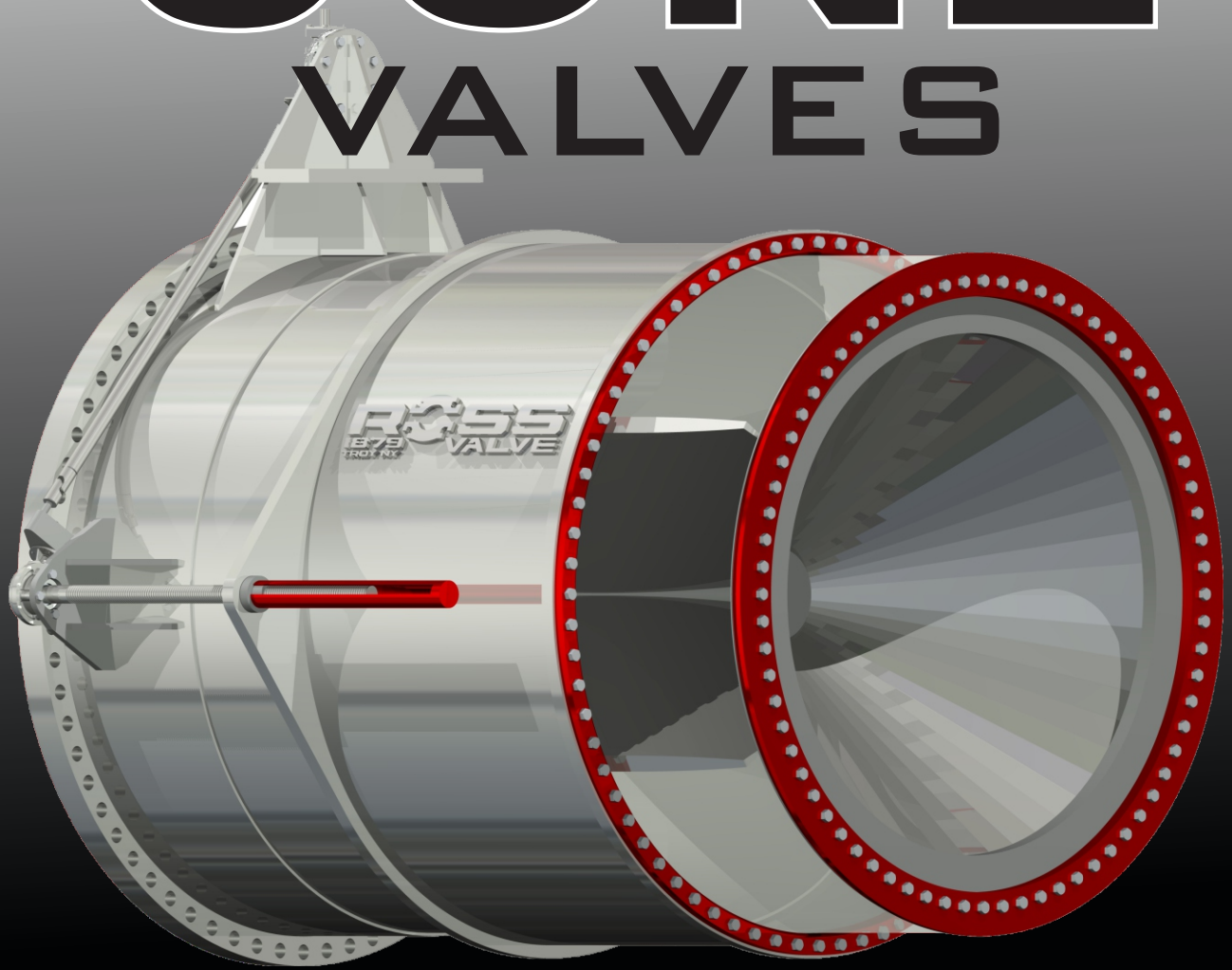
ROSS 1879 VALVE

FIXED CONE VALVES



FCV

FIXED CONE VALVE

ROSS 1879 VALVE P.O.BOX 595 TROY NY 12180 518.274.0961 WWW.ROSSVALVE.COM

ROSS - RCV

Rotary Cone Valve

