

# 1 Exam Prep

## SMACNA HVAC Duct Constructions Standards Questions

### Part 1

1. Vertical riser supports shall be installed at maximum spacing intervals of?
  - A 6 feet
  - B 10 feet
  - C 12 feet
  - D 15 feet
2. A 24 inch by 16 inch rectangular duct with a 1.5 inch flexible liner will have exterior dimensions of?
  - A 24.5 inches by 16.5 inches
  - B 25.5 inches by 17.5 inches
  - C 26.5 inches by 18.5 inches
  - D 27 inches by 19 inches
3. The minimum aluminum equivalent required to replace 22 gauge galvanized steel is?
  - A .027
  - B .034
  - C .043
  - D .052
4. Metal nosing shall be used on upstream edges of liners at every transverse joint when velocities exceed?
  - A 1,400 fpm (7.11. mps)
  - B 2,400 fpm
  - C 4,000 fpm (20.3 mps)
  - D 5,000 fpm
5. Collars to which flexible duct is attached shall be a minimum of?
  - A 2 inches in length
  - B 3 inches in length
  - C 4 inches in length
  - D 8 inches in length
6. Sleeves used for joining two sections of flexible duct shall be a minimum of?
  - A 2 inches in length
  - B 4 inches in length
  - C 5 inches in length
  - D 3 inches in length

7. Metallic flexible duct shall be attached with?

- A Less than three #8 sheet metal screws
- B Less than four # 8 sheet metal screws
- C At least four #8 sheet metal screws
- D At least three #8 sheet metal screws

8. Flat oval duct construction shall be capable of withstanding a pressure \_\_\_\_\_ greater than that of the assigned pressure class without structural failure or permanent deformation.

- A 50 %
- B 45 %
- C 40 %
- D 60 %

9. The type of duct used for positive pressure applications only, unless special designs are used, is?

- A Round duct
- B Flat oval duct
- C Flexible duct
- D Straight duct

10. Duct joints are normally strong enough to permit maximum hanger spacing at?

- A 6 to 8 foot intervals
- B 8 to 12 foot intervals
- C 8 to 10 foot intervals
- D 6 to 10 foot intervals

11. Each layer of rectangular duct using flexible liner shall be attached with \_\_\_\_\_ coverage of adhesive at the liner contact surface area.

- A 95%
- B 90%
- C 85%
- D 80%

12. A joint running 90 degrees to the airflow is which type of joint?

- A Transverse
- B Longitudinal
- C Vertical
- D Horizontal

13. Air duct designed for a duct pressure class of 1/2 inch (w.g.) has an operating pressure up to \_\_\_\_\_ inch (w.g.).

- A Up to 1/2
- B 1/2 up to 1
- C 1 up to 2
- D 2 up to 3

14. For a Type L-1, metal duct \_\_\_\_\_ seam, the pocket depth varies from 1/4 inch to 5/8 inch, depending on the gauge of metal and the roll form equipment.

- A Grooved
- B Pittsburgh
- C Standing
- D Slide lock

15. The rectangular elbow is 40 inches. The radius centerline is?

- A 40 inches
- B 54 inches
- C 60 inches
- D 72 inches

16. When using a button punch snaplock for metal duct work, the seam may be used for \_\_\_\_\_ inch w.g. static or less.

- A 2
- B 3
- C 4
- D 6

17. The T-1 flat drive is suitable for use as reinforcement for 24 gauge metal when the duct wall static pressure is \_\_\_\_\_ inch water gage.

- A 1/2
- B 1
- C 2
- D 3

18. When installing rectangular ducts using flexible liner, metal nosings shall be used on the upstream edges of the liners at every transverse joint, if velocities exceed \_\_\_\_\_ (fpm).

- A 3,700
- B 3,800
- C 3,900
- D 4,000

19. Flexible liners for rectangular ducts must be installed with mechanical fastening devices that are as corrosion resistant as?

- A Possible, without being cost prohibitive
- B Galvanized metal
- C G60 coated galvanized steel
- D Stainless steel

20. The rectangular elbow is 54 inches. The centerline radius is?

- A 40 inches
- B 54 inches
- C 60 inches
- D 81 inches

21. For a metal duct Joint T-1, flat drive slip, use gauge not less than two gauges less than duct gauge, with \_\_\_\_\_ gauge minimum.

- A 16
- B 20
- C 22
- D 24

22. For a Type L-1, metal duct Pittsburgh seam, the most common pocket sizes are?

- A 1/4 inch to 5/8 inch
- B 1/4 inch to 3/8 inch
- C 5/16 inch to 5/8 inch
- D 5/16 inch to 3/8 inch

23. Type L-4 metal duct standing seams used on duct-interiors should be fastened together at the ends and at \_\_\_\_\_ inch intervals.

- A 5
- B 6
- C 7
- D 8

24. Each layer of flexible duct liner used in a rectangular duct must be attached with \_\_\_\_\_ percent coverage of adhesive at the liner contact surface area.

- A 87
- B 90
- C 92
- D 95

25. When installing rectangular ducts using flexible liner, ducts with interior widths of \_\_\_\_\_ require mechanical fasteners in addition to adhesive.

- A Eight inches or more
- B Eight inches or less
- C More than eight inches
- D At least eight inches

26. The 4 X 8 sheets cost \$6.50 per square foot to install. The material cost \$3.00 per square foot. There are 8 sheets of 26 gage black iron to fabricate. The material cost is?

- A Less than \$ 700
- B Between \$ 700 and \$1,000
- C Between \$1,000 and \$1,300
- D More than \$1,300

27. Zinc coated steel costs \$58 per 4 x 8 sheet. There are 14 sheets of 22 gage zinc coated steel to fabricate. The total weight of the coated steel is?

- A Less than 700 pounds
- B Between 700 and 800 pounds
- C Between 800 and 900 pounds
- D More than 900 pounds

28. A joint running 90 degrees to the airflow is which type of joint?

- A Transverse
- B Longitudinal
- C Vertical
- D Horizontal

29. Air duct designed for a duct pressure class of 1/2 inch (w.g.) has an operating pressure up to \_\_\_\_\_ inch (w.g.).

- A Up to 1/2
- B 1/2 up to 1
- C 1 up to 2
- D 2 up to 3

30. For a metal duct Joint T-1, flat drive slip, use gauge not less than two gauges less than duct gauge, with \_\_\_\_\_ gauge minimum.

