

2018 National Metal and Nonmetal Mine Rescue Contest

Technician Team Competition Written Test (Dräger BG-4)

Directions:

- 1. Find the correct answer to each of the questions.**
- 2. Select only one answer per question.**
- 3. Then, fill in the corresponding circle on the answer sheet for each numbered question.**

Good Luck!



July 23, 2018

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10 Questions for Dräger BG-4:

1. The breathing air is circulated in a open breathing cycle. The carbon dioxide contained in the exhaled air is absorbed in a regeneration cartridge (CO₂ absorber). The breathing air is enriched with oxygen from the oxygen cylinder.
A. True
B. False
2. The Sentinel electronic monitoring system comprises a sensor unit, switch box, and display unit. It continuously measures the pressure in the oxygen cylinder and indicates this pressure on the sensor unit, tests and monitors the correct functioning of the BG 4, and generates a warning when the residual pressure is reached, as well as in the event of malfunctions.
A. True
B. False
3. The minimum charging pressure for an oxygen cylinder is _____ psi/200 bar.
A. 3315
B. 3135
C. 3515
D. None of the above
4. If the manual by-pass valve does not operate, the cause would be
A. The cylinder pressure is incorrect
B. The pressure indicator is defective
C. The pressure reducer is defective
D. The pressure indication (display) is defective
5. Disinfection: Place parts into disinfectant bath, only use approved disinfectants. Excessive disinfectant concentrations and over-long disinfecting times can damage the mask.
A. True
B. False
6. If necessary the harness should be washed separately in a washing machine with a max temperature of _____.
A. 90 °F
B. 90 °C
C. 60 °F
D. 60 °C


7. For temperatures of up to 104 °F the period of use for a PSS BG4 is up to _____ with ice in cooler.
- A. 40 minutes
 - B. 120 minutes
 - C. 240 minutes
 - D. None of the above
8. Of the following groups, which is not a Major Component?
- A. Pneumatics
 - B. Breathing Loop
 - C. Sentinel System
 - D. Case & Hardware
9. With regards to the Pressure Reducer, the relief valve activation is 1.5 to 1.9 L/min.
- A. True
 - B. False
10. The Panorama Nova Mask reduces peripheral vision to 90%.
- A. True
 - B. False

10 Questions for MX6 iBrid:

11. The battery icon at >100% charge remaining is the color blue.
- A. True
 - B. False
12. The operating temperature range for the instrument is -25° Celsius to 55° Celsius.
- A. True
 - B. False
13. There are three levels of audio gas alarms based on the frequency of beeps and the length of delay between beeps.
- A. True
 - B. False
14. The bump test process does not allow qualified personnel to review and adjust a unit's settings
- A. True
 - B. False

15. The configuration mode display screens time out after 90 seconds. When activated, the main configuration screen remains on for 10 minutes.
- A. True
 - B. False
16. An optical media interface is located on the bottom of the instrument and is used for infrared data transmissions at speeds of _____ bytes/second.
- A. 100,000
 - B. 105,000
 - C. 115,000
 - D. None of the above
17. The alkaline battery pack is only approved for use with _____ or _____ batteries in the instrument.
- A. Duracell MM 2500, Rayovac LR10
 - B. Duracell MM 1500, Rayovac LR6
 - C. Duracell MM 2000, Rayovac LR8
 - D. None of the above
18. The measurement range for Hydrogen Sulfide (H₂S) electrochemical sensor is zero to _____ ppm.
- A. 50
 - B. 100
 - C. 500
 - D. None of the above
19. The LCD backlight flashes as part of all alarm sequences, except for the battery low condition. The visual alarm is also used as the confidence indicator which, when enabled, blinks the LEDs once every _____ seconds.
- A. 5
 - B. 10
 - C. 30
 - D. None of the above
20. For a Carbon Dioxide (CO₂) infrared sensor range of 0% to 5% volume, the measurement resolution is _____ % volume.
- A. 0.01
 - B. 0.02
 - C. 0.05
 - D. None of the above

10 Questions from MSHA Publication 3027 (Module 2 and Module 3):

21. The map symbol  indicates:
- A. An undercast.
 - B. An overcast
 - C. An axillary fan.
 - D. The main fan.
22. Mine Rescue teams should not alter ventilation without authorization from the command center because:
- A. Altering the ventilation could force explosive gases into areas where survivors might be located.
 - B. It could force deadly gases over fire areas or hot spots and cause an explosion.
 - C. It could supply additional oxygen to a fire area and “feed” the fire.
 - D. It could also result in ventilation changes that would alter the air at the command center.
23. Which of the following gases have the largest explosive range?
- A. Carbon Monoxide
 - B. Hydrogen
 - C. Butane
 - D. Acetylene
24. The specific gravity for Propane is _____.
- A. 1.5291
 - B. 1.5625
 - C. 1.5894
 - D. 2.0100
25. MSHA requires mine rescue stations serving underground M/NM mines to have _____ gas detectors appropriate for each gas which may be encountered at the mines served.
- A. Three
 - B. Four
 - C. Five
 - D. Enough

26. Chemical analysis is generally a more time-consuming process than testing with a portable device, but its advantage is timeliness. It tells exactly what gases the sample contains, and in precisely what amounts. A complete chemical analysis can also reveal the presence of gases that portable detectors are not designed to detect.
- A. True
 - B. False
27. The range of concentrations within which a gas will explode is known as its “explosive range.” Figures representing the higher and lower limits of the explosive range are expressed in percentages.
- A. True
 - B. False
28. With mechanical ventilation, mine fans are used to create the pressure differential by changing the air pressure at specified points in the mine. And the less pressure difference the fan creates, the faster the flow of air.
- A. True
 - B. False
29. In many mines during a rescue and recovery operation, air locks are put up to establish a fresh air base and enable teams to move forward into questionable air without contaminating the air at the fresh air base.
- A. True
 - B. False
30. **Anemometer** – Instrument used for measuring medium-velocity (120-2,000 cfm) and high-velocity (2,000-10,000 cfm) air currents in the mine.
- A. True
 - B. False

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ANSWER KEY

	Answer	Page	Publication
1	B	3	4057781 PSS BG Service Manual
2	B	3	4057781 PSS BG Service Manual
3	D	17	4057781 PSS BG Service Manual
4	C	35	4057781 PSS BG Service Manual
5	A	39	4057781 PSS BG Service Manual
6	D	39	4057781 PSS BG Service Manual
7	C	42	4057781 PSS BG Service Manual
8	D	43	4057781 PSS BG Service Manual
9	B	44	4057781 PSS BG Service Manual
10	A	53	4057781 PSS BG Service Manual
11	A	33	MX 6 Manual Revision 9
12	B	3	MX 6 Manual Revision 9
13	B	6	MX 6 Manual Revision 9
14	A	11	MX 6 Manual Revision 9
15	B	32	MX 6 Manual Revision 9
16	D	7	MX 6 Manual Revision 9
17	D	3	MX 6 Manual Revision 9
18	C	39	MX 6 Manual Revision 9
19	C	7	MX 6 Manual Revision 9
20	A	6	MX 6 Manual Revision 9
21	D	7	MSHA 3027 Module 3
22	C	21	MSHA 3027 Module 3
23	D	47	MSHA 3027 Module 2
24	B	47	MSHA 3027 Module 2
25	B	3	MSHA 3027 Module 2
26	B	4	MSHA 3027 Module 2
27	A	7	MSHA 3027 Module 2
28	B	5	MSHA 3027 Module 3
29	A	23	MSHA 3027 Module 3
30	B	53	MSHA 3027 Module 3