

**D-0 SOUTH END CAP CALORIMETER  
COLD TEST RESULTS**

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D-ZERO ENGINEERING NOTE 3740.224-EN-269

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# ECS COLD TEST RESULTS

## OUTLINE

### I. INTRODUCTION

- A. THE TEST
- B. SILMILARITY TO CC & ECN COLD TEST

### II. OUTLINE OF TEST

- A. INSULATING VACUUM
  - 1. Pumpdown time
  - 2. Rate of rise
- B. PRESSURE VESSEL
  - 1. Pumpdown
  - 2. Rate of rise
- C. COLD TEST
  - 1. Vacuum space monitoring results
  - 2. Filling
  - 3. Frost spots
- D. WARM UP

## INTRODUCTION

The South endcap calorimeter vessel was moved into Lab A on Sept. 18, 1990. A cooldown of the pressure vessel with liquid nitrogen was performed on Sept. 26 to check the vessel's integrity. With the pressure vessel cold, the insulating vacuum was monitored for leaks. Through out the testing, the insulating vacuum remained good and the vessel passed the test.

The cold test was carried out per the procedures of D-Zero engineering note 3740.220-EN-250. The test was very similar to the cold test performed on the Central Calorimeter in October of 1987. The test of the ECS was performed in the same manner using the same equipment as the ECN cold test. Reference D-Zero engineering notes 3740.210-EN-122, 3740.000-EN-107, and 3740.210-EN-110 for information about the CC cold test. Reference EN-260 for the results of the ECN cold test.

## INSULATING VACUUM

The insulating vacuum space was pumped on while equipment was being connected to the pressure vessel. Two hours after starting to pump with the blower the vacuum space pressure was at about 40 microns. The pumping continued overnight (another 16 hours). In the morning the pressure was 11.5 microns. A rate of rise test was performed. With the pump valved off, the pressure rose to 14 microns within 5 minutes and then rose to 16 microns in 6 hours (0.33 microns/hour).

## PRESSURE VESSEL

After all connections were made to the pressure vessel, a vacuum pump with an estimated effective pumping speed of about 70 scfm was valved on. After 18 hours, the pressure vessel was down to 270 microns. An additional day of pumping took the pressure down to only 250 microns. A leak was then found and fixed around the seal of the rupture disc.

The pump was put on line again. The pressure vessel with pump on line was 27 microns after 16.5 hours. A rate of rise was then conducted. The pressure was 90 microns after valving out the pump. After 30 minutes the pressure increased to 107 microns. (34 microns/hr).

## COLD TEST

The EC South vessel was rolled outside of Lab A in preparation for a 5000 gallon liquid nitrogen trailer which arrived Sept. 26 at 12:45. Before filling the vessel, the vacuum space pump was valved off. The pressure in the vacuum space was 12 microns at that point. During the next 24 hours of the test, the vacuum space pressure decreased uneventfully to 8 microns.

Approximately 3000 gallons of LN2 were used to cool down and collect 50" of LN2 in the bottom of the pressure vessel. This took approximately 5.5 hours. During the latter part of the filling, two or three metallic bangs or creaks were heard.

Frost spots were observed at the top of the beam bypass tube on the south side. Additional frost spots developed overnight on the outer closure plate of the south vacuum vessel head. In November, after the south head was cut off, it was found that the vacuum vessel was touching the inner vessel in three locations.

As a final part of the test, the pressure vessel's pressure was increased to 13 psig (relieving pressure) with 50" of LN2 in the vessel's bottom. The vacuum space pressure did not change. The criterion of a successful test is no pressure rise in the vacuum space during the test. This was met and the test was deemed successful.

## WARM - UP

The vessel was drained outside of Lab A and when empty was moved inside. During the warm-up, the heater was only used during working hours each day (approximately 12 hours). The vacuum space did not have a pump on it during warm up and 6 days after the cold test the pressure only increased to 20 microns! The warm-up went rather slow, as we were limited to about 65 scfh air and a heater temperature of 300 Fahrenheit. The vessel was warm enough to let up the insulating vacuum and remove equipment after about 6 days time. (Includes a weekend)