- A 16
- B 20
- C 22
- D 24

31. For a Type L-1, metal duct \_\_\_\_\_ seam, the pocket depth varies from 1/4 inch to 5/8 inch, depending on the gauge of metal and the roll form equipment.

- A Grooved
- B Pittsburgh
- C Standing
- D Slide lock

32. For a Type L-1, metal duct Pittsburgh seam, the most common pocket sizes are?

- A 1/4 inch and 5/8 inch
- B 1/4 inch and 3/8 inch
- C 5/16 inch and 5/8 inch
- D 5/16 inch and 3/8 inch

33. When using a button punch snaplock for metal duct work, the seam may be used for \_\_\_\_\_ inch w.g. static or less.

- A 2
- B 3
- C 4
- D 6

34. Type L-4 metal duct standing seams used on duct-interiors should be fastened together at the ends and at \_\_\_\_\_ inch intervals.

- A 5
- B 6
- C 7
- D 8

35. The T-1 flat drive is suitable for use as reinforcement for 24 gauge metal when the duct wall static pressure is 1/2 inch water gage to a maximum width of?

- A 20
- B 18
- C 12
- D 8

36. Each layer of flexible duct liner used in a rectangular duct must be attached percent coverage of adhesive at the liner contact surface area.

- A 87
- B 90
- C 92
- D 95

37. When installing rectangular ducts using flexible liner, metal nosings shall be used on the upstream edges of the liners at every transverse joint, if velocities exceed \_\_\_\_\_ (fpm).

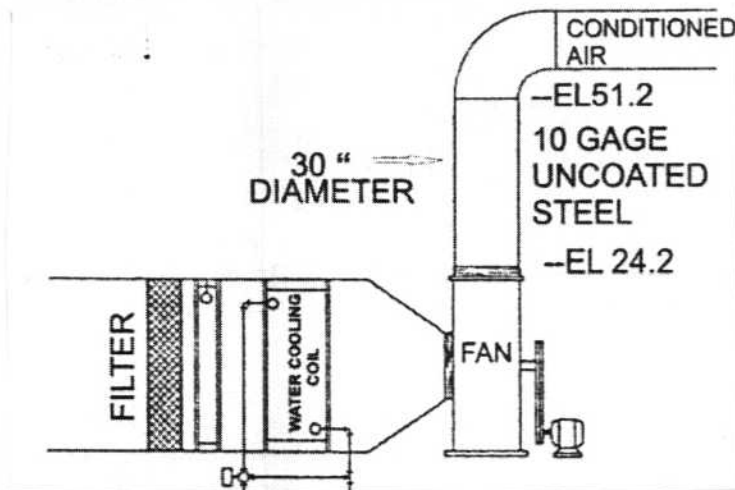
- A 3,700
- B 3,800
- C 3,900
- D 4,000

38. When installing rectangular ducts using flexible liner, ducts with interior widths of \_\_\_\_\_ require mechanical fasteners in addition to adhesive.

- A Eight inches or more
- B Eight inches or less
- C More than eight inches
- D At least eight inches

39. Flexible liners for rectangular ducts must be installed with mechanical fastening devices that are as corrosion resistant as?

- A Possible, without being cost prohibitive
- B Galvanized metal
- C G60 coated galvanized steel
- D Stainless steel



40. The pounds of steel required to construct the piping from elevation 24.2 to elevation 51.2 is?

- A Less than 1,000
- B Between 1,000 and 1,200
- C Between 1,200 and 1,400
- D More than 1,400

41. The equivalent aluminum to match galvanized steel 24 gage is?

- A .028
- B .034
- C .032
- D .023

42. The maximum duct width for aT-1 flat drive 24 gage reinforcement with 1/2 inch water gage is?

- A 10 feet
- B 18 inches
- C 20 inches
- D 14 feet

43. The discharge position is identified by all except?

- A CCWUBD
- B CCWTHD
- C CCWBGD
- D CCWBADD

44. The equivalent aluminum duct for 24 gage galvanized steel is?

- A .023
- B .027
- C .034
- D .043

45. Slips and drives must not be less than how many gages lighter than the duct wall?

- A 1
- B 2
- C 3
- D 4

46. The minimum gage for slips and drives is?

- A 20
- B 22
- C 24
- D 26

47. When installing rectangular ducts using flexible lining, which is not correct?

- A The liner surface designated to be exposed shall face the air stream
- B The duct dimensions shall be decreased as necessary to compensate for liner thickness
- C Each layer of duct shall be attached with 90% coverage of adhesive at the liner contact surface area
- D Longitudinal joints in liners shall be coated with adhesive when velocities over 3,000 fpm are anticipated

48. The minimum gage for access doors shall be?

- A 16
- B 22
- C 20
- D 24

49. The duct is 32 inches. Using a Double "S" slip joint, the minimum gage allowed is?

- A 24
- B 22
- C 20
- D 18

50. Johnny Ray is installing negative 10 inch water gage round duct. The longitudinal seam duct is 34 inches in diameter. The smallest angle Johnny Ray can use is?

- A 1" X 1" X 1/8"
- B 1 1/4" X 1 1/4" X 3/16"
- C 1 1/2" X 1 1/2" X 3/16"
- D 2" X 2" X 3/16"

51. Given an operating pressure over one-half inch up to one inch water gage, the duct pressure class is \_\_\_\_\_ inch water gage.

