Hydrants and Valves

Distribution Review

Fire Hydrants and Valves

Hydrant and Valve Training Objectives

To gain an understanding of:
- The construction of the four main types of hydrants
- Gate valve construction and uses
- Globe valve construction and uses
- Ball valve construction and uses
- Butterfly valve construction and uses
- Relief valve construction and uses
- Pressure regulating valve construction and uses
- Air and vacuum relief valve construction and uses
- Altitude valve construction and uses

Fire Hydrants

Types of Fire Hydrants
- Dry Barrel
- Wet Barrel
- Warm Climate
- Flush Hydrant
Fire Hydrants

**Dry Barrel Hydrant**
Used in locations that freeze
Main valve is located below ground
Drain valve allows water to drain from barrel when the main valve is closed

**Wet Barrel Hydrant**
Filled with water all the time
Not used in locations that freeze
Has separate valve for each nozzle
No main valve... geyser results when hydrant is hit and damaged

**Warm Climate Hydrant**
Main valve is at ground level
Main valve controls flow from all nozzles
Has no drain mechanism in upper barrel and is pressurized in the lower barrel
Fire Hydrants

**Flush Hydrant**
Used where an above ground hydrant would be objectionable
Airport taxi-ways, pedestrian malls
Completely below ground
Accessible through cover

Fire Hydrants

**Installation and Placement**
Placed 2 feet off curb
Fed by a minimum main diameter of 6 inches
An auxiliary valve should be installed between hydrant and main
A breakaway flange should be installed 2 inches above ground surface

Valves

**Gate Valve**
Designed to start flow
Not used to throttle flow
Disc is raised into the bonnet
Minimal head loss when open
Large valves have equalizing lines or bypass valves for use prior to opening
**Gate Valve Parts**
- hand wheel
- yoke
- stem
- bonnet
- disc (gate)
- seat

**Types of Gate Valves**
- Rising stem
  (outside screw and yoke)
- Non-rising stem
- Horizontal
- Resilient wedge

**Globe Valve**
Commonly used for household plumbing
Not well suited for distribution system mains due to head loss
Used where head loss is not a concern
Can be used to throttle flow and control downstream pressure
Valves

**Globe Valve Parts**
- hand wheel
- bonnet
- stem
- stuffing box
- back seat
- disc
- seat

**Ball Valve**
- Used as isolation valves
- Minimal head loss
- Not used to throttle flow
- Fully open/shut with ¼ turn

**Ball Valve Parts**
- stem/operator
- ball
- seat
Valves

**Butterfly Valve**
- Designed to start/stop flow
- High pressure throttling will damage disc
- Faster operation than gate valves
- Used primarily at pump stations and treatment plants

**Check Valve**
- Allow flow in one direction
- Used at pump discharges
- Foot valve is a special check valve on pump suctions
- Slamming check valve can cause water hammer, some are designed with restraints to limit slamming

**Check Valves**
- Swing Check
- Ball Check
- Cushioned Swing Check
**Pressure Relief Valve**
Used to prevent overpressure and dampen water hammer.
System pressure must overcome spring tension to open valve.
This type is used primarily on positive displacement chemical feed pumps.
Also used on water heaters and boilers.

**Pressure Reducing Valve**
Used to reduce pressure from a higher pressure zone in order to provide water to a lower pressure zone by throttling flow.
Pilot system automatically controls valve operation.
Valves

Altitude Valve
Used to control storage tank level
Single acting valves allow flow in one direction
Double acting valves allow flow in two directions

Valves

Air and Vacuum Relief Valve
Air in system can reduce flow as much as 15%
Automatically vents air at high points in the system
Allows air in to break vacuum in system to prevent pipe collapse while draining

Valves

New Service Tap
Known as a "corporation stop"
Usually a ball valve but could be a plug valve
Tapped with system pressurized to prevent contamination
Tapped at 45° angle down from top center of pipe to minimize air and sediment entry
Saddle used to prevent damage to pipe when installing the new valve
Hydrants and Valves

Valves

**Curb Stops and Boxes**

**Curb Stop**
- Main shutoff for water service
- Inverted plug valve or ball valve
- Leaks common when operating old connections

**Curb Box**

**Arch-style**
- Fits loosely over meter and curb stop
- Movement of box will not affect water line

**Minneapolis-style**
- Prevents misalignment by connecting to curb stop
- Damage to box may damage supply line

Review the lecture handout and then complete the quiz. This will help you remember the information we just covered.