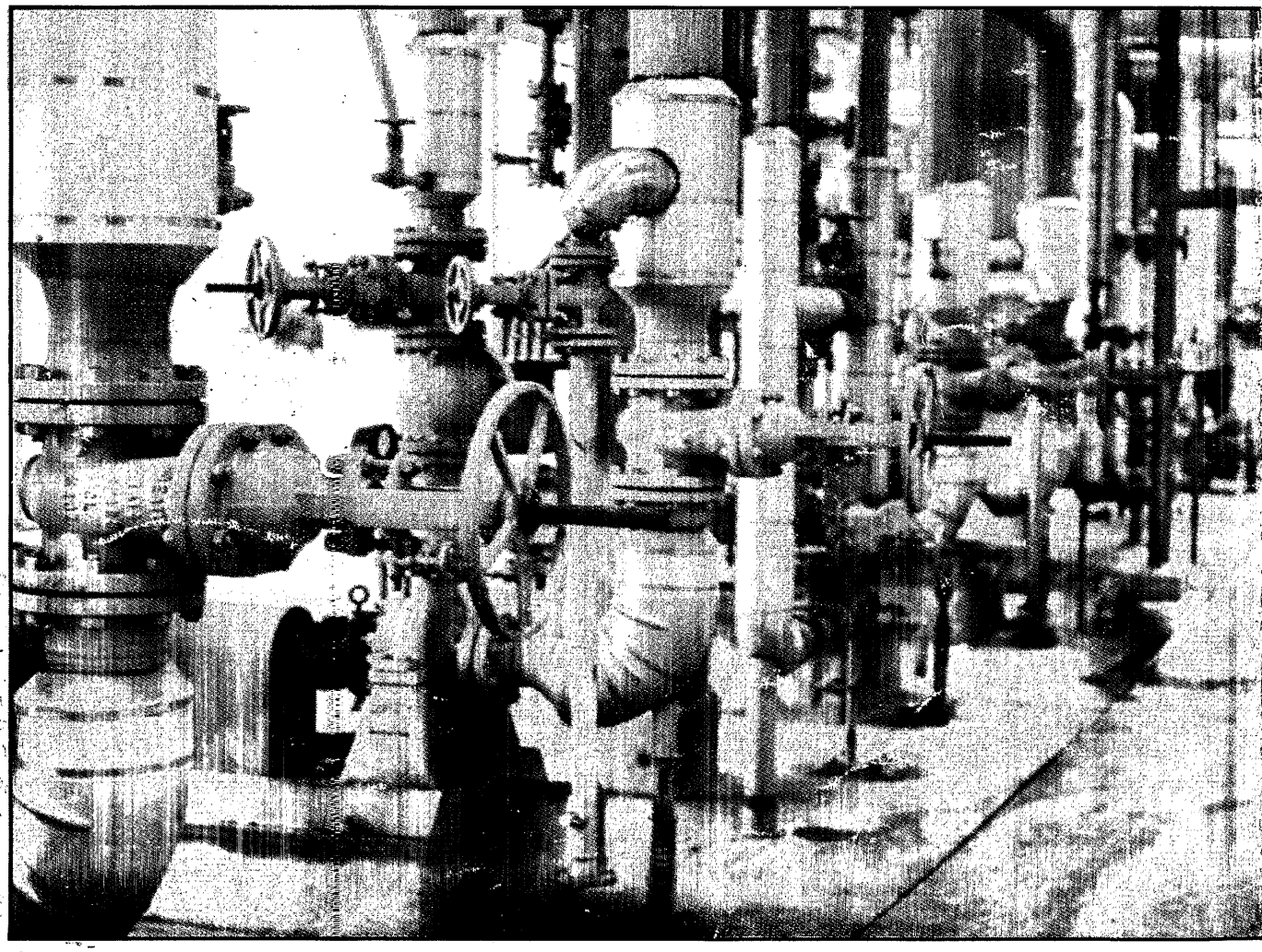
1140WB

24

Valves



HOWELL TRAINING

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This text has been validated by the Committee on Training Division of Refining, American Petroleum Institute, 1971

Special Acknowledgment

For the general encouragement and support given the PROFIT programed learning series by the API Executive Committee on Training and Development: J. P. Malott, Continental Oil Co., Chairman; H. D. Aggers, Thums Long Beach Co., Chairman, Committee on Vocational Training; Howard Swaim, Continental Oil Co., Chairman, API Sub-committee on Programed Learning, and members of the subcommittee.

PILOT PROFIT

Ninth Printing
March 1986

VALVES

VALVES

Construction · Operation
Troubleshooting · Service

In the petroleum industry, valves are used to control the flow of liquids and gases.

In the *Valves* program, the trainee will learn about the construction and operation of the most widely used valves such as gate, globe, plug, and check valves.

He will also learn what valves should be used with various types of service and how to troubleshoot difficulties that may develop due to fouling, leakage, or wear.

INSTRUCTIONS

This is a programed learning course.

Programed learning gives information in a series of steps called *frames*. Each frame gives some information and asks you to make use of it.

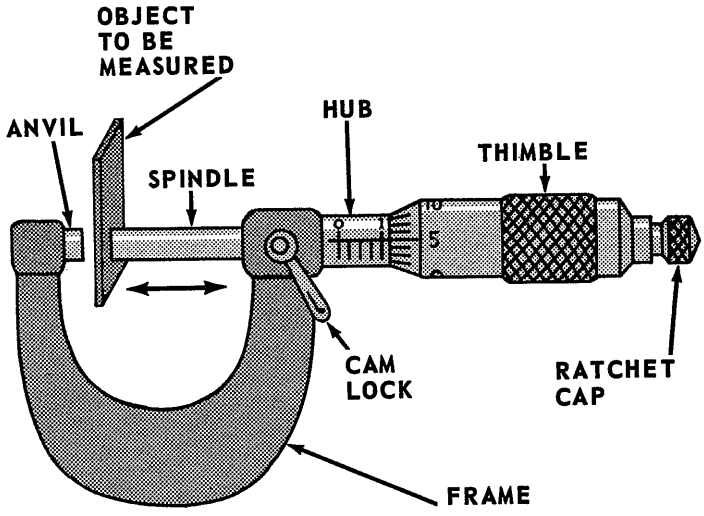
Here is how it works. First, cover the response column at the right with a mask.

Read this frame and use the information it gives to fill in the blank.

> A micrometer is an instrument designed to measure in thousandths of an inch.
>
> A micrometer is a good tool for measuring very _____ differences in size. — small

Move the mask down to uncover the word at the right of the frame. If you have filled the blank with that word or a word that means the same, you are ready to go ahead to the next frame.

The drawing of a micrometer provides information that will help you fill in the next blanks.



> Seven major parts are shown in the drawing, but only the _____ and the _____ contact the object to be measured. — anvil; spindle

The next frame calls for a choice. Circle or underline the appropriate word.

Of the two parts that contact the object, only the (anvil/ spindle) moves. spindle

A program is a series of frames that work like the ones you have just done:

Read the frame.

Use the information to fill in the blanks or make a choice.

Move the mask down and check the response column.

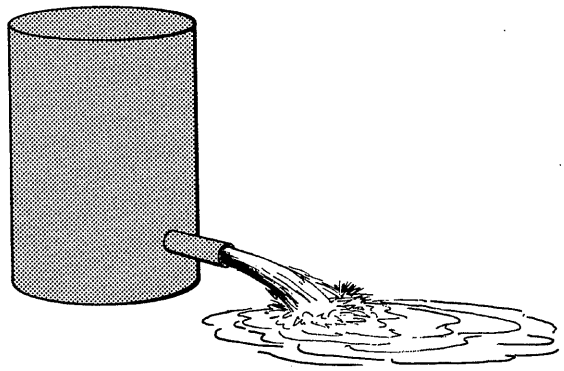
Go on to the next frame.

Remember to cover the response column with a mask before you begin each page.

Notice that the left-hand pages from here on are printed upside down. The program is designed so that you will go through all the right-hand pages first, and then turn the book upside down and go through the other pages.

VALVES

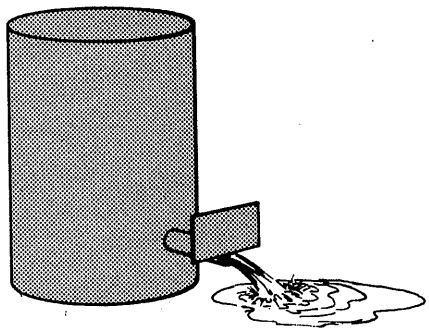
1. Liquids or gases flow from areas of higher pressure to areas of lower pressure.
   A pipe is connected to a tank of water.



   The water flows out of the pipe opening because the pressure in the tank is (greater/less) than the pressure outside. — greater

2. There (is/is not) a pressure difference. — is

3. For a liquid or gas to flow, a pressure _____ must exist. — difference, or drop



4. Suppose the opening of the pipe is partially closed with a piece of sheet metal.
   The amount of flow (changes/stays the same). — changes

5. The amount of flow is (less/more). — less

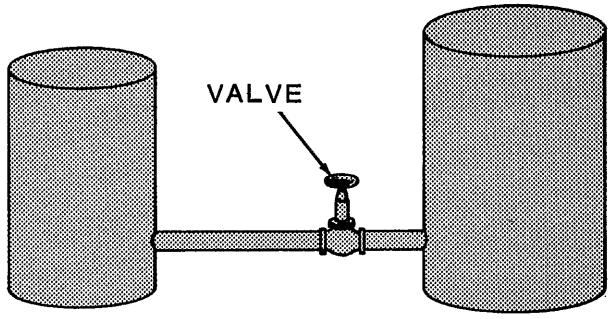
6. If the opening of the pipe is completely closed, the flow _____. — stops

7. Changing the size of the opening of the pipe (changes/does not change) the amount of flow. — changes

8. Flow through a pipe is stopped by closing the pipe's _____. opening, or end

9. By changing the size of opening of a pipe, the (rate/direction) of flow is controlled. rate

10. In industrial piping, control of flow is of high importance.



Mechanical devices that are used in industrial piping for flow control are called _____. valves

11. Basically, a valve stops flow through a pipe by closing the _____ of the pipe. opening

12. A valve that is partially open allows (partial/maximum) flow to exist. partial

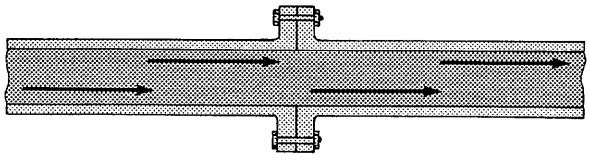
13. When a valve allows some flow, but not maximum flow, it is said to be in the *throttling* position.
To throttle with a valve is to regulate the (rate/direction) of flow. rate

14. A valve that is in the completely open position allows (some/maximum) flow. maximum

15. Any valve can be in one of three positions: throttling, fully opened, or _____ _____. fully closed

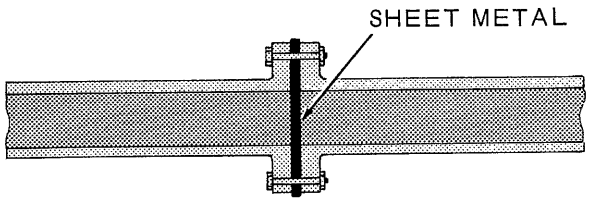
GATE VALVES

16. Two pipes are tightly joined together.



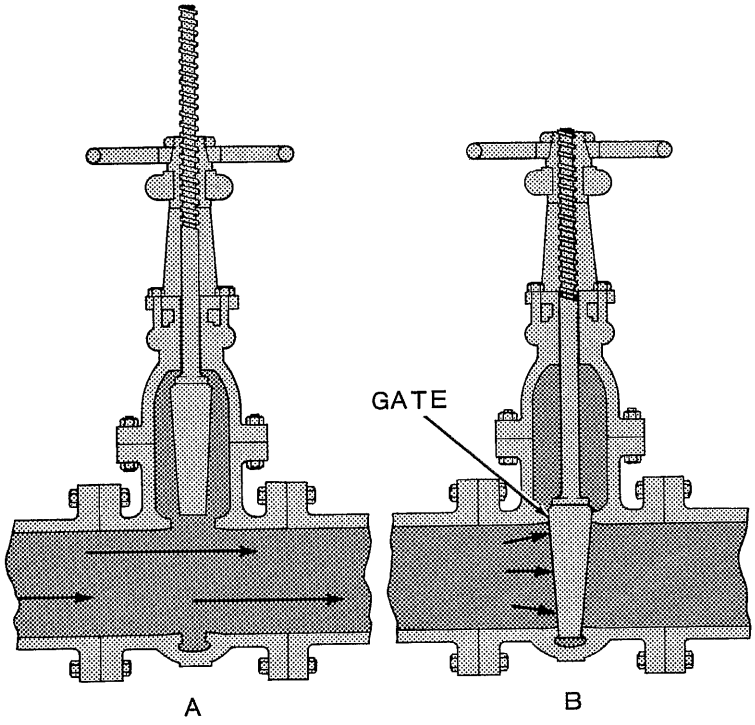
Flow (can/cannot) exist through them. can

