



SENSE Level I

Module 2: Safety and Health of Welders Knowledge Exam

Multiple Choice: Circle the letter which corresponds to the correct answer.

1. Potential hazards relating to arc welding are _____ .
 - a) radiation.
 - b) fumes.
 - c) toxic gases.
 - d) all of the above.

2. When using a fire extinguisher to extinguish a fire, it should be _____ .
 - a) pointed at the base of the fire.
 - b) moved up and down to cool the flames.
 - c) pointed at the top of the fire.
 - d) held within six (6) inches of the flames.

3. What type of fire extinguisher should be used on electrical fires?
 - a) Type A
 - b) Type B
 - c) Type C
 - d) Type D

4. What are the initials of the federal organization created to insure safe and sanitary working conditions for employees?
 - a) FAA
 - b) IRS
 - c) FDA
 - d) OSHA

5. The maximum safe working pressure for Acetylene is _____ .
 - a) 10 psi.
 - b) 15 psi.
 - c) 20 psi.
 - d) 32 psi.

6. Vaporized metals, such as zinc, cadmium, lead, chromium and beryllium _____ .
 - a) are hazardous.
 - b) can be ignored.
 - c) are highly flammable.
 - d) may cause slag inclusions.

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7. Fuel gas hoses are usually colored _____ .
- a) green.
 - b) red.
 - c) blue.
 - d) yellow.
8. Flash burn is _____ .
- a) another name for a severe sunburn.
 - b) a burn caused by the welding arc coming in contact with bare skin.
 - c) a burn to the eye caused by exposure to ultraviolet light from the welding arc.
 - d) damage to equipment and clothing due to the extreme heat of the welding arc.
9. One should **never** enter a welding shop without wearing _____ .
- a) gloves.
 - b) safety glasses.
 - c) a welding helmet.
 - d) welding leathers.
10. What should one **never** use on gas cylinders, regulators, connections and hoses?
- a) Wrenches
 - b) Teflon tape
 - c) Leak detectors
 - d) Oil
11. One should **never** cut or weld directly against _____ .
- a) cast iron.
 - b) concrete.
 - c) a workbench.
 - d) a non-flammable surface.
12. One should **never** operate arc welding equipment while _____ .
- a) standing on wet or damp floors.
 - b) in poorly lighted areas.
 - c) someone is standing nearby.
 - d) in a confined area with proper ventilation.

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13. A burn that causes the skin to blister is referred to as a _____ .
- a) first degree burn.
 - b) second degree burn.
 - c) third degree burn.
 - d) fourth degree burn.
14. The selection of a correct lens shade number depends on the _____ .
- a) brightness of the sun in the area.
 - b) type of shielding gas being used.
 - c) amount of welding current being used.
 - d) filler metal being used.
15. Federal regulation requires that hazardous information about a product be provided to all users of that product. The form used to provide this information is called a(n) _____ .
- a) Information Form (IF).
 - b) Hazardous Information Sheet (HIS).
 - c) Occupational Safety and Hazard Form (OSHF).
 - d) Material Safety Data Sheet (MSDS).
16. Which of the following is the only acceptable method for lighting oxyfuel torches?
- a) Matches
 - b) Cigarette lighter
 - c) Welding arc
 - d) Striker
17. Areas that have less than _____ cubic feet per welder, or that have ceilings less than 16 feet high, require forced ventilation.
- a) 4,000
 - b) 8,000
 - c) 10,000
 - d) 12,000
18. A confined space is one that _____ .
- a) has a flammable atmosphere.
 - b) has unrestricted means of entry or exit for employees.
 - c) is designed for continuous employee occupancy.
 - d) is large enough that a person can enter and perform tasks.



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19. A Hot Work Permit _____ .

- a) authorizes the performance of work potentially posing a fire hazard.
- b) promotes the development of standard fire safety guidelines.
- c) records unsafe conditions at a job site.
- d) helps the manager keep records of hazardous spaces.

True or False: For each statement provided below, circle (a) if True and (b) if False.

20. While welding, ventilation should be placed as close to the fume source as practical.

- a) True
- b) False

21. Because of the low amount of ultraviolet light present, it is **not** necessary to use shaded lenses when oxy-fuel cutting.

- a) True
- b) False

22. Long hair, loose-fitting clothes, and ties are personal safety hazards around rotating equipment.

- a) True
- b) False

23. A butane or propane cigarette lighter is safe around welding equipment as long as it is kept in one's pocket.

- a) True
- b) False

24. A fully charged oxygen cylinder contains approximately 225 psi at 70° F.

- a) True
- b) False

25. Safety glasses are **not** required when welding with the helmet down.

- a) True
- b) False

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26. Skin contact with liquid oxygen can cause frostbite.
- a) True
 - b) False
27. Gas cylinders **must** be chained or secured at all times.
- a) True
 - b) False
28. Oxygen cylinders should **never** be stored with flammable gases such as acetylene cylinders.
- a) True
 - b) False
29. In order to maintain production, it is acceptable to operate welding equipment beyond its rated capacity.
- a) True
 - b) False
30. When not in use, an electrode holder, GTAW torch or MIG gun should **not** be placed in contact with a grounded metal surface.
- a) True
 - b) False
31. Acetylene cylinders should **never** be operated while lying on their side because acetone could be drawn into the valve, regulator and hoses.
- a) True
 - b) False
32. One should **never** touch an electrode to a metal surface other than the workpiece because those surfaces may become electrically live.
- a) True
 - b) False
33. ANSI Z49.1 allows oxygen to be used as a substitute for compressed air when necessary.
- a) True
 - b) False



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34. Burns are some of the most common and painful injuries in a welding shop.

- a) True
- b) False

35. Fuel gas fittings are equipped with left hand threads.

- a) True
- b) False



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Module 3: Drawing and Welding Symbol Interpretation Knowledge Exam

Multiple Choice: Circle the letter which corresponds to the correct answer.

1. The primary element of any welding symbol is referred to as the _____ .
 - a) arrow.
 - b) tail.
 - c) reference line.
 - d) weld symbol.

2. Information appearing below the reference line refers to the _____ .
 - a) arrow side.
 - b) near side.
 - c) other side.
 - d) far side.

3. The term _____ refers to the center-to-center spacing of an intermittent fillet weld.
 - a) increment
 - b) contour
 - c) pitch
 - d) center

4. Which of the following is not considered a type of weld joint?
 - a) Butt
 - b) Tee
 - c) Corner
 - d) Fillet

5. The weld joint formed when two parallel members overlap each other is called a _____ joint.
 - a) corner
 - b) tee
 - c) edge
 - d) lap

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6. In a single V-groove weld, the sloped surfaces on which the weld metal is applied are called _____ .
- a) root surfaces.
 - b) root faces.
 - c) groove angles.
 - d) groove faces.
7. A weld applied to the other side of a joint before a groove weld is started is called a _____ .
- a) melt-through weld.
 - b) backing weld.
 - c) root weld.
 - d) back weld.
8. The finished surface (cover pass) of a weld is referred to as the _____ .
- a) crown.
 - b) weld reinforcement.
 - c) weld face.
 - d) root face.
9. In a completed weld, the junction between the surface of a weld and the base metal is called the _____ .
- a) weld edge.
 - b) leg.
 - c) toe.
 - d) weld reinforcement.
10. The height of the weld above the base metal in a groove weld is called the _____ .
- a) crown of the weld.
 - b) weld reinforcement.
 - c) weld buildup.
 - d) face of the weld.



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11. Information appearing above the reference line refers to the _____ .
- a) near side.
 - b) arrow side.
 - c) far side.
 - d) other side.
12. The graphic representation of a weld to be performed is called a _____ .
- a) tail.
 - b) welding symbol.
 - c) weld symbol.
 - d) arrow.
13. A right-angle triangle attached to either side of the reference line indicates a _____ .
- a) Bevel-groove weld.
 - b) V-groove weld.
 - c) Fillet weld.
 - d) Flange-groove weld.
14. Information that appears to the left of the weld symbol refers to the _____ .
- a) weld length.
 - b) weld size.
 - c) electrode size.
 - d) number of passes.
15. The field weld symbol is a supplementary symbol indicated by a _____ .
- a) triangular flag.
 - b) rectangular flag.
 - c) circle.
 - d) half-circle.
16. Plug and slot welds are commonly used on a(n)_____ joint.
- a) butt
 - b) corner
 - c) edge
 - d) lap

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17. In order to perform a 2G weld, the plate(s) would be positioned vertical and the weld would be made in the _____ position.
- a) flat
 - b) horizontal
 - c) vertical
 - d) overhead
18. The weld-all-around symbol is indicated by a _____ at the junction of the reference line and arrow.
- a) triangular flag
 - b) half circle
 - c) circle
 - d) semi-circle
19. Information that appears to the right of the weld symbol refers to the _____ .
- a) process to be used.
 - b) length of weld.
 - c) size of weld.
 - d) joint configuration.
20. A weld produced by filling an elongated hole in an overlapping member, and attaching it to the member beneath is called a _____ .
- a) plug weld.
 - b) spot weld.
 - c) seam weld.
 - d) slot weld.

