Fitting Connection Trial Log

October 19, 2006

Resurrected U-tube test setup – see picture below.



Trial 1

This was left in an unknown state from previous tests. One nut was tight to hand pressure. The other was loose. It was finger tightened only.

4 bara pressure

Pressure to about 44 psig was applied for roughly 5 minutes with nitrogen bottle. Leak check OK to about 10⁻⁹. No leak

Overnight at pressure

It was started at about 44 psig at roughly 4PM and left overnight.

October 20, 2006

Overnight pressure continued

Pressure had fallen to about 36 psig. Bottle open. Believe regulator drift. Leak check OK to 10^{-9} scale.

<u>8 bara pressure</u> Pressurized to 100 psig for about a minute. Leak check to 10^{-9} scale OK.

Trial 2

U-tube from above was removed. Reminder that this was also used for trial tests of tacking so one nut was tacked with 9396 but removed anyway. Another, different, U-tube attached and torqued to 36 oz-inches.

Initial Leak Check Leak check OK.

<u>Pressure to 4 bara</u> Unless otherwise stated, pressurization for about 1 minute. Leak check OK

Pressure to 8 bara Leak check OK

Trial 3

Change to different U-tube and repeat. Pictures of attaching U-tube here for amusement. Note this trial uses a spare U-tubes, not used before. Nuts required working, back and forth, on fitting to engage smoothly.



Initial Leak Check No leak.

Pressure to 4 bara No leak.

Pressure to 8 bara No leak.

Trial 4

Change to different U-tube and repeat. This is also an unused spare.

Initial Leak Check No leak.

Pressure to 4 bara

No leak.

Pressure to 8 bara No leak.

<u>Thermal cycle</u> Put test plate with fitting into thermal cycle chamber(having not much better to do that is possible over the weekend) at about 5:30PM. The usual 50 cycles 20 <-> -35 C.

October 23, 2006

Leak check of U-tube that was thermal cycled. No leak.

Removed Trial 4 U-tube.

Put on Trial 1 U-tube. This was used as practice piece to help train Rodney. One nut torqued to 24 in-oz and the other nut to the standard 36 in-oz. Note that 36 in-oz is roughly 20% of a turn.

Both leak check OK.

Pressurized to about 4 bara for < 1minute. No leak.

Pressurized to about 8 bara. No leak.

October 24, 2006

Back of nuts. Picture on left below is before backing off. Picture on right is after. This is to try to simulate operator error during disengagement of nut wrench during assembly. Nut engagement is naturally only in the very last fraction of a turn.



Leak checks OK

4 bara. Leak checks OK

8 bara. Leak checks OK.

Finger loosen both nuts. Nuts feel loose. Little or no resistance to backing off.

Leaks!!. Cannot tell if one fitting or both fittings.

Gently finger tighten. Single picture below. Note that finger tight is now very close to original torque position.



Leak check OK

4 bara. Leak checks OK.

8 bara. Leak checks OK. Tried two 8 bara cycles.

Torque both nuts to 36 in-oz. Note that one nut barely moves from finger tight but other moves significantly. The nut on the right was originally torqued to 24 in-oz. The one on the left to 36 in-oz.



Loosen nuts and finger tighten again. Now can finger tighten to very close to location of 36 in-oz. See picture below.



Re-torque to 36 in-oz. See picture below. Can barely see additional motion.



October 25, 2006

Nuts were torqued to 36 in-oz yesterday. Tube near blank off was bent down by accident. This has happened before so does not look happy. Nevertheless keep going.

Pressurized with nitrogen to 200 psig, about 14 bara. Leak checks OK!

Added some supports to the inlet and outlets to prevent future bending.

October 26, 2006

We tried to vent C3F8 through the B1 capillary to cool one end. We reached at least -36F but this is not easily controllable or reliable. B1 leak check OK after this.

Decided to try LN2. One fitting only on each capillary is dunked for 20 sec to a minute.

Here is a summary of the LN2 results. Note that B1 and B3 were qualification samples done with non-frozen epoxy(not sure if still in date, could have been). B2 and B4 at CERN. Ask if these leak. B14 and B15 were done with frozen epoxy and have both seen 150 thermal and 150 pressure cycles prior to these trials. B1 and B3 went through the normal 50 thermal cycles and 50 pressure cycles prior to these trials.

TOTAL number of LN2 cycles then leak check							
Sample	0	1	2	5	10	After 50	Comments
						cycles	
						20 bara	
B1	OK	OK	OK	OK	OK	OK	
B3	OK	OK	OK	OK	OK	OK	
B14	OK	Leak					Bubble at
							9394 Al
							interface
							not
							capillary
B15	OK	OK	OK	OK	OK	Small	Cannot
						leak,	see
						few 10 ⁻⁹	bubbles at
						but	200 psig
						there.	

Note that the leak in B14 is similar in character to the leak seen in B19, namely at the 9394-aluminum interface. Both leaks at LN2-dunked end.