17. A piece of sheet metal is inserted between the joints.



The flow is _____. stopped

18. This shows two gate valves installed between two pipes.



Liquid is flowing through (valve A/valve B). valve A

19. A gate valve stops flow by placing a metal _____ across the opening. gate

20. When the valve is completely open, the gate is raised (partially/completely) out of the line of flow. completely

21. In the open position, the gate causes (practically no/much) resistance to flow. practically no

22. When flow encounters resistance or changes direction, turbulence and pressure _____ occur. drop

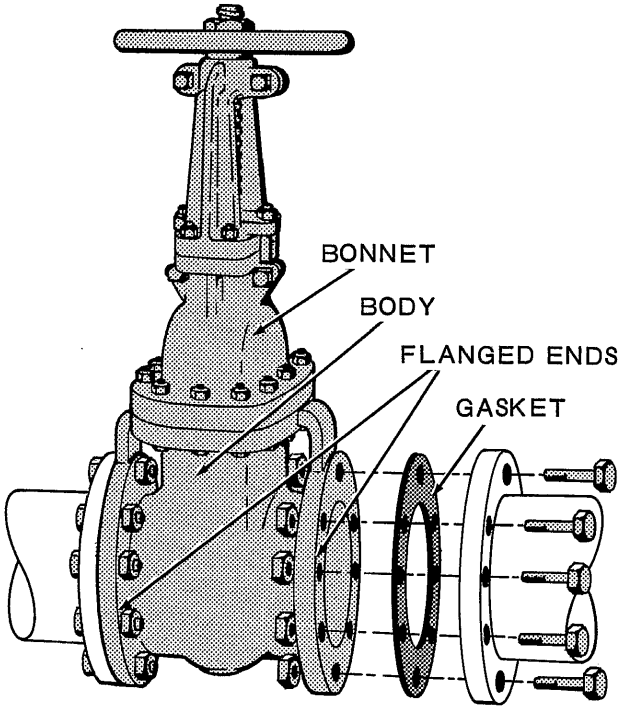
23. In an open gate valve, there is little _____ or _____ drop. turbulence; pressure

24. The enclosure of a gate valve is such that it (permits/ does not permit) the gate to be completely raised out of the line of flow. permits

25. Flow exists due to pressure.
When a gate valve stops the flow, the gate (resists/ does not resist) the pressure. resists

26. The gate has to be strong enough to withstand the _____ of the flow. pressure, or force

27. The pipes are always attached to the body of the valve.



This valve has a body with _____ ends with bolt holes in them. flanged

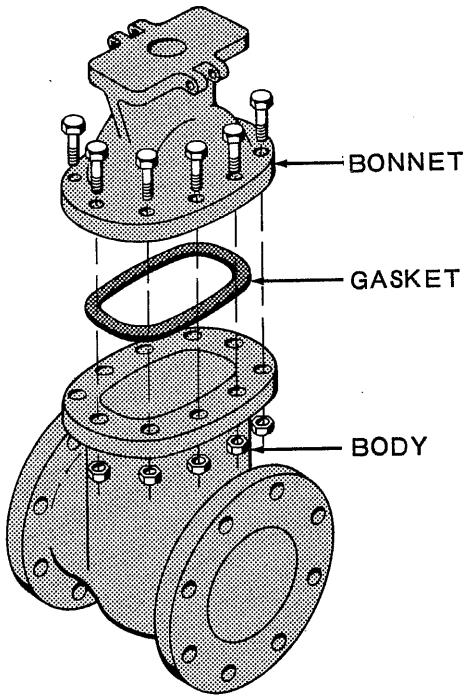
28. The end of the pipe is also _____. flanged

29. The pipe and valve are held together with _____. bolts

30. To have a tight, leak-proof connection, a _____ is inserted between pipe and valve. gasket

31. The part of the valve that is mounted on top of the body to form a tight enclosure is called the _____. bonnet

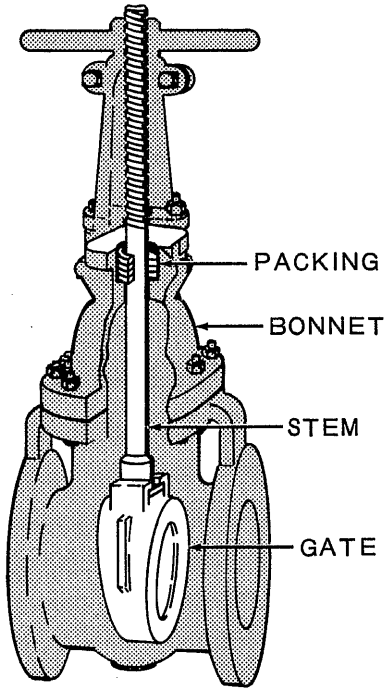
32. In this valve, the bonnet and body are also bolted together.



Between the bonnet and body, a bonnet _____ is inserted for tight closure. gasket

Stem Designs

33. Look at this valve.



The gate of this valve is attached to a stem. The stem goes through a stuffing box located in the _____. bonnet

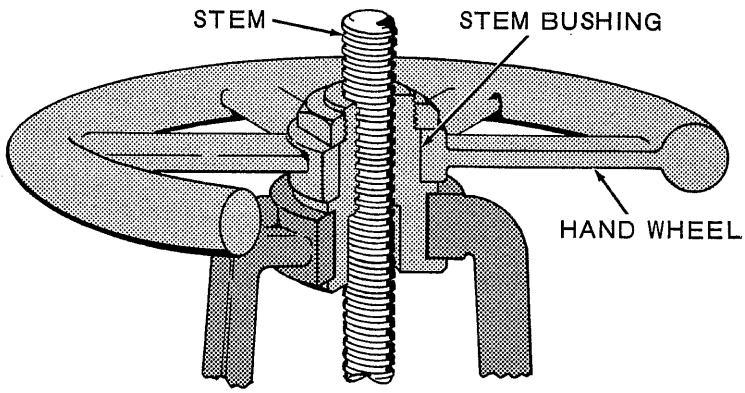
34. The stuffing box is filled with a material called _____. packing

35. The function of the packing is to (hold the stem/stop leakage). stop leakage

36. If the stuffing box is not packed properly, the valve may _____. leak

37. The stem of this gate valve is threaded at the (handwheel/gate) end. handwheel

38. The threaded end of the stem screws through the stem bushing.

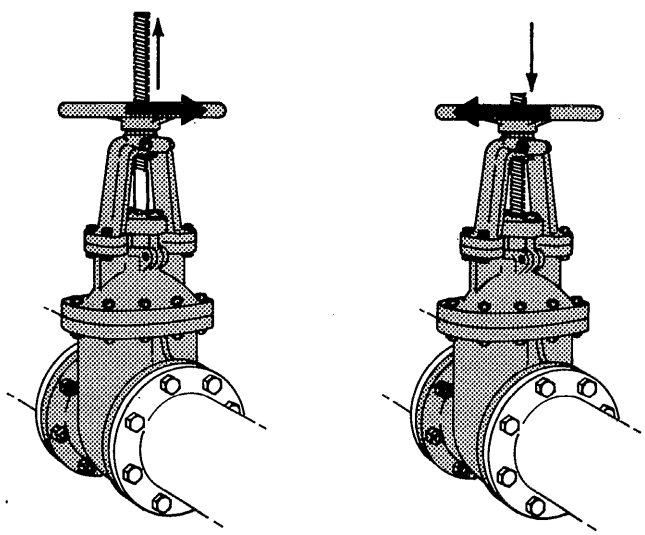


The threads of the stem (are/are not) engaged by the threads of the bushing. are

39. The handwheel and the stem bushing are solidly connected. As the handwheel is turned, the stem bushing _____. turns, or moves

40. The bottom of the stem is solidly connected to the _____. gate

41. Neither the gate nor the stem can turn.



As the handwheel is turned, the threaded bushing engages the threads of the _____. stem

42. This makes the stem go _____. up, or down

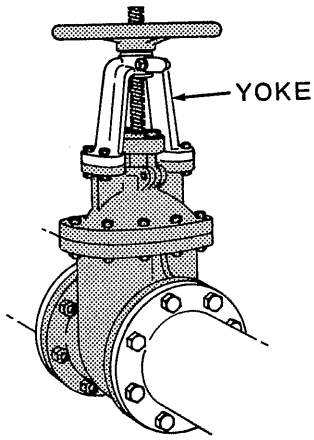
43. If the stem rises, the gate also _____. rises

44. If the handwheel is turned in the opposite direction, the stem and gate are pushed (down/up). down

45. In this type of gate valve, the stem (rises/does not rise). rises

46. As the stem rises, it rises (outside/inside) of the valve. outside

47. This type of valve also has an outside yoke to support the handwheel and bushing.

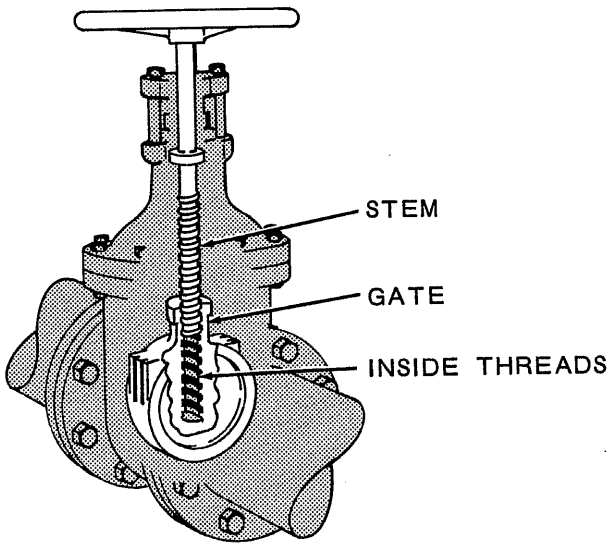


The abbreviation for this type of gate valve is OS & Y, which stands for _____ _____ and yoke. outside stem

48. In an OS & Y gate valve, the stem (can/cannot) be seen when the valve is open. can

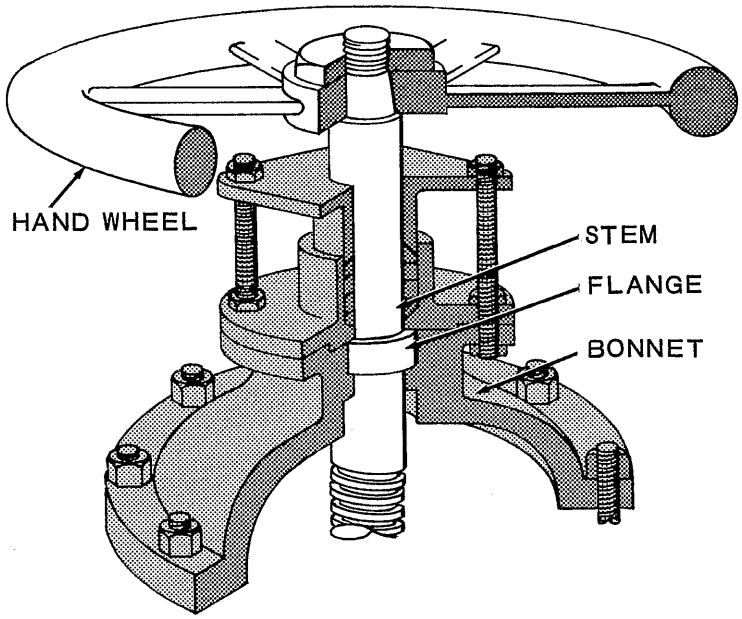
49. By looking at an OS & Y valve, an operator can tell if the valve is _____ or closed. open

50. The valve stem may also be threaded on the bottom.



With such a stem, a gate is used that is _____ on the inside. threaded

51. The handwheel of such a valve is solidly attached to the stem.



The part of the stem that passes through the bonnet has a _____ on it. flange

52. Due to the flange on the stem, the stem (can/cannot) move up or down. cannot

53. As the handwheel is turned, the stem _____. turns

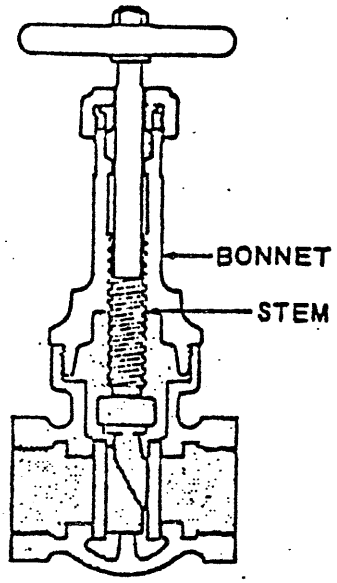
54. As the stem turns, it engages the threads on the inside of the gate.
As the stem screws into the gate, it (pulls up/pushes down) the gate. pulls up