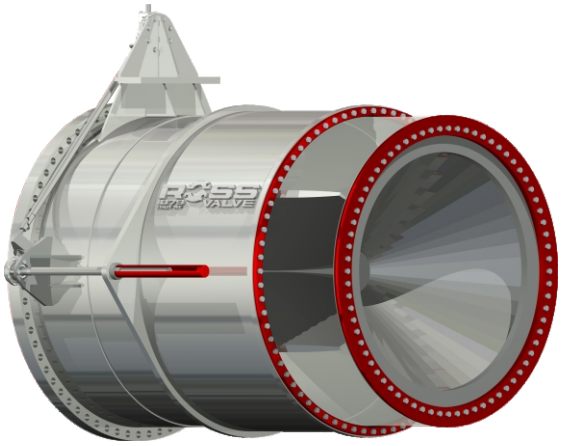
The New Standard **C**value.

ROSS CV

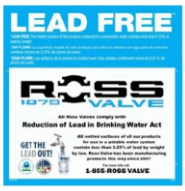
VALUE SINCE 1879

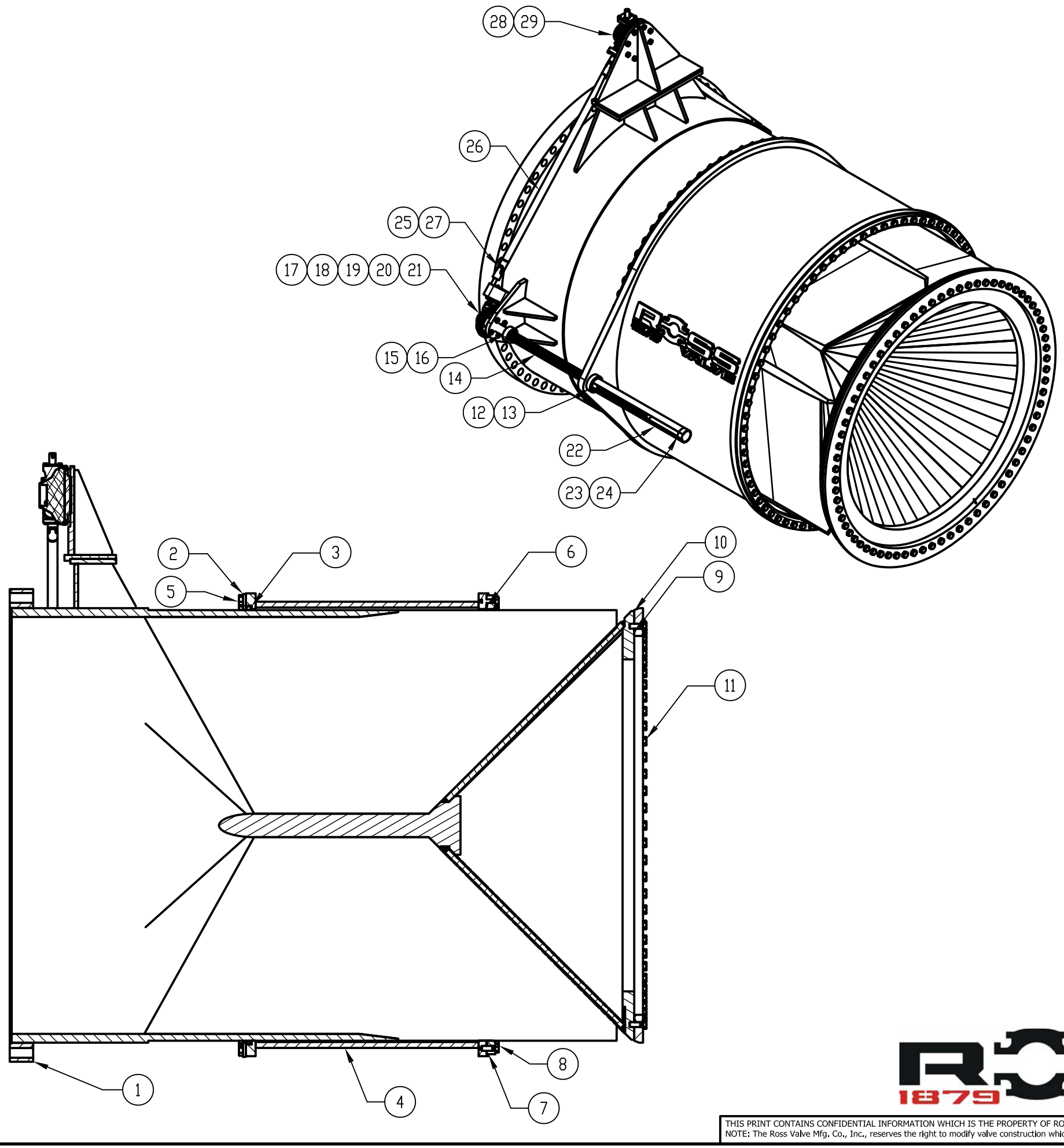
FIXED CONE VALVE (FCV)

