

SLUICE GATES

1. General. Sluice gates installed at drainage structures through a levee or floodwall should be designed and the appropriate gate utilized to be capable of sufficient seal. The gate operator should be able to operate the gates with floodwaters approaching the top of the levee. Gates, gate frames, operators, guides, and stems should be designed and selected for each drainage structure. Installation should be in accordance with the manufacturer's instructions.

2. Design and selection criteria. The following criteria should be used in the design and selection of a sluice gate system.

2.1. The most commonly used specification for sluice gates used in water and wastewater treatment plants is AWWA C501. It is strongly recommended this specification be used as guidance for selection of the gates, operating equipment and associated hardware.

2.2. Gate, frame, stem, guides, wedges fasteners and associated miscellaneous hardware should be fabricated from materials, which will provide a minimum service life of 30-years. A determination should be made as to the corrosiveness of the sewage (where applicable). It is recommended that the gate manufacturer be contacted as to what types of testing should be performed in order to accurately assess the condition of the sewage (where applicable). If severe corrosion conditions are present, stainless steel components (i.e. gate (disc), frame, guides, etc.) are available and should be considered. With the water quality of the sewage (where applicable) known, the manufacturer should be able to determine if stainless steel components are needed. Normal construction materials are cast iron for the frame, gate, and guides. Wedges, thrust nut, lift nut, and couplings are bronze castings. Seat facings are extruded bronze. Stems and fasteners are stainless steel. Adjusting screws and some special fasteners are bronze.

2.3. The gate should be capable of withstanding the seating, unseating, and operating heads. A seating head and an unseating head equal to the difference between the top of levee elevation and the closed gate elevation should be used in design. All components should be adequate to withstand all stresses encountered during installation or operation without breakage or deleterious deformation.

2.4. Each gate should meet leakage requirements of the AWWA. AWWA specifications maintain that leakage under seating head should not exceed 0.1 gpm per foot of perimeter. Under the design unseating heads, leakage should not exceed 0.2 gpm per foot of perimeter. It is recommended that each gate be equipped with adjustable wedges. Wedges allow for gate adjustment and control of leakage. Wedges are typically used on both upstream and downstream sides of the gate and are also available for the top and bottom of the gate.

2.5. Installation of the gate and operator should be in accordance with manufacturer's recommendations. The best method of mounting a sluice gate is to an embedded wall thimble. The second choice is to a flanged pipe. The flange must be true in order to provide a proper sealing surface. If a flange is to be welded to an existing pipe in the field, in-place machining of the flange will more than likely be required after completion of the welding process. Warping of

the flange is almost certain due to the heat associated with the welding process. If there is no existing thimble or flanged pipe, gates are available that mount to a concrete wall.

2.6. The operating stem and floorstand operator should be sized by the manufacturer of the gate. If possible, use of a non-rising stem operator should be avoided. Proper sizing is a must in order to provide proper operation of the gate during all load conditions. The amount of effort to be used to operate the floorstand should be known. A force of 40 pounds on the handwheel or crank is typically used as design criteria for the maximum effort case (water level at top of levee). It is required that the floorstand operator be equipped with a "gate position indicator".

2.7. Stem guides should be adjustable in two directions to provide full adjustment for proper alignment of the stem. The guides should be anchored with not less than 4-bolts. Guides should be spaced per manufacturers' recommendations. The l/r ratio of the unsupported length of column should not exceed 200.

3. Prior to installation of replacement gate systems, the design and the proposed gate systems along with the installation procedure should be submitted for review.