55. If the handwheel is turned in the opposite direction, the stem unscrews and the gate is pushed _____. down

56. In such a valve design, the stem (rises/does not rise). does not rise

57. The abbreviation for such a valve is NRS.
NRS stands for non-_____ _____. rising stem

58. This drawing shows a valve with a bonnet threaded on the inside.



The threads of the bonnet (engage/do not engage) the threads of the stem. — engage

59. The handwheel and the stem are also solidly connected. As the handwheel is turned, the stem _____ — turns

60. The threads on the stem engage the threads of the _____ — bonnet

61. As the stem engages the bonnet threads, it (must also/need not) move up or down. — must also

62. As the stem rises, the handwheel also _____ — rises

63. The stem is attached to the gate. As the stem is raised, the gate _____ — rises, or opens

Review

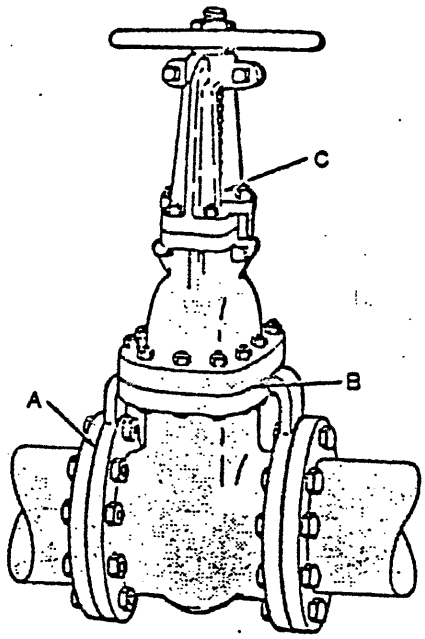
64. A gate valve stops flow by placing a metal _____ across the opening. — gate, or disc

65. The part of the valve that is connected to the pipe is the _____ of the valve. — body, or flange

66. A flanged-end body is (bolted/welded) to the pipe. — bolted

67. The top part of the valve that is mounted onto the body to form a tight enclosure is the _____ of the valve. — bonnet

68. Suppose that after a valve is installed, it leaks at point A.

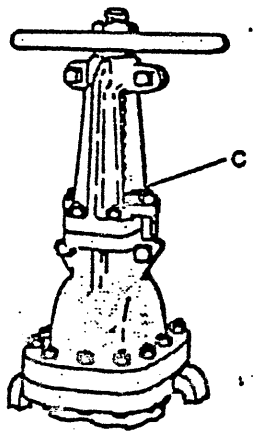


Tightening the bolts (may/cannot) stop the leakage. may

69. If tightening the bolts does not stop the leakage, replacing the _____ may be necessary. gasket

70. A worn gasket can cause leakage not only at point A but at point _____ as well. B

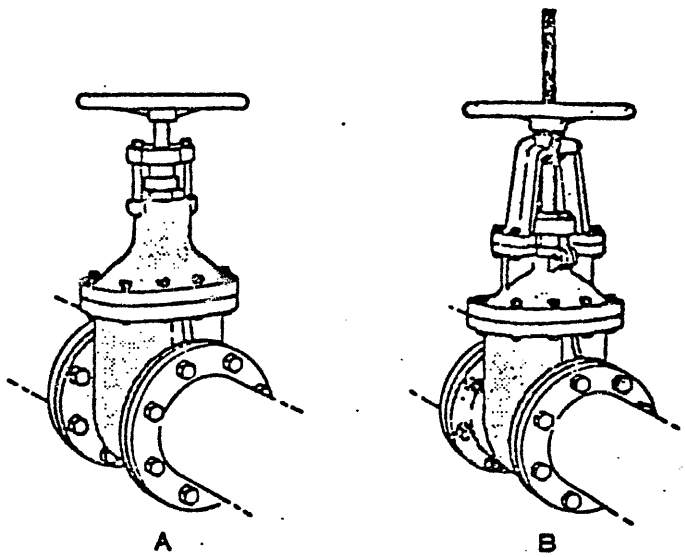
71. The leakage at point C is from the stem.



This type of leakage occurs due to improper _____ of the stuffing box. packing

72. In an OS & Y gate valve, the stem is threaded on _____ top

73. Both of these valves are open.



Valve A is an (OS & Y/NRS) valve. NRS

74. Valve B is an (OS & Y/NRS) valve. OS & Y

75. In areas where not much overhead clearance exists, an _____ valve is used. NRS

76. The line of flow through an open gate valve is (in a straight/not in a straight) line. in a straight

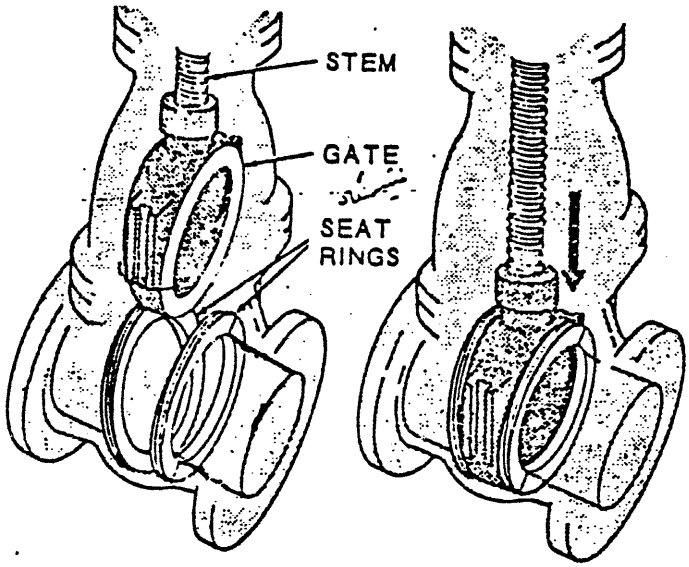
77. When a gate valve is completely open, the gate is _____ of the line of flow. out

78. The turbulence in a completely opened gate valve is (high/low). low

79. The pressure drop across a completely opened gate valve is _____ little, or small

Gate Designs

80. The stem raises or lowers the gate. The gate is the part of the valve that controls the opening.



When the gate is lowered to stop all flow, it makes a close fit with the _____ _____. seat rings

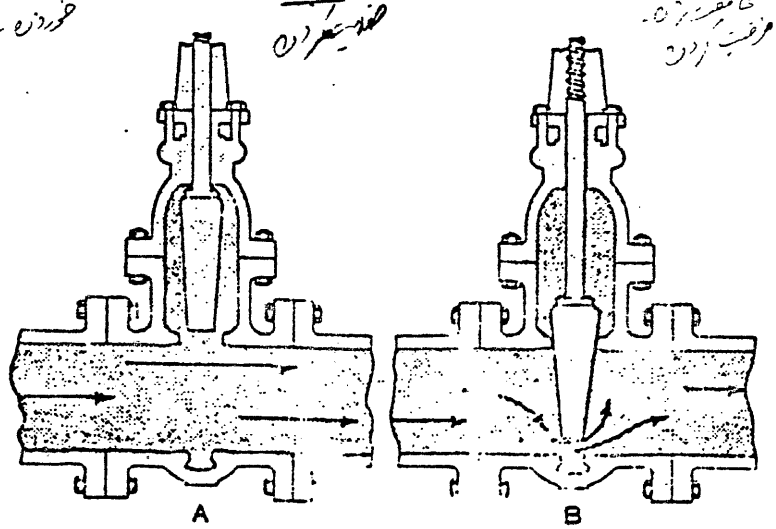
81. The seat rings and the gate (make/do not make) contact each time the valve is closed. make

82. As the gate is opened or closed, friction between gate and seats (occurs/does not occur). occurs

83. When friction occurs, wear also _____. occurs

84. When a valve is throttling, it regulates the (rate/direction) of flow. rate

85. Liquids or gases flowing under high pressure tend to erode material that opposes their flow.



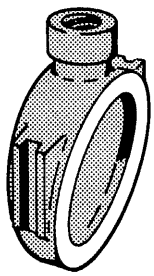
The gate ... ll erode in positior 12 B

86. The valve in B is (throttling/allowing full flow). throttling

87. The wear on the valve in B will be (evenly/unevenly) distributed. unevenly

88. If the gate and the seat rings are worn or eroded unevenly, positive shutoff upon closing (is/is not) possible. is not

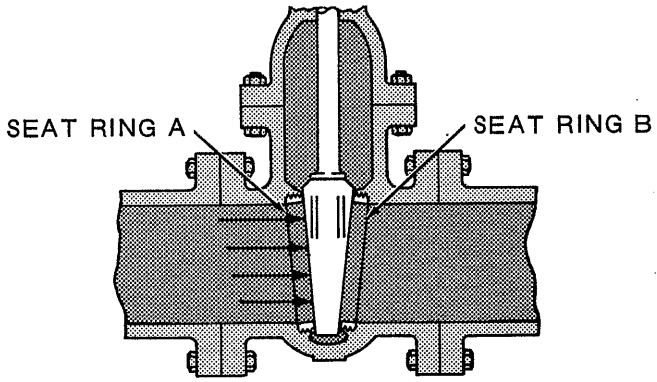
89. The design of the gate can vary. The most common one is the *solid wedge* gate.



Such a gate is made out of (one part/two parts). one part

90. Complete shutoff with a solid gate is accomplished through a close fit between the gate and the _____ _____. seat rings

91. A solid wedge gate is lowered into closed position.



The flow exerts pressure on (one side/both sides) of the gate. one side

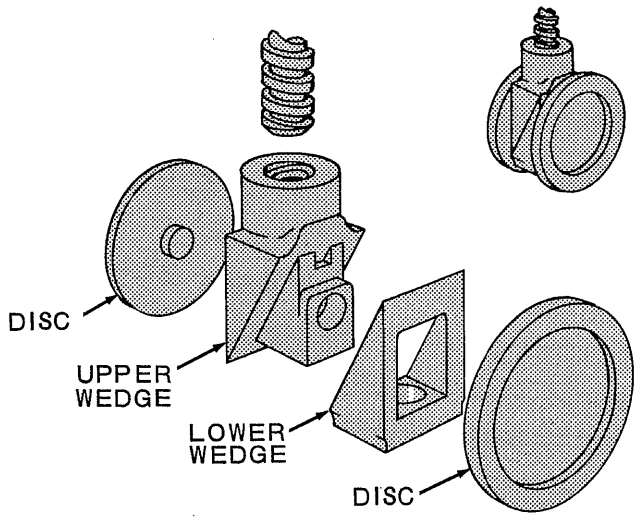
92. As the gate is raised, the flow will press the gate against ring (A/B). B

93. Whether the gate is lowered or raised, there is more friction between the gate and seat ring _____. B

94. This flow-pressure action tends to wear out (both seats/one seat) quicker. one seat

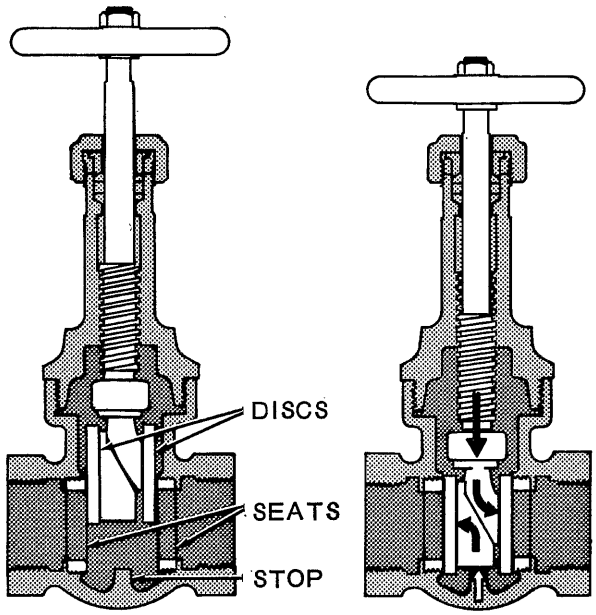
95. When seat ring B wears beyond a certain point, complete shutoff becomes _____. impossible

96. Another type of gate is the parallel discs and wedges gate.



This type of gate is made out of (one/many) parts. many

97. When closing, the parallel discs descend between two matching seats.



When the lower wedge, or *spreader,* reaches the stop, it (can/cannot) descend further. cannot