- A 1
- B 2
- C 3
- D 4

52. The Pittsburgh seam is a Type L- \_\_\_\_\_ longitudinal seam used on rectangular ductwork.

- A 1
- B 2
- C 3
- D 4

53. The Type L-3 longitudinal duct seam refers to all of the following except?

- A Pipelock
- B Snaplock
- C Flat lock
- D Grooved seam

54. The flat drive slip T-1 is suitable for use as reinforcement for a?

- A 26 gage duct wall 20 inches wide, with a maximum reinforcement spacing of 12 feet and a 1 inch water gage static
- B 26 gage duct wall 22 inches wide, with a maximum reinforcement spacing of 10 feet and a 1/2 inch water gage static
- C 24 gage duct wall 22 inches wide with a 1 inch water gage static pressure
- D 24 gage duct wall 20 inches wide with a 1/2 inch water gage static pressure

55. Screws can be spaced no more than \_\_\_\_\_ inches apart on duct access panels.

- A 12
- B 10
- C 8
- D 6

56. The installation of dampers, turning vane assemblies or other devices placed inside lined ducts or fittings?

- A Must not damage the liner or cause erosion of the liner
- B Must be accompanied by appropriate buildouts
- C Is strongly discouraged
- D Is prohibited as of January 1, 2006

57. Liners must be installed with mechanical fastening devices that?

- A Do not chemically interact with the adhesives
- B When installed, are as corrosion resistant as G60 coated galvanized steel
- C Are made of G60 coated galvanized steel
- D Cause as little damage as possible to the liner when applied as recommended by the manufacturer

58. Unless otherwise specified, steel sheet and strip used for duct and connectors must be \_\_\_\_\_ coated galvanized steel of lock-forming grade conforming to ASTM A653 and A924 standards.

- A G-22
- B G-24
- C G-55
- D G-60

59. The Type L-2 longitudinal duct seam may be used for \_\_\_\_\_ inch water gage static or less.

- A 6
- B 5
- C 4
- D 3

60. Fasten longitudinal standing seams on ducts at the ends and at \_\_\_\_\_ inch intervals.

- A 10
- B 8
- C 6
- D 4

61. Duct access panels must be?

- A At least equal to the duct gage
- B 26 gage
- C 24 gage
- D 22 gage

62. Each layer of duct liner must be attached with \_\_\_\_\_ percent coverage of adhesive at the liner contact surface area.

- A 87
- B 89
- C 90
- D 95

63. Ducts with interior widths of \_\_\_\_\_ inches or less do not require mechanical fasteners in addition to adhesive.

- A 6
- B 8
- C 10
- D 12

64. A 48 inch width coil or sheet stock of manufacturers standard 10 gage uncoated steel weighs \_\_\_\_\_ pounds per square foot.

- A 2.500
- B 3.125
- C 4.375
- D 5.625

65. Pittsburgh lock systems should be used on?

- A Spiral and longitudinal seams
- B Spiral ducts only
- C Flat oval ducts
- D Straight duct and fittings

66. When using a button punch snap lock screws must be added at the ends of all duct of what in. wg?

- A 2
- B 4
- C 6
- D 10

67. Four sheets of 36 inch by 120 inch 28 gage galvanized sheet metal weighs?

- A 93.72 pounds
- B 76.4 pounds
- C 105.7 pounds
- D 1.884 pounds

68. L-4 standing seams should be fastened?

- A 2 inches maximum from ends and at 6 inch maximum intervals
- B 2 inches maximum from ends and at 2 inch maximum intervals
- C 2 inches maximum from ends and at 8 inch maximum intervals
- D 4 inches maximum from ends and at 8 inch maximum intervals

69. Junior is installing a 30 inch round duct with a transverse joint. The number of screws required along the joint is?

- A 3
- B 5
- C 6
- D 7

70. The 60 X 18 inch rectangular duct is paired at 5 foot spacing. The minimum size of the strap hangers is?

- A 1 inch by 22 gage
- B 1 inch by 20 gage
- C 1 inch by 18 gage
- D 1 inch by 16 gage

71. The 12 inch round duct requires a \_\_\_\_\_ inch rod.

- A 1/4
- B 3/8
- C 1/2
- D 5/8

72. The type lock used for straight duct and fittings is the?

- A Pittsburgh lock
- B Button punch snap lock
- C L-4 Standing seam
- D Flat lock

73. The L-4 Standing Seam lock should be fastened at intervals not to exceed how many inches?

- A 2
- B 4
- C 6
- D 8

74. Rectangular ducts with flexible liners with an interior width of 6 inches?

- A Require mechanical fasteners in addition to adhesive
- B Do not Require mechanical fasteners in addition to adhesive
- C Shall be coated with adhesive when velocities are over 2,000 FPM
- D Shall have metal nosings used on the downstream edges of the liner

75. The contractor is installing a 14 inch volume damper. The contractor should use?

- A Single blades
- B Multiple blades
- C Stainless steel
- D Dual hemming

76. When using rectangular aluminum duct at 3 inch wg., to replace 22 gage galvanized steel, the minimum aluminum equivalent to use is?

- A .027
- B .034
- C .043
- D .052

77. Belt guards shall conform to the regulations of?

- A The building official
- B DBPR
- C SMACNA
- D OSHA

78. The operating pressure required for one inch wg. is?

- A Up to 1/2 inch wg.
- B Over 1/2 inch up to 1 inch wg.
- C Over 1 inch up to 2 inch wg.
- D Over 1 inch wg.

79. Reinforcement for flat sides of oval duct shall be?

- A Aluminum .043 or greater
- B Galvanized 24 gage or better
- C Of a size equal to or greater and spaced at intervals specified for flat oval duct
- D Of the same size and spacing interval as specified for rectangular duct

80. Flexible duct line installations with an interior width of 6 inches?

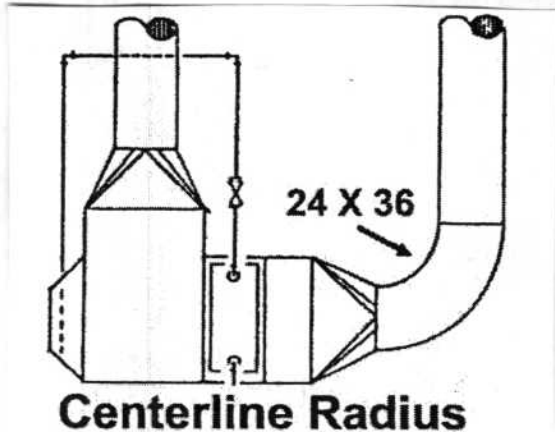
- A Require pins
- B Do not require pins
- C Require at least 95 percent adhesive coverage
- D May not be wider than 8 inches at 2,500 FPM's

81. The maximum sag between flexible duct supports is?

- A 1/2 inch
- B 1 inch
- C 2 inches
- D 2 1/2 inches

82. Class C used for transverse joints only is applicable for static pressure construction class up to \_\_\_\_\_ wg.

- A 1
- B 2
- C 3
- D 4



83. The centerline radius for the centerline radius drawing above is?

- A 24 inches
- B 36 inches
- C 48 inches
- D 60 inches

84. The Pittsburgh lock is good to \_\_\_\_\_ water gage.

- A Plus 10
- B Minus 10
- C Plus or minus 8
- D Plus or minus 10

85. Ducts with interior widths of \_\_\_\_\_ inches or less do not require mechanical fasteners in addition to adhesives.

