Instructions Back to home page

1. Print these pages.
2. Print the Cross Connection manual at (large files and could take time to download) http://www.epa.gov/safewater/pdfs/crossconnection/crossconnection.pdf or at http://garyklinka.com/Manuals/crossconnection_24_manual.pdf
3. Simply follow the manual from beginning to end to answer the questions.
4. Go to the bottom of this page for course verification forms and mailing instructions.

Course qualifies for the following Credentials: 6 hours of credit Fees: $60

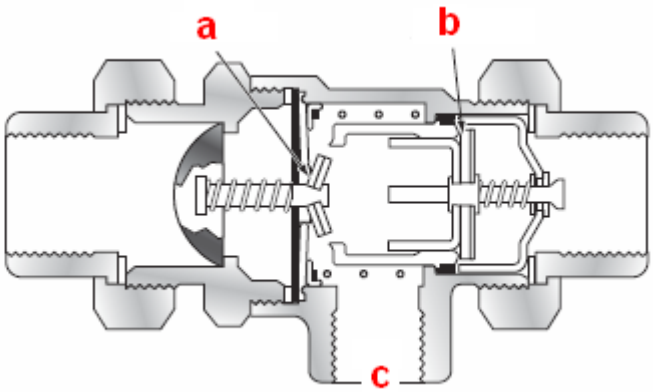
1. Commercial Plumbing Inspector
2. Journeyman Plumber License
3. Journeyman Plumber-Restricted Appliance License
4. Master Plumber License
5. Master Plumber-Restricted Appliance License
6. UDC-Plumbing Inspector Certification

----------Cross Connection 24 part 3 ----------

153. The double check with intermediate atmospheric vent is capable of protects against backpressure.
a. true b. false

154. Backpressure keeps the vent of the double check with intermediate atmospheric vent closed, but zero supply pressure or backsiphonage will open the inner chamber to atmosphere.
a. true b. false

FIGURE 22.
Double check valve with atmospheric vent.



Use the above diagram for questions 155-157

155. The letter ‘a’ represents _____

156. The letter ‘b’ represents _____

157. The letter ‘c’ represents _____

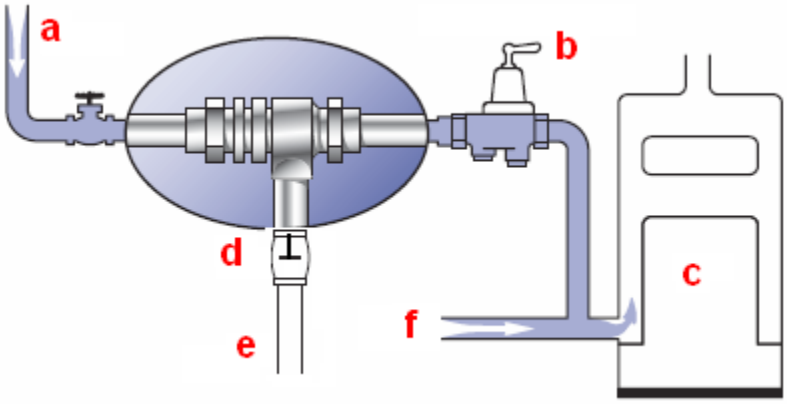


FIGURE 23.
Typical residential use of double check with atmospheric vent.