98. As the stem continues to descend, it (forces/does not force) the upper spreader onto the lower one. forces

99. As the upper spreader is forced onto the lower spreader the discs are pushed (outward/inward).

outward

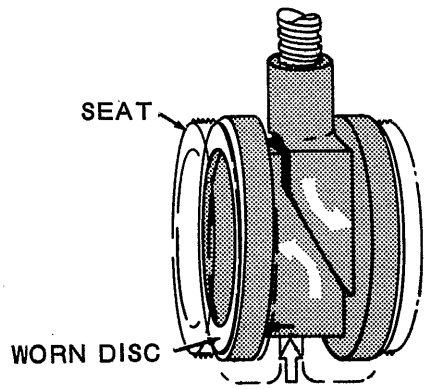
100. This outward push forces the discs against the _____ _____.

seat rings

101. With this type of gate, a very tight closing (is/is not) possible.

is

102. One side of this disc is worn more than the other side.



Because of the tight closing produced by the wedging action, wear on one side (still allows/prevents) complete shutoff.

still allows

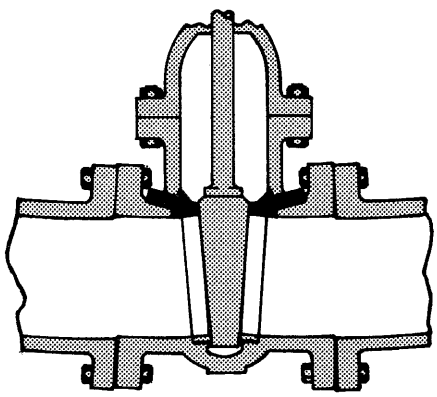
103. The discs are attached to the spreader in such a way that they can rotate when they are raised or lowered. Due to the rotation, when wear occurs it is (more even/uneven).

more even

104. When opening such a gate, the first turn of the handwheel (raises the discs/releases the spreader pressure).

releases the spreader pressure

105. In some systems, temperature changes and pipe expansion can warp the body of a valve, causing extreme pressure on the gate.



Warping (can/cannot) cause the gate to stick.

can

106. Under such conditions a parallel disc gate is used.
As soon as the upper spreader is raised, it (releases/does not release) the wedging pressure. releases

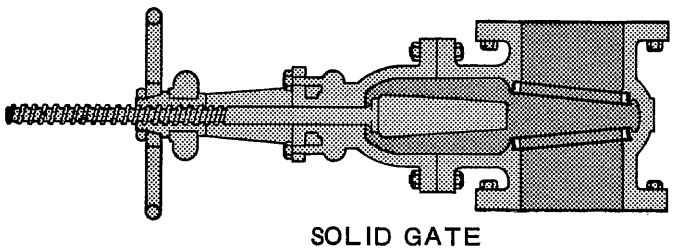
107. As the wedging pressure is released, the discs (become freer/remain tightly wedged). become freer

108. Under conditions where warping of the valve body can occur, a (solid wedge/parallel disc) gate is easier to operate. parallel disc

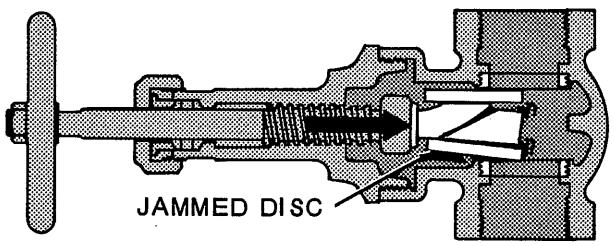
109. Suppose a material with coarse particles is being handled.
Because it has more parts, it is easier for a (solid gate/parallel disc gate) to become fouled by particles. parallel disc gate

110. A parallel disc gate should be used with (any type of material/relatively clean material). relatively clean material

111. At times, it is necessary to mount a valve in the vertical position.



SOLID GATE

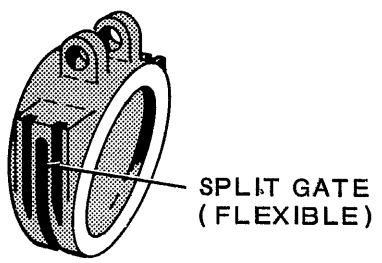


PARALLEL DISC GATE

A solid gate (can/cannot) be used in a vertical position. can

112. Because of the wedges, it is (easy/difficult) for a parallel disc gate in the vertical position to malfunction. easy

113. Another type of gate is the *solid split* gate.



The gate is made out of (one piece/many pieces). one piece

114. The outer edges of such a gate (are/are not) flexible. are

115. As the valve body warps, it exerts pressure on the gate. The outer edges of the split gate (will give/are rigid). will give

Review

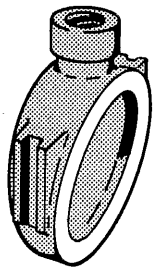
116. A gate valve stops flow by placing a _____ across the opening. gate

117. The gate has to make a tight fit with the _____ _____ to produce positive shutoff. seat rings

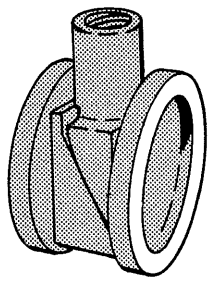
118. In an open gate valve, there is (little/much) resistance to flow. little

119. The erosion that occurs in a throttling gate is (even/uneven). uneven

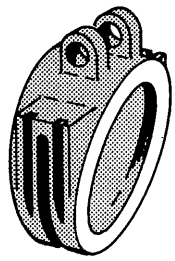
120. Identify these gates.



A. _____ wedge gate. solid



B. _____ _____ gate. parallel disc



C. _____ _____ gate. solid split

121. Threading can be located on different parts of the stem. In an OS & Y valve, the stem is threaded on _____. top

122. The abbreviation NRS stands for _____-_____ _____ valve. non-rising stem

123. When a valve is used in an area where there is not much overhead clearance, an (OS & Y/NRS) valve is used. NRS

124. The material put in the stuffing box is called the _____. packing

125. The packing is used to (hold the stem/prevent leakage). prevent leakage

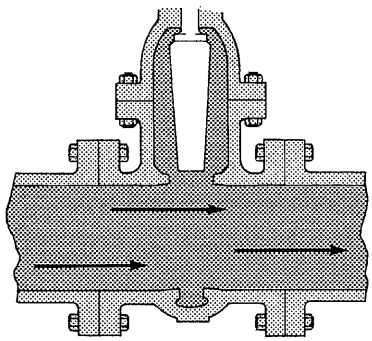
126. If possible, a gate valve (should/should not) be used for throttling. should not

127. For longer seat ring and gate life, a gate valve should be used in systems where it is (frequently/not frequently) closed or opened. not frequently

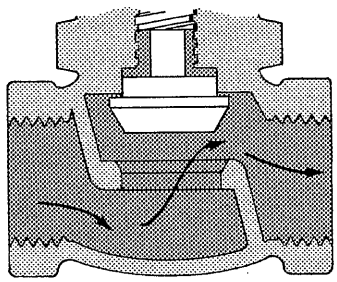
128. An operator looking at an OS & Y valve (can tell/cannot tell) whether the valve is open or closed. can tell

GLOBE VALVES

129. In a gate valve, the flow is in a straight line, without bends.



GATE VALVE



GLOBE VALVE

In the globe valve, the line of flow (changes/does not change) direction. changes

130. With the change of direction, turbulence (occurs/does not occur).

occurs

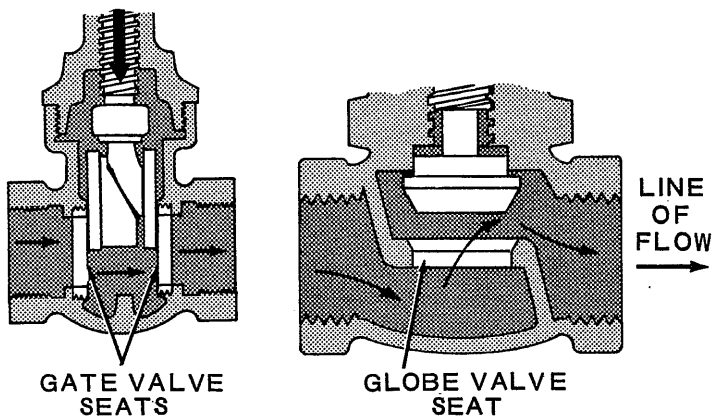
131. Turbulence increases the _____ drop across the valve.

pressure

132. A globe valve will produce a (higher/lower)pressure drop than a gate valve.

higher

133. The seats in a gate valve are perpendicular to the line of flow.



In the globe valve, the seat is (parallel/also perpendicular) to the line of flow.

parallel

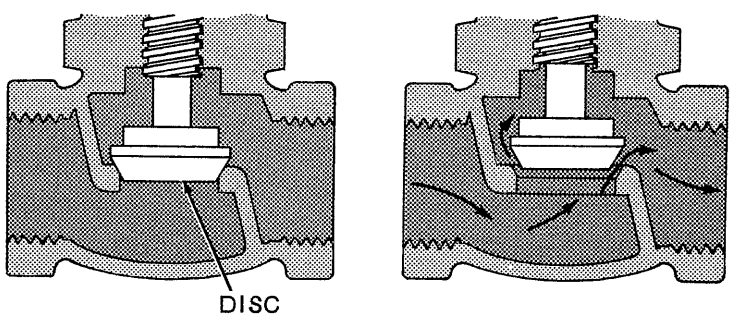
134. In the gate valve, all contact between the seating and the gate ends (as soon as flow begins/only when the valve is completely open).

only when the valve is completely open

135. Suppose a gate valve is being operated to increase flow. Friction between the gate and the seats ends only when the gate is completely _____.

open

136. In a globe valve, the disc comes down onto the seat.



Flow starts (as soon as/some time after) seat and disc contact is broken.

as soon as

137. In a gate valve, there is much wear due to friction when closing and opening.
In a globe valve, there is (very little/much) wear due to friction. — very little

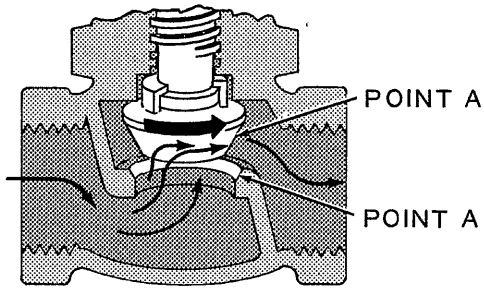
138. When a gate valve is partially open, (all of the gate/part of the gate) is exposed to flow erosion. — part of the gate

139. When a globe valve is partially open, (all/part) of the disc is exposed to flow. — all

140. Wear or erosion of a disc is likely to be (even/uneven). — even

141. Because the gate in a gate valve is held between two seat rings, it (can/cannot) turn. — cannot

142. Suppose the disc of a globe valve is free to rotate on the stem.



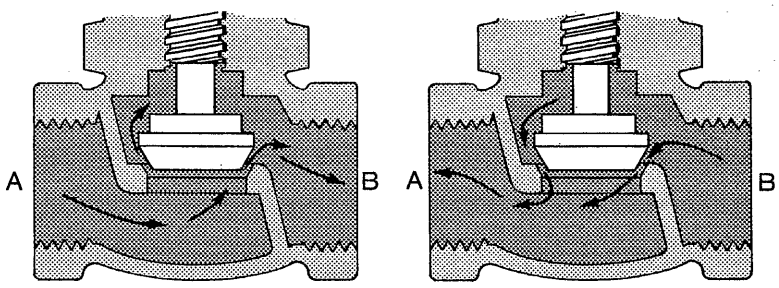
Liquid flowing through the opening between seat and disc can cause the disc to _____. — rotate, or turn

143. Due to the turning, point A on the disc (will/will not) always make contact with point A on the seat ring. — will not

144. The wear due to the contact friction is (more even/uneven) on the disc of a globe valve. — more even

145. When the seat and disc wear evenly, after long use complete closure is (still possible/not possible). — still possible

146. Suppose a globe valve is in a throttling position.



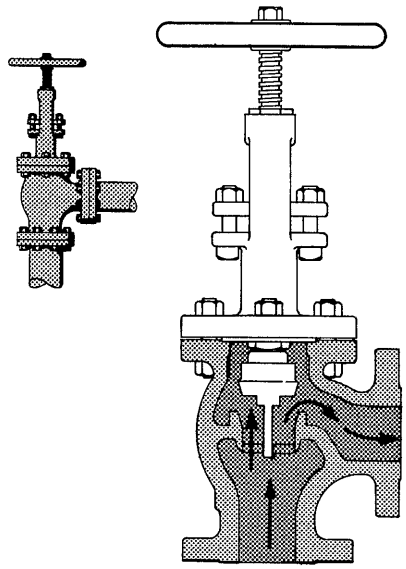
When the direction of flow is from A to B, the flow is from (under/the side of) the disc. — under

