

# **Standard Procedure for Gas Line Testing**

Project

- 1. Ventilation test standard book
- 2. Pressure holding test standard book
- 3. Helium Leak Testing Standard Book
- 4. Dust particle test standard
- 5. Microoxygen analysis test standard
- 6. Moisture analysis test standard



## **Bump Test Standard Procedure**

- 1. Purpose:
- 1. Confirm that the gas type configuration in the pipeline is correct.
- 2. Blow out the iron chips with larger particles
- 2. Scope:

Gas pipelines include MAIN GAS PIPING and HOOK UP PIPING.

- 3. Equipment:
- 1. GN2 gas source
- 2. Hose
- 3. Flow charts and procedures
- 4. Test program

Program
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Things to note

- 1 Obtain the construction drawings or flow charts of the relevant pipelines (such as the attached pictures), and check one by one whether the machine points, gas quantity, disk quantity, etc. are constructed according to the drawings.
- 2 Prepare the gas source (GN2) for wanted testing.
- 3 As shown in the figure, first disconnect points B, V5, and V6, connect the air source to point B and turn on the air. Use GN2 purge (about 2.5~3

kg/cm2) Confirm whether there is GN2 blowing out of V5 and V6 (cycle purge 10 times). Blow out the iron chips, turn off the air source, and check whether the P5 and P6 panel inlets and outlets are connected with new gaskets (VCR: 1/ $8 \sim 1/4$  turns) ), then turn the P5 and P6 disk group Valve and Regulator to the Open position, turn on the gas again to see ch5,

Check whether there is GN2 blowing out in ch6 (cycle purge 10 times). Blow out the iron cuttings to complete the NET-H-GN2-L02 ventilation test.  $\circ$ 

4 S As shown in the figure, disconnect A, V1, V2, V3 and V4, connect the air source to point A and turn on the air, purge with GN2 (approx. 2.5~3 kg/cm2) Confirm whether there is GN2 blowing out of V1, V2, V3, and V4 (cycle purge 10 times). Blow out the iron chips, turn off the air source, and check the P1, P2, P3, and P4 panel group inlets and outlets. Replace the gasket connection with a new one. (VCR: 1/8~1/4 circle), then open the Valve and Regulator of the P1, P2, P3, and P4 disk sets to the Open position, and turn on the air again to see if there is GN2 blowing out of ch1, ch2, ch3, and ch4 (cycle purge

10 times) Blow out the iron shavings to complete the NET-H-PN2-L02 ventilation test.

- 5 As shown in the figure, first disconnect points C, V7 and V8, connect the air source to point C and turn on the air. Use GN2 purge (about 2.5~3 kg/cm2) Confirm whether there is GN2 blowing out of V7 and V8 (cycle purge 10 times). Blow out the iron chips, turn off the air source, check that the inlet and outlet of P7 and P8 plate group are connected (SWG: 1 and 1/4 turns), and then turn P7, P8 disk set Valve and Regulator to the Open position, turn on the air again to see if there is GN2 blowing out of ch7 and ch8 (cycle purge 10 times) and blow out the iron chips, thus completing the NET-H-CDA-L02 ventilation test.
- 6 As shown in the figure, first disconnect points D and V9, connect the air source to point D and turn on the air, then use GN2 purge (about 2.5~3

kg/cm<sup>2</sup>) Confirm whether there is GN2 blowing out of V9 (cycle purge 10 times). Blow out the iron chips, turn off the air source, check the P9 disk group inlet and outlet, replace the gasket connection (VCR:  $1/8 \sim 1/4$  turn), and then Turn the P9 disk group Valve and Regulator to the Open position, turn on the air again to see if there is GN2 blowing out of ch9 (cycle purge 10 times) and blow out the iron clippings. This completes the FGEH20G8-V1 ventilation test.



Attached pictures



## **Standard Procedure for Pressure Holding Test**

1. Purpose:

In order to check whether the welding joints of the pipeline meet the welding requirements for airtightness and the assembly requirements for joints for airtightness, the pressure holding test is carried out.