Use the above diagram for questions 158-163

158. The letter ‘a’ represents _____

159. The letter ‘b’ represents _____

160. The letter ‘c’ represents _____

161. The letter ‘d’ represents _____

162. The letter ‘e’ represents _____

163. The letter ‘f’ represents _____

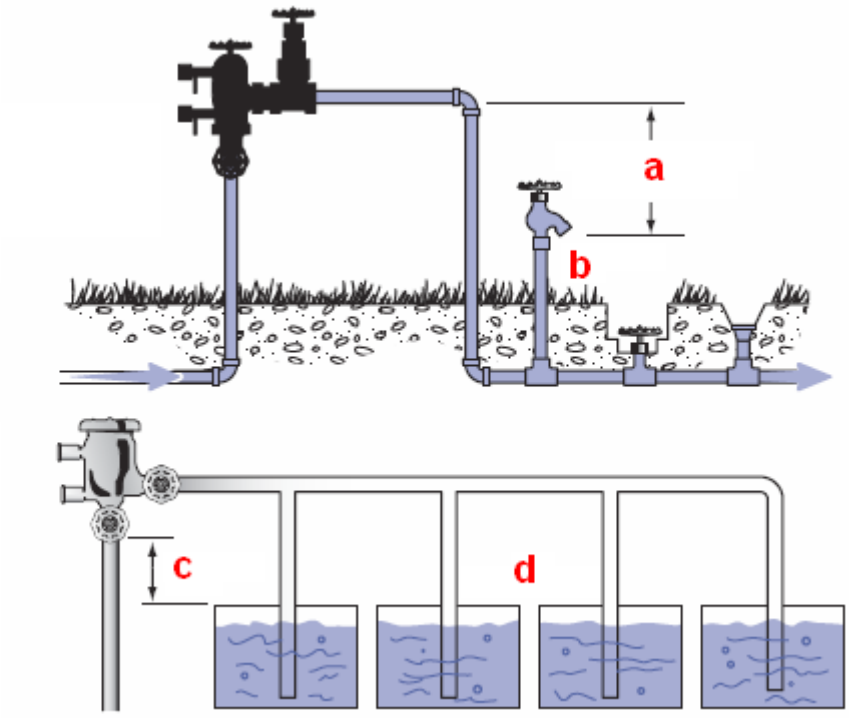


FIGURE 21.
Typical agricultural and industrial application of pressure vacuum breaker.

Use the above diagram for questions 164-167

164. The letter ‘a’ represents _____

165. The letter ‘b’ represents _____

166. The letter ‘c’ represents _____

167. The letter ‘d’ represents _____

168. A double check valve is essentially two single check valves coupled within one body and furnished with test cocks and two tightly closing gate valves.

a. true b. false

169. Each check valve on a double check valve assembly is spring loaded open and requires approximately a pound of pressure to close.

a. true b. false

170. Double checks are commonly used to protect against medium to high hazard installations.

a. true b. false

171. A double check detector check consists of two, spring loaded check valves, a bypass assembly with water meter and double check valve, and two tightly closing gate valves.

a. true b. false

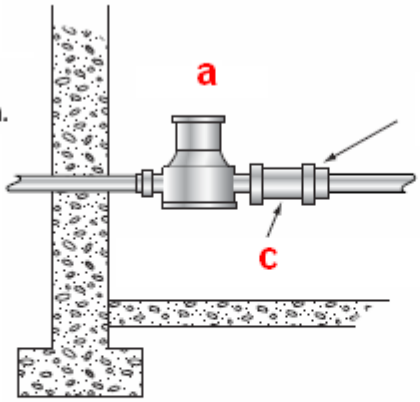
172. A Residential Dual Check is need to furnish reliable and inexpensive backsiphonage and backpressure protection for individual residences resulted in the debut of the residential dual check.

a. true b. false

173. A Residential Dual Check is sized for ½ “, ¾”, and 1-inch service lines and is installed immediately downstream of the water meter.

a. true b. false

FIGURE 27.
Residential installation.



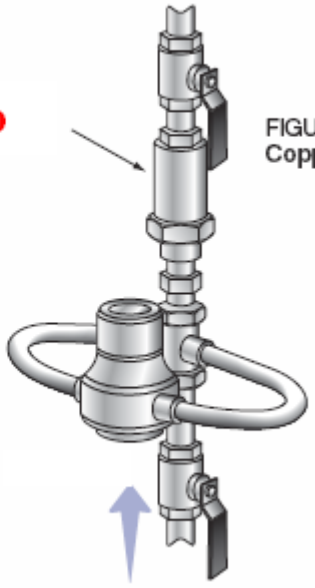


FIGURE 28.
Copper horn.

