Answer Key

Properties of Natural Gas – Principles of Combustion

1. Carbon Dioxide, Water Vapor & Heat
2. 1 part natural gas to 10 parts air

Gas Piping Systems

3. 1”
4. An approved shut-off valve shall be installed upstream of the MP regulator & within 6 feet of the appliance and in the same room.
5. with Striker Plates or being 3inches from a penetrating edge
6. 80,000 BTUH ÷ 890 BTU/cu. ft. = 89.88 CFH
7. 150,000 BTUH ÷ 803 BTU/cu. ft. = 186.79 CFH = 1-1/4”
8. 1,170 CFH
9. 3/4"
10. 1/2"
11. 1"
12. 1"

Appliance Installation Codes

13. 18 inches above the floor
14. 50 cubic feet of volume for every 1,000 BTUH of input

Combustion Air

15. 75% free area
16. When a vertical combustion air duct doesn’t terminate in an attic
17. 130,000 Total BTUH ÷ 3000 BTUH/sq. in. = 43.33 sq. in. 6X7=42 7X7=49
18. 175,000 BTUH ÷ 3,000 = 58.33 sq. in. 7X7=49 8X8=64
19. 128 sq. in. ÷ .75 (75% free area) = 170.66 sq. in. 12X14=168 14X14=196
20. 80,000 BTUH furnace using inside air requires 100 sq. in. of free area for each grill.
    100 sq. in. ÷ .75 (75% free area) = 133.33 sq. in. 10X12=120 12X12=144
21. 80,000 BTUH ÷ 1,000 X 50 cu. ft. = 4,000 cu. ft.
22. 148,000 BTUH ÷ 3,000 = 49.33 sq. in. 5X10=50
23. 148,000 BTUH ÷ 2,000 = 74 sq. in.
24. Only the water heater requires combustion air. 38,000 BTUH ÷ 4,000 = 9.5 sq. in.
    3" round = 7.06 sq. in. 4" round = 12.56 sq. in.
25. 38,000 BTUH ÷ 3,000 = 12.66 sq. in. 3X5=15

Deration

26. The deration multiplier for Kamas is .74
27. 75,000 BTUH X .83 Deration Multiplier ÷ 890 ÷ 3 orifices = 23.31 CFH = #44 Orifice
28. 80,000 BTUH X .83 Deration Multiplier = 66,400 BTUH
29. 108,000 X .84 Deration Multiplier ÷ 923 BTU/cu. ft. ÷ 4 orifices = 24.57 CFH = #43 Orifice

Venting

30. 8 Feet IFGC 503.6.4 & 503.8(1)
31. 4 feet horizontally, 4 feet below, 1 foot above. IFGC 503.8(2)
32. When it is common vented with a draft hood equipped appliance IFGC 504.3.20 (2)
33. 6” <10,000 BTUH> 9” <50,000 BTUH> 12” (< = **LESS THAN**) (> = **MORE THAN**)
34. 6 feet (1-1/2 feet for each inch of connector diameter) IFGC 504.3.2

Venting - continued

35. 4” Draft Hood=12.56 sq. in. X (7 times Rule) = 87.92 sq. in.=10” round IFGC 504.2.8 & 504.3.17
36. 5” single wall vent connector to a 5” B Vent Stack (7’ Lateral rounds up to 10’)

37. 5” single wall vent connector to a 5” B Vent Stack with a (18’ Height rounds down to 15’)
38. 4” single wall water heater vent connector (17’ Height rounds down to 15’)
39. 5” B Vent Furnace vent connector
    (Must use Table 3 because 5” Fan Min on 15’ Height w/ 2’ Rise on Table 4 is more than 108)
40. Common Vent is 5” B Vent (17’ Height rounds down to 15’)
41. 3” single wall vent connector to a 3” B Vent Stack (7’ Lateral rounds up to 10’)

Retrofitting – Gas Piping Systems

42. 253,000 BTUH ÷ 923 BTU/cu. ft. = 274.10 CFH = 1-1/4” Trunk Line
43. 200,000 BTUH ÷ 825 BTU/cu. ft. = 242.42 CFH = 1” Branch Line
44. 348,000 BTUH ÷ 825 BTU/cu. ft. = 421.18 CFH = 1-1/4” Trunk Line

Retrofitting – Combustion Air

45. 240,000 Total BTUH ÷ 2000 BTUH/sq. in. = 120 sq. in.
46. 40,000 BTUH ÷ 3000 BTUH/sq. in. = 13.33 sq. in.
47. 150,000 Total BTUH ÷ 3000 BTUH/sq. in. = 50 sq. in.
    7” Round = 38.48 sq. in. 8” Round = 50.27 sq. in.

Retrofitting – Venting

48. 7” Vertical Vent. A 3” Draft Hood = 7.06 sq. in. X (7 times Rule) = 49.42 sq. in.
    6” = 28.27 sq. in. 7” = 38.48 sq. in. 8” = 50.27 sq. in. (see IFGC 504.2.8 & 504.3.17)
49. No. 7” Common Vent
    40,000 + 108,000 + 150,000 BTUH = 298,000 BTUH
    Table 4 Common Vent Section @ 15’ Height FAN+NAT 6”= 221 7”=343
50. Largest is 7” due to the 7 times Rule (see IFGC 504.2.8 & 504.3.17)
    Smallest is 4” due to capacity requirements –
    Table 2 @ 15’ Height w/ a 15’ Lateral (12’ rounds up to 15’) 3” = NR 4” = 72
    Table 1 @ 15’ Height w/ a 15’ Lateral (12’ rounds up to 15’) 3” = 37 4” = 76
    The actual test questions won’t yield different answers if different Tables are used.
    This was just provided to illustrate the differences between the two Tables.