

Richard Schmitt

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Sent: Monday, January 22, 2007 9:56 AM
Subject: MuCool Butt Weld Inspection

Arkadiy,

Eric Brown of Cooperheat-MQS, Inc. inspected seven butt welds in the Mucool bayonet box and three in the bayonet can on 1/18/07. He rejected weld #7 on the 5K supply line. The defect is a tungsten inclusion. All other welds were acceptable.

On January 19 I discussed the inspection results with Mark Joseph at Cooperheat(219-838-0505. He had not seen the report or the films, but had discussed them with Brown. Brown said the defect was a "hair over" the allowable of 1/2 T, at 24.5mils, so he rejected it. The diameter was measured with a grading comparator tool. He is willing to re-inspect the joint and determine the defect size more carefully.

Inspection of the film at Fermilab the single defect appeared to be a dot about 0.02 inch diameter, but we did not make a precise measurement.

B31.3 tolerances for tungsten inclusions are 1/2T width and 2T length where T is the tube wall thickness.(table 341.3.2) The tube wall thickness is 0.049 inches, the material TP304. This defect is close to the width tolerance and well below the length tolerance. And it is only a single defect.

The design pressure is 60 psig. The tube wall thickness required is

$$t = \frac{PD}{2S_a} = \frac{60 * 1}{2 * 20000} = 0.0015 \text{ inches}$$

Since this is only 3% of the actual thickness, the tube stress is very low. Thermal contraction could cause a local stress around the defect, but this should not affect the integrity of the tube. A cold shock and leak check will demonstrate this integrity.

Therefore the weld is acceptable as is and does not require further radiography. It must be cold shocked and leak checked.

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