Use the above diagram for questions 174-176

174. The letter 'a' represents _____

175. The letter 'b' represents _____

176. The letter 'c' represents _____

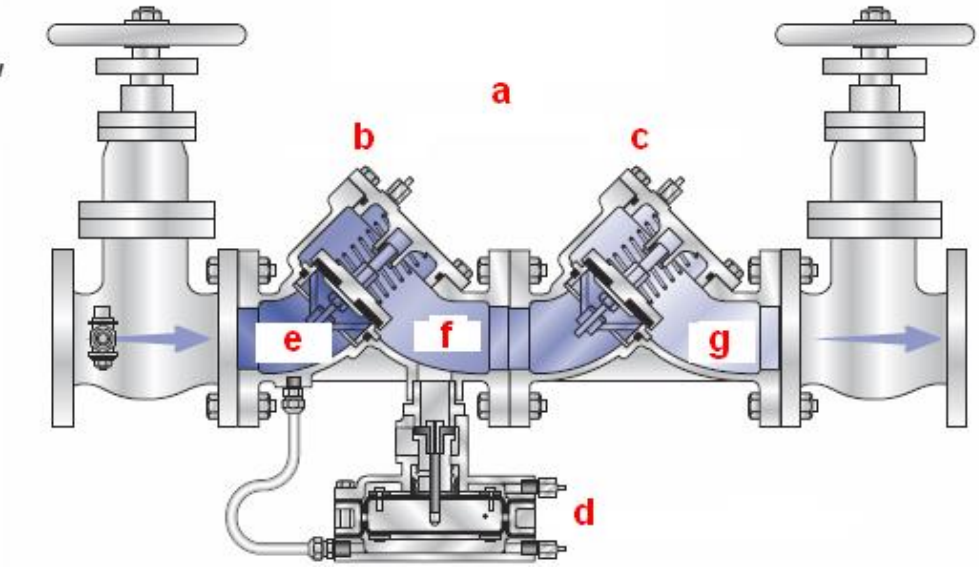
---

177. Reduced Pressure Principle Backflow Preventer provides the Maximum protection against backsiphonage and backpressure conditions utilizing reduced pressure principle backflow preventers.
a. true b. false

178. Reduced Pressure Principle Backflow Preventer are designed such that this "zone" between the two checks is always kept at least ten pounds less than the supply pressure.
a. true b. false

179. Reduced Pressure Principle Backflow Preventer are furnished with test cocks and gate valves to enable testing and are available in sizes ¾-inch through 10 inch.
a. true b. false

FIGURE 29B.
Reduced pressure zone backflow preventer (2½-inches thru 10-inches).



Use the above diagram for questions 180-186

180. The letter ‘a’ represents _____

181. The letter ‘b’ represents _____

182. The letter ‘c’ represents _____

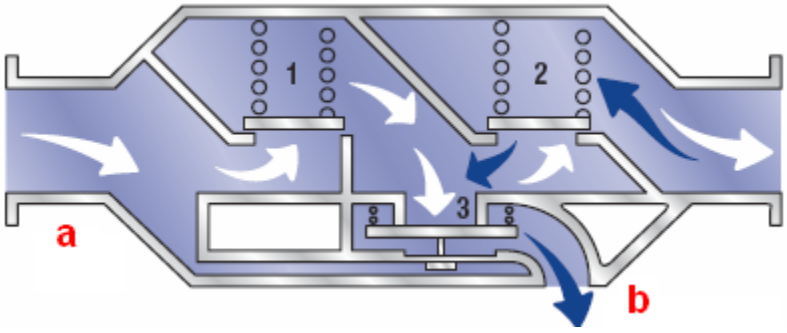
183. The letter ‘d’ represents _____

184. The letter ‘e’ represents _____

185. The letter ‘f’ represents _____

186. The letter ‘g’ represents _____

FIGURE 30.
Reduced pressure zone backflow preventer — principle of operation.

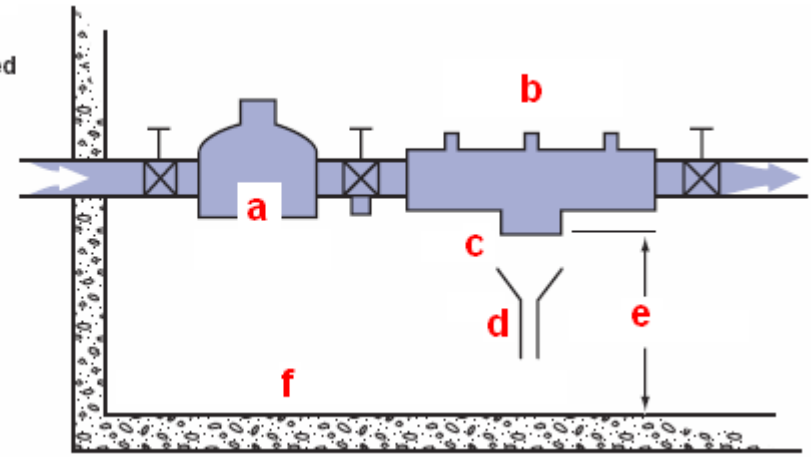


Use the above diagram for questions 187-188

187. The letter ‘a’ represents _____

188. The letter ‘b’ represents _____

FIGURE 34.
Typical installation reduced pressure principle device horizontal illustration.



