

2014 North Central Mine Rescue Contest Wilmington, IL

Written Test – Technician Team Competition

Drager SCBA, BG4 PSS+

*Directions: Select the letter preceding the **BEST** answer to each of the following questions.
Choose only one answer per question.*

MSHA Publication 3027 - Module 2 Mine Gases MSHA Publication 3027 - Module 3 Ventilation Metal and Nonmetal National Mine Rescue Contest Rules 2014

1. The technician team competition may include which of the following test components:
 - A. Two self-contained breathing apparatus
 - B. Back board
 - C. First Aid Kit
 - D. All of the above

2. Soluble gases may be released into mine air from groundwater.
 - A. True
 - B. False

3. During mine rescue and recovery work the command center directly approves all:
 - A. Ventilation Tests
 - B. Ventilation Construction
 - C. Ventilation Alterations
 - D. B and C only

4. The purpose of mine ventilation is to provide a velocity of air sufficient to remove harmful gases, dust, smoke and fumes.
 - A. True
 - B. False

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5. **Which of the following properties are associated with Hydrogen Sulfide gas:**
- A. The gas is one of the most poisonous known.
 - B. The gas is not soluble in water.
 - C. The gas is yellowish, with an odor of rotten eggs.
 - D. All of the above.
6. **Line Brattice must be permanently installed for short duration ventilation applications.**
- A. True
 - B. False
7. **Check Curtains or Run-Through Curtains are designed to:**
- A. Close manually after you have passed through them.
 - B. Deflect the intake air current into a working area.
 - C. Fasten at the top and one side only.
 - D. All of the above.
8. **Which of the following properties are associated with Acetylene gas:**
- A. The gas is highly flammable.
 - B. Found after methane explosions in air having a low oxygen content.
 - C. The gas is slightly toxic.
 - D. B and C only.
9. **If a mine ventilation system is badly damaged or is out completely, the distinction between intake and exhaust air on the mine map may not be valid.**
- A. True
 - B. False
10. **Auxiliary fan tubing used to control and direct airflow to or from a mining area will be:**
- A. Rigid tubing for forcing systems
 - B. Collapsible tubing for exhaust systems
 - C. Usually suspended from timbers or eye bolts
 - D. All of the above

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- 11. The Bioguard does not incorporate which of the following features:**
- A. Ambient temperature.
 - B. Available oxygen pressure.
 - C. Ambient CO₂ level.
 - D. Battery capacity.
- 12. The CO₂ absorber unit may be used if:**
- A. Safety strips are undamaged.
 - B. The polyethylene bag is completely sealed and undamaged.
 - C. Ports 1-3 are tightly sealed with plugs.
 - D. The use-by date on the label has not yet expired.
 - E. All of the above.
- 13. The maximum charging pressure of the oxygen cylinder is 285 bar (4135 psi).**
- A. True
 - B. False
- 14. The maintenance interval for replacement of inhalation and exhalation valves when the BG 4 is in constant use:**
- A. Every three years
 - B. Yearly
 - C. Every five years
 - D. Every six years
- 15. Testing the BG 4 with an installed CO₂ absorber can be performed:**
- A. Total of 4 times with each test lasting no more than 10 minutes.
 - B. Total of 3 times with each test lasting no more than 30 minutes.
 - C. Total of 5 times with each test lasting no more than 15 minutes.
 - D. None of the above.

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- 16. During testing of the BG 4 - the low pressure warning should activate when the pressure is lower than:**
- A. 3.1 mbar
 - B. 1.4 mbar
 - C. 20.1 mbar
 - D. 0.16 mbar
- 17. Removing the tally from the Bodyguard will cause which of the following:**
- A. Activates the pressure relief valve.
 - B. Activates the panic alarm.
 - C. Activates the motion sensor.
 - D. Turns the Bodyguard off.
- 18. All parts that come in contact with exhaled air must be thoroughly cleaned and disinfected after use with a 10% acetone solution:**
- A. True
 - B. False
- 19. Relief valve inspection and assembly includes:**
- A. Examining the O-ring.
 - B. Rubbing the O-ring with Molykote 111.
 - C. Inserting the relief valve into the two slits in the spring bar from below.
 - D. All of the above.
- 20. On power up 5 short beeps and a battery warning 2 indicates that the Bioguard battery is good for two more 4-hour uses.**
- A. True
 - B. False
- 21. A successful Bioguard check for readiness includes:**
- A. 180 bar pressure reading or greater.
 - B. Green LED flashes.
 - C. Red LED flashes.
 - D. A and B are correct.

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22. **Preparing the ice pack includes all of the following except:**
- A. Fill the ice receptacle with water up to 44 mm from rim and freeze.
 - B. Fill frozen ice receptacle up to rim and refreeze.
 - C. The first freeze is for 24 hours at -15° C.
 - D. The second freeze is for 8 hours.
23. **A precondition to a high pressure leak test is an oxygen cylinder with a pressure greater than 200 bar (2900 psi).**
- A. True
 - B. False
24. **The maximum drying temperature for breathing hoses and the breathing bag is:**
- A. 200° F.
 - B. 140° F.
 - C. 90° F.
 - D. 120° F.
25. **During testing – checking the inhalation valve includes:**
- A. Tightly pinch the inhalation hose with your hand.
 - B. Pump slowly to at least 12 mbar.
 - C. A low pressure warning by the Bioguard indicates test failure.
 - D. None of the above.
26. **When testing the drain valve – pumping the test unit must have opened the valve by:**
- A. 10 mbar.
 - B. 18 mbar.
 - C. 14 mbar.
 - D. None of the above.

