimated reseat pressure value in testing and calibration As-Found column of Data Sheet.

5.2.7 LOWER pressure completely.

5.2.8 COMPARE As-Found values with setpoints and associated tolerances specified on Data Sheet.

5.2.9 IF As-Found values are within specified tolerances, PERFORM the following:

5.2.9.1 RECORD pressure values in the testing and calibration As-Left column of Data Sheet.

5.2.9.2 QC Inspector ENTER required information on Data Sheet.

5.2.9.3 GO TO Section 5.4.

5.2.10 IF As-Found values are out of tolerance, STOP WORK AND

NOTIFY Engineering for further instruction.
5.3 Vacuum Relief Valves

5.3.1 IF Performance of any step(s) in this procedure is/are not required for procedure completion, MARK N/A for steps not performed in appropriate Data Sheet signoff space AND EXPLAIN in Comments/Remarks section of Data Sheet.

5.3.2 ATTACH vacuum gauge/stopper assembly to vacuum relief valve under test.

5.3.3 SLOWLY INCREASE vacuum until valve lifts AND RECORD the corresponding lift pressure (vacuum) value in As-Found column on Data Sheet.

5.3.4 LOWER vacuum until valve reseats AND RECORD reseat pressure (vacuum) value in As-Found column on Data Sheet.

5.3.5 RELEASE vacuum completely.

5.3.6 COMPARE As-Found values with setpoints and associated tolerances specified on Data Sheet.

5.3.7 IF As-Found values are within specified tolerances, PERFORM the following:

5.3.7.1 RECORD pressure/vacuum values in the testing and calibration As-Left column of Data Sheet.

5.3.7.2 QC Inspector ENTER required information on Data Sheet.

5.3.7.3 GO TO Section 5.4.

5.3.8 IF as-found values are out of tolerance, STOP WORK AND NOTIFY Engineering for further instruction.
5.4 Restoration

5.4.1 IF potentially contaminated valves were tested, ENSURE test equipment has been surveyed by HPT.

5.4.2 DISCONNECT AND REMOVE any installed test equipment.

5.4.3 RECORD the Test Equipment information and calibration status on Data Sheet as applicable.

5.4.4 CHECK equipment restoration by observing indications are consistent with expected conditions.

NOTE - Non-code relief valves have a hexagonal aluminum tag, attached by a stainless steel wire seal.
- The seal is installed by facility personnel and crimped with a QC crimper.
- The tag and seal are placed on the valve. Figure 2 illustrates typical valve configurations where tag and tamper-proof seal are placed on the valve. If tag and seal are not affixed to the valve in a tamper-proof configuration, a torque seal or equivalent is also applied to the valve to provide tamper indication capabilities.
- The valve seals have the following inscribed on tag:
  - The type of valve; i.e., NON-CODE
  - Date of seal installation
  - Name or assigned number of qualified technician installing seal
  - Lift pressure setpoint value.

5.4.5 INSTALL proper seal and tag.

5.4.6 Engineering REVIEW AND SIGN Data Sheets.

5.4.7 REPORT deficiencies or cause of early failure to FWS.

5.4.8 RETURN Work Package and Data Sheet(s) to FWS.

5.4.9 INFORM Shift Manager/FWS maintenance is complete and system may be returned to desired configuration.

5.4.10 RECORD Work Request Number(s) of any work documents generated as a result of this instruction in COMMENTS section of Data Sheet.
5.5 Acceptance Criteria

Acceptance Criteria has been met when Steps in this procedure have been satisfactorily performed and As-Left values meet the specifications and tolerance(s) per the Data Sheet.

5.6 Review

5.6.1 INFORM Shift Manager/FWS test is complete.

5.6.2 FWS REVIEW AND ENSURE the following:
   - Completed Data Sheets meet the acceptance criteria.
   - Comments sections are filled out appropriately.
   - Work requests needed as a result of this procedure are identified and generated.
   - Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the Data Sheet.

5.6.3 RECORD all findings and repairs in the CRAFT/RESOURCE USAGE LOG or the Work Package.

5.7 Records

This procedure is performed within a work package, as such, the procedure in its entirety will be maintained as a record per the Work Control process.

The record custodian identified in the Company-level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
### Data Sheet 1 - Information Record Sheet

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**FWS Review Signature**
Testing of Non-Code Pressure Relief Valves

Figure 1 - Safety Relief Valve Test Set-Up Example
Figure 2 - Examples of Affixed Seals and Tags

- Retainer Pin
- Lift Ring
- Seal

Steam Service
Typical

Air Service
Typical

Hot Water
Heaters
Typical

Typical
Figure 3 - Relief Valve (only) Test Set-Up Example

All fittings, valves, tubing, pipe, gauges, etc. To be rated a minimum of 1.5 X the maximum pressure reached during the test.