Use the above diagram for questions 189-194

189. The letter ‘a’ represents _____

190. The letter ‘b’ represents _____

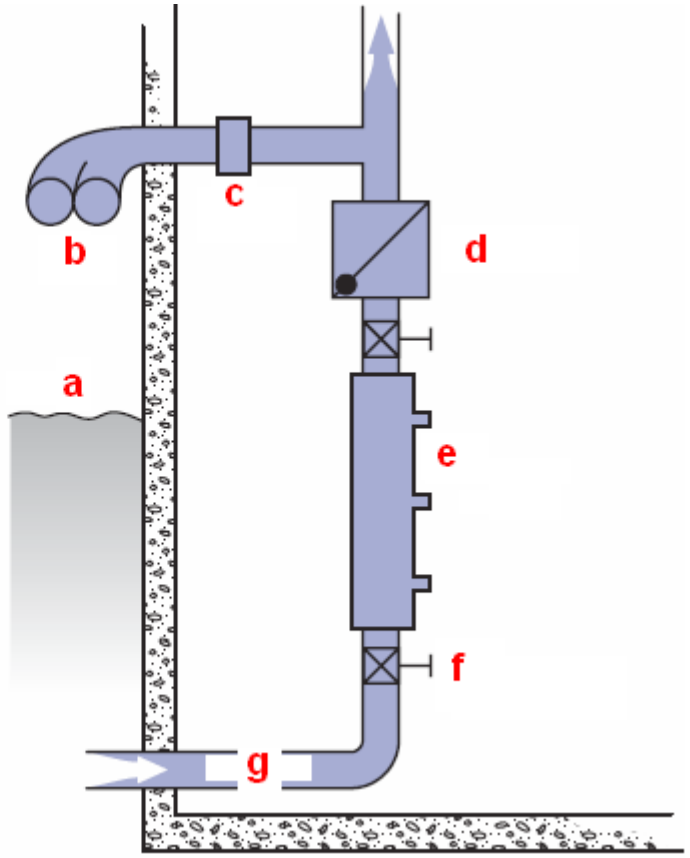
191. The letter ‘c’ represents _____

192. The letter ‘d’ represents _____

193. The letter ‘e’ represents _____

194. The letter ‘f’ represents _____

Typical fire line installation double check valve vertical installation.



Use the above diagram for questions 195-201

195. The letter ‘a’ represents _____

196. The letter ‘b’ represents _____

197. The letter ‘c’ represents _____

198. The letter ‘d’ represents _____

199. The letter ‘e’ represents _____

200. The letter ‘f’ represents _____

201. The letter ‘g’ represents _____

202. Field testing of a pressure vacuum breaker involves testing both the internal spring loaded soft seated check valve as well as testing the spring loaded air inlet valve.

a. true b. false

203. Testing the pressure vacuum breaker must be performed with the device non-pressurized and the air inlet open.

a. true b. false

204. When testing the pressure vacuum breaker the number 2 shut-off valve must also be closed and the air inlet valve canopy removed.

a. true b. false

When testing a Reduced Pressure Principle Backflow Preventer device the tested is for three optional characteristics. List the 3 optional characteristics.

205. _____

206. _____

207. _____

208. When testing double check valve assembles there are two test methods, one requiring closing of the number 1 shut-off valve, and one without this requirement.

a. true b. false

IV. Definitions-Fill in the correct definition.

209. A foreign substance, that if permitted to get into the public water system, will degrade its quality so as to constitute a moderate hazard, or impair the usefulness or quality of the water to a degree which does not create an actual hazard to the public health but which does adversely and unreasonably effect such water for domestic use. _____

210. Any individual, partnership, company, public or private corporation, political subdivision or agency of the State Department, agency or instrumentality or the United States or any other legal entity. _____ _____

211. A method of backflow prevention in which a backflow preventer is located to correct a cross connection at an in-plant location rather than at a water service entrance. _____