- A 6
- B 8
- C 10
- D 12

86. A 28 inch 20 gage round spiral seam duct 100 feet long weighs \_\_\_\_\_ pounds.

- A 12.9
- B 129
- C 1,290
- D 680

87. A clockwise top angular down blast discharge is identified as?

- A CWTADD
- B CCWTAUD
- C CCWTADD
- D CWTADD

88. A Class "E" round duct angle ring has a size of?

- A 1.5 X 1.5 X .25
- B 2 X 2 X .1875
- C 2 X 2 X .25
- D 1 X 1 X 1

89. Reinforcement for flat sides of oval duct shall be provided to limit wall deflection to \_\_\_\_\_ inches.

- A 1/2
- B 3/4
- C .25
- D 3/16

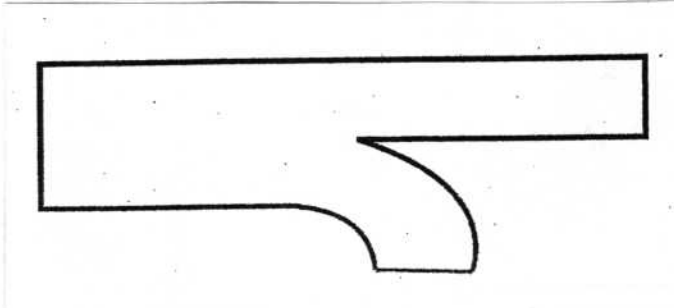
90. A 1/4 inch single hanger rod for rectangular duct should have a maximum allowable load of how many pounds?

- A 80
- B 120
- C 160
- D 270

91. The number of mitered pieces required for a mitered elbow when the velocity is less than 1,000 feet per minute is?

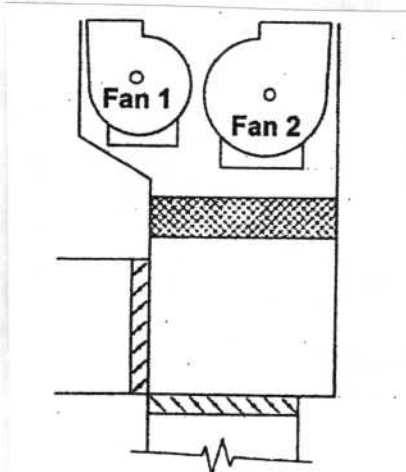
- A 1
- B 2
- C 3
- D 4

92. The drawing below is representative of a/an?



- A Volume damper
- B Wye junction
- C Smoke damper
- D Standard junction

93. Discharge fan Number 2 is a/an?



- A CWUBD
- B CCWDBD
- C CCWTADD
- D CCWUBD

## **Part 2**

1. According to *SMACNA Duct Construction Standards*, a 42" round galvanized steel duct fitting installed in a high velocity air distribution system in a multi-story building shall be fabricated with \_\_\_\_\_ gage metal. Assume 10 inch WG pressure.

- A. 16
- B. 18
- C. 20
- D. 22
- E. 24

2. According to *SMACNA Duct Construction Standards*, the recommended strap hanger for a 30 inch round duct is \_\_\_\_\_.

- A. 1" x 20 ga.
- B. 1" x 18 ga.
- C. 1" x 16 ga.
- D. 1" x 14 ga.
- E. 1-1/2" x 16 ga.

3. According to *SMACNA Duct Construction Standards*, the gage of metal for the fittings on a spiral seam flat oval duct 30" wide is \_\_\_\_\_.

- A. 16
- B. 18
- C. 20
- D. 22
- E. 24

4. According to *SMACNA Duct Construction Standards*, a duct 24" wide x 14" high constructed of 18 gage sheet metal and installed in a system supplying air at 6" W.G. positive static pressure requires reinforcement conforming to \_\_\_\_\_.

- A. Class A
- B. Class B
- C. Class C
- D. Class D
- E. Class G

5. A 24" x 36" duct operating at 4" W.G. Static pressure is to be constructed of 20 gage material. The SMACNA reinforcement class required is \_\_\_\_\_.

- A. D at 5' spacing
- B. D at 8' spacing
- C. H at 5' spacing
- D. E at 8' spacing
- E. E at 10' spacing

6. Given: An outside air tank louver has the following characteristics:

SMACNA type 1 storm louver

Distance between head and top blade = 1/2"

Distance between sill and bottom blade = 3/4"

Distance between intermediate blades = 1.25"

Openings between intermediate blades = 16

Distance between louver jambs = 60"

The free area of the louver is:

- A. Less than 10 sq. ft.
- B. Between 10.0 and 15.0 sq. ft.
- C. Between 15.1 and 20.0 sq. ft.
- D. Between 20.1 and 25.0 sq. ft.
- E. More than 25 sq. ft.

7. According to *SMACNA*, a traverse joint consisting of two angles in the reversed direction or back to back is:

- A. A formed flange
- B. A companion angle
- C. A capped flange
- D. A double flange
- E. A reversed range

8. According to *SMACNA*, the height of 20" wide rectangular galvanized sheet metal duct with an aspect ratio of 2.5 to 1 is:

- A. 6"
- B. 8"
- C. 10"
- D. 20"
- E. 24"

9. According to *SMACNA*, the number of pieces for a mitered 90 degree elbow is \_\_\_\_\_. (Assume 1,500 fpm velocity, R/D = 1)

- A. 3
- B. 4
- C. 5
- D. 6

10. Given: 30" x 30" duct, 8' - 6" long, is constructed of 16 gauge black steel. The longitudinal seam is welded. The weight of the duct is \_\_\_\_\_.

- A. 150.1 lbs.
- B. 180.6 lbs.
- C. 212.5 lbs.
- D. 240.8 lbs.
- E. 254.3 lbs.

11. According to *SMACNA*, a 30 inch round spiral seam duct installed in an air distribution system should be constructed of \_\_\_\_\_? (Assume 2" WG positive static pressure.)