FEATURES & BENEFITS



- **PRECISION CONTROL** over entire gate opening/closing stroke through the use of twin ACME threaded power screws. Significance of this? Able to precisely control and maintain flow at any gate opening/closing position from 1% open to full 100% open.
- **LONG LIFE** – Metal to metal stainless steel fully replaceable body & gate seats provides excellent sealing in closed and seated position with minimal drip tight leakage.
- **VIBRATION AND CAVITATION FREE OPERATION** – Totally symmetrical balanced rib & discharge cone design and construction. Significance of this? Results in vibration and cavitation free operation over entire gate opening/closing stroke.
- **MAINTENANCE ABSOLUTELY MINIMIZED** – Rugged design and construction results in maintenance absolutely minimized. Grease lubrication to critical twin ACME threaded power screws provided for ease of periodic maintenance.
- **DROP TIGHT SHUTOFF** – Long life metal to metal monel seating provides excellent sealing in closed and seated position with minimal drip tight leakage.
- **OPTIONAL HOODED CONSTRUCTION** – For purposes of containing fixed cone discharge, most fixed cone valves are provided with either discharge hoods integrally mounted to traveling gate OR separately mounted stationary hoods
- **UNIFORM FLOW PATTERN** – Fully circular uniform discharge flow pattern at all discharge openings.
- **PROVEN DESIGN** – To the extent possible, Ross Valve's FCV replicates the principal design, construction and functionality of the original fixed cone valve originally developed by USBR's Mr. C.H. Howell & Mr. H.P. Bunger, commonly referred to in the industry as a Howell-Bunger valve.





FIXED CONE VALVE (FCV)

BILL OF MATERIAL/MATERIAL SPECIFICATIONS

FIXED CONE VALVE ASSEMBLY

ITEM	QTY	DESCRIPTION	MATERIAL
1	1	BODY	STAINLESS STEEL - ASTM A240 304/304L/STEEL - ASTM A516 GR70
2	1	PACKING GLAND	STAINLESS STEEL - ASTM A276 304/304L
3	1	GATE SEAL	NBR/ NITRILE/ BUNA-N
4	1	GATE	STEEL - ASTM A516 GR70/BRONZE
5	A/R	CAPSCREW – HEX HEAD	STAINLESS STEEL 304
6	1	O-RING	NBR/ NITRILE/ BUNA-N
7	1	GATE SEAT/ SEAL RING	STAINLESS STEEL ASTM A240 304/304L
8	A/R	CAPSCREW - HEX HEAD	STAINLESS STEEL 304
9	1	O-RING	NBR/ NITRILE/ BUNA-N
10	1	BODY SEAT/ SEAL RING	STAINLESS STEEL ASTM A240 304/304L
11	A/R	CAPSCREW - HEX HEAD	STAINLESS STEEL 304
12	2	THRUST NUT	BRONZE - B584 C86300
13	16	CAP SCREW - HEX HEAD	STAINLESS STEEL 304
14	2	POWER SCREW	STAINLESS STEEL - ASTM A276 304/304L
15	2	STOP COLLAR	BRONZE - B505 C93200
16	4	SETSCREW	STAINLESS STEEL 304
17	2	KEY	STEEL - C1018 CF
18	2	BEVEL GEARBOX	
19	8	CAPSCREW- HEX HEAD	STAINLESS STEEL 304
20	2	LOCKNUT	STEEL - C1018 CF
21	2	SETSCREW	STEEL - GR8
22	2	POWER SCREW COVER	STEEL - ASTM A53/A106
23	2	GREASE FITTING	STAINLESS STEEL 304
24	2	POWER SCREW COVER CAP	MALLEABLE IRON
25	4	U-JOINT	STAINLESS STEEL 303
26	2	INTERCONNECTING SHAFT	STAINLESS STEEL - ASTM A276 304/304L
27	8	KEY	STEEL - C1018 CF
28	1	TRIPLE PINION GEARBOX	
29	8	CAPSCREW - HEX HEAD	STAINLESS STEEL 304

