**2021 Worksheet # 7**

**Category 1 Distribution:**

**Piping Materials for Medical Gas - Pressure Gas:**

**Piping Materials for Medical - Vacuum and WAGD systems:**

**Pages:**

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1. Brazed joints shall be made using a brazing alloy that exhibits a melting temperature in excess of \_\_\_\_\_\_\_\_\_\_\_ to retain the integrity of the piping system in the event of fire.

 a. 1200 F

 b. 800 F

 c. 1000 F

 d. 2400 F

2. For medical-surgical vacuum systems, piping shall be hard drawn, seamless copper tube type \_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. ASTM B88

 b. ASTM B819

 c. ASTM B280

 d. Any of the above

3. GTAW autogenous orbital welded joints shall be purge during welding with mixture of\_\_\_\_\_\_\_.

 a. 75% helium 15% argon

 b. 70% helium 31% argon

 c. 75% nitrogen 25% argon

 d. 75% helium 25% argon

4. Joints shall be brazed within \_\_\_\_\_\_\_ hours after the surfaces are cleaned for brazing.

 a. Twenty-four

 b. Four

 c. One

 d. Eight

5. NFPA 99 requires tubing to be cut square using a sharp tubing cutter that shall be free from grease, oil or other lubricants not suitable for oxygen service. What is required of the tube ends after cutting?

 a. Shall be deburred and rolled smooth

 b. Shall be re-cleaned

 c. Shall be reamed or rolled smooth

 d. Shall be filed

6. Welded joints for medical gas and medical-surgical vacuum systems shall be permitted to be made using a gas tungsten are welding (GTAW) autogenous orbital procedure. Stainless tube may be joined by any methods except which of the following?

 a. ARC

 b. TIG

 c. GTAW

 d. MIG

7. The following shall be prohibited throughout medical gas and vacuum distribution pipeline system\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. Push fit connectors

 b. Flared and compression

 c. Pipe-crimping tools

 d. All of the above

8. If copper or CMT vacuum tubing is installed along with any medical gas tubing, the vacuum tubing shall, prior to installation, be prominently \_\_\_\_\_\_\_\_\_ to preclude using materials or installation procedures in the medical gas system that are not suitable for oxygen service.

 a. Labeled

 b. Marks

 c. Nothing

 d. taping

 9. What threaded joints in medical gas and vacuum distribution piping shall be limited to\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

 a. Pressure and vacuum indicators

 b. Alarm devices

 c. Demand check fittings

 d. All of the above

10. To assure that all ambient air has been removed from the pipeline prior to brazing, a (n) \_\_\_\_\_\_\_\_\_\_\_shall be used to verify the effectiveness of the purge.

 a. Air analyzer

 b. Oxygen analyzer

 c. Nitrogen analyzer

 d. Any of the above

11. Brazing between bulk cryogenic vessels and vaporizers shall be by a qualified brazier using BAg brazing alloy. The brazier shall be qualified to what standard\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

 a. ASSE

 b. ASTM

 c. CGA M-1

 d. ANSI/ASME

12. Which of the following filler metals shall be used to braze copper-to-copper joints in medical gas/vacuum distribution piping?

 a. BAu. series

 b. Bag. series

 c. Bcup. series

 d. Bni. series

13. Which of the following filler metals shall be used when brazing dissimilar metals such as copper and bronze or brass?

 a. Bcup with flux

 b. BAg with flux

 c. BAg without flux

 d. Bcup without flux

14. Which of the following piping materials shall be permitted for field installed medical surgical vacuum distribution piping systems?

 a. B 88 copper tube

 b. B 819 copper tube

 c. Stainless steel tube.

 d. None of the above

15. While brazing medical-gas copper joints, a purge gas shall flow continuously to prevent the formation of copper oxide on the inside surface of the joint. What shall be used as a purge gas?

 a. Oil free, dry argon MD

 b. Any inert gas

 c. Oil free, dry nitrogen NF

 d. Oil free, dry helium NF

16. B 819 copper that is NPS 3⅛ inch and larger outside diameter, with a pressure of 185 psi or greater is required to be what type of copper?

 a. Type K

 b. Type L

 c. Type M

 d. None of the above

17. Axially swaged fittings that provide a metal-to-metal seal having pressure rating not less than \_\_\_\_\_\_\_\_\_ and temperature (1000) ̊ rating of a brazed joint and when complete are permanent, shall be permitted to be used in medical gas piping systems.

 a. 600 psi

 b. 400 psi

 c. 300 psi

 d. 150 psi

18. NFPA 99 requires tubing to be cut square using a sharp tubing cutter that shall be free from grease, oil or other lubricants not suitable for oxygen service. What is required of the tube ends after cutting?

 a. Shall be reamed or rolled smooth

 b. Shall be filed

 c. Shall be re-cleaned

 d. Shall be deburred or rolled smooth

19. If stainless steel tube in a vacuum system is be joined using memory metal fitting having a temperature rating of 1000 degrees Fahrenheit, the fitting must have a pressure rating of Not less than many psi\_\_\_\_\_\_\_\_\_?

 a. 150

 b. 300

 c. 500

 d. These fittings do NOT meet the temperature requirement for joining stainless steel tube.

20. Brazed joints shall be made using a brazing alloy that exhibits a melting temperature in excess of \_\_\_\_\_\_\_\_\_degrees F to retain the integrity of the piping system in the event of fire.

 a. 1000

 b. 1200

 c. 800

 d. 2400

21. If the WAGD system is joined with the medical surgical vacuum piping, it shall be connected at a minimum distance of \_\_\_\_\_\_\_\_\_feet from any vacuum inlet.

 a. 3

 b. 5

 c. 5.5

 d. 6

22. At a minimum, how many feet shall CMT be identified as suitable for oxygen by the manufacturer \_\_\_\_\_\_\_\_\_\_\_\_?

 a. 7 feet

 b. 9 feet

 c. 3 feet

 d. 6 feet

23. Brazed joints are permitted to be repaired, except no joint shall be heated more than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

 a. Never allowed

 b. Once

 c. Twice

 d. Three

24. CMT shall have a flame spread index of\_\_\_\_\_\_\_\_ or less and a smoke developed index of 50 or less as determined by ASTM E84?

 a. 25

 b. 20

 c. 30

 d. 50

25. It is the responsibility of the installer to furnish \_\_\_\_\_\_\_\_\_\_ certifying that all installed piping and materials are cleaned for oxygen service by the manufacturer.

 a. labels

 b. documentation

 c. CGA M-1

 d. brazing qualifications

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