147. When the flow is from A to B, there (is/is no) turbulence or preassure drop. — is

148. Suppose the flow is from B to A.
The turbulence (increases/decreases). — increases

149. For the least pressure drop, a globe valve should be installed so that the flow is from (under/the side of) the disc. — under

150. There are also globe valves which can be installed as shown.



The flow through an angle valve has (more/fewer) changes of direction than in a regular globe valve. — fewer

151. The turbulence through an angle globe valve will be (less/more) than through a regular globe valve. — less

152. The stem in a gate valve is only for raising and lowering the gate.

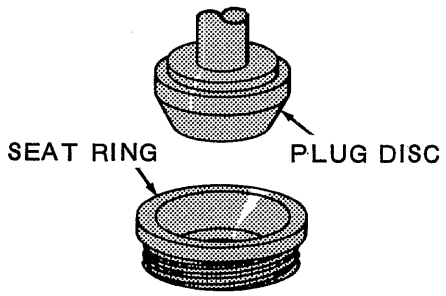
The stem in a globe valve, besides raising and lowering the disc, must also _____ the disc into the seat ring. — guide, or position

153. In a gate valve, the gate is guided into place by the seating.

In a globe valve, the stem (guides/does not guide) the disc. — guides

154. The part of the globe valve that controls the opening is called the _____. — disc

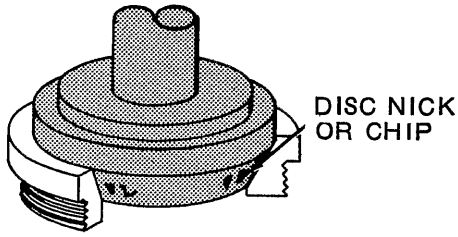
155. Globe valve discs come in different designs. The most widely used one is the plug disc.



The plug disc is (cone/ball) shaped. cone

156. The seat ring has a (matching/nonmatching) cone-shaped center. matching

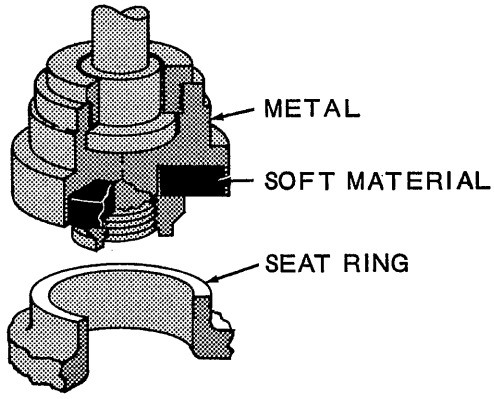
157. Abrasive particles in liquids can chip or nick the disc.



If the nicks or chips are not too large, tight closing is (still possible/not possible). still possible

158. A plug disc is used for heavy throttling service. Even after some wear occurs, positive shutoff is still _____. possible

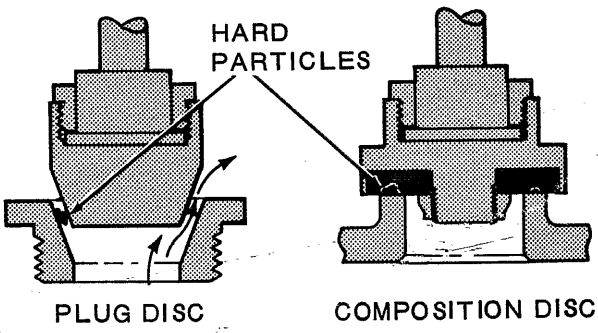
159. This drawing shows a composition disc.



Here, the disc is made out of _____ (how many) different materials. two

160. When completely closed, the seat ring makes contact with the (soft/hard) part of the disc. soft

161. Piping sometimes must handle liquids containing small, hard particles. These particles can accumulate on the seats or discs.

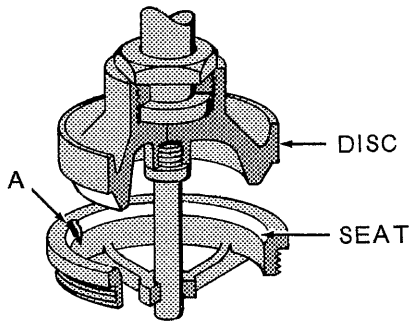


Such accumulation, if uneven, (can/cannot) prevent a plug disc from completely closing. can

162. When a composition disc is used, fine particles (can/cannot) embed themselves in the soft part of the disc. can

163. A composition disc with particles embedded in it (can/cannot) make a tight shutoff. can

164. This drawing shows a conventional disc.



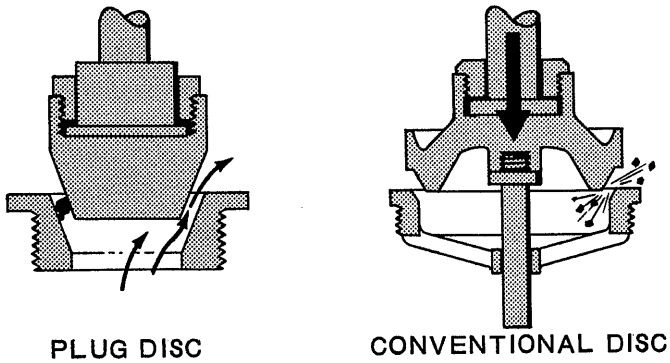
The disc-to-seat area is (larger/smaller) than a plug disc. smaller

165. If such a disc is nicked or worn at point A, tight closure is (possible/not possible). not possible

166. For extensive throttling service, a (plug/conventional) disc is preferred. plug

167. With a conventional disc, the contact between seat and disc (is/is not) metal-to-metal. is

168. Here, a small piece of a hard substance is caught on the seat.



PLUG DISC CONVENTIONAL DISC

A conventional disc (can/cannot) crush such a particle more easily than a plug disc. can

Review

169. There are three major types of discs used in globe valves. The disc that has the largest disc-to-seat area of contact is the _____ type. plug

170. A conventional disc, upon closing, (makes/does not make) metal-to-metal contact. makes

171. In a composition disc, the seating makes contact with the (hard/soft) material of the disc. soft

172. When a globe valve is used for extensive throttling service, a (plug/composition) disc is used. plug

173. The stem in a globe valve(guides/does not guide) the disc into the seating. guides

174. When a valve with little turbulence is needed, a (gate/globe) valve is used. gate

175. For throttling service, a (globe/gate) valve is desirable. globe

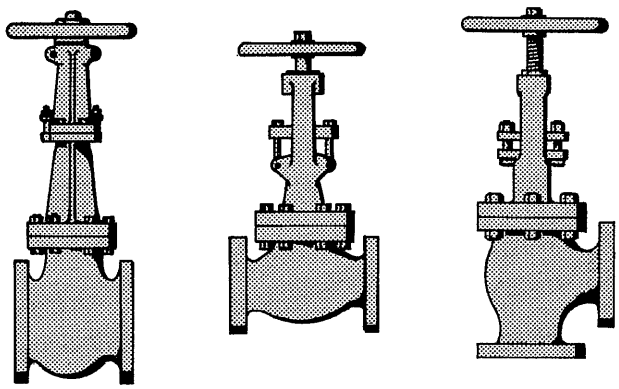
176. A gate valve has an enclosure that allows for the gate to be out of the line of flow.
The disc in a globe valve, when completely open, (is/is not) out of the flow. is not

177. To minimize pressure drop across a globe valve, the flow should be from (under/the side of) the disc. under

Now turn the page, turn the book over, and go on.

178. The outside appearance of a gate valve is (the same as/different from) a globe valve. — different from

179. A gate valve can be recognized by looking at it.



Valve (A/B/C) is a gate valve. — A

180. Valve C is an _____ valve. — angle, or globe

181. An angle valve is a (gate/globe) valve. — globe

182. The part of the globe valve that is attached to the pipe is called the _____ of the valve. — body

183. The bonnet of a valve is always on (top/bottom) of the valve. — top

184. The stuffing box in a valve (is/is not) in the body. — is not

185. Material called _____ is used in the stuffing box. — packing

186. Packing is used to prevent _____. — leakage, or leaks

187. In both gate and globe valves, it takes (one/more than one) turn of the handwheel to open or close the valve. — more than one

188. To reach the open position, the movement of the gate or disc is (up/down). — up

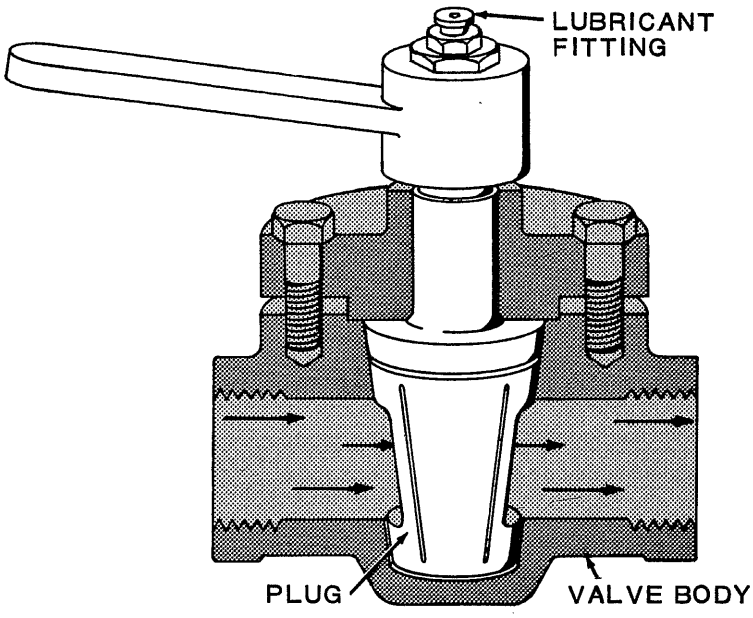
189. The valve with the least pressure drop is the _____ valve. — gate

190. A gate valve has little pressure drop because it offers little _____ to the flow. — resistance, or stoppage

191. The flow through a gate valve is in a _____ line. — straight

PLUG VALVES

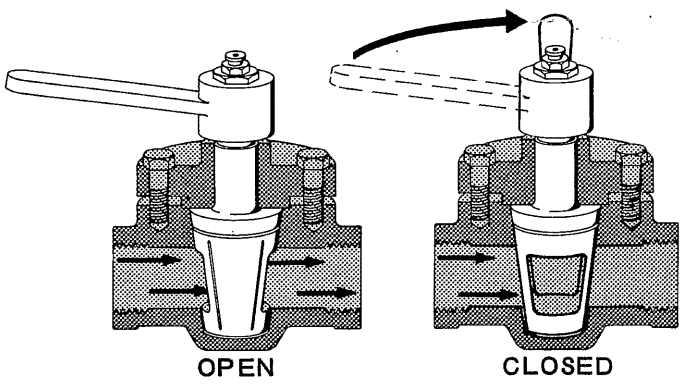
192. Another type of valve used in industrial piping is the plug valve.