- A. 20 gauge galvanized steel
- B. 22 gauge galvanized steel
- C. 24 gauge galvanized steel
- D. 26 gauge galvanized steel
- E. 18 gauge galvanized steel

12. According to *SMACNA*, round sheet metal ductwork having transverse joint connections may be constructed with a \_\_\_\_\_.

- A. Standing "S"
- B. Pocket lock
- C. Drive sup
- D. Drawband
- E. Welded bead

13. According to *SMACNA*, which of the following is a T-10 transverse joint?

- A. Drive slip
- B. Standing "S"
- C. Inside sup joint
- D. Standing seam
- E. Welded seam

14. Given: A 24" round air duct, 11' - 4" long, is constructed of 20 gauge galvanized steel and is fabricated using a longitudinal seam. The weight of the duct is?

- A. Less than 130 lbs
- B. Between 130 and 135 lbs.
- C. Between 136 and 140 lbs.
- D. More than 140 lbs.

15. What type of stiffener is required for a supply air duct 22" wide x 20" deep constructed of 22 gage sheet metal with a maximum static pressure of 1/2" W.G.?

- A. Standing "S"
- B. 1" x 1" x 118" angle
- C. 1-118" x 3-1/4" x 18 gauge channel
- D. None required

16. Given: A 30" x 28" rectangular duct, with a 2" WG positive static pressure, is reinforced by 1-1/8" x 18 gage standing S drive reinforcements 5' on center.

The minimum gage metal required for the duct is:

- A. 18
- B. 20
- C. 22
- D. 24

17. According to *SMACNA*, the minimum gauge of a double S drive slip on a 32" wide rectangular transverse joint is \_\_\_\_\_.

- A. 22 gauge
- B. 24 gauge
- C. 26 gauge
- D. 28 gauge

18. Given:     A 15" high by 18" wide duct  
              2" WC positive static pressure  
              24 gage galvanized sheet metal

According to *SMACNA Duct Construction Standards*, what is the minimum recommended transverse joint construction for the 18" side?

- A. No reinforcement is required
- B. Grade A. 24 gage reinforcement joints at 10 feet spacing
- C. Grade A. 24 gage reinforcement joints at 8 feet spacing
- D. Grade B. 22 gage reinforcement joints at 6 feet spacing
- E. Grade B. 20 gage reinforcement joints at 2.5 feet spacing

19. According to *SMACNA Duct Construction Standards*, a reinforced standing seam joint in 20 gage ductwork requires a \_\_\_\_\_ angle to qualify for class 'H' rigidity.

- A. 1 x 1 x 16 gage
- B. 1-1/2 x 1-1/2 x 16 gage
- C. 1 x 1 x 1/8
- D. 2 x 2 x 16 gage
- E. 2 x 2 x 1/8

20. According to *SMACNA Duct Construction Standards*, \_\_\_\_\_ gage galvanized steel shall be used to construct a 36" round duct fitting installed in a high velocity air distribution system.

- A. 16 gage
- B. 18 gage
- C. 20 gage
- D. 22 gage
- E. 24 gage

21. According to *SMACNA Duct Construction Standards*, a 2' WG class galvanized sheet metal duct 99' wide shall be constructed of \_\_\_\_\_ gage metal.

- A. 16 gage
- E. 18 gage
- C. 20 gage
- D. 22 gage
- E. 24 gage

22. According to *SMACNA Duct Construction Standards*, the recommended thickness of a 60" round galvanized steel duct (longitudinal seam), is \_\_\_\_\_ gage.

- A. 26 gage
- B. 24 gage
- C. 22 gage
- D. 20 gage
- E. 18 gage

23. According to *SMACNA Duct Construction Standards*, the access doors for a high pressure air handling unit casing should be limited to approximately \_\_\_\_\_ in size.

- A. 16" wide x 36" high
- B. 18" wide x 36" high
- C. 18" wide x 40" high
- D. 18" wide x 48" high
- E. 20" wide x 54" high

24. According to *SMACNA Duct Construction Standards*, a 60" wide flat oval duct of spiral lock seam construction shall be fabricated with \_\_\_\_\_ gage sheet metal.

- A. 16 gage
- B. 18 gage
- C. 20 gage
- D. 22 gage
- E. 24 gage

25. According to *SMACNA Duct Construction Standards*, the recommended thickness of a 36" round galvanized steel duct constructed of longitudinal seams with draw band joints is \_\_\_\_\_ gage.

- A. 20 gage
- B. 22 gage
- C. 24 gage
- D. 26 gage
- E. 28 gage

26. According to *SMACNA Duct Construction Standards*, the approximate weight of a 24 gage, 24" round spiral duct, 100' long, wrapped with 2" of 3 pounds/cubic foot density insulation is \_\_\_\_\_ pounds. Select the closest answer

- A. 721
- B. 918
- C. 1,146
- D. 1,201
- E. 1,320

27. According to *SMACNA Duct Construction Standards*, the maximum negative pressure of a 36" diameter round duct constructed of 16 gage galvanized steel is \_\_\_\_\_.

- A. 1/2" wg
- B. 1" wg
- C. 1-1/2" wg
- D. 2" wg
- E. 10" wg

28. According to *SMACNA Duct Construction Standards*, the maximum negative pressure to be applied to a flat oval duct is \_\_\_\_\_ water gage.

- A. -1/2"
- B. -1"
- C. -2"
- D. -3"
- E. Negative pressures are not recommended

29. According to *SMACNA Duct Construction Standards*, an air duct 24" wide x 18" deep constructed of 16 gage sheet metal has a maximum negative static pressure of 2" wg. The type stiffener required is \_\_\_\_\_?

- A. Standing drive slip
- B. Standing "S"
- C. 1" x 1" x 1/8" angle
- D. 1-1/8" x 3-1/4" x 18 gage channel
- E. None required

30. According to *SMACNA Duct Construction Standards*, the Centerline stretch out of a 30" wide x 24" high standard radius 90 degree elbow is \_\_\_\_\_? (assume the turn is in the horizontal plane)

- A. 47"
- B. 57"
- C. 60.5"
- D. 70.5"
- E. 94.23"

31. According to *SMACNA Duct Construction Standards*, the recommended strap hanger for an 18" round duct is \_\_\_\_\_ minimum.

