**2021 Worksheet # 9**

**Performance Criteria and Testing:**

**System Verification:**

**System Inspection:**

**Medical Support Gases:**

**Operation and Management:**

**Category 2 Piped Gas and Vacuum Systems:**

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1. After a final tie-In on an active vacuum system, each vacuum joints shall be tested with a \_\_\_\_\_\_\_\_\_\_ leak detector or other means that will allow detectant on an active vacuum system.

a. Pressure gauge

b. A tracer gas

**c. Ultrasonic**

d. Vacuum gauge

2. After the final Tie-In each joint shall be leak tested by the source gas. New work and the existing system at the normal operating pressure shall be leak check with a leak detectant that is safe for use with oxygen and does NOT contain \_\_\_\_\_\_\_\_\_\_\_.

a. Acetone

b. Chlorine

c. Freon

**d. Ammonia**

3. After the piping system, the blow down test shall be done. Then the Installer must perform which of the following test \_\_\_\_\_\_\_\_\_\_\_?

**a. Initial pressure test**

b. Initial cross connection

c. Initial piping purge test

d. All of the above

4. Alarm panels and shutoff valves labeling shall be \_\_\_\_\_\_\_\_\_\_ when modification is made, changing the areas serviced.

a. Backdated

b. Monthly

c. Yearly

**d. Updated**

5. Area alarms shall be tested to verify the warning signals for all vital life support and critical care areas if the pressure in the piping system increases or decreases by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**a. 20%**

b. 40%

c. 60%

d. 10%

6. At the sample port a demand of approximated 25 % percent load shall be created to cause the compressors to cycle on and off continuously and the dryers to operate for the \_\_\_\_\_\_\_\_\_ period.

a. 24 hour

b. 12.5 hour

c. 10 hour

**d. 12.0 hour**

7. Before the piping system is put into use, the \_\_\_\_\_\_\_\_\_ is responsible for the ascertaining that the gas delivered to the outlet/inlet has the proper labels and connecting fittings.

a. Verifiers

**b. Facility Authority**

c. Installers

d. Maintenance staff

8. Breached portions of the systems subject to inspection and testing shall be confined to only the specific altered zone or area that is downstream for pressure gases at the point of intrusion. Where a system shall be declared breached?

a. Physical separation of pipeline

b. System component removal

c. Replacement or addition of system components

**d. Any of the above**

9. Distribution piping for support gas systems (nitrogen and instrument air) shall be \_\_\_\_\_\_\_\_\_\_\_ type “L or K” copper tube.

a. ASTM B280

b. ASTM B88

**c. ASTM B819**

d. Any of the above

10. During the initial pressure test, the source shutoff valve shall remain closed and the test pressure for pressure gases shall be 1.5 times the system working pressure, but not less than \_\_\_\_\_\_\_\_\_\_\_\_\_.

a. 200 psi

b. 100 psi

c. 75 psi

**d. 150 psi**

11. Final line filters for instrument air shall be rated for a minimum of \_\_\_\_\_\_\_\_efficiency at \_\_\_\_\_\_\_ micron.

a. 100% @ .1

b. 100% @ .01

c. 98% @ .1

**d. 98% @ .01**

12. In Category 2 piped gas or piped vacuum systems shall be permitted to administrate moderate sedation, minimal sedation. If a patient is put into a deep sedation or general anesthesia then the risk assessment would most likely place the user in what category?

a. Category 4

b. Category 3

**c. Category 1**

d. Category 2

13. Initial piping purge test the Installer shall use the appropriate adapters and purge with an intermittent high-volume flow of test gas until the purge produces \_\_\_\_\_\_\_\_\_\_\_\_in a clean white cloth.

a. copper oxide

b. No white coloration

c. black scale

**d. No discoloration**

14. Inspection and testing shall be performed on all new piped gas systems, additions, renovations, temporary installations or repaired systems to assure the facility that all applicable provisions of NFPA 99 have been adhered to and system integrity has been achieved or maintained. What is required of the individual doing the testing or inspecting?

a. Have two years’ experience

**b. Have a documented process and procedure**

c. Be a certified tester

d. None of the above

15. Installer shall create a form indicating that the standing pressure test has been performed and witnessed, a copy shall be provided to the \_\_\_\_.

a. Doctors

b. Nurses

**c. Verifier**

d. Any of the above

16. Instrument Air system that employ a standby header shall be permitted to have a simplex cooler and dryer. Where a standby header is provided a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ shall be installed to prevent backflow.

a. One way valve

**b. Check valve**

c. Isolation valve

d. Two-way check valve

17. Instrument air sources shall produce air at not less than a gauge pressure adequate for the intended line pressure and pressure controls \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ accordance to table 5.1.11.