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21. The size of the weld represented in Figure 1 _____ .

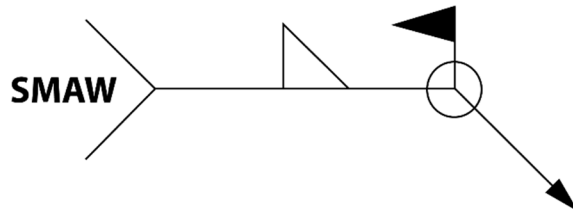


Figure 1

- a) is not important.
- b) cannot be determined directly from the symbol.
- c) can be determined from the symbol.
- d) is not specified, therefore cannot be welded.

22. The welding symbol information provided in Figure 1 requires _____ .

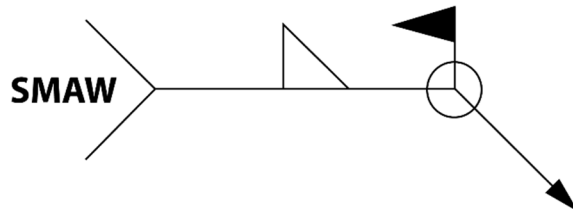


Figure 1

- a) a field weld.
- b) weld-all-around.
- c) a fillet weld.
- d) all of the above.

23. The welding symbol shown in Figure 4 depicts a _____ .



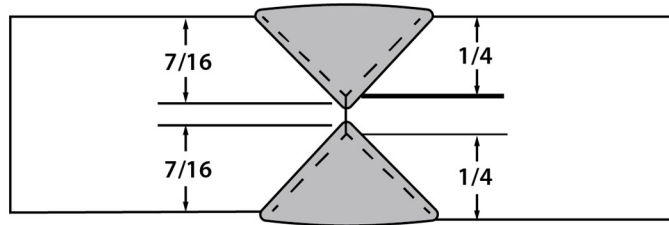
Figure 4

- a) backing weld on the other-side followed by a V-groove weld on the arrow side.
- b) Single-V-groove weld on the arrow-side followed by a back weld on the other-side.
- c) Single-V-groove weld on the arrow-side with melt-through.
- d) bevel groove weld made one-half the way around the diameter of a pipe.

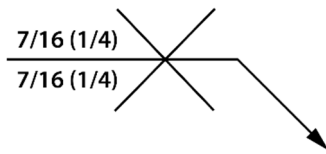
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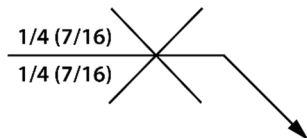
24. Which of the following welding symbols correctly describes the joint configuration shown in Figure 5?



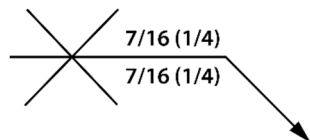
a)



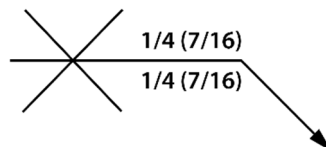
b)



c)



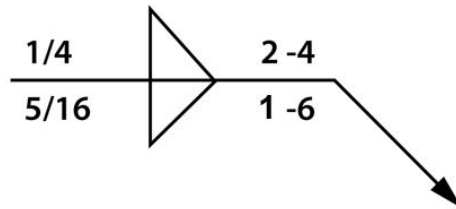
d)



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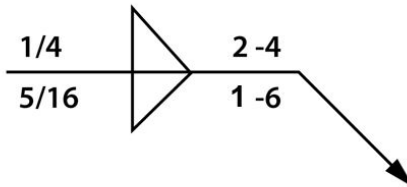
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25. The size of the arrow side weld in Figure 6 is _____ .



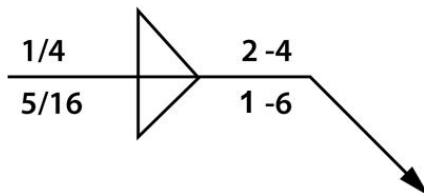
- a) 1/4 in.
- b) 5/16 in.
- c) 1 in.
- d) 2 in.

26. The length of the other side weld in Figure 6 is _____ .



- a) 1 inch.
- b) 6 inches.
- c) 2 inches.
- d) 4 inches.

27. The pitch of the other side weld in Figure 6 is _____ .

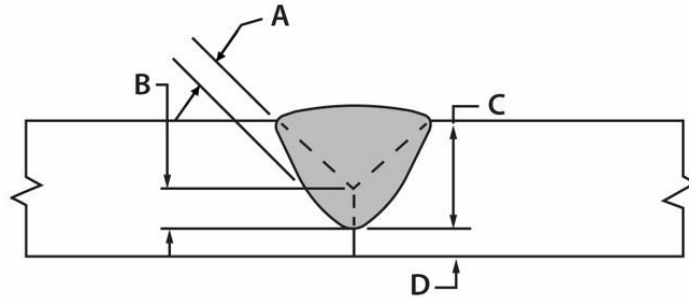


- a) 1/4 inch.
- b) 4 inches.
- c) 5/16 inch.
- d) 1 inch.

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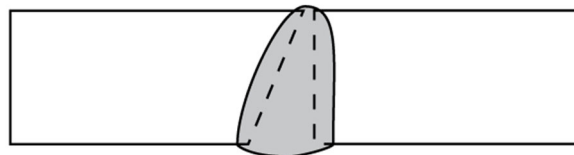
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28. The dimension "C" in Figure 9 identifies _____ .

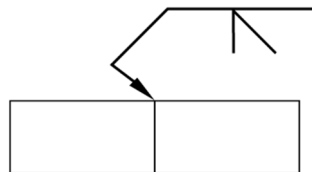


- a) joint penetration and weld size.
- b) weld size and root penetration.
- c) depth of fusion.
- d) complete joint penetration.

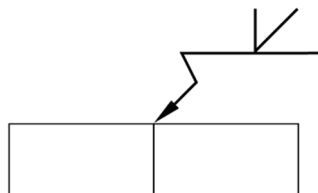
29. Which of the welding symbols below depicts the weld shown?



a)

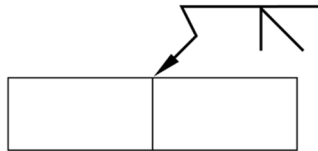


b)

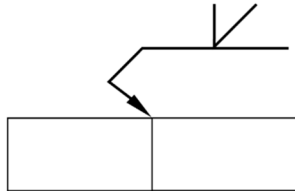


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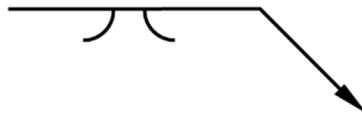
c)



d)

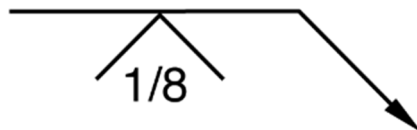


30. The weld symbol below depicts what type of joint?



- a) Flare V-groove
- b) Flare bevel-groove
- c) Edge flange
- d) Corner flange

31. In the weld symbol below, the 1/8 dimension refers to the _____ .

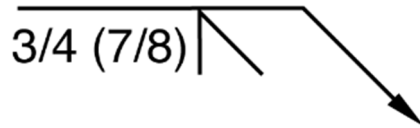


- a) groove angle.
- b) depth of preparation.
- c) weld size.
- d) root opening.

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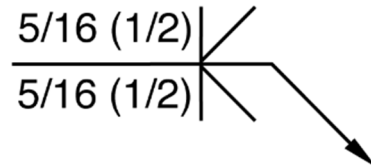
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32. In the weld symbol below, the $\frac{3}{4}$ dimension refers to the _____.



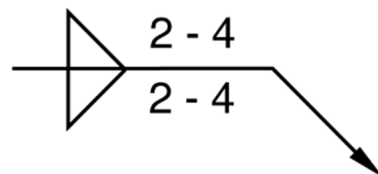
- a) weld size.
- b) effective throat.
- c) depth of bevel.
- d) root opening.

33. If applied to 1-inch thick material, the weld symbol below describes a _____.



- a) full penetration double-bevel groove weld.
- b) full penetration double V-groove weld.
- c) partial penetration double bevel-groove weld.
- d) partial penetration double V-groove weld.

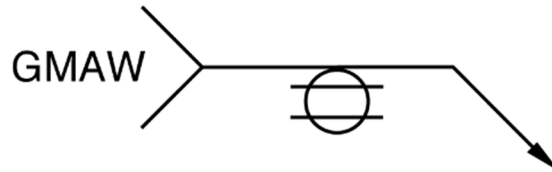
34. The weld symbol below describes a _____.



- a) staggered intermittent fillet weld.
- b) chain intermittent fillet weld.
- c) segmented fillet weld.
- d) intermittent fillet weld.

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35. The welding symbol below depicts a _____ .



- a) gas metal arc spot weld.
- b) resistance spot weld.
- c) gas metal arc seam weld.
- d) gas metal arc slot weld.

Consider the welding symbols in Figure 10 below for the following questions.

