**Worksheet # 2**

**Category 1 Piped Gas and Vacuum Systems**

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**Ventilation:**

**97 - 99**

1. A variant on the cryogenic liquid container manifold shall be permitted to have three headers. Such a variant shall have a minimum of \_\_\_\_\_ connections required for each of the primary and secondary headers.

a. An Average Days’ Supply

b. 4

c. 2

d. 3

2. All pressure relief valves shall be made of brass, bronze or \_\_\_\_\_\_\_\_\_.

a. Carbon Steel

b. Stainless Steel

c. Copper

d. Cast Iron

3. Cylinders in use and in storage shall be prevented from reaching temperatures in excess of \_\_\_\_\_\_\_\_\_.

a. 160℉

b. 190℉

c. 125℉

d. 100℉

4. Final line pressure regulators, when used for bulk cryogenic liquid systems shall be of a \_\_\_\_\_\_ design.

a. Straight Through

b. Parallel

c. Balanced

d. None of The Above

5. In central supply systems using gas or liquid cylinders, each header shall have a \_\_\_\_\_\_\_ to prevent debris from entering the manifold controls.

a. Check Valve

b. Relief Valve

c. Filter

d. Monitor

6. Indoor locations for oxygen, nitrous oxide and mixtures of these gases shall not communicate with \_\_\_\_\_\_\_ locations.

a. Engines

b. Kitchens

c. Anesthetizing Locations

d. All of The Above

7. Louvered openings for natural ventilation shall have a minimum free area of \_\_\_\_\_.

a. 70 Sq. Inches

b. 60 Sq. Inches

c. 72 Sq. Inches

d. 62 Sq. Inches

8. Manifolds for gas cylinders without reserve shall consist of \_\_\_\_\_\_\_\_ equal headers; each with an average day’s supply, but not fewer than \_\_\_\_\_\_\_\_ connections.

a. One - One

b. Four - Four

c. Three - Three

d. Two - Two

9. Manifolds in this category shall have a \_\_\_\_\_\_\_ signal that visibly indicates the operating status of the equipment and shall activate an indicator at all \_\_\_\_\_\_\_\_ alarm panels to indicate when or just before changeover from one header to the other.

a. Master - Area

b. Master - Local

c. Local - Master

d. Area – Master

10. All positive-pressure supply systems shall be provided with means to control the final line pressure at the source shall meet which one of the follows?

 a. Able to maintain stable pressures

b. Each control mechanism able to flow 100 percent of the peak calculated demand.

 c. Protected against overpressure

 d. All of the above

11. Nitrous oxide and carbon dioxide using cylinders or portable containers shall be prevented from reaching temperatures lower than\_\_\_\_\_\_.

a. 125 F

b. 20 F

c. -20 F

d. 130 F

12. The gas produced by evaporation from the secondary header in a cryogenic liquid cylinder system shall enter the supply system \_\_\_\_\_\_\_\_ of the final line regulator.

a. Upstream of the filter

b. Not Required

c. Upstream

d. Downstream

13. The minimum clearance around the EOSC for a temporary source is \_\_\_\_\_\_ ft?

a. 2 Feet

b. 6 Feet

c. 3 Feet

d. 5 Feet

14. The reserve header in a cryogenic liquid cylinder system shall have sufficient gas cylinder connections for an average day’s supply, but not fewer than \_\_\_\_connections.

a. 1

b. 4

c. 3

d. 2

15. When multiple buildings are served from a single cryogenic liquid oxygen source, where is it required to place the emergency oxygen supply connection?

