**2021 Worksheet # 4**

**Medical – Surgical Vacuum Central Supply Systems:**

**Waste Anesthetic Gas Disposal Central Supply:**

**Oxygen Central Supply System Using Concentrators:**

**Cryogenic Fluid Central Supply Systems:**

**Pages:**

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1. A WAGD source system shall activate the \_\_\_\_\_\_\_\_\_ alarm when the backup or lag producer is running.

 a. Local

 b. Area

 c. Master

 d. Local and master

2. A category 1 dedicated WAGD source shall consist of \_\_\_\_\_\_\_\_ or more producers, each shall be sufficient to serve the peak calculated demand.

 a. 1

 b. 2

 c. 3

 d. All of the above

 3. WAGD source systems shall be controlled to ensure continuous flow under all conditions. \_\_\_\_\_\_\_\_\_\_ activation of producer’s as necessary to supply the demand.

 a. Manually

 b. Automatically

 c. Either a or b

 d. None of the above

4. Category 1 medical-surgical vacuum sources shall consist of an automatic means to prevent \_\_\_\_\_\_ through any off-cycle vacuum pump.

 a. Vacuum

 b. Back pressure

 c. Backflow

 d. All of the above

5. The \_\_\_\_\_\_\_\_\_\_\_\_\_ valve shall be the line separating the applicability between NFPA 55 and this code.

 a. Source

 b. Main

 c. In line

 d. None of the above

6. Category 1 medical-surgical vacuum systems shall activate which alarm when the backup or lag pump is running. If one pump is not in use or less equivalent capacity for one pump then an \_\_\_\_\_\_ alarm shall activate.

 a. Master

 b. Area

 c. Local

 d. All of the above

7. If WAGD is produced by the medical surgical vacuum source, the total concentration of oxidizers of oxygen (%O2) shall be maintained below\_\_\_\_\_\_ percent.

 a. 23.6%

 b. 19.5%

 c. 15.5%

 d. 21.5%

8. Category 1 WAGD source systems shall be controlled to ensure the operation to equalize wear on all producers. Who shall arrange a schedule for manual alternation?

a. Authority having jurisdiction

b. facility’s governing body

c. Facility staff

d. Risk assessment

9. Cryogenic fluid central supply systems shall be installed by personnel qualified in accordance with CGA M-1, Standard for Medical Gas Supply Systems at Health Care Facilities, or ASSE \_\_\_\_\_\_\_\_Professional Qualifications Standard for Bulk Medical Gas Systems Installers.

 a. 6015

 b. 6010

 c. 6030

 d. 6040

10. Cryogenic fluid central supply systems shall be installed in compliance with the Current Good Manufacturing Practices per 21 CFR 210 and 21 CFR 211.

 a. FDA

 b. CGA

 c. USP

 d. none of the above

11. Cryogenic Fluid central supply systems Instrumentation tubing shall be constructed of annealed copper tubing or seamless \_\_\_\_\_\_\_\_ tubing.

 a. Stainless Steel

 b. Poly

 c. Hard copper

 d. ASTM B819

12. If an WAGD Source is produced by a dedicated producer with a total power less than 1 horsepower, then the source shall be permitted to be located near the \_\_\_\_\_\_\_\_.

 a. Intakes

 b. Outlets

 c. Inlet’s

 d. Exhausts

13. Valves of quick-open or quarter-turn designs, such as ball or plug valves, shall not be permitted in the portion of an (Cryogenic) oxygen piping system operating above \_\_\_\_ psi [3000 kPa]

 a. 435

 b. 350

 c. 200

 d. 500

14. Pressure relief valve installed in a cryogenic fluid system shall be set \_\_\_\_\_\_\_ above the normal working pressure but no higher than the MAVP of the health care facility pipeline.

 a. 80 percent

 b. 100 percent

 c. 50 percent

 d. 25 percent

15. To determine the type of WAGD sources and systems shall be chosen by consultation with \_\_\_\_\_\_\_ having knowledge of the requirements to determine the type of system, number and placement of terminals and other required safety and operating devices.

 a. Verifier

 b. medical staff

 c. Engineer

 d. Maintenance staff

16. Vacuum exhausts from multiple pumps joined together to one common exhaust shall be permitted provided each pump can be isolated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a. tube cap

b. Manual Valve

c. Check valve

d. Any of the above

17. Vacuum producers (e.g., fans or blowers) designed for operations at vacuum below 130 mm (5in.) HgV shall be as follows \_\_\_\_\_\_\_\_\_\_\_\_.

 a. Interconnected via piping

 b. Ductwork

 c. Determined by the manufacturer

 d. Any of the above

18. The cryogenic fluid central supply system shall have a local signal that visibly indicates the operating status of the equipment and an indicator at all \_\_\_\_\_\_\_\_\_\_\_\_\_ under the following conditions.

 a. master alarms

 b. area alarm

 c. local alarm

 d. all of the above

19. WAGD vacuum producers designed for operation at vacuums below \_\_\_\_\_ inches Hg/V shall be used only for WAGD service and not employed for other services.

 a. 4

 b. 2

 c. 5

 d. 3

20. What source shall not be used to power the venturi of a WAGD system\_\_\_\_\_\_\_\_\_\_\_\_\_?

 a. Instrument air

 b. medical air

 c. Inert gas

 d. All of the above

21. The following components of the cryogenic fluid central supply system shall be accessible and visible to delivery personnel during filling operations:

 a. Fill connection

 b. Full trycock valve

 c. Hose purge valve

 d. all of the above

22. Vacuum filtration shall be supply with Filters that shall be efficient to \_\_\_\_\_\_\_\_\_\_ and 99.7 percent HEPA or better, per DOE-STD-3020

 a. 0.01

 b. 0.02

 c. 0.05

 d. 0.3

23. For each oxygen concentrator supply source a local alarm to indicate low oxygen concentration when a concentration lower than \_\_\_\_\_ percent is observed.

 a. 99

 b. 91

 c. 95

 d. 93

24. The monitor shall be capable of monitoring \_\_\_\_\_ percent oxygen concentration with 1 percent accuracy

 a. 95

 b. 93

 c. 97

 d. 99

25. Oxygen concentrator supply units for use with medical gas pipelines shall produce oxygen meeting the requirements of\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

 a. Oxygen 93 USP

 b. medical air USP

 c. Oxygen USP

 d. either a or c

26. An oxygen concentrator unit used in the oxygen central supply system, an alarm indicating that oxygen concentration is below 91% shall activate a local alarm signal at both \_\_\_\_\_\_\_\_?

 a. Master alarm

 b. Local alarm

 c. Area Alarm

 d. Local and master alarm

27. Vacuum filtration shall be sized for \_\_\_\_\_\_\_\_\_\_\_ percent of the peak calculated demand while one filter or filter bundle is isolated.

 a. 95

 b. 90

 c. 99

 d. 100

28. Vacuum filtration shall be located on the \_\_\_\_\_\_\_\_\_\_\_\_\_ side of the vacuum producer

 a. Upstream

 b. Downstream

 c. Patient side

 d. All of the above

29. Vacuum filtration shall be at least \_\_\_\_\_\_\_\_\_\_\_\_ to allow one filter to be exchanged without impairing the vacuum system.

 a. No requirements

 b. Simplex

 c. As many as you want

 d. Duplex

30. Use of oxygen concentrator supply systems as all three sources shall only be permitted after documented risk analysis by the \_\_\_\_\_\_ of the health care facility indicating understanding of the inherent risks and defining how those risks shall be mitigated.

a. Not allowed

b. Governing body

c. Governing authority

d. AHJ

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