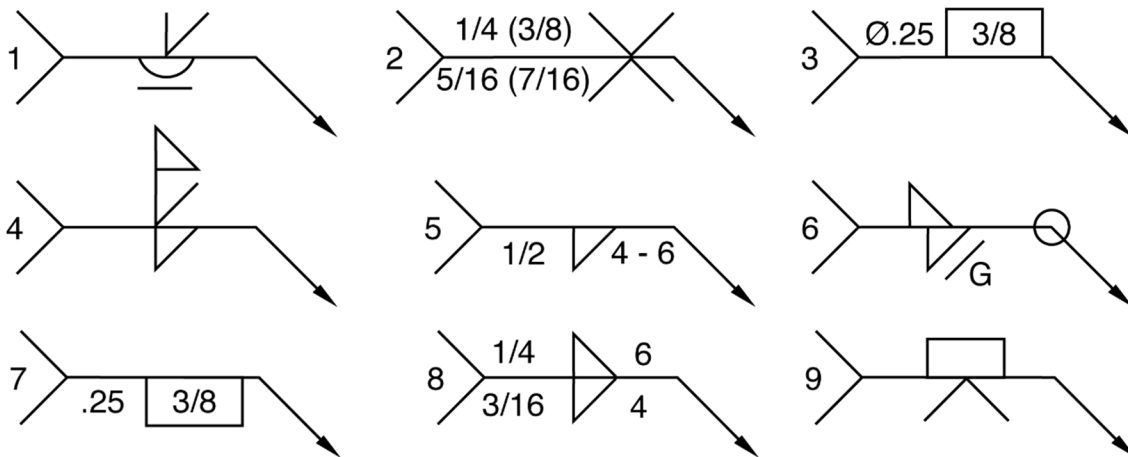


Figure 10

36. Which of the welding symbols in Figure 10 represents an intermittent fillet weld?

- a) 1
- b) 8
- c) 6
- d) 5

37. Which of the welding symbols in Figure 10 (above), represents a groove weld with melt through?

- a) 2
- b) 3
- c) 6
- d) None of the above

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Module 3: Drawing and Welding Symbol Interpretation Knowledge Exam

38. Which of the welding symbols in Figure 10 represents a plug weld not completely filled?
- a) 1
 - b) 3
 - c) 5
 - d) 7
39. Which of the welding symbols in Figure 10 (above), represents a groove weld with backing weld or back weld?
- a) 1
 - b) 2
 - c) 6
 - d) 7



SENSE Level I Module 4: SMAW Knowledge Exam

Multiple Choice: Circle the letter which corresponds to the correct answer.

1. Of the following, which is not a requirement for the SMAW process?
 - a) Electricity
 - b) Gas supply
 - c) Base metal
 - d) Filler metal

2. Which of the following is an incorrect statement about an E7018 electrode?
 - a) Once opened, it should be kept in an electrode oven.
 - b) The weld deposit has a minimum tensile strength of 70,000 psi.
 - c) They are suitable for flat position and horizontal fillet only.
 - d) They are suitable for use in all welding positions.

3. The distance from the molten tip of the SMAW electrode to the surface of the molten weld pool should be _____ .
 - a) one electrode diameter.
 - b) open circuit voltage.
 - c) ignition length.
 - d) arc current.

4. Which one of the following electrodes is not suitable for use in all positions?
 - a) E6010
 - b) E6011
 - c) E7018
 - d) E7024

5. Which of the following electrodes would you select to produce a weld with shallow penetration?
 - a) E6010
 - b) E6011
 - c) E6013
 - d) E7018



SENSE Level I Module 4: SMAW Knowledge Exam

6. An engine-driven generator without a rectifier produces what form of welding current?
- a) AC only
 - b) DC only
 - c) Both AC and DC
 - d) AC and DCEP
7. Which group of electrodes is low hydrogen type?
- a) E7024, E7027, and E7028
 - b) E6010 and E6011
 - c) E6012, E6013, and E7014
 - d) E7015, E7016 and E7018
8. "Arc blow" is caused by _____ .
- a) strong winds associated with outdoor welding.
 - b) magnetic forces associated with direct current.
 - c) too high an amperage for the size of the electrode.
 - d) too low an amperage for the size of the electrode.
9. "Duty cycle" is a term used to indicate the _____ .
- a) percentage of time in a 24 hour cycle that a machine can operate at rated output.
 - b) percentage of time in a 10 minute period a machine can operate at rated output.
 - c) percentage of time in a machine which can do the type of work for which it was designed.
 - d) length of time required for the machine to cycle, expressed as a percentage run time
10. When the welding machine is set to DCEP, current flows _____ .
- a) from the work to the electrode.
 - b) from the electrode to the work.
 - c) both to and from the electrode.
 - d) depending on the electrode being used.



SENSE Level I Module 4: SMAW Knowledge Exam

11. Which of the following welding cable sizes is the largest?
- a) # 1/0
 - b) # 2
 - c) # 1
 - d) # 2/0
12. Rectifiers are noted for their ability to _____ .
- a) control welding power.
 - b) reduce spatter.
 - c) change AC to DC.
 - d) eliminate arc blow.
13. In North America, alternating current changes direction _____ .
- a) once per second.
 - b) 60 times per second.
 - c) 120 times per second.
 - d) 240 times per second.
14. In order to reduce waste and control cost, you should weld until the electrode is _____ .
- a) one half inch from the core wire.
 - b) down to the core wire.
 - c) four (4) inches from the core wire.
 - d) down to the classification numbers.
15. The last digit in the electrode classification E7018 indicates _____ .
- a) welding position the electrode can be used.
 - b) minimum tensile strength of the electrode.
 - c) type of current and electrode coating.
 - d) carbon content of the deposited weld.

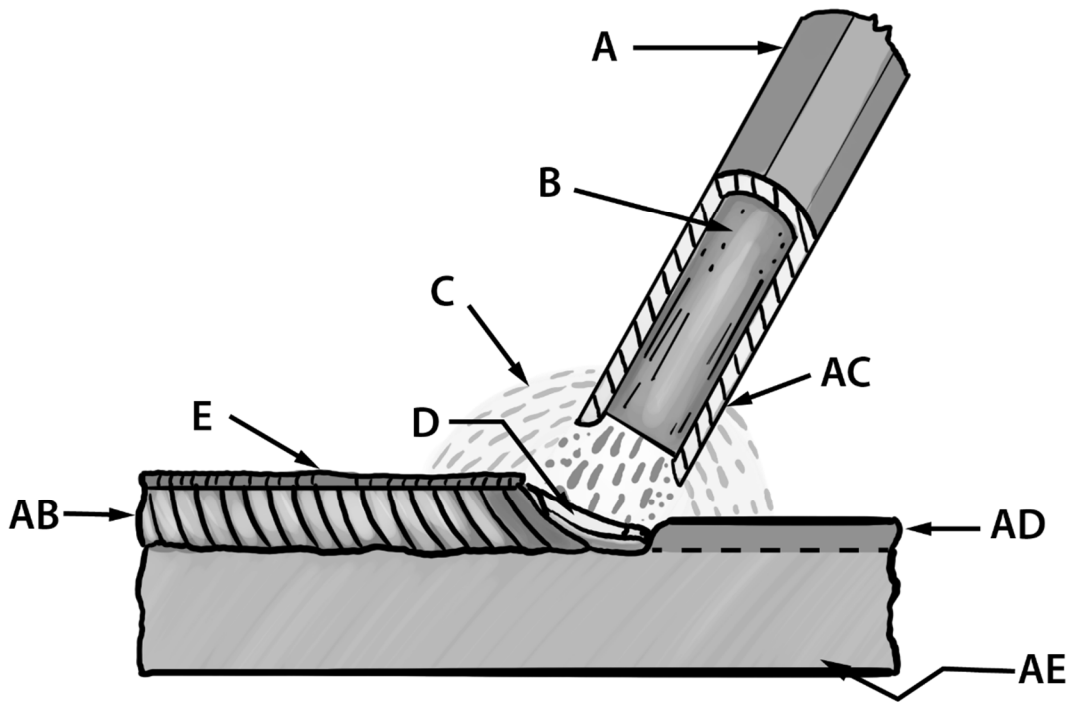


SENSE Level I Module 4: SMAW Knowledge Exam

16. The E7024 electrode can be used in _____ .
- a) all positions.
 - b) flat position and horizontal fillets only.
 - c) flat, horizontal and vertical down positions.
 - d) flat, horizontal, vertical down and overhead positions.
17. The electrode classification that indicates a deep penetrating electrode that can be used with alternating current (AC) current is _____ .
- a) E6010.
 - b) E6011.
 - c) E6012.
 - d) E6013.
18. Back-stepping at the end of a weld made with the SMAW process _____ .
- a) is not done because it traps slag.
 - b) reduces electrode stub loss.
 - c) helps to prevent crater cracking.
 - d) puts too much heat on the electrode holder.
19. The first two (2) digits of the electrode classification indicate the _____ .
- a) positions in which the electrode can be used.
 - b) minimum tensile strength of the deposited weld.
 - c) type of coating and operating characteristics of the electrode.
 - d) type of current with which the electrode can be used.
20. An E6010 deep penetrating electrode belongs to _____ .
- a) F1 Group.
 - b) F2 Group.
 - c) F3 Group.
 - d) F4 Group.