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27. **The use of the ice pack's protective cover is required.**
A. True
B. False
28. **If the low pressure warning signal sounds, either the cylinder valve is open or the oxygen cylinder is empty:**
A. True
B. False
29. **When testing the minimum valve – pumping the test unit should have opened the valve by:**
A. 1.0 to 1.2 mbar.
B. 1.4 to 2.0 mbar.
C. 0.1 to 2.5 mbar.
D. None of the above.
30. **A system error is indicated through the Bioguard by:**
A. An “E” icon is displayed and the alarm bleeps four times.
B. An “X” icon is displayed and red LEDs flash two times.
C. An “E” icon is displayed and red LEDs flash four times.
D. An “X” icon is displayed and the alarm bleeps four times.

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ANSWER SOURCE KEY

MSHA Publication 3027 - Module 2 Mine Gases
MSHA Publication 3027 - Module 3 Ventilation
Metal and Nonmetal National Mine Rescue Contest Rules 2014

Question	Answer	Source
1	A	2014 Metal and Nonmetal Mine Rescue Contest Rules, Technician Team Competition, Page 61, General Rule 1 <i>Comments:</i> Back board removed 2014, First aid kit removed 2014, Gas detector and Communications system must also be included.
2	A	Mine Gases, Module 2, Page(s) 2-7, Solubility <i>Comments:</i> True
3	D	Mine Ventilation, Module 3, Page(s) 3-21 – Building Ventilation Controls Mine Ventilation, Module 3, Page 3-3 – Introduction <i>Comments:</i> Ventilation testing is not under command center control as it will not alter mine conditions
4	B	Mine Ventilation, Module 3, Page(s) 3-4 <i>Comments:</i> Volume not velocity, Also must provide adequate oxygen
5	A	Mine Gases, Module 2, Page(s) 2-19 and 20 <i>Comments:</i> It is water soluble, It is colorless
6	B	Mine Ventilation, Module 3, Page(s) 3-24 – Line Brattice <i>Comments:</i> Can be held in place by team members
7	B	Mine Ventilation, Module 3, Page(s) 3-9 – Check Curtains <i>Comments:</i> Close automatically, Fasten at the top only
8	D	Mine Gases, Module 2, Page(s) 2-24 <i>Comments:</i> It is combustible, but it will not support combustion.
9	A	Mine Ventilation, Module 3, Page(s) 3-6 – Note to Trainer <i>Comments:</i> Normal production conditions may no longer be valid
10	C	Mine Ventilation, Module 3, Page(s) 3-10 – Auxiliary Fans and Tubing <i>Comments:</i> Flexible for forcing, Rigid for exhaust

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BG 4 PSS+ Closed-Circuit Breathing Apparatus
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Question	Answer	Source
11	C	3rd Edition, pg. 3-4, What is What - Description <i>Comments:</i> No CO ₂ function is available
12	E	3rd Edition, pg. 10, Preparation for Operation – Fitting the CO₂ Absorber <i>Comments:</i> Checklist from the manual
13	B	3rd Edition, pg. 47, Maintenance and Care – Charging the Oxygen Cylinder <i>Comments:</i> The maximum pressure is 200 bar (2900 psi).
14	A	3rd Edition, pg. 72, Maintenance Intervals <i>Comments:</i> Specified in manual
15	D	3rd Edition, pg. 57, Testing – Testing the PSS BG 4 with Inserted CO₂ Absorber <i>Comments:</i> Maximum of 6 tests with duration of no more than 15 minutes.
16	B	3rd Edition, pg. 59, Testing – Checking the Response Threshold of the Low Pressure Warning <i>Comments:</i> Specified in Manual, The other three values are random.
17	C	3rd Edition, pg. 30, Practical Use – Bodyguard in Operation <i>Comments:</i> The Tally has no effect on the other three responses.
18	B	3rd Edition, pg. 46, Cleaning, Disinfection, Drying – Caution: <i>Comments:</i> Organic solvents are contraindicated.
19	D	3rd Edition, pg. 53, Assembling the PSS BG 4 – Fitting the Relief Valve <i>Comments:</i> Specified in manual.
20	B	3rd Edition, pg. 20, Preparing for Use – Testing the Battery Capacity <i>Comments:</i> The battery will not last a single 4-hour use.
21	D	3rd Edition, pg. 28, Preparation for Use – Checking Readiness for Use <i>Comments:</i> Red LED flashes indicate failure.

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22	C	3rd Edition, pg. 17, Preparing for Use – Preparing the Ice Pack <i>Comments:</i> 16 hours is the listed time period.
23	B	3rd Edition, pg. 21, Preparing for Use – High Pressure Leak Test <i>Comments:</i> 200 bar is the cylinders maximum operating pressure, 165 bar (2393 psi) is the minimum test pressure.
24	B	3rd Edition, pg. 46, After Use – Cleaning, Disinfection, Drying <i>Comments:</i> Specified in manual.
25	D	3rd Edition, pg. 60, Testing – Checking the Inhalation Valve <i>Comments:</i> Exhalation hose is pinched, 10 mbar is pressure, Bioguard warning is irrelevant.
26	B	3rd Edition, pg. 61, Testing – Checking the Drain Valve <i>Comments:</i> Specified in manual, Must not open at or below 10 mbar
27	A	3rd Edition, pg. 18, Preparing for Use – Fitting the Ice Pack – Warning. <i>Comments:</i> Specified in Manual.
28	B	3rd Edition, pg. 4, Description. <i>Comments:</i> Cylinder valve is closed.
29	C	3rd Edition, pg.64, Testing – Checking the Minimum Valve <i>Comments:</i> Specified in manual.
30	D	3rd Edition, pg. 14, Preparing for Operation – Installing / Changing the Battery <i>Comments:</i> Specified in manual, Alarm bleeps 4 times.