212. Any actual or potential connection between the public water supply and a source of contamination or pollution. _____

213. A method of backflow prevention which requires a backflow prevention preventer at the water service entrance. _____

214. That point in the owners water system beyond the sanitary control of the District; generally considered to be the outlet end of the water meter and always before any unprotected branch. _____ _____

215. A document issued by the Department which allows the use of a backflow preventer. _____ _____

216. Any person who has legal title to, or license to operate or habitat in, a property upon which a cross-connection inspection is to be made or upon which a cross-connection is present. _____

217. A substance that will impair the quality of the water to a degree that it creates a serious health hazard to the public leading to poisoning or the spread of disease. _____

218. Accepted by the Director of Municipal Services as meeting an applicable specification stated or cited in this regulation, or as suitable for the proposed use. _____

219. A physical separation sufficient to prevent backflow between the free-flowing discharge end of the potable water system and any other system. Physically defined as a distance equal to twice the diameter of the supply side pipe diameter but never less than one (1) inch. _____

220. Any water supply, on or available, to the premises other than the purveyor's approved public potable water supply. _____

221. A device which prevents backsiphonage by creating an atmospheric vent when there is either a negative pressure or subatmospheric pressure in a water system. _____

222. The flow of water or other liquids, mixtures or substances, under positive or reduced pressure in the distribution pipes of a potable water supply from any source other than its intended source. _____

223. A device or means designed to prevent backflow or backsiphonage. Most commonly categorized as air gap, reduced pressure principle device, double check valve assembly, pressure vacuum breaker, atmospheric vacuum breaker, hose bibb vacuum breaker, residential dual check, double check with intermediate atmospheric vent, and barometric loop. _____

224. A condition in which the owners system pressure is greater than the suppliers system pressure. _____

225. An assembly of two (2) independently operating spring loaded check valves with tightly closing shut off valves on each side of the check valves, plus properly located test cocks for the testing of each check valve. _____

226. The flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply system from any source other than its intended source caused by the sudden reduction of pressure in the potable water supply system. _____

227. A fabricated piping arrangement rising at least thirty five (35) feet at its topmost point above the highest fixture it supplies. It is utilized in water supply systems to protect against backsiphonage. _____

228. An assembly of two (2) spring loaded, independently operating check valves without tightly closing shut-off valves and test cocks. Generally employed immediately downstream of the water meter to act as a containment device. _____

229. A device having two (2) spring loaded check valves separated by an atmospheric vent chamber. _____

230. An assembly consisting of two (2) independently operating approved check valves with an automatically operating differential relief valve located between the two (2) check valves, tightly closing shut-off valves on each side of the check valves plus properly located test cocks for the testing of the check valves and the relief valve. _____

231. A device which is permanently attached to a hose bibb and which acts as an atmospheric vacuum breaker. _____

232. A device containing one or two independently operated spring loaded check valves and an independently operated spring loaded air inlet valve located on the discharge side of the check or checks. Device includes tightly closing shut-off valves on each side of the check valves and properly located test cocks for the testing of the check valve(s). _____

B. Owner

233. The Owner shall be responsible for the elimination or protection of all cross-connections on his premises.
a. true b. false

234. The Owner, after having been informed by a letter from the Department, shall at his expense, install, maintain, and test, or have tested, any and all backflow preventers on his premises.
a. true b. false

235. The Owner shall correct any malfunction of the backflow preventer which is revealed by periodic testing.
a. true b. false

236. The Owner shall inform the Department of any proposed or modified cross-connections and also any existing crossconnections of which the Owner is aware but has not been found by the Department.
a. true b. false

237. The Owner shall install a bypass around any backflow preventer unless there is a backflow preventer of the same type on the bypass. Owners who cannot shut down operation for testing of
the device(s) must supply additional devices necessary to allow testing to take place. (Ref. Fig. 33 page 23.)
a. true b. false

238. The Owner shall not install backflow preventers in a manner approved by the Department. (Ref. Figures 3 through 37, pages 23 through 24.)
a. true b. false

239. The Owner may install only backflow preventers approved by the Department or the Commission.
a. true b. false

240. Any Owner having a private well or other private water source, may have a permit if the well or source is cross-connected to the Department's system. Permission to cross-connect may be denied by the Department. The Owner shall be required to install a backflow preventer at the service entrance if a private water source is maintained, even if it is not cross-connected to the Department's system.
a. true b. false