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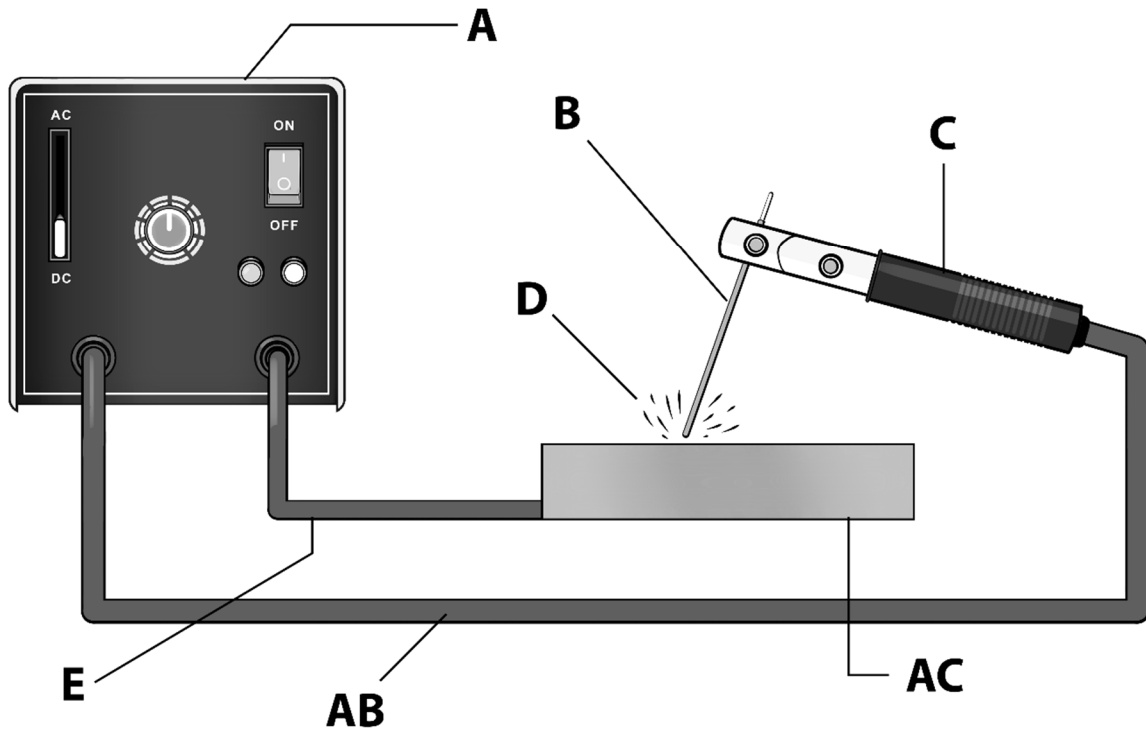
Matching: Match the terms listed to the labeled components shown in the figure below.



21. ___ Shielding atmosphere
22. ___ Solidified weld metal
23. ___ Base metal
24. ___ Flux Coating
25. ___ Core wire
26. ___ Weld Pool
27. ___ Solidified slag

SENSE Level I Module 4: SMAW Knowledge Exam

Match the terms listed to the labeled components shown in the figure below.



28. ___ Power source
29. ___ Electrode holder
30. ___ Work
31. ___ Electrode lead
32. ___ Work piece lead
33. ___ Electrode
34. ___ Arc



SENSE Level I Module 4: SMAW Knowledge Exam

True or False: For each statement provided below circle (a) if True and (b) if False.

35. SMAW equipment is portable because the welding machines can be powered with gasoline or diesel engines.

- a) True
- b) False

36. Excessive spatter and undercutting of weld joints can be caused by current values being set too high.

- a) True
- b) False

37. The E6010 Electrode is run mostly on DCEN.

- a) True
- b) False

38. A number 1 in the next to last digit of the electrode classification for SMAW electrodes, indicates that an electrode can be used in the flat position and on horizontal flat welds only.

- a) True
- b) False

39. A number 2 in the next to last digit of the electrode classification on an SMAW electrode, indicates the electrode may be used in all welding positions.

- a) True
- b) False

40. With direct current electrode positive (DCEP), the work piece is positive.

- a) True
- b) False



SENSE Level I Module 5: GMAW Knowledge Exam

Multiple Choice: Circle the letter which corresponds to the correct answer.

1. In GMAW, the shielding for the molten metal is accomplished through the use of _____.
 - a) granular flux.
 - b) inert and reactive gases.
 - c) reactive gases only.
 - d) inert gases only.

2. GMAW is the abbreviation for?
 - a) Gas Machine Arc Welding.
 - b) Gas Method Arc Welding.
 - c) Gas Material Arc Welding.
 - d) Gas Metal Arc Welding.

3. In GMAW, insufficient gas flow can cause?
 - a) Undercut.
 - b) Overlap.
 - c) Porosity.
 - d) Hydrogen cracking.

4. A worn contact tube results in _____.
 - a) poor arc starts.
 - b) ropey welds.
 - c) excessive spatter.
 - d) porosity.

5. The benefit of copper coated electrode wires is _____.
 - a) better arc starts.
 - b) increased contact tip life.
 - c) improved wire feeding.
 - d) all of the above.



SENSE Level I Module 5: GMAW Knowledge Exam

6. What type of power source is used for GMAW?
 - a) Constant Current
 - b) Alternating Current
 - c) Variable Voltage
 - d) Constant Voltage

7. In GMAW, which type of metal transfer is restricted to flat position and horizontal fillet welds?
 - a) Pulsed Transfer
 - b) Short Circuiting Transfer
 - c) Spray Transfer
 - d) Surface Tension Transfer

8. What type of electrode wire is used with GMAW?
 - a) Flux cored
 - b) Solid
 - c) Tubular
 - d) None of the above

9. In GMAW, the amperage is controlled by adjusting the _____.
 - a) voltage.
 - b) wire feed speed.
 - c) wattage.
 - d) arc length.

10. In GMAW, electrode extension is defined as the distance from the _____.
 - a) nozzle the molten weld pool.
 - b) end of the contact tube to the molten weld pool.
 - c) tip of the wire to the molten weld pool.
 - d) end of the contact tube to the tip of the wire.



SENSE Level I Module 5: GMAW Knowledge Exam

11. Which AWS electrode classification is correct for GMAW wire?
- a) ER70S-3
 - b) E70S-6
 - c) E70-S3
 - d) E71T-1
12. Which of the following is considered an advantage of the GMAW process?
- a) Higher deposition rates than manual processes.
 - b) Easy to use compared to manual processes.
 - c) Less electrode waste than with SMAW.
 - d) All of the above.
13. Electric current is transferred to the electrode through the _____ .
- a) gun cable liner.
 - b) contact tube.
 - c) wire feed rolls.
 - d) gas diffuser.
14. What shielding gas or gas mixture will not produce spray transfer?
- a) 100% Argon
 - b) 98% Argon/2% CO₂
 - c) 90% Argon/10% CO₂
 - d) 100% CO₂
15. The contact tube should be _____ .
- a) sized to match the wire diameter.
 - b) slightly smaller than the wire diameter.
 - c) 1-1/2 times larger than the wire diameter.
 - d) 2 times larger than the wire diameter.
16. What does the 70 indicate in the electrode classification ER70S-3?
- a) Trade name
 - b) Tensile Strength
 - c) Yield Strength
 - d) Hardness



SENSE Level I Module 5: GMAW Knowledge Exam

17. Excessive amounts of weld spatter in the nozzle may cause _____ .
- a) lack of fusion.
 - b) undercutting.
 - c) poor shielding.
 - d) longitudinal cracks.
18. Which of the following is not recommended when welding with short-circuiting transfer?
- a) Welding in all positions.
 - b) Welding open roots.
 - c) Welding on thin materials.
 - d) Welding heavy plate.
19. Which of the following is not an advantage of the GMAW process?
- a) Higher deposition rates.
 - b) Relatively easy process for a beginner to learn.
 - c) Can be used to weld ferrous and nonferrous metals.
 - d) Good for use in windy areas.
20. The transfer mode that uses low currents, low voltage, and small diameter electrode wire to weld in all positions is called _____ .
- a) spray transfer.
 - b) globular transfer.
 - c) droplet transfer.
 - d) short-circuiting transfer.
21. What positions and types of welds can be successfully welded using the spray transfer mode on carbon steel?
- a) 1F, 1G and 2F,
 - b) 1G and 2G open root welds
 - c) 2G and 3G open welds.
 - d) All joint types in all positions.