a. Each building served

b. Building closest to the source

c. Main building only

d. largest building served

16. Category 1 design and construction Locations for central supply systems shall have electrical devices protected from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. physical damage

b. 5ft. Above the floor

c. Both A – B

d. All of the above

17. Drawing # 3 name the numbers?

A. Main Line Valve #1\_\_\_\_\_\_\_\_\_\_

B. Check Valve #2\_\_\_\_\_\_\_\_\_\_

C. Line Pressure Indicator #3\_\_\_\_\_\_\_\_\_\_

D. Line Pressure Alarm Switch Sensor #4 \_\_\_\_\_\_\_\_\_\_

E. Relief Valve and Vent #5\_\_\_\_\_\_\_\_\_\_

F. Demand Check #6\_\_\_\_\_\_\_\_\_\_

G. Connection point #7\_\_\_\_\_\_\_\_\_\_

H. Inlet Isolation Valve #8\_\_\_\_\_\_\_\_\_\_\_



 18. Category 1 systems shall be permitted to serve spaces identified as?

 a. Category 1

 b. Category 2

 c. Category 3

 d. All of the above

19. For control equipment that is physically remote from the supply system, the control equipment shall be installed within a \_\_\_\_\_\_\_\_\_\_\_ to prevent unauthorized access.

a. Lock doors

b. Latched or locked

c. Locked enclosure

d. Secure enclosure

20. Polymeric materials shall not be used in an oxygen system with pressures greater then \_\_\_\_\_\_\_\_\_.

a. 300 psig

b. 250 psig

c. 350 psig

d. 150 psig

21. The manifold in this category shall have their primary and secondary headers located in the \_\_\_\_\_\_\_\_\_\_\_\_?

 a. same enclosure

 b. Two enclosure

 c. Three enclosure

 d. Weather type enclosure

22. The \_\_\_\_\_\_\_\_\_\_ shall be permitted to be located in the same enclosure as primary and secondary headers or in another enclosure. Shall not have fewer than three connections.

 a. Cryogenic header

 b. Conserve header

 c. Reserve header

 d. Master alarm header

23. When designing and construction for central supply systems the storage shall meet the following requirements:

a. If outdoor they shall be well drained and provided with an enclosure wall or fencing constructed of noncombustible materials.

b. If heated the maximum allowable heated to 130⁰C / they shall allow access by delivery vehicles and management of cylinders

c. If indoors shall have a minimum of 1 hour and a ¾ fire protection rating.

d. All of the above.

24. When vented to the outside, relief valve vent lines shall be labeled in any manner that will distinguish them from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a. vacuum pipeline

b. WAGD pipeline

c. medical gas pipeline

d. all of the above

25. Mechanical exhaust inlets shall be unobstructed and shall draw air from within 300 mm \_\_\_\_\_\_\_ of the floor and adjacent to the cylinder or containers.

a. 18″

b. 16″

c. 12″

d. 12.5″

26. In a cylinder storage room the temperature shall maintain not greater than \_\_\_\_\_\_\_.

a. 120℉

b. 130℉

c. 115℉

d. 125℉

27. Natural ventilation shall consist of two nonclosable louvered openings, one opening shall be located within 30 cm (1 ft) of the floor, and the other one shall be located within \_\_\_\_\_\_ of the ceiling.

a. 2 ft.

b. 3ft.

c. 1.5ft.

d. 1ft.

28. Plumes from medical procedures exhaust shall be located outdoors and at least \_\_\_\_\_\_\_\_ from any door, window, air intake, or other openings in buildings or places of public assembly.

 a. 50 feet

 b. 75 feet

 c. 25 feet

 d. 35 feet

29.Heating, cooling, ventilating, and process systems serving spaces or providing health care functions covered by this code. What code or standard should Ventilation of Health Care Facilities, shall be provided in accordance with \_\_\_\_\_\_\_\_\_\_\_\_\_\_?

a. ASHRAE 98

b. NFPA 55

c. ASHRAE 170

d. ASHRAE 90.1

30. If indoors rooms containing oxygen, nitrous oxide, or other oxidizers, walls and floors shall be \_\_\_\_\_\_\_\_\_\_ separated from the rest of the building.

1. 3 hr.
2. 4 hr.
3. ¾ hr.
4. 1 hr.