ROSS VALVE MFG. CO., INC.
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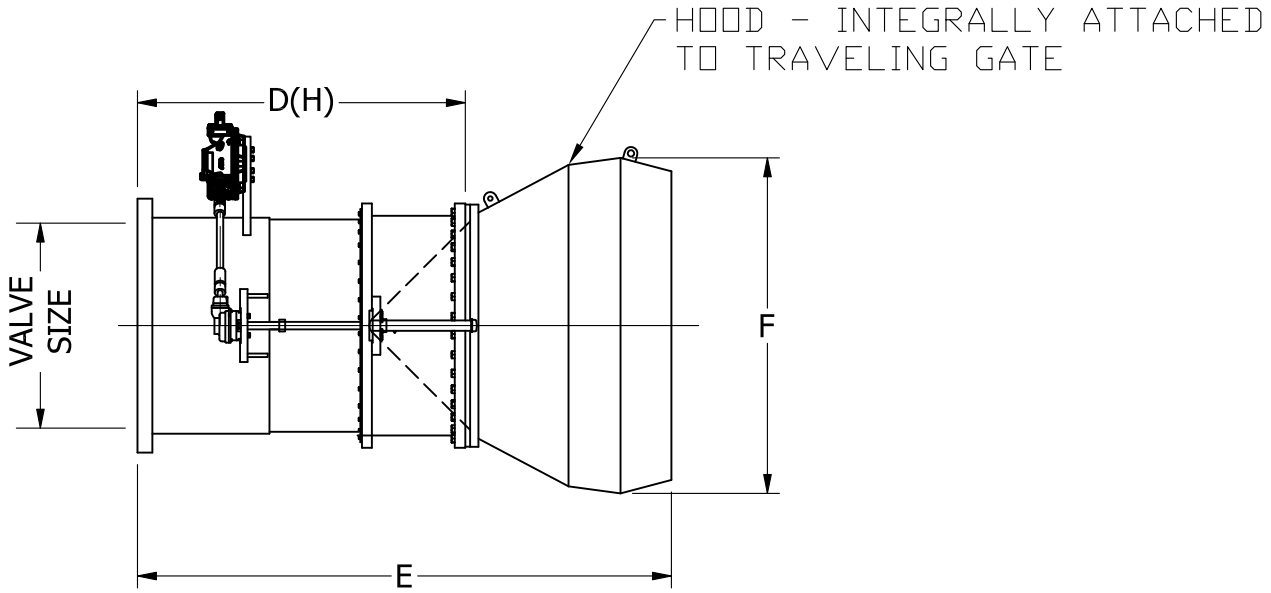
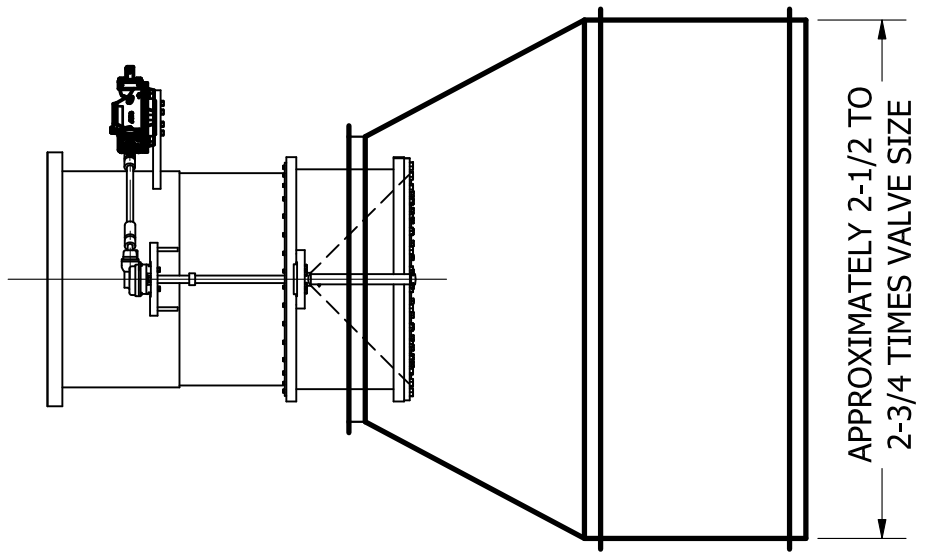
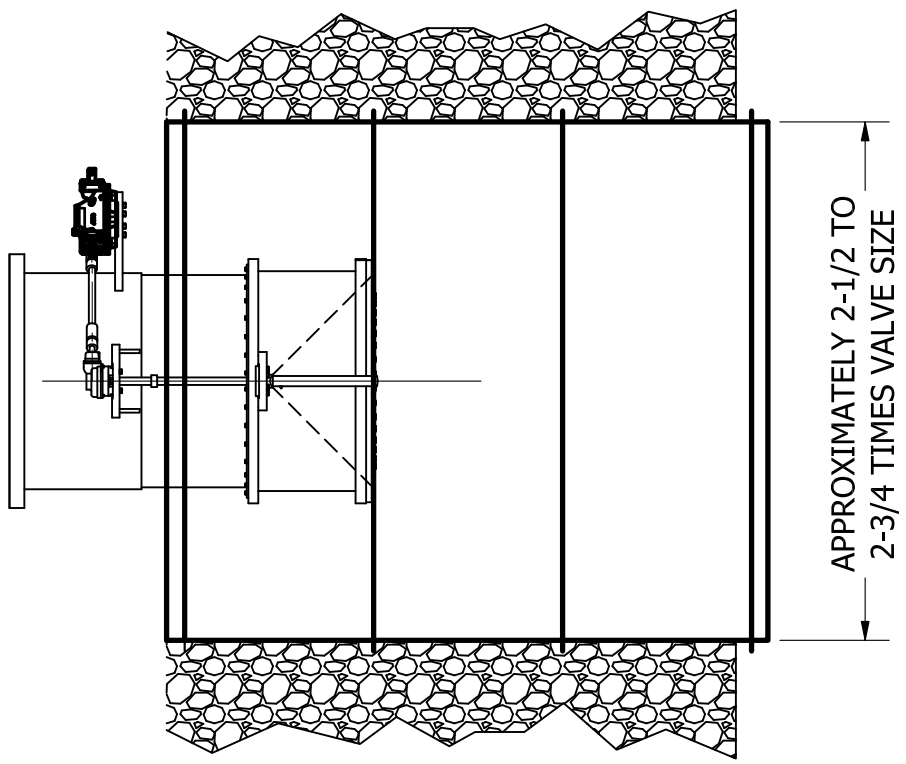
POST OFFICE BOX 595 - TROY, NY 12181 FAX (518) 274 - 0210
WEBSITE: www.rossvalve.com - E-MAIL sales@rossvalve.com