SENSE Level I Module 5: GMAW Knowledge Exam

22. Which shielding gas or gas mixture is most often used for welding carbon steel with the short-circuiting transfer mode?
- a) 100% Argon
 - b) 10% Carbon dioxide, 90% Helium
 - c) 98% Argon, 2% Oxygen
 - d) 75% Argon, 25% Carbon Dioxide
23. Which one of the gases listed below is inert?
- a) Carbon Dioxide
 - b) Hydrogen
 - c) Argon
 - d) Oxygen

True or False: For each statement provided below circle (a) if True and (b) if False.

24. A constant voltage power supply is the most common type used for the GMAW process.
- a) True
 - b) False
25. The rate at which the arc moves along the weld joint is called the wire feed speed.
- a) True
 - b) False
26. A minimum of 80% Argon is required to achieve a spray transfer.
- a) True
 - b) False
27. In the electrode classification ER70S-6, the "S" stands for short circuiting transfer.
- a) True
 - b) False

SENSE Level I Module 6: FCAW Knowledge Exam

Multiple Choice: Circle the letter which corresponds to the correct answer.

1. In the AWS electrode classification E71T-1, the digit after the dash designates _____.
 - a) tensile strength.
 - b) welding position.
 - c) chemical composition.
 - d) gas shielded.
2. A flux cored electrode that protects the weld zone from contaminants with fluxing elements released from the core of wire the itself is called _____.
 - a) gas-shielded.
 - b) mechanized.
 - c) dual shielded.
 - d) self-shielded.
3. Which electrode classification identifies a filler metal that can be used in the overhead position?
 - a) E70T-1
 - b) E74T-9
 - c) E73T-8
 - d) E71T-5
4. Which of the following is not essential for FCAW-S?
 - a) Constant voltage power supply
 - b) Tubular electrode
 - c) Wire feeder
 - d) External shielding gas
5. In the FCAW electrode classification E71T-1, the letter T indicates _____.
 - a) tensile strength.
 - b) toughness values.
 - c) tungsten electrode.
 - d) tubular electrode.

SENSE Level I Module 6: FCAW Knowledge Exam

6. A flux cored electrode used with an external shielding gas is not _____ .
- a) gas-shielded.
 - b) semiautomatic.
 - c) automatic.
 - d) self-shielded.
7. When examining a spool of filler metal to determine if it is designed for flux cored welding, one should look for _____ .
- a) a 3,4, or 6 in the electrode classification.
 - b) a "T" in the electrode classification.
 - c) an "S" in the electrode classification.
 - d) an "F" in the electrode classification.
8. Which of the following is not true of the FCAW-S process?
- a) Combines characteristics found in SMAW, GMAW and SAW processes.
 - b) Is limited to welding ferrous and nickel base alloys.
 - c) Produces smooth, uniform welds.
 - d) The process produces slag free welds.
9. Which of the following is not an advantage of the FCAW-G process?
- a) Up to four (4) times greater deposition rate than SMAW.
 - b) Many steels are weldable over a wide thickness range.
 - c) Adaptable to both stainless and carbon steels.
 - d) Good for use outdoors in windy conditions.
10. What type of drive rolls are used with FCAW electrode wire?
- a) V-Groove
 - b) U-Groove
 - c) Knurled
 - d) None of the above

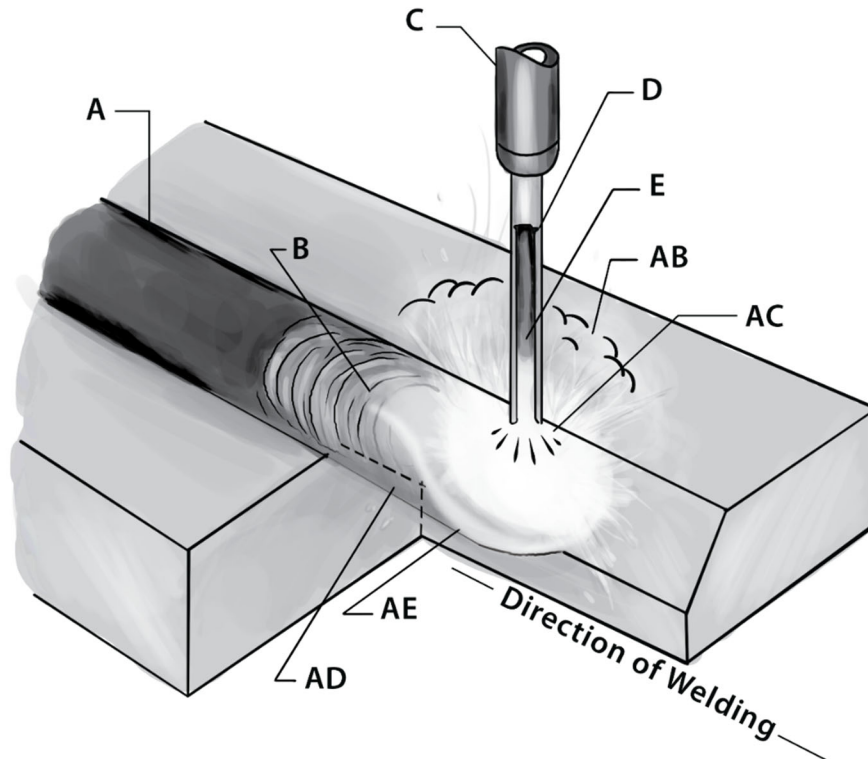
SENSE Level I

Module 6: FCAW Knowledge Exam

11. Of the two basic FCAW processes, one is self-shielding, and one uses an _____ shielding gas.
- a) inert
 - b) internal
 - c) external
 - d) ambient
12. FCAW-G indicates what type of shielding?
- a) Self-shielded
 - b) Gas-shielded
 - c) Globular
 - d) None of the above
13. The FCAW process has the capability of being used in what positions?
- a) Flat position
 - b) Horizontal position
 - c) Vertical position
 - d) All positions
14. In FCAW, the flux inside the tubular wire contains ingredients that _____ .
- a) cause arc flutter.
 - b) oxidize the weld.
 - c) provide shielding.
 - d) prevent slag formation.
15. When employing a weaving technique with FCAW, a welder can eliminate problems with undercut by _____ .
- a) Increasing voltage to increase the electrode burn-off rate.
 - b) Stopping momentarily at the end of each weaving motion.
 - c) Traveling faster to prevent melting away the edges of the joint.
 - d) Using a longer arc length to achieve a better spray transfer.

SENSE Level I Module 6: FCAW Knowledge Exam

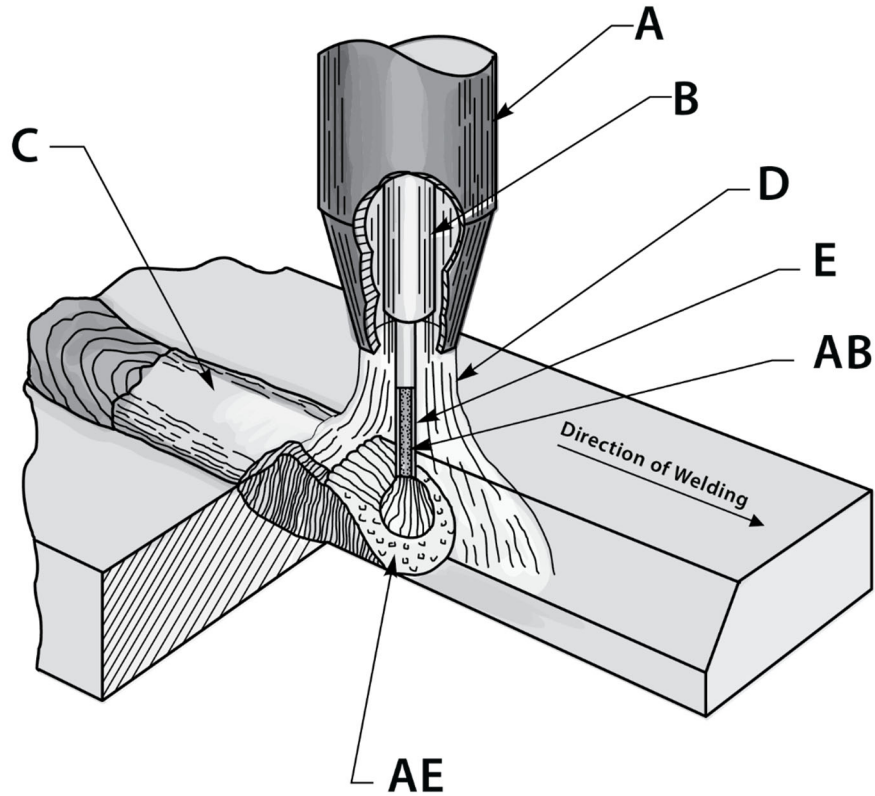
Matching: Match the terms listed to the labeled components shown in the figure below.



16. ___ Weld pool
17. ___ Solidified weld metal
18. ___ Shielding gas
19. ___ Arc and metal transfer
20. ___ Solidified slag
21. ___ Tubular electrode
22. ___ Powdered Flux
23. ___ Contact tube
24. ___ Molten slag

SENSE Level I Module 6: FCAW Knowledge Exam

Match the terms listed to the label components shown in the figure below.