241. In the event the Owner installs plumbing to provide potable water for domestic purposes which is on the Department's side of the backflow preventer, such plumbing may have its own backflow preventer installed.
a. true b. false

242. The Owner shall be responsible for the payment of all fees for permits, annual or semi-annual device testing, retesting in the case that the device fails to operate correctly, and second reinspections for non-compliance with Department or Commission requirements.
a. true b. false

X. Periodic Testing

243. Reduced pressure principle backflow devices shall be tested and inspected at least annually.
a. true b. false

244. Periodic testing shall be performed by the Department's certified tester or his delegated representative. This testing will be done at the tester's expense.

a. true b. false

245. The testing shall be conducted during the Department's regular business hours. Exceptions to this, when at the request of the owner, shall may require additional charges to cover the increased costs to the owner.

a. true b. false

246. Any backflow preventer which fails during a periodic test will be repaired or replaced. When repairs are necessary, upon completion of the repair the device will be re-tested at Department's expense to insure correct operation.

a. true b. false

247. Backflow prevention devices will be tested less frequently than specified in A. above, in cases where there is a history of test failures and the Department feels that due to the degree of hazard involved, additional testing is warranted. Cost of the additional tests will be born by the Department.

a. true b. false

A. Records

248. The Department will initiate and maintain the following:

a. Master files on customer cross-connection tests and/or inspections.
b. Master files on cross-connection permits.
c. Copies of permits and permit applications.
d. Copies of lists and summaries supplied to the Commission
e. all of the above
f. none of the above

B. Reports

249. The Department will submit the following to the Commission.

a. Initial listing of low hazard cross-connections to the State.
b. Initial listing of high hazard cross-connections to the State.
c. Annual update lists of items 1 and 2 above.
d. Annual summary of cross-connection inspections to the State.
e. all of the above
f. none of the above

Illustrations of Air Gaps

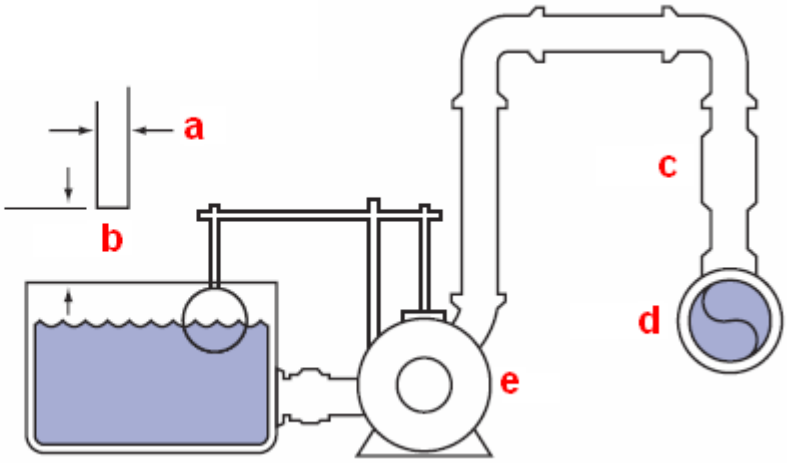


FIGURE 54.
Air gap to sewer subject to backpressure—force main.

Use the above diagram for questions 250-254

250. The letter ‘a’ represents _____

251. The letter ‘b’ represents _____

252. The letter ‘c’ represents _____

253. The letter ‘d’ represents _____

254. The letter ‘e’ represents _____

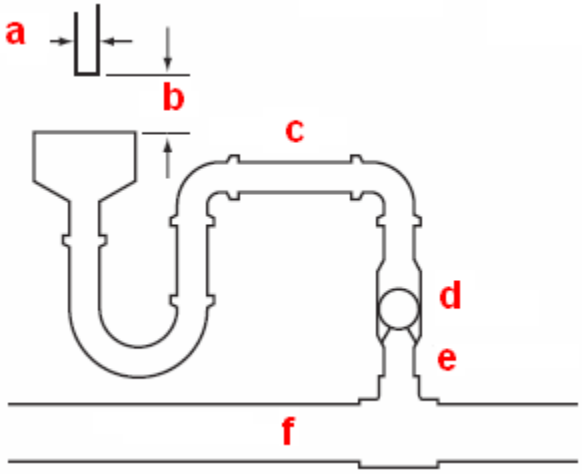


FIGURE 55.
Air gap to sewer subject to backpressure—gravity drain.