### 2. Scope:

Gas pipelines include MAIN GAS PIPING and HOOK UP PIPING.

- 3. Equipment: Brand: Musashino pressure gauge, Ai no pressure gauge. model :
- 4. Reference materials
- 5. Flow charts and procedures
- 5.1 Test procedure

Program



Leave an air inlet at the source of the pipeline, and seal the rest of the air inlet and outlet.

Connect the air outlet at the end of the pipeline to the air source, and connect the air outlet to the disk recorder (attached head) to form a closed space.

The gas used for the inflation test must be an inert gas (nitrogen). At the same time, all valves passing through the inspection pipeline must be opened to ensure that the closed space is filled with the test gas. At the beginning, the pressure is

5kg/cm2, temporarily pressurize for 12 hours. If there is no leakage, continue to pressurize to 10kg/cm2 and perform an air tightness test for 1 hour. If there is no leakage, reduce the pressure to 8kg/cm2 and perform a pressure maintaining test for 24 hours.

Carry out repair and construction improvement

measures for leaky areas.

First use SNOOP to test every welding port and joint on the panel pipeline to see if there is air leakage. [If there is leakage, bubbles will form].

Use a disc pressure recorder to test the pressure conditions on the disc pipeline, and record the real-time pressure value at each moment as time passes.

Test time: air tightness test 1 hour, 10kg/cm2

Pressure holding test for 24 hours, 8kg/cm2

#### 5.2 Disc pressure recorder:

Determine whether there is air leakage according to the circular curve displayed on the recording paper, such as As shown in Figure A, after 24 hours, the circular curve shows zero pressure decay (No Pressure Decrease) under temperature correction, which means there is no leakage.



# Helium Leak Detection Test Standard

1. Purpose:

Use a helium leak detector to test the gas pipelines and panels in a vacuum state to check whether there is helium leakage to ensure that the gas pipelines and panels meet the leak-proof requirements.

2. Scope:

Gas pipelines include MAIN PIPING and HOOK UP PIPING.

- 3. Equipment:
  - 1. Brand: ANELVA Model: M-222LD-D LDL: 2 × 10-11 atm·cc/s
  - 2. Brand: Model: UL1000 LDL: 2 × 10-12 atm·cc/s

### 4. Definition

- 1 · VCR connector: Vacuum clean combination connector
- 2 · Turbo Pump: Vacuum mechanical pump
- 3 · Flow charts and procedures Flow sheet and process

5. Test procedures

Program



#### 5.2 Helium leak detector:

ANELVA M-222LD-D First determine whether there is helium leakage based on the trend shown on the recording paper. If the value remains below 1\*10-9 atm·cc/sec and the trend remains stable downward, it means there is no leakage ; If within the reaction time, the value suddenly rises rapidly upward, it means there is a leak, and it is necessary to check in detail again point by point to confirm that a certain weld bead or joint is leaking.



### Dust particle testing standard

#### 1.Purpose

The dust particles contained in the process gas pipelines will seriously affect the quality of the process. Therefore, all production gas pipelines must be tested for dust particles.

2.Scope

Gas pipelines include MAIN PIPING and HOOK UP PIPING.

3.Equipment

Brand: PMS Model: LPC-101-HP LDL: 0.1um

4.Reference

Particle Counter Operation Manual

- 5. Flow sheet and process
  - 5.1 Test procedure

Program



a. Use inert gas filtered with 0.01µm filter (nitrogen).

- a. Connect the air source to the inlet of the panel pipeline to blow out the panel and pipeline to be tested.
- b.When testing, tap the tube to be tested with a rubber hammer.Road, all valves must be "opened" and "closed" more than thirty times, which can cause the dust particles in the pipe and valves to be discharged out of the pipe with the blowing gas.
- **c.** This blowing process needs to be maintained for at least 30 minutes.