The part of this valve that controls the opening is called the _____. plug

193. The plug is located in the _____ of the valve. body

194. The plug is made out of a solid piece.



The plug (has/does not have) an opening through it. has

195. During operation, the plug (is/is not) raised out of the body. — is not

196. The plug can be turned.
When the opening of the plug is aligned with the opening of the valve, flow (can/cannot) exist. — can

197. To stop the flow, the plug is turned (half a turn/a quarter turn). — a quarter turn

198. The line of flow through a plug valve is (straight/curved or angled). — straight

199. The opening of the plug is closely matched with the opening of the body of the valve.
With the valve in the fully open position, the plug offers (much/little) resistance to flow. — little

200. There is (much/little) turbulence through an open plug valve. — little

201. The pressure drop across a plug valve is (less/greater) than across a globe valve. — less

202. The valve that can be opened or closed quicker is the (globe/plug) valve. — plug

203. A plug valve is made to stop flow by rotating the _____ side across the opening. — closed, or plug, or solid

204. For complete shutoff with a plug valve, the plug and the _____ must make a close fit. — body

205. Although a close fit is required, the plug has to be loose enough to be able to _____. — turn

206. Each time the plug is turned, friction develops between the body and the _____. — plug

207. Friction (can/cannot) wear out the plug and body. — can

208. If the plug is worn out, it will seat _____ in the body. — loosely, or poorly

209. With a worn plug, it is not possible to get complete _____. — shutoff, or stoppage

210. The shank of the plug has a lubricant fitting that makes it possible to apply special lubricant to the _____ itself. — plug

211. If adequate lubricant exists between plug and body, friction is _____ to a minimum. — reduced, or kept

212. Besides helping to reduce friction, the lubricant acts as a sealant to prevent _____. — leakage

213. If the lubricant is lost, excessive wear occurs due to (friction/corrosion). friction

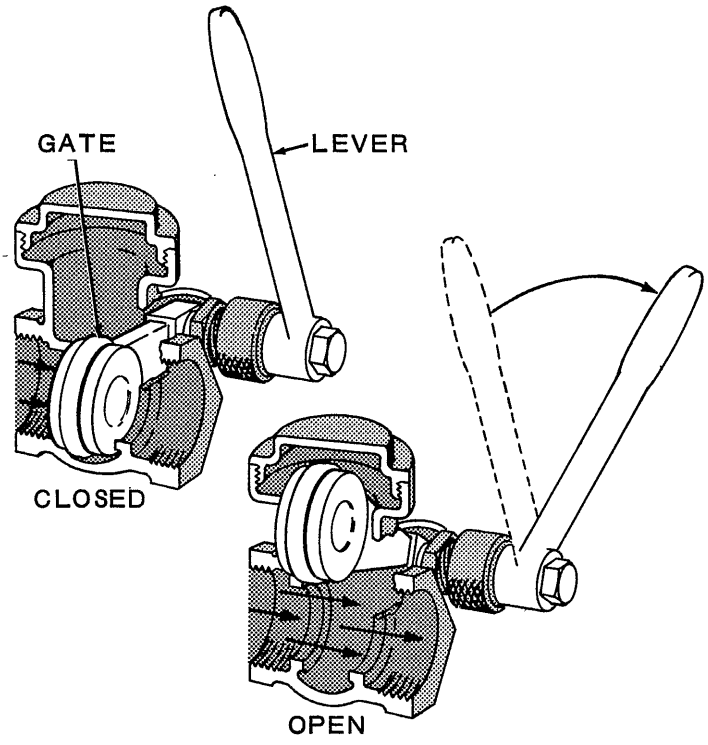
214. A plug valve of this type should be lubricated _____. often, or frequently

215. The plug valve and the gate valve both have (little/much) pressure drop. little

216. A plug valve is a (quick-/slow-) shutoff or opening valve. quick-

217. In terms of operating speed, the gate valve with a handwheel is a relatively _____ valve to open or close. slow

218. This drawing shows a special kind of gate valve.



It (has/does not have) a threaded stem. does not have

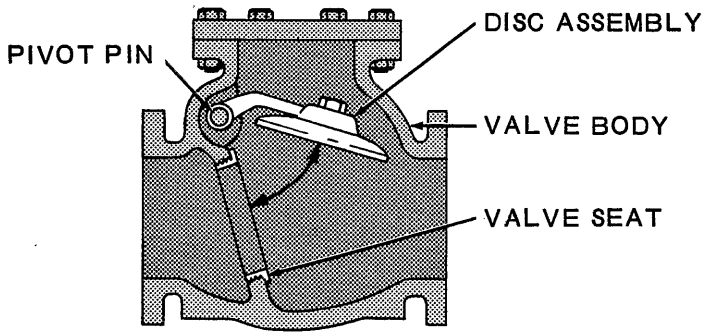
219. The gate of this valve is solidly attached to a stem which is connected to a _____. lever, or handle

220. If the lever is pushed a quarter turn to the right, the gate (is raised/is not raised) to full open position. is raised

221. This type of gate valve is a (quick-/slow-) opening valve. quick-

CHECK VALVES

222. This drawing shows a *swing check* valve.



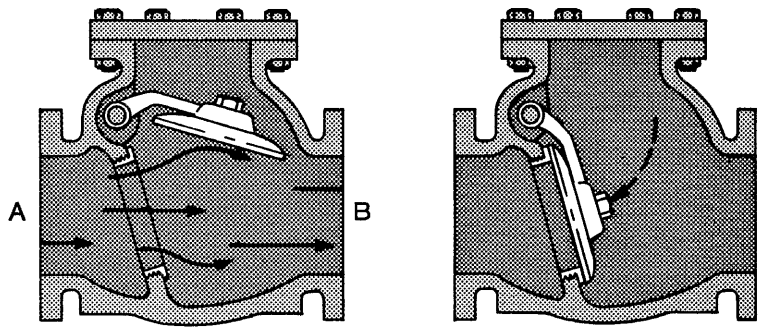
The only moving part is a disc assembly that is attached to the body by a _____ pin. — pivot

223. The pivot-pin mounting leaves the disc assembly free to swing toward and away from the valve _____. — seat

224. When there is no flow through the valve, the disc is positioned so that the valve is (closed/open). — closed

225. Liquid or gas flows only when there is a _____ in pressure between two points. — difference, or drop

226. Suppose the pressure is higher at A than at B.
The direction of flow is from _____ to _____. — A; B



227. Because the disc is free to move, the flow _____ the disc to the open position. — raises, or moves

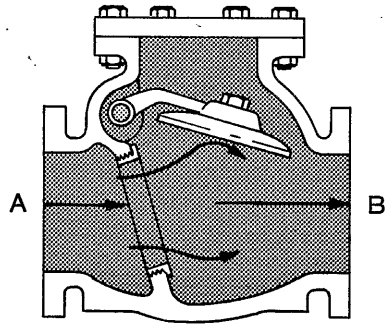
228. Suppose the flow stops.
Unless the material being piped has extremely high viscosity, the disc should _____ back across the seat. — drop, or swing

229. The line of flow through a swing check valve (is/is not) relatively in a straight line. — is

230. The turbulence through an open swing check valve is (great/little). — little

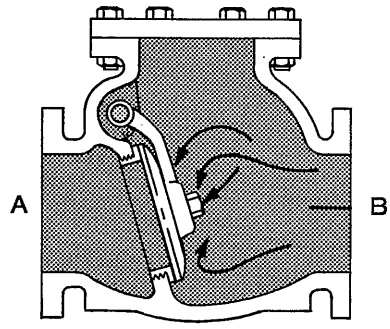
231. A swing check valve is opened (manually/automatically). — automatically

232. Suppose the direction of flow in this check valve is from A to B. Flow in this direction opens the valve.



The line pressure is higher at point (A/B). — A

233. Suppose the pressure becomes greater at B.



The pressure drop is in the (same/opposite) direction. — opposite

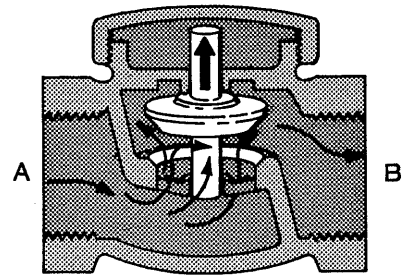
234. With the flow now from B to A, the disc (remains/does not remain) in the open position. — does not remain

235. As the flow reverses, it forces the disc into the _____ position. — closed

236. A check valve allows flow in (only one/either) direction. — only one

237. A check valve is used for controlling (rate/direction) of flow. — direction

238. The drawing shows a *lift check* valve.



The line of flow through a lift check valve is similar to the line of flow through a (gate/globe) valve. globe

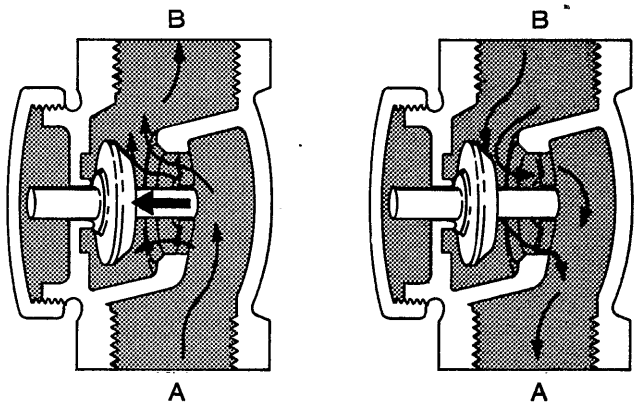
239. When flow occurs from A to B, it (raises/does not raise) the disc. raises

240. As flow stops, gravity (pulls/does not pull) the disc onto the seating. pulls

241. The lift check valve allows flow in (only one/each) direction. only one

242. The direction of the flow is always from (under/the side of) the disc. under

243. Suppose the same lift check valve is installed in a vertical position.



When flow occurs from A to B the disc (is forced away from/remains against) the seat ring. is forced away from

244. If flow stops, gravity (does/does not) pull the disc onto the seat ring. does not

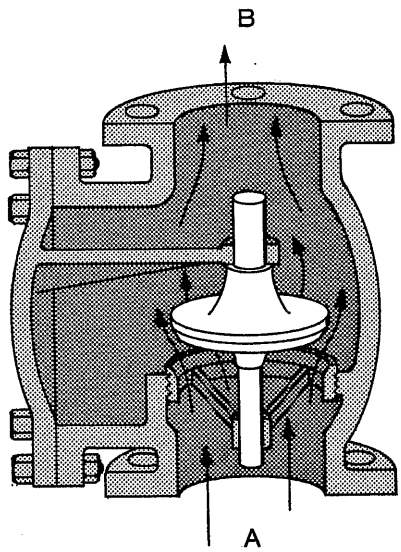
245. Suppose the flow reverses direction so that it is from B to A.
The disc (will/will not) allow flow. will

246. The lift check valve works correctly when installed in the (horizontal/vertical) position. horizontal

247. Based on its correct operating position, this lift check valve is called a _____ lift check valve.

horizontal

248. The lift check valve comes in another design.



When flow occurs from A to B, the disc _____.

raises, or opens

249. When flow stops, gravity (lowers/does not lower) the disc onto the seat.

lowers

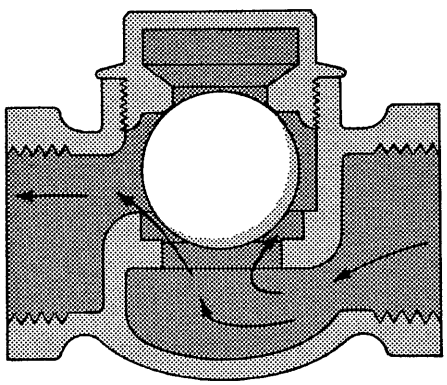
250. If mounted in a vertical position, this lift check valve (operates/does not operate) properly.

operates

251. This is a (vertical/horizontal) lift check valve.

vertical

252. The *ball* valve is also a check valve.



The line of flow through such a valve (is/is not) in a straight line.

is not

253. The part .of the valve that controls the opening is a _____.

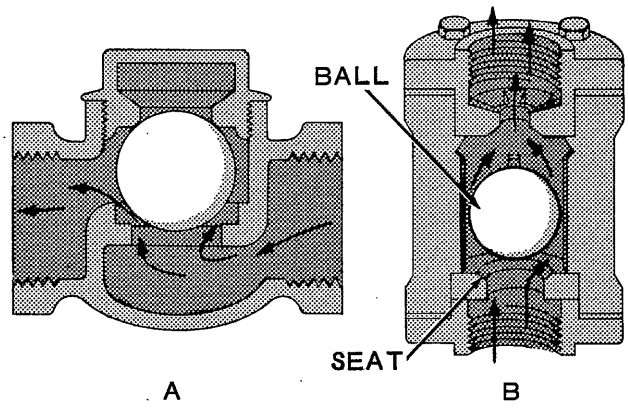
ball

254. When flow occurs, the ball is raised by the _____ of the flow.

pressure, or force

255. As flow stops, gravity pulls the ball into the (closed/open) position. closed

256. The ball check valve also comes in two designs.



Valve A is a (horizontal/vertical) ball check valve. horizontal

Valve B is a _____ ball check valve. vertical

Review

257. A valve is a mechanical device for the control of _____. flow

258. Any valve can be in one of three positions: fully opened, fully closed, or _____. throttling

259. Throttling regulates the (direction/rate) of flow. rate

260. The best valve for throttling is the (gate/globe) valve. globe

261. An OS & Y gate valve is one with a _____ stem. rising, or outside

262. The advantage of an OS & Y valve is that the operator, by looking at the valve, can tell if the valve is _____ or _____. open / closed