Use the above diagram for questions 255-259

255. The letter ‘a’ represents _____

256. The letter ‘b’ represents _____

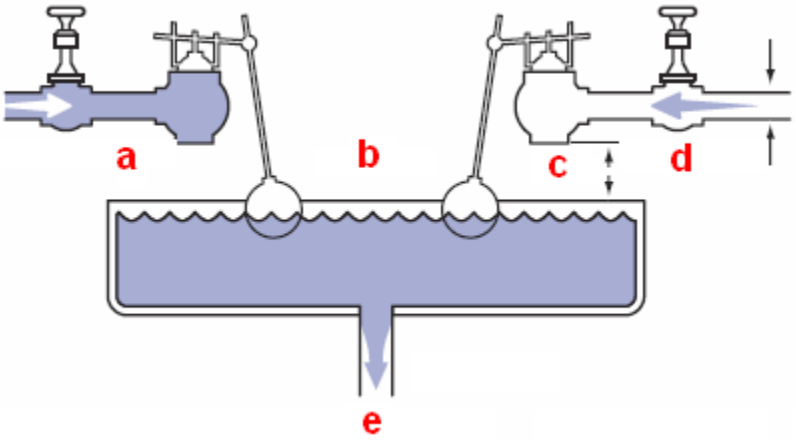
257. The letter ‘c’ represents _____

258. The letter ‘d’ represents _____

259. The letter ‘e’ represents _____

260. The letter ‘f’ represents _____

FIGURE 56.
Fire system makeup tank for a dual water system.



Use the above diagram for questions 261-265

261. The letter ‘a’ represents _____

262. The letter ‘b’ represents _____

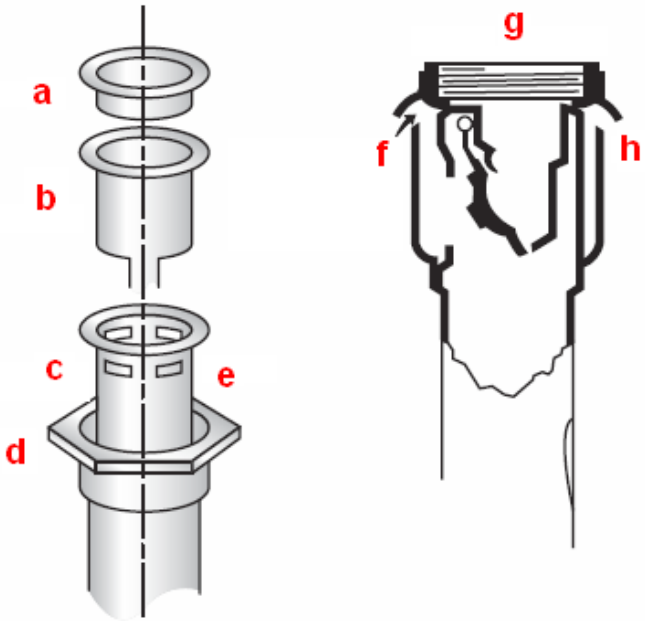
263. The letter ‘c’ represents _____

264. The letter ‘d’ represents _____

265. The letter ‘e’ represents _____

Illustrations of Vacuum Breakers

FIGURE 57.
Vacuum breakers.