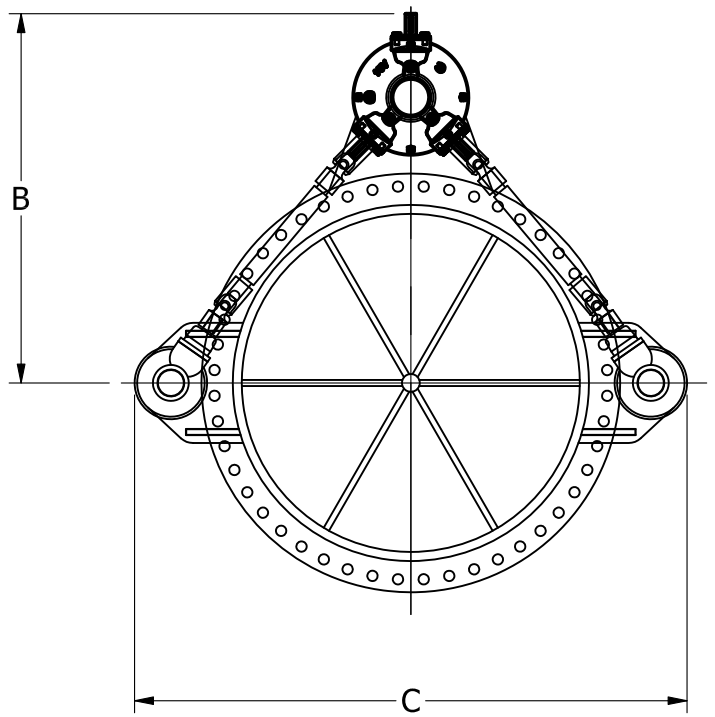
DRAWING: (FCV) FIXED CONE VALVE BOM | DATE 01/02/2015
BODY: FCV | NO SCALE | FIGURE -

