Helium Leak Test Procedure for the TMDS Ionizer Assembly

AUTHOR(S)	DATE	Document Change Notice, Release or Approval
Nichole Washington, Dennis Coyne, Bob Taylor	13 May 2015	see LIGO DCC record Status

This is a general procedure for performing a total (Helium) leakage rate measurement of a vacuum vessel (namely the TMDS Ionizer Assembly, D1400331). Steps for localizing a leak (if one is present) and fixing the leak are also addressed.

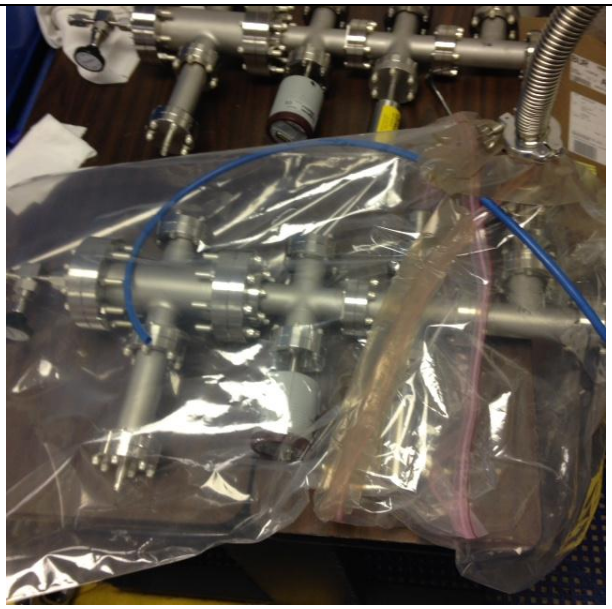
1) Clean & Bake test fittings as required (class A or B):
   - (1) 2.75" Conflat to DN 40 KF adapter
   - (1) DN 40 KF to DN 25 KF adapter
   - (1) DN 25 KF flexible stainless steel tubing x convenient length
   - (2) DN 25 KF rings and clamps
   - (1) DN 40 KF ring and clamp
2) Prepare the Helium leak detector for operation:
   - Attach a clean dry nitrogen bottle, regulated to no more than 1050 mbar, to the purge and ballast ports on leak detector (located on the front of the unit, on the left edge, via 6mm or 8 mm diameter hoses)

oerlikon Leybold Phoenix series, Model L300i Dry, Leak Detector

Pump fittings from DN25KF inlet port to device under test

Helium Leak Test Procedure for the TMDS Ionizer Assembly

3) Prepare TMDS Ionizer Assembly to be tested:
   - Insure that all conflat joints have been torqued down to a “metal-to-metal” condition (no separation between flanges)
   - Close the valves
   - Attach the leak detector to the TMDS Ionizer Assembly with the KF fittings at the isolation/right-angle valve
   - Place a plastic bag around the entire TMDS Ionizer Assembly, sealing it to the Assembly using tape
   - Insert the Helium gas nozzle through a small hole in the bag and tape around the nozzle

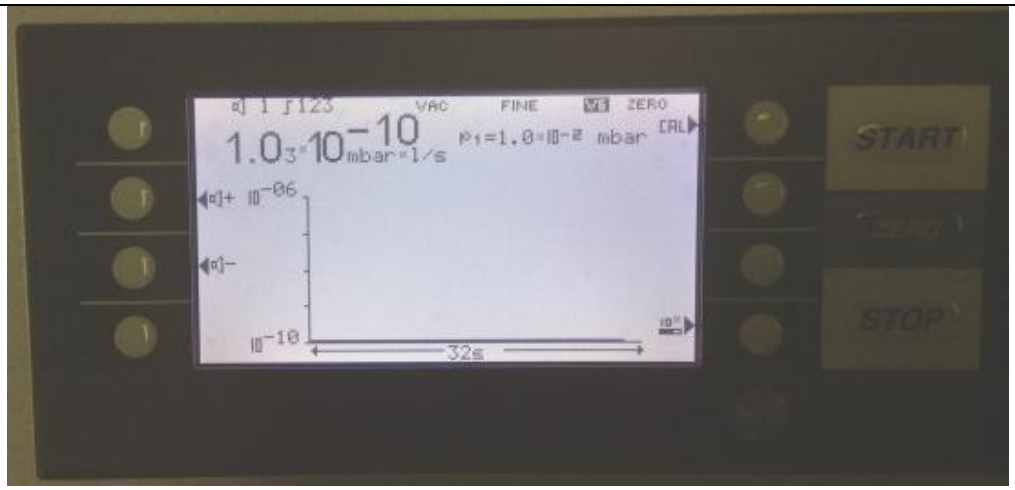
	
DN40KF fitting to angle valve	TMDS Ionizer Assembly in helium filled bag

4) Connect Device Under Test (DUT) to the Leak Detector (Phoenix L300i Dry) –or, connection can happen later when in the stand-by mode
5) Power switch “on” - pump down to stand-by mode for 20 min warm up period
6) Verify that the leak detector is set up for Helium (He) leak detection (not hydrogen)
7) After warming up for 20 minutes, Push “cal” button – calibrates instrument (if button is pushed too soon, equipment will not proceed) Push “internal” testing (not external.
8) Inflate the bag with Helium just before starting the leak measurement
9) Push “start”

Helium Leak Test Procedure for the TMDS Ionizer Assembly

- The detector should automatically pump down (if the system has difficulty pumping down then a large leak is present)
- The detector automatically switches to the Leak detecting mode
- The pressure (or leak rate) vs time Line should level out - large line movement (up/down) could indicate a large leak
- The leak rate number displayed should be less than 1 x 10^{-9} mbar-L/s (higher numbers could indicate small leak)

10) Push “stop” and go back to stand-by mode



If the measured helium leak rate is acceptably low, then:

11) Push “vent”

12) Push “close vent”

13) Close all valves

14) Remove the bag from the TMDS Ionizer Assembly, disconnect the leak detector, and re-seal/cap the openings of the TMDS Ionizer Assembly.

If the measured helium leak rate is higher than the limit cited above, then:

10) Push “start” and go back into leak measurement mode

11) Using the helium gas wand spray a small stream around each joint/seal one by one until the detector responds indicating the location of the (a) leak

12) Repair the leak:

Helium Leak Test Procedure for the TMDS Ionizer Assembly

- If the leak is at a conflat seal, then torque the bolts to ensure metal-to-metal closure
- If the conflat seal is already fully closed, then open the seal in a cleanroom with suitable cleanroom garbing, and inspect the conflat knife edges. If there are scratches, dings, nicks or other damage to the knife edge seal report these. Some knife edge flaws can be stoned out to repair them. Replace the copper gasket.
- If the leak is at a commercial assembly (e.g. electrical feedthrough, angle valve, Baratron gauge, Pirani gauge, etc.), then replace the commercial assembly with another clean unit. Mark the leaky unit for repair/replacement.

13) Retest the leak tightness of the TMDS Ionizer Assembly after making repairs.