Use the above diagram for questions 266-273

266. The letter ‘a’ represents _____

267. The letter ‘b’ represents _____

268. The letter ‘c’ represents _____

269. The letter ‘d’ represents _____

270. The letter ‘e’ represents _____

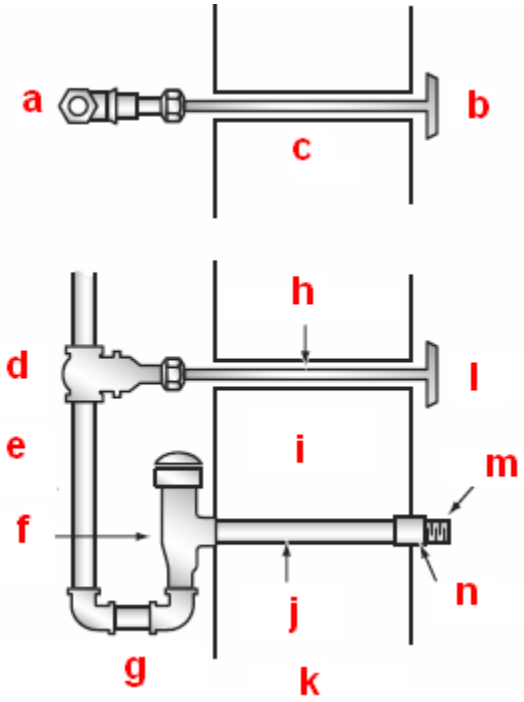
271. The letter ‘f’ represents _____

_____

272. The letter ‘g’ represents _____

273. The letter ‘h’ represents _____

FIGURE 58.
Vacuum breaker arrangement for an outside hose hydrant.



Use the above diagram for questions 273-286

273. The letter ‘a’ represents _____

274. The letter ‘b’ represents _____

275. The letter ‘c’ represents _____

276. The letter ‘d’ represents _____

277. The letter ‘e’ represents _____

278. The letter ‘f’ represents _____

279. The letter ‘g’ represents _____

280. The letter ‘h’ represents _____

281. The letter ‘i’ represents _____

282. The letter ‘j’ represents _____

283. The letter ‘k’ represents _____

284. The letter ‘l’ represents _____

285. The letter ‘m’ represents _____.

286. The letter ‘n’ represents _____

Glossary-Use the Glossary from appendix F to fill in the blank

287. Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects. Its bacteriological and chemical quality shall conform to the requirements of the USEPA National Primary Drinking Water Regulations and the regulations of the public health authority having jurisdiction.

_____

288. The practice, materials, and fixtures used in the installation, maintenance, extension, and alteration of all piping, fixtures, appliances and appurtenances in connection with any of the following: sanitary drainage or storm drainage facilities, the venting system and the public or private water-supply systems, within or adjacent to any building, structure, or conveyance; also the practice and materials used in the installation, maintenance, extension, or alteration of storm water, liquid waste, or sewerage, and water supply systems of any premises to their connection with any point of public disposal or other acceptable terminal.

_____

289. A device that permits air into a water supply distribution line to prevent backsiphonage. _____

_____

290. A drain pipe used to convey liquid wastes that does not connect directly with the drainage system, but which discharges into the drainage system through an air break into a vented trap or a properly vented and trapped fixture, receptacle, or interceptor. _____

291. The edge of the receptacle from which water overflows. _____

_____

292. The minimum cross-sectional area at the point of water supply discharge, measured or expressed in terms of (1) diameter of a circle, or (2) if the opening is not circular, the diameter of a circle or equivalent crosssectional area. _____

293. A device which discharges a predetermined quantity of water to fixtures for flushing purposes and is actuated by direct water pressure. _____

294. A discharge opening through which water is supplied to a fixture, into the atmosphere (except into an open tank which is part of the water supply system), to a boiler or heating system, to any devices or equipment requiring water to operate but which are not part of the plumbing system. _____

295. Any absolute pressure less than that exerted by the atmosphere. _____

296. The water service pipe, the water-distributing pipes, and the necessary connecting pipes, fittings, control valves, and all appurtenances in or adjacent to the building or premises. The water supply system is part of the plumbing system. _____

297. Any actual or potential connection between the public water supply and a source of contamination or pollution. _____

298. Any arrangement whereby backflow can occur. _____

299. Resulting from negative pressures in the distributing pipes of a potable water supply. _____

300. A water surface that is at atmospheric pressure. _____

301. A hopper with no water in the bowl and with the trap and water supply control valve located below frost line. _____

302. The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood level rim of the receptacle. _____

303. The flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source. _____

304. A device or means to prevent backflow. Backflow Preventer, Reduced Pressure Principle Type
An assembly of differential valves and check valves including an automatically opened spillage port to the atmosphere. _____

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Credential Number_____Phone#_____

Course Title and Name Crossconnection 24 part 3

List the name of each credential held by attendee_____

_____Credited Hours 6 hours

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To be completed by GaryKlinka.com

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Attendee passed the course with a greater than 70% score on Date_____

Instructor Signature_____