- A. 1" x 22 gage
- B. 1" x 18 gage
- C. 2" x 22 gage
- D. 2" x 18 gage
- E. 2" x 16 gage

32. According to *SMACNA Duct Construction Standards*, the maximum negative pressure of a 24" diameter round duct constructed of 16 gage galvanized steel is \_\_\_\_\_ Wg? Assume longitudinal seam constructed.

- A. 1/2"
- B. 1"
- C. 1-1/2"
- D. 4"
- E. 10"

33. According to *SMACNA Duct Construction Standards*, the minimum thickness of an aluminum duct that is to be installed in lieu of a 20 gage galvanized sheet steel duct is \_\_\_\_\_ inch.

- A. 0.020
- B. 0.025
- C. 0.032
- D. 0.040
- E. 0.052

34. According to *SMACNA Duct Construction Standards*, slat oval ducts should be installed in which of the following applications?

- A. High pressure systems where there is not enough room for round duct.
- B. High pressure return air systems
- C. High pressure systems requiring acoustical duct liner.
- D. Medium pressure system only.
- E. Low pressure system only.

35. According to *SMACNA Duct Construction Standards*, a T-5 transverse joint is which of the following?

- A. Drive slip
- B. Standing "S"
- C. Plain "S" slip
- D. Standing seam
- E. Pocket lock

36. Given: A supply air duct 20" wide x 17" deep constructed of 18 gage sheet metal has a maximum static pressure of 2" wg.

The type stiffener required is \_\_\_\_\_.

- A. Standing "S"
- B. 1" x 1" x 1/8 angle
- C. 1-1/8" x 3-1/4" x 18 gage channel
- D. None required

37. According to *SMACNA HVAC*, when using a flat drive slip on a transverse joint, the minimum gage of the slip is \_\_\_\_\_.

- A. 24 gage
- B. 26 "
- C. 28 "
- D. 30 "
- E. 32 "

38. A 36" x 20" supply air duct operating at 4" wg static pressure is to be constructed of 20 gage material if the joint spacing is 5', the *SMACNA* reinforcement class required is \_\_\_\_\_.

- A. A
- B. B
- C. C
- D. D
- E. None of the above

39. According to *SMACNA*, the recommended maximum taper for a concentric transition, diverging is \_\_\_\_\_.

- A. 30 deg.
- B. 45 deg.
- C. 60 deg.
- D. 75 deg.
- E. 90 deg.

40. According to *SMACNA Duct Construction Standards*, a duct 2" wg static pressure 24" wide by 22" deep shall be constructed of \_\_\_\_\_ gage sheet metal when reinforced on four foot centers.

- A. 18
- B. 20
- C. 22
- D. 26
- E. 28

41. According to *SMACNA Duct Construction Standards*, a 48" wide standard radius elbow has a centerline radius of \_\_\_\_\_ inches.

- A. 48
- B. 60
- C. 72
- D. 96
- E. 120

42. According to *SMACNA Duct Construction Standards*, a \_\_\_\_\_ is a device used for isolation of mechanical equipment.

- A. Steel rod
- B. Sheet metal strap
- C. Short angle iron
- D. Laminated pad
- E. Reinforcing bar

43. According to *SMACNA Duct Construction Standards*, the maximum unsupported length of a small double turning vane is \_\_\_\_\_.

- A. 24
- B. 36
- C. 48
- D. 60
- E. 72

44. A 24 x 36 inch duct operating at 4" wg static pressure is to be constructed of 20 gage material. If the joint spacing is 5' the *SMACNA* reinforcement class required is \_\_\_\_\_.

- A. F
- B. G
- C. H
- D. I
- E. J

45. A built-up central station air handling unit shall be constructed in accordance with *SMACNA Duct Construction Standards*. The unit casing is required to be constructed of seven foot wide, 18 gage galvanized sheet metal. What size steel angles are required?

- A. 1/2" x 1/2" x 1/16"
- B. 1" x 1" x 1/8"
- C. 1-1/2" x 1-1/2" x 1/8"
- D. 1-1/2" x 1-1/2" x 3/16"
- E. 2" x 2" x 3/16"

46. According to *SMACNA Duct Construction Standards*, a 16" round duct should use minimum \_\_\_\_\_ galvanized steel strap hangers.

- A. 1" x 16 gage
- B. 1" x 18 gage
- C. 1" x 20 gage
- D. 1" x 22 gage
- E. 1" x 24 gage

47. According to *SMACNA Duct Construction Standards*, an eccentric transition shall not exceed \_\_\_\_\_ degrees on diverging flow.

- A. 10
- B. 20
- C. 30
- D. 45
- E. 65

48. According to *SMACNA Duct Construction Standards*, a 60 inch spiral duct weighs approx. \_\_\_\_\_ lbs. per linear foot.

- A. 18.31
- B. 22.27
- C. 26.23
- D. 34.19
- E. 50.10

49. According to *SMACNA Duct Construction Standards*, a typical isolation device utilizing an acoustical pad and an external leveling bolt through a machine frame would be considered a \_\_\_\_\_ device.

- A. Housed spring mount
- B. Open spring mount
- C. Double rubber hanger
- D. Spring hanger
- E. Rubber and spring hanger

50. According to *SMACNA Duct Construction Standards*, a static pressure of 2" would relate to:

- A. 2.0 lbs. per sq. ft.
- B. 4.5 lbs. per sq. ft.
- C. 6.6 lbs. per sq. ft.
- D. 8.2 lbs. per sq. ft.
- E. 10.4 lbs. per sq. ft.

51. According to *SMACNA Duct Construction Standards*, using a flat drive slip on a transverse joint the minimum gage of the slip is \_\_\_\_\_.

- A. 24 gage
- B. 26 gage
- C. 28 gage
- D. 30 gage
- E. 32 gage

52. According to *SMACNA Duct Construction Standards*, the nominal sheet thickness tolerance of a galvanized 2 gage sheet metal product is \_\_\_\_\_.

- A. 0.0306
- B. 0.0336
- C. 0.0366
- D. 0.0396
- E. 0.0456

53. According to *SMACNA Duct Construction Standards*, a rectangular duct operating at 10 inches water gage positive static pressure shall be fabricated with a minimum thickness of \_\_\_\_\_ inches galvanized sheet metal. (Assume reinforcement spacing every 5 feet).