263. In places where not much clearance exists, (OS&Y/NRS) valves are used. NRS

264. In an NRS valve, the gate rises on the _____ of the valve. stem

265. In a gate valve, the gate (rises/does not rise) out of the line of flow when open. rises

266. In a plug valve, the plug (does/does not) rise out of the body. does not

267. A plug valve controls flow by (rotating/sliding) the plug. rotating

268. Both gate and plug valves, when fully open, offer (little/much) resistance to flow. little

OPERATORS

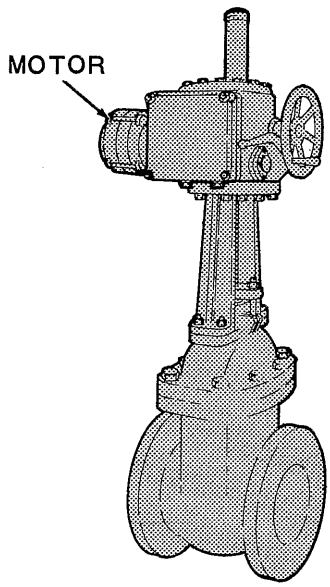
269. Suppose a non-rising stem gate valve is required in a given piping installation.
The NRS gate valve is more likely to insure (high speed of operation/tight closure).

tight closure

270. Suppose both high speed and tight closure are needed.
One way to make the gate of the NRS valve slide shut faster is to make the stem rotate _____.

faster

271. This shows a motor attached to the stem of the valve.



A motor-driven OS & Y valve probably shuts (faster/slower) than one driven by hand.

faster

272. Suppose the valve is too big to be operated by one man. A motor can provide the extra _____ needed to turn the stem.

power

273. Mechanical operators such as motors can make valves open and shut (faster/no faster) than a man can, and can operate the valves with (greater power than/only as much power as) several men at once.

faster

greater power than

274. Suppose a valve is located where a man can't reach it easily.
If a motor is connected to it, the valve (can/cannot) be operated from a distance.

can

275. Mechanical operators make remote locations accessible.
Using remote operators also makes it possible for one man to operate _____ valves at once.

many, or more

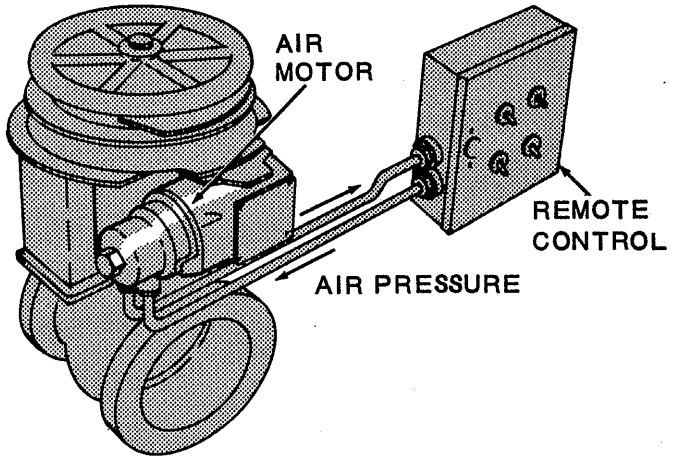
276. Mechanical operators must be selected to meet special requirements.
For example, in any location where there could be explosive fumes, a spark-causing device is (acceptable/undesirable).

undesirable

277. Fire can melt electric wires or short out electric motors. In conditions where fire or explosion can occur, an electrical operator is generally (safe/unsafe).

unsafe

278. Some motors use other sources of power.



This is a motor that operates on _____ _____.

air pressure

279. Air operators can be supplied with the compressed air that drives them either by hose or by pipe. Where the power supply is compressed air, fire (can/cannot) short circuit the operator.

cannot

280. In a situation where danger of explosion exists, an air operator is _____.

desirable, or needed

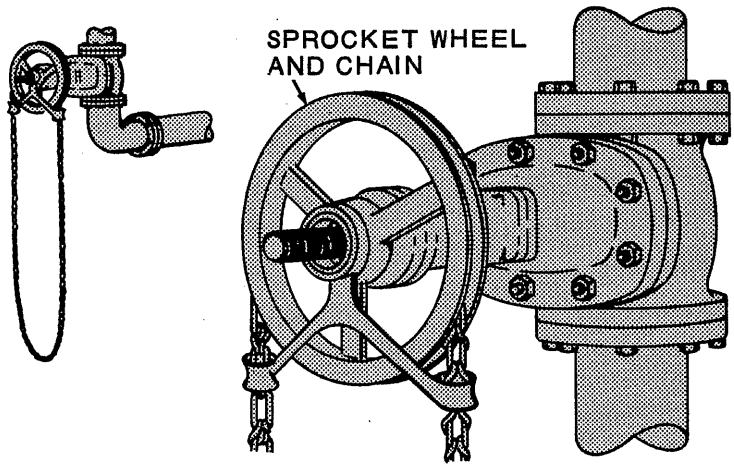
281. An air operator (can/cannot) be controlled from a distance or remotely.

can

282. Electrical and air operators are used for (accessibility/speed/strength/all of these).

all of these

283. There are times when an overhead valve is inaccessible and an electric or air operator cannot be installed on it.



The drawing shows a sprocket wheel and _____ arrangement that can be attached.

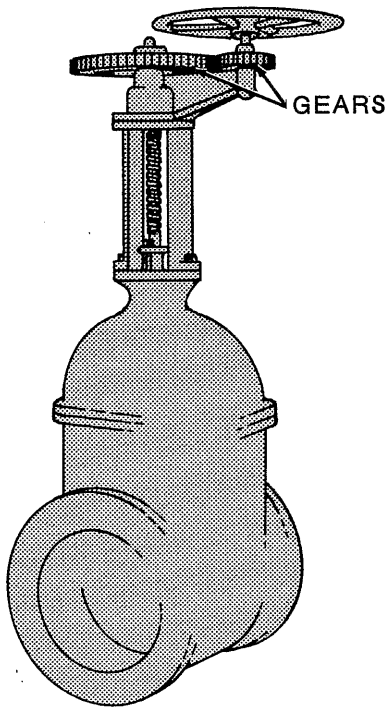
chain

284. As the chain is pulled, the sprocket wheel _____. turns

285. Because the sprocket wheel is attached to the stem, as the wheel turns, the stem _____. moves, or opens, or closes

286. Although the sprocket wheel does increase the power somewhat, the chain operator is primarily used to increase (accessibility/operating power). accessibility

287. A valve located within easy reach but requiring much strength still can be operated without a motor.



This valve is operated through a system of _____. gears

288. Such an operator is called a _____ operator. gear

Review

289. Devices that are attached to valves for operating them are called _____. operators, or power operators

290. In places where there is danger of fire or explosion, an _____ operator is used. air

291. A gear operator is used for (accessibility/power). power

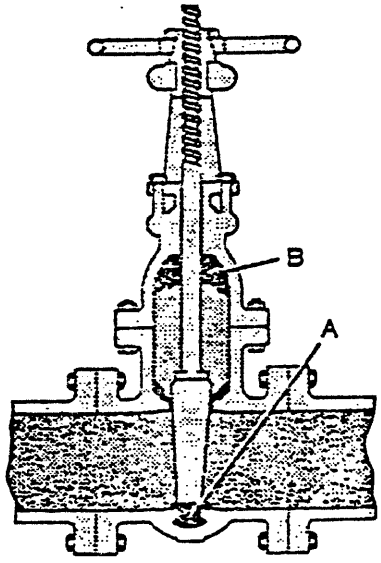
292. A chain operator is primarily used for _____ accessibility

293. An electrical operator is used for power and _____ speed, or accessibility

294. To open or close valves rapidly, _____ or _____ operators are used. electrical; air

OPERATING DIFFICULTIES

295. Accumulation of sludge or particles can foul a valve.



If too much is accumulated at point A, the valve will not be able to _____ completely. close

296. If the accumulation is in the bonnet area, the valve will not be able to _____ completely. open

297. Some bonnets have a bonnet plug.
Steam under high pressure forced into the plug can sometimes remove the _____ condition. fouling, or sludge

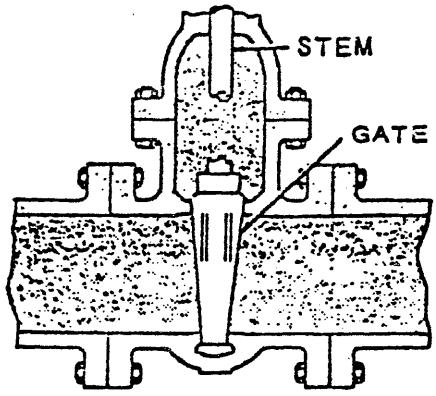
298. If a fouling-removing chemical is added to the flow through the pipe, the chemical (will/will not) circulate through the body of the valve and produce some purging. will

299. If conditions allow, however, the best method is to (dismantle the valve/add chemicals). dismantle the valve

300. When the valve is dismantled, all parts can be _____ inspected, or cleaned

301. When badly worn parts are found they should be _____ replaced

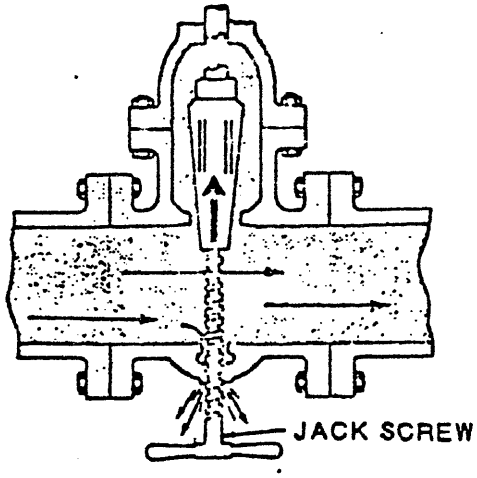
302. At times, the stem in a gate valve can become detached or break away from the gate.



If this happens, the gate (rises/does not rise) as the stem is raised. does not rise

303. If conditions permit, when the stem is detached or broken from the gate, the valve should be dismantled and _____ repaired, or replaced

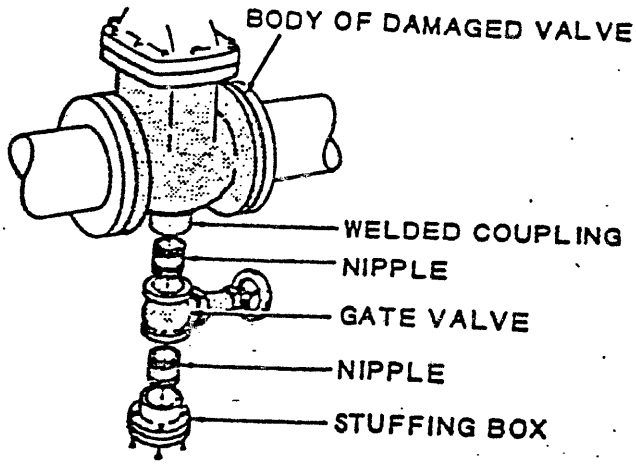
304. At times, conditions do not permit the dismantling of a valve even though the gate must be raised.



Drilling the bottom of the valve and screwing in a jack screw (will/will not) raise the gate. will

305. Drilling a hole through the bottom of the valve while the valve is in service (can/cannot) be dangerous due to possible leakage. can

306. For safety reasons, before drilling the hole, an attachment is used.



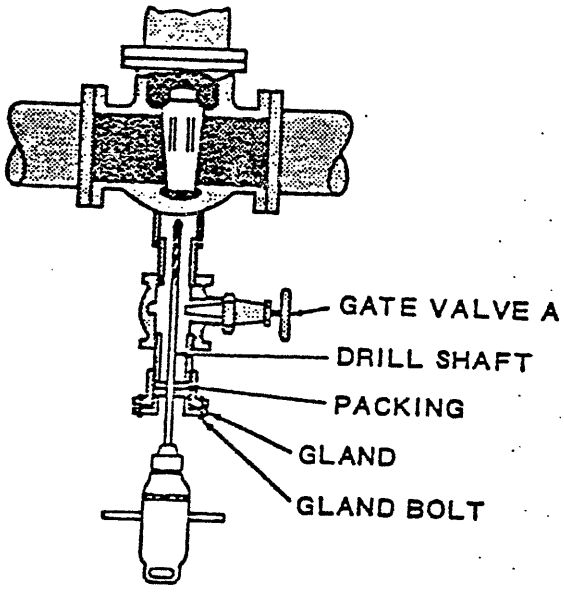
First, a coupling is welded to the _____ of the damaged valve.

body

307. To the coupling, a nipple, gate valve, and a nipple with a _____ box is attached.

stuffing

308. After the attachment is set up, the drill is inserted through it.



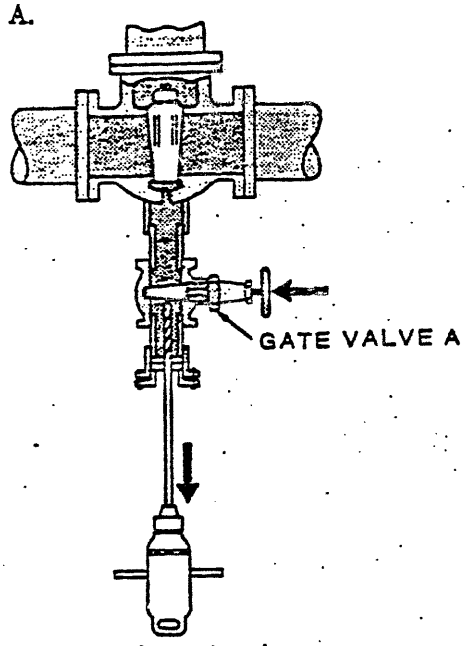
As the bolts attaching the gland to the nipple are tightened, the packing (is/is not) compressed around the driller shaft.

is

309. The packing around the shaft prevents _____ when the body of the damaged valve is pierced.

leakage

310. After the hole is drilled, the drill is pulled out past the gate valve A.



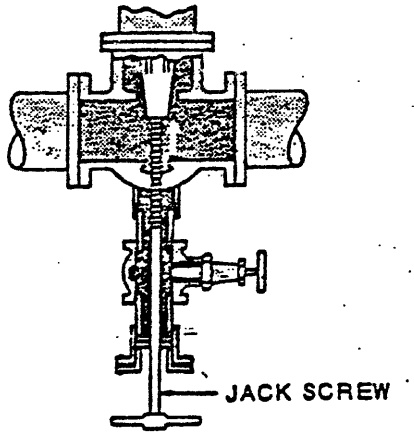
Valve A is closed, thus stopping any _____ that may exist.

leakage, or pressure

311. After entirely removing the drill, a tap is inserted. Once again the gland is tightened.
Now the temporary gate valve A is _____, permitting the tap to be inserted further.

opened

312. After the drilled hole is tapped, the tap is removed as in frame 311. The jack screw is inserted in the same manner.