**a. 50 - 185**

b. 55 - 185

c. 165 - 185

d. 160 – 185

18. Instrument air systems shall activate the alarm systems when the dew point at system pressure exceeds \_\_\_\_\_\_\_\_\_\_\_\_.

a. -20℉

b. -26℉

c. 22℉

**d. -22℉**

19. Intake air for instrument air compressors shall be permitted to be drawn from what location?

a. Equipment location

b. Outside

c. Ducted air

**d. Any of the above**

20. Medical air purity for compressor systems shall be analyzed prior to the source valve being opened. Samples taken at the system sample port for carbon monoxide shall not exceed \_\_\_\_\_\_\_\_\_\_\_\_\_.

a. 500 ppm

b. 2 ppm

**c. 10 ppm**

d. 25 ppm

21. Nitrogen and instrument air supply systems are not to be used for patient care, but are used for powering pneumatic devices and equipment should be considered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ gases.

a. Hazards

b. Medical

**c. Support**

d. All of the above

22. Persons maintaining medical gas and vacuum systems shall have appropriate qualification by demonstrated one of the following:

a. A documented training program acceptable by the health care facility

b. Credentialing to ASSE 6040, technically competent

c. Credentialing to ASSE 6030, technically competent

**d. Any of the above**

23. Support gases system are subject to the same hazards as, present in any piped medical gas system with the additional hazard of \_\_\_\_\_\_\_\_.

a. Asphyxiations

**b. Elevated pressures**

c. Hazards are no different than any other piped medical gas

d. More highly explosive

24. The air quality tests shall be conducted after the medical air source system has been operating normally, but with the source valve closed under a simulated load for an elapsed time at least \_\_\_\_\_\_\_\_\_.

a. 12.5 hours

b. 24 hours

**c. 12.0 hours**

d. 10 hours

25. The initial pressure test for a vacuum system shall be 1.5 times the working pressure but not less than\_\_\_\_\_\_\_\_\_\_\_\_.

 a. 100 psi

 **b. 150 psi**

 c. 50 – 55 psi

 d. 50 psi

26. The initial pressure test for the piping of a medical gas and vacuum system shall be maintained \_\_\_\_\_\_\_\_\_\_\_ with a leak detectant that is safe with oxygen and does not contain ammonia.

a. Until 25% of the joints have been examined for leaks

**b. Until 100% of the joints have been examined for leaks**

c. For 8 hours

d. For 24 hours

27. The installer shall determine that no cross connection exists between the various medical gas and vacuum piping systems. With all systems reduced to atmospheric pressure, the one system being tested shall be charged with at a gage pressure of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a. Source gas @ 150 psi

b. Oil free dry air @100 psi

**c. Oil free dry nitrogen NF @ 50 psi**

d. None of the above

28. Nitrogen NF central supply systems shall be permitted to consist of \_\_\_\_\_\_\_\_\_\_\_\_\_?

a. manifold for gas cylinders

b. manifold for cryogenic

c. installed in accordance to manufacturer’s instruction.

**d. all of the above**

29. The quality of instrument air shall be dry to a dew point of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a. 40℉

b. 32℉

**c. -40℉**

d. 35℉

30. The standing pressure test for positive pressure medical gas piping shall be conducted with the source valve closed and the piping system subjected to a pressure of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a. 20% above operating pressure for 8 hours

b. 150 psi for 8 hours

**c. 20% above operating pressure for 24 hours**

d. 150 psi for 24 hours

31. The standing pressure test for vacuum systems shall be conducted after installation of all components and the piping system shall be subjected to a test pressure of \_\_\_\_\_\_\_\_\_\_\_\_.

a. 29.9″ HG for 8 hours

b. 12.9″ HG for 8 hours

c. 20 psi above operating pressure for 24 hours

**d. 12″ to below HG/V for 24 hours**

32. Verification testing shall be conducted by a party who is technically competent and experienced in the field of medical gas and vacuum pipeline testing, and meets the requirements of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a. ASSE standard 6020

b. ASSE standard 6010

**c. ASSE standard 6030**

d. ASME section IX

33. What percent of the zones shall be tested at the outlet most remote from the source to verify the piping particulate test?

a. 100%

b. 75%

c. 50%

**d. 25%**

34. Where instrument air systems are provided with a standby header, the header shall have how many cylinders attached?

a. An average days’ supply

**b. One-hour of normal operation**

c. 4 cylinder’s

d. 3 cylinder’s

35. Instrument air sources shall be filtered with an activated carbon filters and be located \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the final line filter.

1. Downstream
2. **Upstream**
3. 98% efficiency
4. Indicators

36. Category 2 & 3 medical gas systems shall be permitted to have how many alarm panels \_\_\_\_\_\_\_\_\_\_?

**a. 1**

b. 3

c. 5

d. None of the above

37. Audible and visual alarm indicators shall be periodically tested to determine that they are functioning properly. How long shall the records of the test be maintained until the \_\_\_\_\_\_\_\_\_\_ is performed?

a. First test

b. Second test

c. Last test

**d. Next test**

38. If the Verifier use the system gas for the Purity Test, then it shall be tested at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ equipment.

**a. Source**

b. Vacuum

c. Concentrators

d. WAGD

39. Who’s responsible is it to develop, maintain, and manage a permit-to-work system ensuring uninterrupted quality, quantity, and continuity of supply during all piped medical gas and vacuum system maintenance, repair, or construction work?

**a. Responsible facility authority**

b. Maintenance Staff

c. Credentialing of the requirements for ASSE 6040

d. facility governing body

40. Medical surgical Vacuum station inlet terminal shall be tested on a regular preventive maintenance schedule as determined by \_\_\_\_\_\_\_\_\_\_\_\_ \_.

a. Facility staff

**b. Facility maintenance staff**

c. Daily inspected

d. Risk Assessment

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