#### PMS µLPC-101-HP HP test procedure:

a. The gas outlet of the panel pipeline is connected to the sample sampling port of the dust particle meter.
b. If the panel pipeline has multiple gas outlets, the gas outlets of the panel pipeline must be independently tested.

**c.** Test pressure: maximum limit of gas used 150sig(about 11 kg/cm<sup>2</sup>)

**d**. Test time: Test for ten minutes, sample once and record, test three times in succession to obtain the average value.

e. Test specifications: average  $\leq$  10pcs/ft3 (size  $\leq$  0.1µm) f. The test results need to be printed out and affixed to the test report for future tracking and identification.

#### 5.2 Test specifications: average $\leq$ 10pcs/ft<sup>3</sup>

(size≤0.1µm) < = PMS UIPC-101-HP

### 5.3 Test equipment :

5.3.1 Light scattering laser dust particle counter type : PMS uLPC-101-HP

**b.**The gas source purity must be  $\leq$  0pcs/ft3 (size  $\leq$  0.1µm).



### Micro-oxygen analysis test standard book

#### 1.Purpose

The oxygen content in the pipeline will cause chemical reactions of corrosive and flammable substances. In order to ensure the operating quality of the pipeline and equipment, necessary tests are carried out in accordance with the semiconductor factory's requirements for the oxygen content of the process gas pipeline.

#### 2.Scope

Gas pipelines include MAIN PIPING and HOOK UP PIPING.

3.Equipment

Brand: DELTA-F Model: 550E LDL: 0.2 ppb

4.Reference

Microoxygen Analyzer Operation Manual

5.Flow sheet and process

5.1 Test procedure

Program



a. The test results need to be recorded in the microoxygen analysis test report form for 30 minutes for future traceability and identification.

- 5.1.6 All test connecting tubes must be made of stainless steel 316LEP
- 5.1.7 Test specification: below 10ppb (Or according to customer's specifications)
- 5.2 Test equipment
  - 5.2.1 Equipment name: Micro-oxygen analyzer
  - 5.2.2 Equipment specifications: test pressure from 10 to 60 psig; test flow 2 liters/min
  - 5.2.3 Power supply: AC110V, 60Hz



### Moisture analysis test standard book

1.Purpose

Moisture in pipelines will cause corrosive gases to react chemically with water, corroding the materials of the pipelines. In order to ensure the operational quality of pipelines and equipment, and to meet the semiconductor factory's requirements for moisture content in process gas pipelines, it is necessary to test.

2.Scope

Gas pipelines include MAIN PIPING and HOOK UP PIPING.

3.Equipment

Brand: MEECO TRACER 2 Model: LDL: 0.5 ppb

4.Reference

Moisture Analyzer Operation

- 5.Flow sheet and process
- 5.1 Test procedure

Program



a. The water purity of the nitrogen used to pass through the purifier and filtered through a 0.01µm filter must be below 10ppb.

- **a.** Connect the air inlet of the test pipeline or panel to the air source, open all valves in the test pipeline or panel and blow them clean.
- **b.** Use the design pressure air source to purge the test disk pipeline.
- **C.** This Purge procedure needs to last for more than 3Hrs.

a.Before connecting the gas pipeline to the moisture analyzer, the connecting test pipeline must be blown clean for 5 minutes, so that the water in the connected test pipeline can flow out with the purged gas.

**b**.Connect the gas outlet of the gas pipeline to the sample sampling inlet of the moisture analyzer. (Note: When the gas outlet of the gas pipeline is connected to the moisture analyzer, the purge gas must be flowing)

**c.** During the test, according to the test value of the water analyzer, test and blow out at the same time until the test value of the moisture analyzer reaches below the standard value (10ppb).

a.The test results need to be recorded on the moisture analysis test report form for future traceability and identification.

### 5.1.5 All test pipes must be made of stainless steel 316LEP

- 5.1.6 Test specifications: Below 10 ppb(Or according to customer's specifications)
- 5.1.7 Test pressure: 60 psig
- 5.1.8 Using power: AC110V · 60Hz