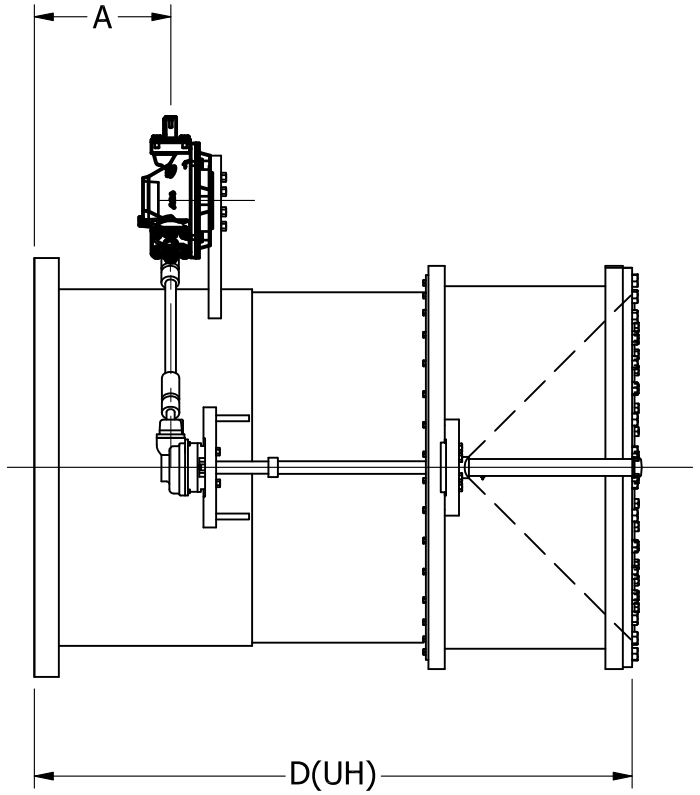
FIXED CONE VALVE (FCV)
BILL OF MATERIAL & MATERIAL SPECIFICAIONS











VALVE				UNHOODED	HOODED		
SIZE	A	B	C	D(UH)	D(H)	E	F
6	4 1/2	6 1/2	9 3/4	28	27 1/8	6	11
8	4 1/2	8 3/4	13	30	28 7/8	8	14
10	4 1/2	10 7/8	16 3/8	32	30 5/8	10	18
12	6	13 1/8	19 5/8	38	36 3/8	12	21
14	6	15 1/4	22 7/8	40	38	14	25
16	6	17 1/2	26 1/8	42	39 3/4	16	29
18	9	19 5/8	29 3/8	48	45 1/2	18	32
20	9	21 3/4	32 5/8	50	47 1/4	20	35
24	9	26 1/8	39 1/8	54	50 5/8	24	42
30	10 1/2	32 3/4	49	64	59 3/4	30	52
36	10 1/2	39 1/4	58 3/4	70	65	36	62
42	10 1/2	45 3/4	68 1/2	76	70 1/8	42	72
48	12	52 3/8	78 3/8	86	79 1/4	48	82
54	12	58 7/8	88 1/8	92	84 1/2	54	92
60	15	65 3/8	97 7/8	102	93 5/8	60	102
66	15	72	107 3/4	108	98 3/4	66	112
72	18	78 1/2	117 1/2	118	107 7/8	72	122
78	18	85 1/8	127 1/4	124	113 1/8	78	132
84	18	91 5/8	137 1/8	134	122 1/4	84	142
90	18	98 1/8	146 7/8	140	127 3/8	90	152
96	21	104 3/4	156 5/8	150	136 1/2	96	162
102	21						
108	21						
114	21						
120	21						
126	21						
132	24						
138	24						
144	24						
150	24						
156	24						
162	24						
168	24						