- A. 0.0110
- B. 0.0125
- C. 0.0243
- D. 0.0250
- E. 0.0276

54. According to *SMACNA Duct Construction Standards*, a return air duct 24" x 21" conveying air at a negative pressure of 1.75" wg shall be constructed of \_\_\_\_\_ gage sheet metal when reinforced on 4' centers.

- A. 20
- B. 22
- C. 24
- D. 26
- E. 28

55. According to *SMACNA Duct Construction Standards*, when using a T-10 transverse joint connection on all four sides, fasten the slip within \_\_\_\_\_ of the corner and at 12" maximum intervals.

- A. 1 inch
- B. 2 inches
- C. 3 inches
- D. 4 inches
- E. 5 inches

56. Given: a 24" round galvanized steel duct of spiral seam construction has a negative pressure of 2" wg. According to *SMACNA*, at least \_\_\_\_\_ gage metal is required.

- A. 28
- B. 26
- C. 24
- D. 22
- E. 20

57. According to *SMACNA*, a reinforced standing seam joint in 24 gage ductwork, requires a/an \_\_\_\_\_ angle to qualify for class "H" rigidity.

- A. 1" x 1" x 16 gage
- B. 1-1/2" x 1-1/2" x 16 gage
- C. 1" x 1" x 1/8"
- D. 2" x 1" x 16 gage
- E. 2" x 2" x 1/8"

58. According to *SMACNA Duct Construction Standards*, a 40" round galvanized steel duct fitting with a maximum dimension of 40", installed in a multistory building high velocity air distribution system, shall be fabricated with \_\_\_\_\_ gage metal. Assume 10 inch wg pressure.

- A. 16
- B. 18
- C. 20
- D. 22
- E. 24

59. According to *SMACNA*, a 60" wide, 20 gauge, flat oval duct, when used for return air systems:

- A. Is recommended for system pressures positive
- B. Can be used for either positive or negative pressures.
- C. Is recommended for use in negative pressures
- D. Is not recommended for use in negative pressure systems
- E. Can be used if job is not to be inspected

60. According to *SMACNA*, the recommended strap hanger for a 10" round duct is \_\_\_\_\_.

- A. 1" x 20 gauge
- B. 1" x 22 gauge
- C. 1" x 24 gauge
- D. 1" x 26 gauge
- E. 2" x 24 gauge

61. According to *SMACNA*, the minimum length of a rt-3 type traverse joint in a round duct is \_\_\_\_\_?

- A. 1 inch
- B. 2 inches
- C. 3 inches
- D. 4 inches
- E. 5 inches

62. According to *SMACNA*, a short pattern bellmouth fitting on a 12" diameter duct has a flange diameter of:

- A. 12"
- B. 16"
- C. 20"
- D. 24"
- E. 26"

63. Given: A sheet metal duct system will require 48 inch long trapeze support angles for tile duct hangers. The load on each trapeze support will be 290 lbs. Galvanized steel angle costs \$1.12 per lb.

What is the least total cost of each trapeze support angle required? (Do not allow for waste)

- A. Less than \$5.20
- B. Between \$5.20 and \$5.40
- C. Between \$5.41 and 5.60
- D. Between \$5.61 and 5.80
- E. More than s5.80

64. According to *SMACNA*, the metal gage and the number of hinges required for a 12 x 12 duct access door at 3" wg. static pressure is:

- A. 20 ga. 2 hinges
- B. 22 ga. 3 hinges
- C. 20 ga. 3 hinges
- D. 22 ga. 2 hinges
- E. 24 ga. 2 hinges

65. According to *SMACNA HVAC Duct Construction Standards*, the maximum negative pressure of 48" diameter round duct constructed of 20 gage galvanized steel, spiral seam is \_\_\_\_\_ .

- A. 1/2" wg
- B. 1" wg
- C. 1-1/2" wg
- D. 2" wg

66. According to *SMACNA HVAC*, a turning vane in a 36" wide by 16" deep rectangular duct shall be constructed of \_\_\_\_\_ metal. Assume the vanes are of a single type spaced on centers of 1-1/2 inches.

- A. 24 gage
- B. 22 gage
- C. 20 gage
- D. 18 gage
- E. 16 gage

67. Given: A 60" x 30" rectangular duct with a 10" wg positive static pressure is reinforced by 2" x 1/4" companion angles at 3' on center.

The minimum gage sheet metal required is \_\_\_\_\_.

- A. 24
- B. 22
- C. 20
- D. 18
- E. 16

## ANSWER KEY

### Part 1

1	C	HVAC Duct Construction Standards Metal/Flexible	5.18
2	D	HVAC Duct Construction Standards, Metal and Flexible	7.14
		$24 + 1.5 + 1.5 = 27$	
		$16 + 1.5 + 1.5 = 19$	
3	C	HVAC Duct Construction Standards, Metal and Flexible	2.124
4	C	HVAC Duct Construction Standards/Metal and Flexible	7.14
5	A	HVAC Duct Construction Standards/Metal and Flexible	3.33
6	B	HVAC Duct Construction Standards/Metal and Flexible	3.33
7	D	HVAC Duct Construction Standards/Metal and Flexible	3.33
8	A	HVAC Duct Construction Standards/Metal and Flexible	3.27
9	B	HVAC Duct Construction Standards/Metal and Flexible	3.27
10	C	HVAC Duct Construction Standards/Metal and Flexible	5.2
11	B	HVAC Duct Construction Standards/Metal and Flexible	7.14
12	A	HVAC Duct Construction Standards, Metal/Flexible	2.112
13	A	HVAC Duct Construction Standards, Metal/Flexible	1.18
14	B	HVAC Duct Construction Standards, Metal/Flexible	2.10
15	C	HVAC Duct Construction Standards, Metal/Flexible	4.3
		$3 \times 40 + 2 = 60$	
16	C	HVAC Duct Construction Standards, Metal/Flexible	2.10
17	A	HVAC Duct Construction Standards, Metal/Flexible	2.110
18	D	HVAC Duct Construction Standards, Metal/Flexible	7.14
19	C	HVAC Duct Construction Standards, Metal/Flexible	7.14
20	D	HVAC Duct Construction Metal/Flexible	2.3
		$3 \times 54 + 2 = 81$	
		TRY	
		$54 + 50\% \text{ Yields } 81$	
21	D	HVAC Duct Construction Standards, Metal/Flexible	2.6
22	A	HVAC Duct Construction Standards, Metal/Flexible	2.10
23	D	HVAC Duct Construction Standards, Metal/Flexible	2.10
24	B	HVAC Duct Construction Standards, Metal/Flexible	7.14

