WAFER CHECK VALVES

INTRODUCTION

Wafer check valves include balanced-clapper and butterfly check valves and come in several designs. The valve body of these check valves may be fabricated from either bronze or iron (malleable, cast or ductile). The balanced-clapper check valves, designed with an off-center post and single clapper, and butterfly check valves, designed with a center post and a bi-parting clapper, are listed by Underwriters Laboratories (UL) under the “check valve” category. They are also approved by FM Global (FM) as “antiwater-hammer check valves” specifically for fire pump discharge use. FM also approves single disk check valves.

Wafer check valves have no end connections and are installed between two flanges. Since these check valves take up less space in the pipe line and are somewhat more economical to install than a conventional swing check valve, some sprinkler contractors advocate their use. Because of their smaller streamline design, valve clearance may present corrosion issues and obstructions if used in a non-potable water supply.

The non-slamming characteristic operation of these check valves is obtained by having the single off-center pivoted clapper (see Figure 1), by having spring-loaded bi-parting clappers (see Figure 2) that close slightly before reversal of the water flow, or by cushioning the movement of the disk with a specially designed spring which controls the valve closure. (See Figure 3).

POSITION

Balanced-clapper check valves, butterfly check valves and disk check valves are acceptable if they are:

- Listed by a recognized testing laboratory for fire protection service;
- Used in fire pump discharge piping installations in which the non-slamming feature is necessary (do not install in pump suction piping);
- Used with potable water supplies and pumper connections;
- Accessible;
- Easily removed for inspection and servicing.

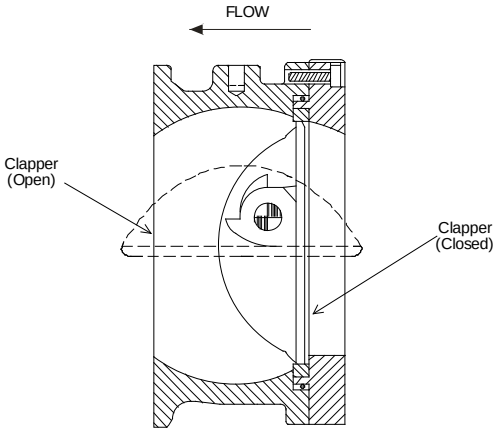

Figure 1. Balanced Clapper Valve
(side view)

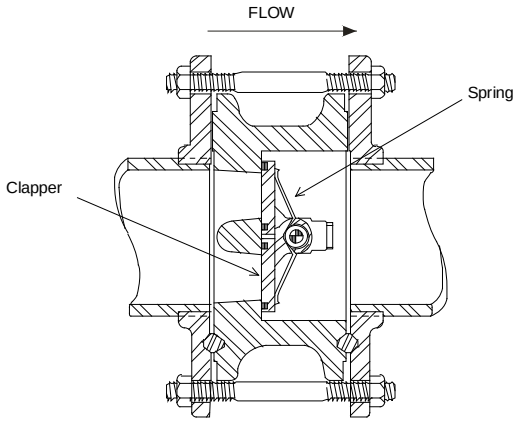

Figure 2. Butterfly Check Valve
(top view)

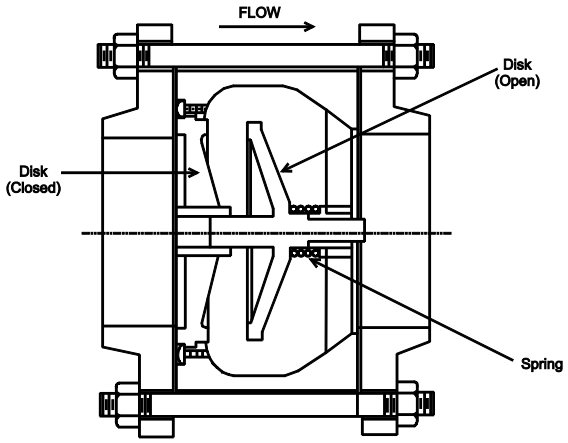

Figure 3. Spring-Loaded Disk Check Valve
(side view)

DISCUSSION

UL lists valves of this type in UL 312. Some of the highlights of the standard include:

- The valves require a minimum clearance of ½ in. (12.7 mm) between the clapper and the body of iron-bodied valves, or ¼ in. (6.4 mm) for bronze-bodied valves. These clearances anticipate their use with potable or clean water supplies. The center post might become a point of obstruction by water-borne debris.
- Check valves weighing more than 60 lbs (27 kg) require an access cover, lifting lug or an eyebolt to facilitate servicing.
- Do not install in pump suction piping.

The in-stream design of the clapper results in a higher friction loss than the swing check valve more conventionally used in fire service.

Cast-iron bodies tend to tuberculate, particularly when there is frequent water turnover such as in a city water connection. Any design with minimal clearance between clappers and body could lead to early failure of a cast-iron bodied valve under such action.

Wafer type valves can be inspected or serviced only by removing the entire valve body from the pipe line. The use of swing check valves with an access cover is recommended in below-grade pits because of the potential difficulty of removal and reinstallation when inspection and cleaning are

performed. The rigidity of the pipe system and close quarters in pits make flange spreading and gasket insertion more difficult. This could result in prolonged impairments unless there is flexibility in the attached pipe lines.

Balanced-clapper check valves and butterfly check valves equipped with grooved couplings permit easier removal. Otherwise, a flanged elbow located near the check valve can be instrumental in removal.

Where check valves of this type are designed for removal from the pipe for inspection and maintenance, pre-fabricate a properly sized spool piece and store it in an accessible location for use during the procedure.