"LARGER SIZES AVAILABLE PLEASE CONSULT W/FACTORY FOR DIMENSIONAL INFO"

"USE DETACHED SEPARATELY MOUNTED HOOD"

ROSS VALVE MFG. CO., INC.
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DRAWING: (FCV) FIXED CONE VALVE DIM		DATE 01/02/2015
BODY: FCV	NO SCALE	FIGURE -

FIXED CONE VALVE (FCV)
DIMENSION CHART & SPECIFICATIONS

TYPICAL SUGGESTED SPECIFICATIONS
FIXED CONE DISPERSION VALVE (FCV) – UNHOODED

PART 1 – GENERAL

01.01 GENERAL

A. The Contractor shall provide (Qty?) (Size?)-inch diameter fixed cone valves in accordance with this specification, that meet the general design requirements set forth herein, and as indicated in the schedules included at the end of this specification.

B. Fixed cone valves shall be constructed of materials specified in Section 2 of this detailed specification.

C. The Contractor shall provide electric motor operated valve actuators as specified herein and as shown on the Contract Drawings.

D. The Contractor shall provide all the valves, wall sleeves, screws, shafts, gear boxes, for the fixed cone valves as specified and as indicated in the Contract Drawings. Each fixed cone valve shall be field tested by the Contractor under the design conditions specified herein and as indicated on the Contract Drawings.

01.02 GENERAL REQUIREMENTS

A. Manufacturers. Fixed cone valves shall be manufactured by Ross Valve Mfg., Co., Inc. or approved equal.A. provided with an electric motor operated valve actuator.

B. Manufacturers. Electric motor operated valve actuators shall be supplied by fixed cone valve manufacturer and manufactured by Flowserve (Limitorque), Rotork, AUMA, Emerson Process Management (EIM) or approved equal.

C. Fixed Cone Manufacturer must provide a complete system, including valve, actuator, controls, etc., and is responsible for ensuring that all system components are fully compatible and meet specification requirements.

01.03 GENERAL PARAMETERS

A. The valves shall be designed to operate and maintain any position between fully open and fully closed. They shall be free from detrimental vibrations. Each valve shall be provided with an electric motor operated valve actuator.

B. The valve shall be designed to close tight and shall operate without vibration or pitting under the specified design conditions. Design parameters for the valve shall be as follows:

1. FCV CENTERLINE ELEVATION (FT)
2. MAXIMUM RESERVOIR LEVEL ELEVATION (FT)
3. MINIMUM RESERVOIR LEVEL ELEVATION (FT)
4. MINIMUM NET AVAILABLE HEAD (FT)

(FCV 100% FULLY OPEN – MAXIMUM DISCHARGE)

5. MAXIMUM NET AVAILABLE HEAD (FT)

(FCV – MINIMUM DISCHARGE)

6. MAXIMUM REQUIRED DISCHARGE FLOW (CFS)

(FCV 100% FULLY OPEN – MINIMUM NET AVAILABLE HEAD)

7. MINIMUM REQUIRED DISCHARGE FLOW (CFS)

(FCV – MAXIMUM NET AVAILABLE HEAD)

8. MAXIMUM OPEN/CLOSE STROKE TIME (MIN)
9. MINIMUM OPEN/CLOSE STROKE TIME (MIN)

C. The valve shall be suitable for frequent operation and for operation after long periods of being idle. The valve shall be capable of operating under all head and flow conditions specified herein.