- 25. ___ Contact tube
- 26. ___ Slag
- 27. ___ Gas nozzle
- 28. ___ Shielding gas
- 29. ___ Depth of penetration
- 30. ___ Electrode

SENSE Level I Module 7: GTAW Knowledge Exam

Multiple Choice: Circle the letter which corresponds to the correct answer.

1. The chemical symbol for tungsten is _____ .
 - a) T
 - b) Tu
 - c) W
 - d) L

2. How long should the post purge (shielding gas) be allowed to flow after the welding arc is broken?
 - a) Stop at the same time the arc is broken.
 - b) Long enough to allow the base metal and electrode to cool.
 - c) Long enough to allow the electrode to cool.
 - d) Long enough to allow the base metal to cool.

3. When using GTAW to weld Aluminum with alternating current (AC., the tip of the tungsten electrode should be _____ .
 - a) tapered.
 - b) tapered with the end slightly blunted.
 - c) rounded at the tip.
 - d) ground at right angles to the grain of the electrode.

4. Alternating Current (AC. is used for welding aluminum because _____ .
 - a) it produces deeper penetration than Direct Current.
 - b) of the cleaning action and medium penetration of the arc.
 - c) AC power is more cost effective than DC power.
 - d) aluminum conducts AC better than DC.

5. Which of the following methods is used to start the GTAW arc without touching the base metal?
 - a) Scratch start
 - b) High frequency start
 - c) Pulse start
 - d) Lift start

SENSE Level I Module 7: GTAW Knowledge Exam

6. High Frequency current is added to alternating current to _____.
 - a) maintain the arc.
 - b) prevent distortion.
 - c) provide cleaning action.
 - d) refine the grain structure of the weld.

7. When the GTAW power source is set to DCEP _____.
 - a) most of the heat is directed toward the electrode.
 - b) most of the heat is directed toward the work.
 - c) heat is equally distributed between the electrode and the work.
 - d) heat is only controlled by the amount of amperage used.

8. As a general rule, the inside diameter of the gas nozzle should be _____.
 - a) two times the electrode diameter.
 - b) three times the electrode diameter.
 - c) four times the electrode diameter.
 - d) 3/8 inch.

9. Pulsed current is useful for welding stainless steel because it _____.
 - a) produces less heat input than steady current.
 - b) melts more of the chromium and nickel alloying elements.
 - c) requires less pre-weld cleaning than steady current.
 - d) inhibits the formation of oxides on the backside of the weld.

10. Pulsed current is useful for welding out of position because _____.
 - a) the arc is easy to start.
 - b) the weld pool is easier to control.
 - c) it is easier to see the puddle.
 - d) it produces deeper penetration.

SENSE Level I Module 7: GTAW Knowledge Exam

11. The shielding gas most commonly used for welding low carbon steel with GTAW is _____ .
- a) carbon dioxide.
 - b) argon.
 - c) helium.
 - d) an argon/helium mixture.
12. To break up the oxide coating from aluminum prior to welding you should _____ .
- a) brush the weld joint with a steel brush.
 - b) brush the weld joint with a stainless steel brush.
 - c) wipe the weld joint with a dry, clean rag.
 - d) aluminum oxides normally do not require removal.
13. Which of the following is not an advantage of GTAW?
- a) High quality welds in a great variety of metals.
 - b) High deposition rate.
 - c) Very little spatter and post-weld cleaning.
 - d) All position welding.
14. If tungsten spitting occurs, what may be done to correct the problem?
- a) Change to a different type of tungsten electrode.
 - b) Use a larger diameter tungsten electrode.
 - c) Decrease the welding current.
 - d) All of the above.
15. An EWTh-2 electrode is _____ .
- a) 2% Thoriated tungsten.
 - b) 2% Titanium tungsten.
 - c) 2% Zirconiated tungsten.
 - d) 2% Lanthanated tungsten.

SENSE Level I Module 7: GTAW Knowledge Exam

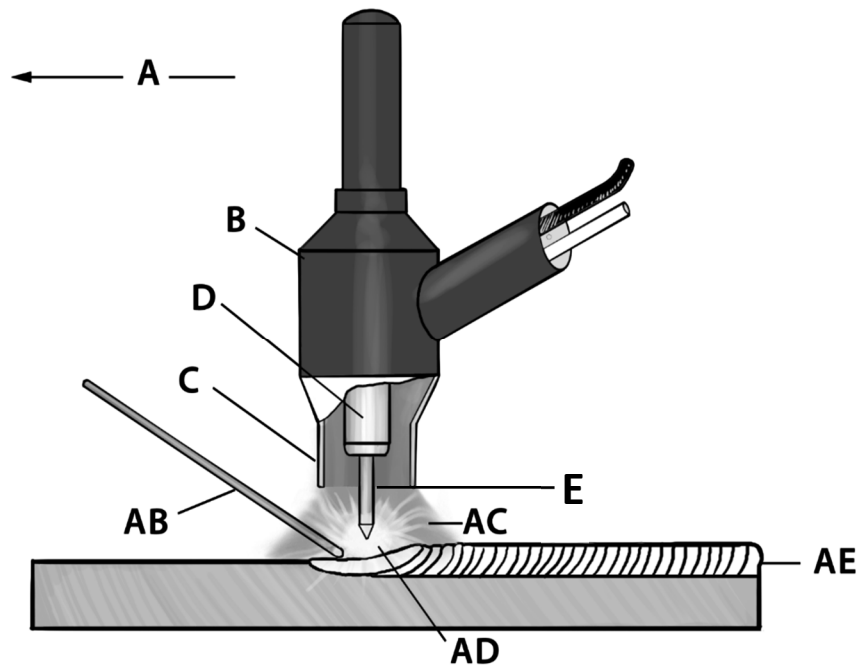
16. Tungsten is used for GTAW electrodes because it has which of the following properties?
- a) High melting point.
 - b) Low electrical resistance.
 - c) Good heat conductivity.
 - d) All of the above.
17. What approximate percentage of the heat of the arc is directed toward the electrode when welding with DCEP?
- a) 30%
 - b) 50%
 - c) 70%
 - d) 90%
18. The voltage present when the welding machine power switch is in the ON position, but no welding is taking place is called _____ .
- a) open-circuit voltage.
 - b) operating voltage.
 - c) arc voltage.
 - d) high frequency voltage.
19. Filler metal with an AWS classification of ER4043 is used to weld _____ .
- a) Carbon Steel.
 - b) Stainless Steel.
 - c) Aluminum.
 - d) Copper.
20. Filler metal with an AWS classification of ER70S-X is used to weld _____ .
- a) Carbon Steel.
 - b) Stainless Steel.
 - c) Aluminum.
 - d) Copper.

SENSE Level I Module 7: GTAW Knowledge Exam

21. Filler metal with an AWS classification of ER308 is used to weld _____ .

- a) Carbon Steel.
- b) Stainless Steel.
- c) Aluminum.
- d) Copper.

Matching: For the following questions match the terms given to the labeled components show in in the figure at right.



- 22. ___ Direction of welding
- 23. ___ Collet body
- 24. ___ Torch
- 25. ___ Tungsten electrode
- 26. ___ Gas shield
- 27. ___ Arc

SENSE Level I
Module 7: GTAW Knowledge Exam

28. ___ Solidified weld metal

29. ___ Filler metal

30. ___ Gas nozzle

For the following questions match each metal listed with the type of current used to weld it.

A) AC

B) DCEP

C) DCEN

31. ___ Magnesium

32. ___ Mild steel

33. ___ Aluminum

34. ___ Stainless Steel

For the following questions match each type of tungsten with its corresponding color code.

A) Red

B) Brown

C) Green

D) Yellow

E) Orange

F) Black

35. ___ Ceriated Tungsten

36. ___ 2% Thoriated Tungsten

37. ___ Pure Tungsten

38. ___ Zirconiated Tungsten

39. ___ Lanthanated Tungsten



SENSE Level I Module 7: GTAW Knowledge Exam

True or False: For each statement provided below, circle (a) if True and (b) if False.

40. GTAW is also commonly referred to as Tungsten Inert Gas and Heliarc Welding.
- a) True
 - b) False
41. GTAW is a good process for high quality welds on a wide variety of metals.
- a) True
 - b) False
42. Shielding gas flow rates should be decreased when welding in the overhead position.
- a) True
 - b) False
43. GTAW produces no spatter and requires limited post-weld cleaning.
- a) True
 - b) False
44. It is not necessary to keep the hot end of the filler wire in the gas-shielding zone.
- a) True
 - b) False
45. The electrode classification EWP indicates a pure tungsten electrode.
- a) True
 - b) False
46. You must always use filler metal when welding with the GTAW process.
- a) True
 - b) False



SENSE Level I Module 7: GTAW Knowledge Exam

47. Filler metal must be of the same composition as the base metal.
- a) True
 - b) False
48. Filler metals used for GTAW are similar in classification as those used for GMAW.
- a) True
 - b) False
49. Copper-coated mild steel filler metals used for oxyacetylene welding are also recommended for GTAW.
- a) True
 - b) False

SENSE Level I

Module 8: Thermal Cutting Process Knowledge Exam

Multiple Choice: Circle the letter which corresponds to the correct answer.