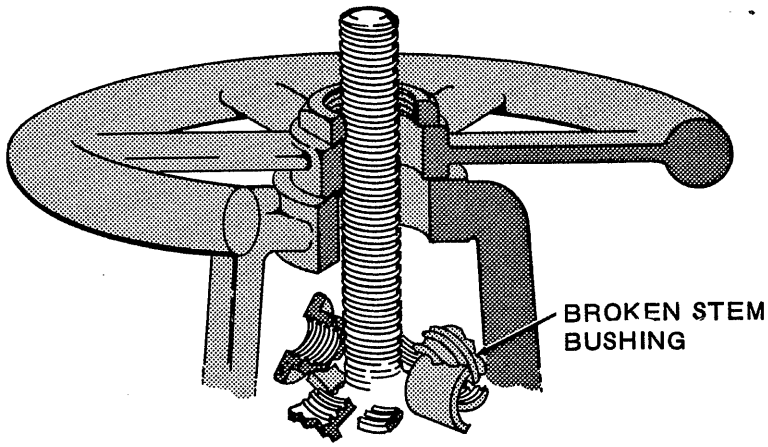
As the jack screw is screwed in, the gate _____

rises, or opens

313. Due to the attachment, leakage is _____

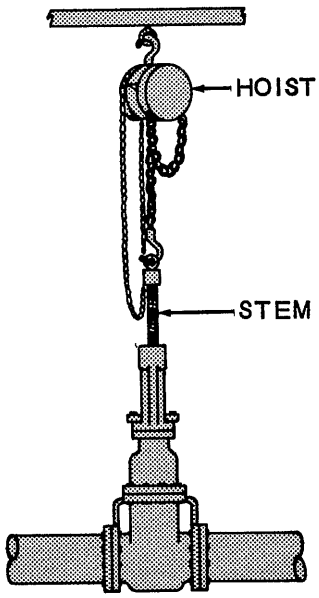
prevented

314. Suppose the stem bushing of an outside yoke valve is stripped or broken.



The handwheel (will/will not) raise the stem. will not

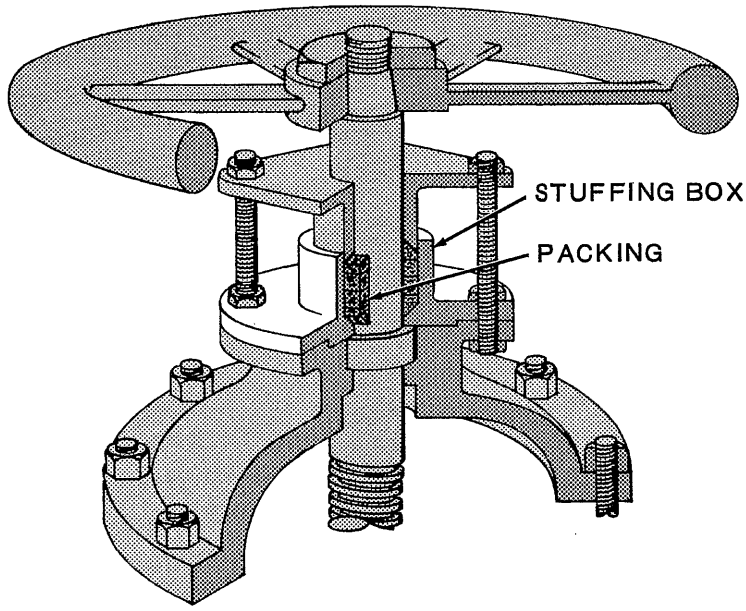
315. If possible, the stem bushing should be replaced. However, in case of emergency, the gate can still be raised.



An overhead hoist is installed and connected to the stem. As the hoist is operated, it _____ the stem. raises, or lifts

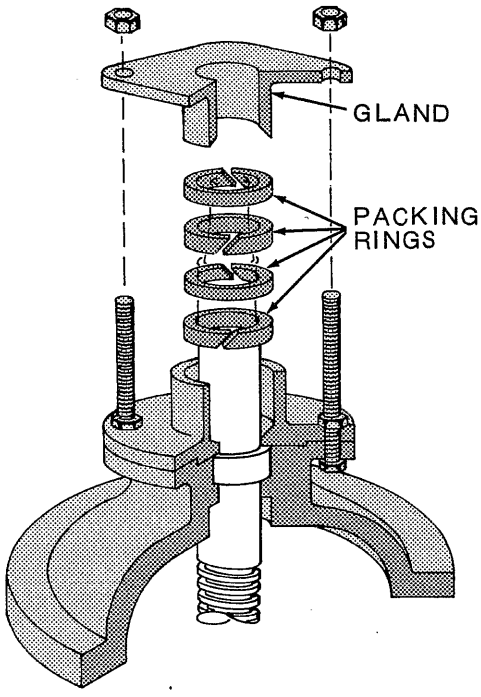
316. Tapping the stem with a soft-headed hammer (will/will not) close the gate. will

317. Every valve with a stem has a stuffing box.



The stuffing box is filled with _____. packing

318. Each manufacturer specifies a given type and size of packing for each stuffing box.



Once cut to the proper length, the packing is installed in rings so that each cut is _____ the other. opposite

319. After the packing is installed in the stuffing box, it is compressed by a _____, which also serves as the stuffing box cover.

gland

320. Leaks that develop around the stem are usually due to either the wrong packing or not _____ packing.

enough, or proper

321. To correct the leak, the stuffing box should be _____ properly.

repacked, or packed

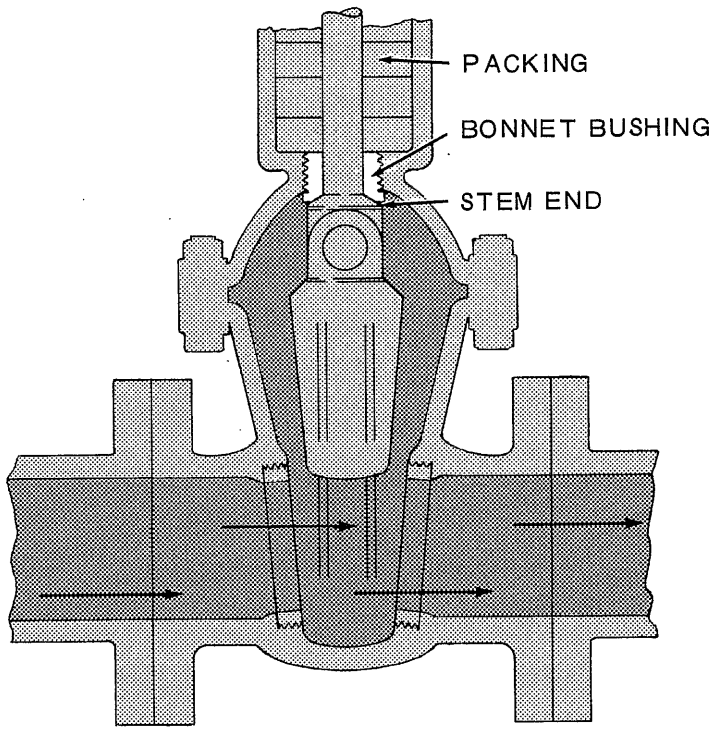
322. If the gland is removed from the stuffing box while the valve is under pressure, the pressure will _____ the packing out.

force, or blow

323. When repacking a valve there should be no _____ present.

pressure

324. During emergencies, a valve may have to be repacked while in service.



If the valve is opened as far as possible, the stem end and the bonnet bushing make a _____ fit.

tight

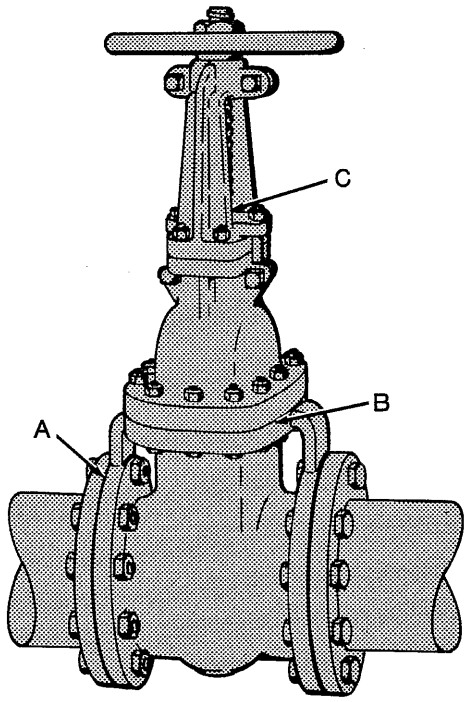
325. This is back-seating. In actuality, the stem end and bushing form a valve within the _____.

bonnet, or valve

326. Back-seating can be dangerous and should only be done in cases of severe _____.

emergency

327. Valves may develop leaks in various places while in service.

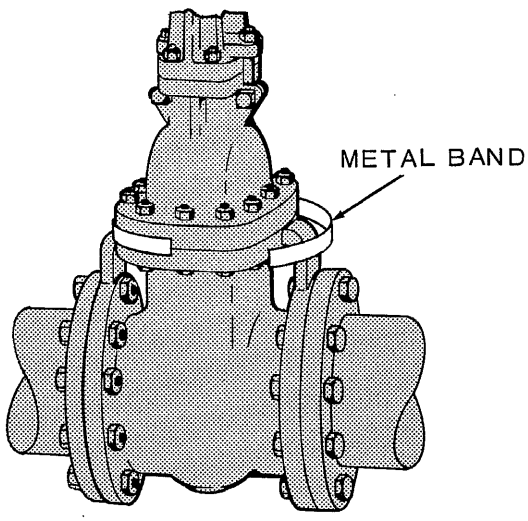


When a leak develops at point C, it is probably due to improper _____. packing

328. A leak at point B is in the joint between the body and the _____ of the valve. bonnet

329. If tightening the bonnet and body bolts does not eliminate the leak, replacing the _____ is indicated. gasket

330. A valve is leaking between the bonnet and the body.



Welding a metal band around the joint (will stop/will not stop) the leak. will stop

331. Welding a metal band should be done only when, due to body or bonnet warping, replacing a gasket does not stop _____. leakage

Review

332. A mechanical device used for flow control is called a _____. valve

333. The part of the valve that is connected to the pipe is called the _____. body

334. The bonnet and body form a _____ enclosure. tight, or valve

335. All gate valves stop flow by placing a metal _____ across the opening. gate, or disc

336. Globe valves are used for regulating the rate of flow or for _____. throttling

337. Check valves are used for controlling the _____ of flow. direction

338. When a valve cannot be operated directly by hand, a valve _____ is attached to it. operator, or motor

339. Electrical operators are usually used for (power/accessibility/speed/all of these). all of these

340. When there is danger of explosion or fire, an _____ operator is preferred. air

341. When repacking or packing a valve, there should be no _____ in the valve. pressure

342. For longer valve life, a gate valve should not be used for extensive _____ service. throttling

343. The valves with the least pressure drop across them are the _____ and _____ valves. gate, plug

344. Check valves are usually (manually/automatically) operated. automatically

THE END

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