WACO Environmental Products

WACO 6600 Series Specification- Fabricated Aluminum Slide & Weir Gates

General

The fabricated 6061-T6 aluminum gates shall be Series 6600 as manufactured by WACO Products, Inc., Baltimore, Maryland or equal. Gates shall be furnished with all necessary accessories and parts for a complete installation and shall be the latest standard product of a manufacturer regularly engaged in the production of equipment of this type. All gates shall be furnished by the same manufacturer. Upward opening gates shall be designated “slide gates” and downward opening gates shall be designated as “weir gates”.

Design

Except as otherwise indicated by this specification, all gates will be designed and manufactured to meet or exceed all AWWA Standard C562, most current edition, including, but not limited to, those defining: allowable leakage, head and loading calculations, structural strength, deflection requirements, and material specifications including minimum dimensions.

Structural components shall have a minimum design safety factor of 4 with regard to ultimate tensile, compressive, and shear strength and a minimum safety factor of 2 with regard to tensile, compressive, and shear yield strength.

Slide Plate

The slide plate is to be fabricated from minimum 1/4” thickness 6061-T6 aluminum plate and shapes, reinforced as required to meet the engineer’s specified design head. Deflection under full design head will be no more than 1/720 of the span width of the gate.

Guide Frame & Bench

The guide frame is fabricated from minimum 1/4” thickness 6061-T6 aluminum extrusions and structural members to resist loads imposed by the design head. Additionally, any self-contained frame will require no additional reinforcing where it extends above the operating floor to support the operator.

The frame is fabricated to accommodate a one-piece Ultra High Molecular Weight Polyethylene (UHMW) bearing bar/seal. This bearing bar/seal is supplied mounted in the frame to reduce friction and wear between the slide/weir plate and frame faces, as well as to form the side seal seats to prevent leakage.

On self-contained frames the bench (yoke) to support the operator is formed by two back to back structural shapes, angles or channels as loading requires, which are welded or bolted to the guide frame to provide a rigid one-piece frame assembly. The bench shall be capable of supporting all loads imparted by the operator, and shall have a deflection under full design head operation of no more than 1/720 of the span width of the gate.

For non-self-contained frames, a fabricated pedestal of the same alloy as the frame is mounted on the operating floor or over-hung off of a wall at the operating level by means of an offset wall bracket. The pedestal shall be capable of supporting all loads imparted by the operator.

Invert

Slide gate: The slide gate frame invert shall be a flush-bottom design formed by a neoprene block installed within a groove with an integral keeper. The invert frame member shall be a one-piece 6061-T6 aluminum extrusion which forms a seating surface for the edge of the plate bottom, retains the neoprene invert seal, and forms a structural cross-member for the frame. The gate shall be installed so that the gate invert shall be flush with the channel invert in order to maximize flow and prevent fouling.

Weir gate: UHMW self-adjusting seals are attached to the invert frame which is welded to the guide frame sides across the bottom to form a continuous frame and seal assembly. The frame is mounted so that the gate invert is flush with the channel or port bottom. The flush-bottom design maximizes flow to that of the channel, or port opening.

Seals

All gate side frames, slide gate upper seals, and weir gate invert seals shall prevent leakage using a UHMW bearing bar/seal that requires no adjustment. Seal pressure shall be made constant automatically by means of an integrated round section nitrile member within a continuous extruded slot in the bearing bar/seal. The cord shall exert pressure on the UHMW away from the frame face and compressing the seal against the plate face. Leakage shall be limited to 0.05 gallons per minute per wetted foot of perimeter in either seated or unseated conditions.

UHMW polymer shall be made from black virgin resins with an ultraviolet inhibiting formula. The bearing bar/seal and cord can be replaced without dismantling or loosening any portion of the frame. Bearing bar/seal shall be held in place laterally by the frame construction and requires no bolts or fastened retainers. Access to seals shall be by means of a securing cap at the bench, allowing for service at the gate operating elevation.

