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C-A OPERATIONS PROCEDURES MANUAL

7.1.64 Inspection/Testing Cryogenic System Relief Devices

Text Pages 2 through 4

Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
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Approved: _____ *Signature on File* _____
Collider-Accelerator Department Chairman Date

A. Nicoletti

7.1.64 Inspection/Testing Cryogenic System Relief Devices

1. Purpose

- 1.1 The purpose of this procedure is to outline a regular test program for RHIC cryogenic system relief valves and burst disks.

Relief valves are clearly the critical safety components in any cryogenic system, and efforts must be made to assure they will work properly if needed. The National Board Inspection Code recommends a 5 year testing interval, which can be met with regard to the relief valves associated with the 24.5 kW refrigerator and its associated compressors. However due to the unique operational features of the RHIC cryogenic system, this recommendation is not applicable to the relief valves installed in the RHIC ring.

2. Responsibilities

- 2.1 The C-A Department Cryogenic Group leader, or designee, is responsible for the regular execution of this procedure.

3. Prerequisites

- 3.1 The RHIC accelerators are shutdown.

4. Precautions

None

5. Procedure

- 5.1 Refrigerator and Compressor Room Relief Valves.

- 5.1.1 Perform a 100 % visual inspection annually during every RHIC shutdown period. The inspection shall include, but not be limited to:

5.1.1.1 Inspection for external signs of damage and proper valve marking. This will include set pressure, identification, capacity, and date of last test. Also examine for mechanical damage, rust, leakage, loose nuts, bolts, or other parts.

5.1.1.2 Inspection of atmospheric discharge lines to insure they have adequate rain and moisture protection, and they are capable of draining condensate and rainwater.

5.1.1.3 Checking to make sure the relief valve discharge line stays unobstructed.

5.1.2 Remove from the system and bench test to relief pressure 20% of all relief valves every RHIC shutdown period starting in 2002.

Note 1:

Original Isabelle refrigerator equipment is to be tested first.

Note 2:

Testing of more than 20% of the valves depends on results of initial testing. In this plan, all valves will be tested in a 5-year period.

5.1.2.1 Bench testing will verify the set pressure and reseating capability of the valve. This requires removing of the relief device and installing it on a test bench.

5.1.2.1.1 During the bench test, slowly increase the pressure until the relief valve opens.

5.1.2.1.2 Document the result of the test in a log book approved by the Group Leader

5.1.2.1.3 If the relief pressure is not within 4% of it's indicated value, replace it.

5.2 Ring Relief Valves, Including Warm Gas Storage and Liquid Helium Storage Systems

Note:

In all future RHIC accelerator shutdown periods, the cryogenic process lines as well as the magnets themselves, will continue to operate at approximately 15 atmospheres and 80 K. The relief valves associated with this piping are essentially in continuous service. This is also true for relief valves protecting the Liquid Storage area and Tank farm. This precludes removal and bench testing of these devices.

5.2.1 Perform a 100 % visual inspection every RHIC shutdown period. The inspection shall include but not be limited to:

5.2.1.1 Checking for external signs of damage and insuring proper valve marking. This includes set pressure, identification, capacity, and date of last test. Also examine for mechanical damage rust, leakage, loose nuts, bolts, or other parts.

- 5.2.1.2 Inspecting atmospheric discharge lines to insure they have adequate rain and moisture protection, and that they are capable of draining condensate and rainwater.
 - 5.2.1.3 Checking to make sure the relief valve discharge line stays unobstructed.
 - 5.2.1.4 All pressure relief valve data will be maintained in an inventory record. The record shall include location, size, set pressure, manufacturer, capacity, date installed, dates of inspections, and latest date for replacement.
- 5.3 Burst Disks installed on the RHIC 24 kW refrigerator and associated compressor system.
- 5.3.1 Perform Annual inspection every RHIC shutdown period. This will include:
 - 5.3.1.1 Verification of burst pressure, component identification, capacity, and date of last replacement.
 - 5.3.1.2 Inspect for mechanical damage, rust, leakage, loose nuts, bolts, or other parts or vent obstruction.
 - 5.3.1.3 Replace approximately 15% of the burst disks every year starting with the oldest. No burst disk should be in the system more than 7 years.
 - 5.3.1.4 Maintain all burst disk data in an inventory record. The record shall include location, size, burst pressure, manufacturer, capacity, date installed, dates of inspections, and latest date for replacement.

6. Documentation

- 6.1 Refrigerator and Compressor Room Relief valve bench test results
- 6.2 Inventory Record for Burst Disks, Ring Pressure relief valves, Warm Gas and Liquid Helium Storage Systems

7. References

None

8. Attachments

None