1. What is the term for the width of the cut produced by any cutting process?
 - a) Drag line
 - b) Kerf
 - c) Wraparound
 - d) Slag
2. Which fuel gas can be used to cut low carbon steel?
 - a) MAPP
 - b) Propane
 - c) Acetylene
 - d) All of the above
3. The maximum recommended safe working pressure for Acetylene is _____.
 - a) 10 psi.
 - b) 15 psi.
 - c) 20 psi.
 - d) 32 psi.
4. Which oxyacetylene flame has an excess of fuel?
 - a) Oxidizing
 - b) Neutral
 - c) Carburizing
 - d) None of the above
5. The oxyfuel process uses oxygen and what other types of gases?
 - a) Inert Gases
 - b) Reactive Gases
 - c) Mixed gases
 - d) Flammable gases

SENSE Level I

Module 8: Thermal Cutting Process Knowledge Exam

6. To ensure that oxyfuel lines are not improperly connected, fuel gas hoses are _____ .
- a) Red with right-hand threads
 - b) Red with left-hand threads
 - c) Green with right-hand threads
 - d) Green with left-hand threads
7. A fully charged acetylene cylinder contains approximately _____ .
- a) 15 psi @ 70°F
 - b) 225 psi @ 70°F
 - c) 500 psi @ 70°F
 - d) 2,200 psi @ 70°F
8. While cutting with acetylene, the oxygen working pressure is _____ .
- a) greater than the acetylene working pressure.
 - b) equal to the acetylene working pressure.
 - c) less than the acetylene working pressure.
 - d) a constant 20 pounds per square inch.
9. While flame cutting, the preheat flames (with the cutting jets open) should be _____ .
- a) carburizing.
 - b) oxidizing.
 - c) neutral.
 - d) reducing.
10. Oxyacetylene torches can cut _____ .
- a) stainless steel.
 - b) aluminum.
 - c) copper nickel alloys.
 - d) carbon steel.

SENSE Level I
Module 8: Thermal Cutting Process Knowledge Exam

11. If an excessive amount of preheat is used when making an oxyfuel cut, the _____ .
- a) cutting stream may gouge the side of the cut.
 - b) top edge may be melted or removed.
 - c) cut may be incomplete.
 - d) sides of the kerf may be dished.

True or False: For each statement provided below, circle (a) if True and (b) if False.

12. It is NOT necessary to wear shaded lenses when oxyfuel cutting, because it uses a flame instead of an electric arc.
- a) True
 - b) False
13. Acetylene can be used with any oxyfuel cutting tip.
- a) True
 - b) False
14. Mechanized OFC is commonly referred to as a track burner.
- a) True
 - b) False
15. During the Mechanized OFC process, there is no need for the operator to monitor the cut being made.
- a) True
 - b) False
16. A good quality cut will have drag lines that DO NOT slant or curve backwards.
- a) True
 - b) False

SENSE Level I
Module 8: Thermal Cutting Process Knowledge Exam

17. The most common cause of the top edge being melted away during a cut is traveling too fast.
- a) True
 - b) False

Unit 3: Manual Plasma Arc cutting (PAC)

Multiple Choice: Circle the letter which corresponds to the correct answer.

18. In Plasma Arc Cutting (PAC), the term “plasma” refers to _____ .
- a) a shielding gas that protects the cutting stream from contaminants.
 - b) a gas which has been heated to the point that it will conduct electricity.
 - c) a long arc that transfers molten metal to the work piece.
 - d) the glow produced by the arc used for cutting.
19. While using the PAC process, the air MUST be _____ .
- a) lubricated.
 - b) completely dry.
 - c) humidified.
 - d) inert.
20. What is the metallic residue from a Plasma cut called?
- a) Drag
 - b) Kerf
 - c) Slag
 - d) Dross
21. During a Plasma cut, the temperature of the arc is approximately _____ .
- a) 11,000° F - 17,000° F.
 - b) 18,000° F - 25,000° F.
 - c) 26,000° F - 43,000° F.
 - d) 44,000° F - 120,000° F.

SENSE Level I

Module 8: Thermal Cutting Process Knowledge Exam

22. What material listed below, gives off toxic zinc fumes when plasma cutting?

- a) Aluminum
- b) Galvanized steel
- c) High carbon steel
- d) High strength low alloy steel

23. A plasma arc cutting power supply MUST be able to produce _____ .

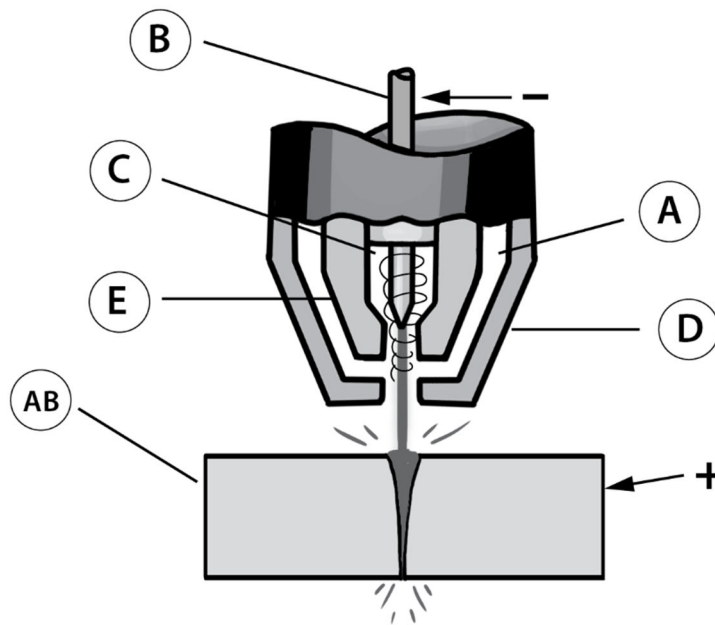
- a) alternating current (AC).
- b) direct current (DC).
- c) either AC or DC.
- d) low voltage.

24. The electrodes for Plasma arc torches are made from _____ .

- a) brass.
- b) tungsten.
- c) stainless steel.
- d) carbide.

SENSE Level I Module 8: Thermal Cutting Process Knowledge Exam

Matching: Match the components listed to the labeled components shown in the figure below.



25. ___ Work piece
26. ___ Shielding Gas Nozzle
27. ___ Shielding gas
28. ___ Electrode
29. ___ Orifice Gas
30. ___ Constricting Nozzle

SENSE Level I

Module 8: Thermal Cutting Process Knowledge Exam

True or False: For each statement provided below, circle (a) if True and (b) if False.

31. PAC will not work on aluminum because aluminum is non-magnetic.
- a) True
 - b) False
32. A high travel speed with plasma cutting will result in heat input that is much higher than that produced by oxyfuel cutting processes.
- a) True
 - b) False
33. PAC produces a large quantity of fumes that are potentially hazardous.
- a) True
 - b) False
34. The width of a PAC cut is narrower than an oxyfuel cut.
- a) True
 - b) False
35. When using PAC, there is no need to worry about excessive flying sparks.
- a) True
 - b) False
36. One should ALWAYS use the proper filter plate shade number when using the PAC process.
- a) True
 - b) False
37. Because Plasma Arc Cutting is so much faster than Oxyfuel Cutting, there is no time for the material to get hot.
- a) True
 - b) False

SENSE Level I
Module 8: Thermal Cutting Process Knowledge Exam

38. One should NEVER operate the PAC process if there is moisture on or around the equipment.
- a) True
 - b) False

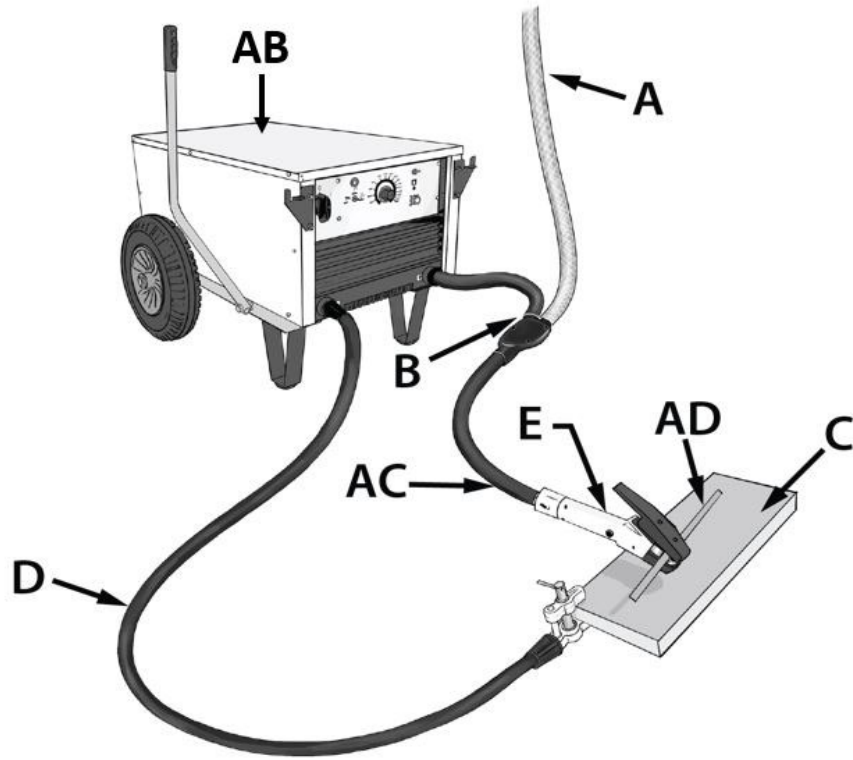
Unit 4: Manual Air Carbon Arc Cutting (CAC-A)

Multiple Choice: Circle the letter which corresponds to the correct answer.