Manual Operator

The standard gate operator will be a BS-1015 horizontal handwheel type mounted on a pedestal or benchstand unless otherwise specified. The bronze operating nut of the operator will be accurately machined to match the thread of the rising stem. Non-rising stems shall be used where specified, where overhead space is limited, or where mounting the operator in a floor box is required. The operating nut shall be supported by regreasable ball or roller thrust bearings top and bottom secured in an accurately machined cast aluminum or iron housing bolted to the bench or pedestal.

Where torque, operation (including dual stems) or space requirements dictate, bevel gear boxes with either a handcrank or handwheel shall be supplied in lieu of the standard operator. Bevel gear boxes shall have stainless steel input and/or output shafts, accurately machined gears supported by ball or roller bearings secured in an accurately machined cast aluminum or iron housing bolted to the bench or pedestal. An AWWA nut with or without a floor box will be supplied where t-wrench or portable actuator operation is required and may be a standalone input or an integral part of a crank, handwheel, or gear box.

Regardless of the manual operator used to meet the specification, the maximum effort on the handwheel, crank or AWWA nut is to be limited to less than a 40 lb. pull. The lift mechanism will be capable of withstanding an effort of up 200 lbs. or more without damage to the operator, stem or gate frame. Manually operated gates are to be supplied with adjustable stop collars as required to set the gate opening range. Where the size of the gate requires lift assist but the frequency of operation does not indicate use of a permanent electric operator, a portable electric or hydraulic operator with height adjustable floor stand or

bench mount will be supplied as specified.

Electric Operator Option

The slide/weir gate will be provided with an electric multi-turn operator incorporating integral limit switches to stop the gate plate in the desired open and closed positions. The operator will also have a torque limit switch to prevent damage to an obstructed gate. Operators can be specified for modulating function where required to maximize level or flow control. Electric operators shall be in accordance with ANSI/AWWA C542 “Electric Actuators for Valves and Slide Gates”.

Dual Operator

When the plate width exceeds twice the height or 60 inches, dual interconnected operators and stems are to be used. Operators for multiple stems will be linked with stainless steel shafts and couplings and can be manually or electrically powered.

Stems

Stem shall be of minimum 1½” diameter stainless steel rod with accurately machined Acme threads. Stem shall be designed for a safety factor of 2 based on a critical buckling compressive load calculated by the Euler Column formula where C=2 and assuming a 50 lb torque on the AWWA nut. A stem pocket shall be welded to the face of the stiffened side of the plate and to the uppermost stiffener. The stem shall fit within the slide plate stem pocket and be attached to the pocket by means of a stainless steel bolt capable of withstanding the full force of the operator stem under full design head.

Stem guides will be supplied to support the stem as required to meet the stem design criteria and shall be fabricated of the same alloy material as the gate and frame. Stem guides shall have bronze or UHMW bushings to reduce stem friction and wear as required by the installation. Stem guides shall be adjustable in multiple dimensions to allow for alignment with operator and gate stem nut. Guides will be mounted on the gate frame or installation wall as required to support and align the stem(s) properly.

Other Features:

All WACO Products gates are made to order from approved drawings and our standard designs can be customized to fit virtually any specific head, mounting, or operating condition. Special operating systems such as water hydraulic, pneumatic, and fluid hydraulic cylinders, modulating duty electric actuators, or custom controls for timing and/or sequencing operation are also available.

Quality:

WACO welders are independently certified to AWS standards, supervised by our own certified in-house inspector, and our designers, welders and gate fabricators have over 225 years of combined experience making exceptional flow control gates and related products. WACO gate designs are rigorously tested, including seal systems that have been 25,000 cycle tested in an abrasive slurry with no degradation in sealing performance.

Specifying Style:

To specify Series 6600 models, use the specifying grid by selecting the opening type and mounting style required. Where the installation may require a combination of frame types (i.e. embedded side frame with channel mounted invert frame) please call WACO Products Engineering Department for recommendations and model designation.

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