25	C	HVAC Duct Construction Standards, Metal/Flexible	7.14
26	B	HVAC Duct Construction Metal/Flexible $8 \times 32 \times 3.00 = \$768$	A2
27	A	HVAC Duct Construction Metal/Flexible $14 \times 32 \times 1.406 = 629.8$	A1
28	A	HVAC Duct Construction Metal/Flexible	1.73
29	A	HVAC Duct Construction Standards, Metal/Flexible	1.18
30	D	HVAC Duct Construction Standards, Metal/Flexible	2.6
31	B	HVAC Duct Construction Standards, Metal/Flexible	2.10
32	D	HVAC Duct Construction Standards, Metal/Flexible	2.10
33	C	HVAC Duct Construction Standards, Metal/Flexible	2.10
34	D	HVAC Duct Construction Standards, Metal/Flexible	2.10
35	A	HVAC Duct Construction Standards, Metal/Flexible	2.110
36	B	HVAC Duct Construction Standards, Metal/Flexible	7.14
37	D	HVAC Duct Construction Standards, Metal/Flexible	7.14
38	C	HVAC Duct Construction Standards, Metal/Flexible	7.14
39	C	HVAC Duct Construction Standards, Metal/Flexible	7.14
10	B	HVAC Duct Construction Standards Metal/Flexible $30 \div 12 = 2.5'$ $3.14 \times D \times L \times WPF = \text{Pounds}$ $3.14 \times 2.5 \times (51.2 - 24.2) \times 5.625 = 1,192.2$	A.2
41	B	HVAC Duct Construction Standards Metal/Flexible	1.59
42	C	HVAC Duct Construction Standards Metal/Flexible	2.110
43	C	HVAC Duct Construction Standards Metal/Flexible	A.18
44	C	HVAC Duct Construction Standards Metal/Flexible	2.124
45	B	HVAC Duct Construction Standards Metal/Flexible	2.108
46	C	HVAC Duct Construction Standards Metal/Flexible	2.108
47	B	HVAC Duct Construction Standards Metal/Flexible	7.14
48	B	HVAC Duct Construction Standards Metal/Flexible	9.22
49	B	HVAC Duct Construction Standards Metal/Flexible	2.7
50	A	HVAC Duct Construction Standards Metal/Flexible	3.6
51	A	HVAC Duct Construction Standards/Metal/Flexible	1.18
52	A	HVAC Duct Construction Standards/Metal/Flexible	2.10

53	B	HVAC Duct Construction Standards/Metal/Flexible	2.10
54	D	HVAC Duct Construction Standards/Metal/Flexible	2.110
55	C	HVAC Duct Construction Standards/Metal/Flexible	7.2
56	A	HVAC Duct Construction Standards/Metal/Flexible	7.14
57	B	HVAC Duct Construction Standards/Metal/Flexible	7.14
58	D	HVAC Duct Construction Standards/Metal/Flexible	1.2
59	C	HVAC Duct Construction Standards/Metal/Flexible	2.10
60	B	HVAC Duct Construction Standards/Metal/Flexible	2.10
61	A	HVAC Duct Construction Standards/Metal/Flexible	7.2
62	C	HVAC Duct Construction Standards/Metal/Flexible	7.14
63	B	HVAC Duct Construction Standards/Metal/Flexible	7.14
64	D	HVAC Duct Construction Standards/Metal/Flexible	A.2
65	D	HVAC Duct Construction Standards, Metal and Flexible	2.10
66	B	HVAC Duct Construction Standards, Metal and Flexible	2.10
67	A	HVAC Duct Construction Standards, Metal and Flexible	A.1
		$36 \div 12 = 3$ and $120 \div 12 = 10$	
		# Sheets X L X W X WPF = Pounds	
		$4 \times 10 \times 3 \times .781 = 93.72$	
68	C	HVAC Duct Construction Standards, Metal and Flexible	2.10
69	D	HVAC Duct Construction Standards, Metal and Flexible	3.3
70	B	HVAC Duct Construction Standards, Metal/Flexible	5.7
71	A	HVAC Duct Construction Standards, Metal/Flexible	5.9
72	A	HVAC Duct Construction Standards, Metal/Flexible	2.10
73	D	HVAC Duct Construction Standards, Metal/Flexible	2.10
74	B	HVAC Duct Construction Standards, Metal/Flexible	7.14
75	B	HVAC Duct Construction Standards, Metal/Flexible	7.6
76	C	HVAC Duct Construction Standards, Metal/Flexible	2.124
77	D	HVAC Duct Construction Standards, Metal/Flexible	A.19
78	B	HVAC Duct Construction Standards, Metal/Flexible	1.18
79	D	HVAC Duct Construction Standards, Metal/Flexible	3.27
80	B	HVAC Duct Construction Standards, Metal/Flexible	7.13
81	D	HVAC Duct Construction Standards, Metal/Flexible	3.37
82	B	HVAC Duct Construction Standards, Metal/Flexible	1.11

83	B	HVAC Duct Construction Standards, Metal/Flexible	4.3
84	D	HVAC Duct Construction Standards, Metal/Flexible	2.10
85	B	HVAC Duct Construction Standards, Metal/Flexible	1.6, S 2.6
86	C	HVAC Duct Construction Standards, Metal/Flexible	A.9
87	D	HVAC Duct Construction Standards, Metal/Flexible	A.18
88	B	HVAC Duct Construction Standards, Metal/Flexible	3.6
89	B	HVAC Duct Construction Standards, Metal/Flexible	3.27
90	D	HVAC Duct Construction Standards, Metal/Flexible	5.7
91	C	HVAC Duct Construction Standards, Metal/Flexible	3.1
92	B	HVAC Duct Construction Standards, Metal/Flexible	1.21
93	D	HVAC Duct Construction Standards, Metal/Flexible	A.18

## **Part 2**

No answers