39. When using CAC-A, the molten metal is removed by
- a) a jet of air passing through the arc.
 - b) the oxygen in the air causing the metal to oxidize.
 - c) setting the work piece on edge so the molten metal can run downhill.
 - d) metal vaporizing from the intense arc.
40. What amount of air pressure is normally supplied to a heavy-duty air carbon arc electrode holder?
- a) 40 to 60 cubic feet per hour
 - b) 50 to 70 pounds per square inch
 - c) 60 to 80 cubic feet per hour
 - d) 80 to 100 pounds per square inch
41. While performing air carbon arc cutting, a carbon mixture or _____ electrode can be used
- a) copper coated tungsten.
 - b) copper coated graphite.
 - c) copper coated zinc.
 - d) copper coated steel.

SENSE Level I Module 8: Thermal Cutting Process Knowledge Exam

Matching: For the following questions match the terms given to the labeled components show in in the figure at right.



- 42. ___ Work piece
- 43. ___ Work piece lead
- 44. ___ Concentric cable
- 45. ___ Carbon electrode
- 46. ___ Electrode lead
- 47. ___ Compressed air
- 48. ___ Power supply
- 49. ___ Torch



SENSE Level I

Module 8: Thermal Cutting Process Knowledge Exam

True or False: For each statement provided below, circle (a) if True and (b) if False.

50. Because the CAC-A process is so precise there are few, if any, flying sparks.
- a) True
 - b) False
51. The CAC-A process DOES NOT require electricity.
- a) True
 - b) False
52. One should always use the proper filter plate shade number when using the CAC-A process
- a) True
 - b) False
53. Due to the excessive noise produced by CAC-A, proper ear protection is required.
- a) True
 - b) False
54. Fumes are a potential hazard associated with the CAC-A process.
- a) True
 - b) False
55. The CAC-A process requires the same shade of filter plate as PAC.
- a) True
 - b) False

SENSE Level I

Module 9: Welding Inspection and Testing Knowledge Exam

Multiple Choice: Circle the letter which corresponds to the correct answer.

1. Which of the following is NOT a type of weld joint?
 - a) Butt
 - b) T
 - c) Fillet
 - d) Corner

2. The portion of the joint where the two pieces to be joined come closest together is called the _____.
 - a) bevel.
 - b) joint root.
 - c) groove angle.
 - d) root face.

3. A weld produced by filling an elongated hole in an overlapping member, fusing it to the member beneath is called a _____.
 - a) plug weld.
 - b) spot weld.
 - c) seam weld.
 - d) slot weld.

4. A weld having a triangular cross section which is applied to a T-joint, corner joint or lap joint is called a _____.
 - a) flange weld.
 - b) flare weld.
 - c) fillet weld.
 - d) slot weld.

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5. A weld used to build up thin surfaces and to provide a layer of corrosion protection and/or abrasion-resistance is called a(n) _____ .
- a) edge weld.
 - b) flare weld.
 - c) flange weld.
 - d) surfacing weld.
6. The height of a weld above the base metal in a groove weld is the _____ .
- a) crown of the weld.
 - b) weld buildup.
 - c) face of the weld.
 - d) weld reinforcement.
7. A(n) _____ fillet weld has the same leg and size dimensions.
- a) equal leg
 - b) concave
 - c) convex
 - d) unequal leg
8. A weld formed by progressing along the joint with a side-to-side motion is called a _____ .
- a) stringer bead.
 - b) stagger bead.
 - c) weave bead.
 - d) side bead.
9. The base material next to the weld that is NOT melted, but that undergoes structural and metallurgical changes is called the _____ .
- a) Root Zone.
 - b) Penetration Zone.
 - c) Heat Affected Zone.
 - d) Distortion Zone.

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10. The problem occurring in weldments due to the non-uniform heating produced by welding is called _____ .
- a) porosity.
 - b) incomplete fusion.
 - c) distortion.
 - d) slag inclusion.
11. The most common type of destructive testing of welds is called _____ .
- a) tensile testing.
 - b) bend testing.
 - c) break testing.
 - d) fillet break testing.
12. According to the AWS D1.1 code, if a welder continues to use a particular procedure, how long does his/her qualification remain in effect?
- a) Indefinitely, unless the ability of the welder is questioned.
 - b) Six (6) months unless the ability of the welder is questioned.
 - c) Twelve (12) months unless the ability of the welder is questioned.
 - d) Until the welder produces a defective weld.
13. A weld discontinuity caused by the improper termination of the welding arc is referred to as _____ .
- a) undercut.
 - b) overlap.
 - c) a crater crack.
 - d) incomplete fusion.
14. A discontinuity that results from the entrapment of gas within the weld is referred to as _____ .
- a) crack.
 - b) slag inclusion.
 - c) undercut.
 - d) porosity.

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15. Which weld metal discontinuity is generally considered to be the most severe?
- a) Porosity
 - b) Overlap
 - c) Slag inclusion
 - d) Crack
16. Which weld discontinuity results from weld metal flowing out of the joint and laying on the base metal surface without fusing?
- a) Undercut
 - b) Underfill
 - c) Overlap
 - d) Incomplete fusion
17. A weld metal discontinuity caused when the welder fails to completely fill the weld groove is called _____ .
- a) underfill.
 - b) undercut.
 - c) overlap.
 - d) incomplete fusion.
18. The weld discontinuity caused by starting the welding arc outside the weld joint is referred to as _____ .
- a) incomplete fusion.
 - b) undercut.
 - c) overlap.
 - d) arc strike.
19. The first inspection method should ALWAYS be _____ .
- a) liquid penetrant.
 - b) magnetic particle.
 - c) visual.
 - d) ultrasonic.

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20. Which one of the following test is a destructive test?
- a) Magnetic particle
 - b) Tensile strength
 - c) Liquid penetrant
 - d) Ultrasonic
21. The pipe welding position in which the axis of the pipe lies fixed at a 45 degrees angle is _____ .
- a) 1G.
 - b) 2G.
 - c) 5G.
 - d) 6G.
22. A groove that is melted into the base metal adjacent to the toe of the weld and left unfilled is called _____ .
- a) stress cracking.
 - b) cold lap.
 - c) undercut.
 - d) underfill.
23. Slag trapped in a weld is an example of _____ .
- a) porosity.
 - b) inclusions.
 - c) entrapment.
 - d) stress risers.
24. Which discontinuity is most likely to be caused during the manufacturing of steel plate?
- a) Porosity
 - b) Lamination
 - c) Undercut
 - d) Underfill

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25. The location from which bend specimens are taken is determined _____ .

- a) by the welder that made the weld.
- b) by the certified welding inspector.
- c) by the code being used.
- d) at random.

26. During a guided bend test, the welding inspector is observing _____ .

- a) degree of penetration.
- b) degree of cold lap.
- c) quality of fusion.
- d) tensile strength.

27. With which welding process is it possible to have slag inclusions?

- a) GMAW
- b) SMAW
- c) GTAW
- d) OAW

True or False: For each statement provided below, circle (a) if True and (b) if False.

28. Actions taken to insure good weld quality should ALWAYS begin prior to welding.

- a) True
- b) False

29. The CWI examination contains three parts, each two (2) hours long.

- a) True
- b) False

30. Increasing the carbon content of steel decreases the likelihood of cracking problems.

- a) True
- b) False

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31. Porosity is considered to be the most critical discontinuity.
- a) True
 - b) False
32. Undercut can be caused by a slow travel speed.
- a) True
 - b) False
33. Underbead cracking can be caused by welding on wet or contaminated metal.
- a) True
 - b) False
34. A linear discontinuity has a width that is close in size to its length.
- a) True
 - b) False
35. Excessive convexity occurs when the weld metal rolls over the weld toe.
- a) True
 - b) False
36. When welding with the SMAW process, slag inclusions can be caused by improper cleaning between weld beads.
- a) True
 - b) False
37. When welding with the GTAW process, tungsten inclusions can be caused by improper grinding of the electrode.
- a) True
 - b) False



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38. When welding with the GMAW process, incomplete fusion is most likely to occur when using the short circuiting transfer mode.
- a) True
 - b) False
39. Insufficient shielding gas coverage is likely to cause undercut.
- a) True
 - b) False