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## Inspections, Compliance, Enforcement, and Criminal Investigations

### Common Values Used in Process Fluid Systems

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**DEPT. OF HEALTH, EDUCATION, AND  
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#### ITG SUBJECT: COMMON VALVES USED IN PROCESS FLUID SYSTEMS

During the course of an Establishment Inspection, an investigator is expected to identify the different valves employed in piping systems in order to properly evaluate the adequacy of the system as related to the process. 21 CFR 128b, for instance, requires use of certain valves, or similar, in certain applications when used in steam retort systems for thermal processing of low-acid canned foods. It is important that investigators are familiar with basic operating characteristics of these valves and are able to recognize physical differences so as to point out possible misuses to plant personnel.

The common valves that are encountered are:

#### Plug Cock Valves (Figure 1)<sup>4</sup>

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[\(image size 12KB\)](#)<sup>8</sup>

The basic design is similar to the old-fashioned wooden spigot. Full flow is obtained when the opening in the tapered plug faces in the direction of flow. When the plug is rotated a quarter of a turn, flow is stopped. Opening and closing is accomplished usually by applying a lever or a wrench to the plug stem. Plug Cock Valves are sometimes used in retort vent lines in the same manner as a gate valve.

#### Gate Valves (Figure 2)<sup>9</sup>

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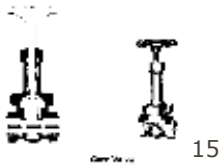
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[\(image size 32KB\)](#)<sup>13</sup>

Gate Valves are primarily designed to start or stop flow. Thus, they provide "free flow" service. In service, these valves generally are either fully open or completely closed. When fully open, the fluid or gas flows through the valve in a straight line with very little resistance to flow. This feature makes the valve ideal for use in vent lines of steam retorts, where rapid venting of air is so important to proper food processing. Gate Valves should not be used in the regulation or throttling of flow because accurate control is not possible.

### Globe Valves (Figure 3)<sup>14</sup>



(image size 28KB)<sup>16</sup>

Globe Valves are extensively employed for the control of flow and where positive shut-off is required. Close control over flow is readily accomplished. The change in direction of the fluid as it flows through the valve results in increased resistance to the flow. The positive shut-off feature is ideal for air lines of retorts which use air for pressure cooling. The Globe Valve can prevent air leakage into the retort during processing.

### Ball Valves (Figure 4)<sup>17</sup>

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(image size 28KB)<sup>21</sup>

Ball Valves are quick opening, needing only a quarter turn from full open to full close. Because of their smooth, full opening port, they also exhibit a negligible pressure drop. Ball Valves are nonsticking and, with seats now almost universally made of plastic, a bubble tight closure can be obtained. The Ball Valve is also excellent for use in pressure cooled retort applications.

The most difficult recognition to attempt will be that between the Gate Valve and the Globe Valve. Figures 2 and 3 provide illustrations and cutaway drawings of the respective valves. If the valve were not installed in the plumbing, identification would be quite simple, for only a peek through either port opening would be sufficient. Such is not the case in the great majority of experiences in the field; therefore, certain exterior features must be observed. The body of the Globe Valve is always distinguished by the bulbous or global shape, hence the origin of its name. The Gate Valve may also have a somewhat bulbous body shape but not to the degree of the Globe Valve. This is where some difficulty may be encountered. The Gate Valve is further characterized by the greater body dimension between the centerline of the ports and the union bonnet ring. This is necessary to provide a recess for the sliding shut-off wedge which is retracted upward to allow flow.

For further information call (301) 443-3340.

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