D. Opening and closure time for the ____inch valve shall be between 4 and 6 minutes.

E. The valve shall be ____inches in diameter and will be designed for discharges as noted in 1.03 B. The valve should be operable under a normal head of _____feet to ____ feet and a maximum head of____ feet. Performance curves shall be furnished for the valve showing the expected discharge rates in cubic feet per second for a reservoir level varying between elevations _____feet and _____ feet, with the valve opening varying from 10 percent to full open in increments of 10 percent. The valve shall be designated to fit into the available space as shown on the drawings.

F. The valve walls and vanes shall be designed using the guidelines presented in the report, "Vane Failures of Hollow-Cone Valves," by Albert G. Mercer, 1970, International Association for Hydraulic Research Symposium, Stockholm, paper G4. The design shall take into account the maximum flow condition as determined by the Contractor's valve discharge coefficient at any open condition, at any static head up to the maximum possible at the dam, and the head loss (HL) in feet in the pipeline between the valves and the reservoir. Each valve shall have a vibration parameter equal to or less than 0.115 based on the following equation:

$$\text{Mercer's Parametric Coefficient - C} = \frac{Q/(C_v \times D \times T_v)}{\sqrt{(E/\rho)}}$$

Taken from the above reference where;

Q = Maximum discharge, cfs

C_v = Coefficient depending on number of vanes and ratio of shell thickness to vane thickness

D = Nominal diameter of valve, feet

T_v = Vane thickness, feet

E = Young's modulus of elasticity, psf

ρ = Mass per unit volume, slugs/ft3

G. Each valve shall be complete with all parts and components specified and/or required for operation, installation, and maintenance including items and devices not specifically called for in these specifications but necessary to provide a complete and operational valve. Each valve will consist of the following main parts:

1. Valve body.
2. Valve gate which operates over the valve body.
3. Operating and driving mechanism.
4. Seals.
5. Upstream flange for mounting to upstream wall flange.

H. Furnish lifting eyes, lugs, and other attachments, as required, for handling and installation.

I. Contractor shall be responsible for reviewing the Specifications and Drawings, and furnishing equipment and equipment components that can be accommodated within these limitations. Contractor shall specifically note the size of the access openings in the valve structure for lifting/lowering the valves.

J. Detailed manufacturing production drawings shall be provided to the Owner upon completion of the project.

K. Operation Conditions. The valve shall be used to control and regulate the free discharge of water into atmosphere during releases. The valve will normally be pressurized. The leakage rate through the seats shall not exceed 0.4 oz/per minute per inch of valve diameter. The valves will be located outside as shown on the drawings. The valves shall be capable of withstanding temperatures in the range of -30o to 100o F as well as exposure to a wide range of weather conditions.

L. Description. The valves shall be designed to operate and maintain any position between fully open and fully closed. They shall be free from detrimental vibrations. Each valve shall be provided with an electric motor operated actuator directly mounted directly above the valve as shown on the Contract Drawings and shall be mounted on the bracket shown on the Contract Drawings.

01.04 DESIGN

A. Contractor shall assume full responsibility for the design, fabrication, manufacturing, inspection, shop testing, and furnishing of the fixed cone valves and electric actuators in accordance with the specifications and drawings. The design and fabrication of all valves shall be by the same company. The design stresses and factors of safety used throughout the design shall be proven in practice and the design stresses shall be equal to or lower than specified herein.

B. The maximum unit tensile or compressive combined stress in any material under the worst case condition, except where otherwise specified, shall not exceed 33 percent of the minimum yield strength or 20 percent of the minimum ultimate strength required by the applicable specification for the material. Maximum shear stresses shall not exceed 60 percent of the allowable stress in tension, except that maximum torsion shear stress in shafts shall not exceed 50 percent of the allowable stress in tension. Confirmation of the design criteria shall be submitted.

C. Each valve shall be used to control and regulate the free discharge of water into atmosphere during releases. The valves will normally be pressurized by the available reservoir head. The leakage rate through the seats shall not exceed 0.4 oz./per minute per inch of valve diameter. The valves will be located outside of the valve chamber and exposed to the atmosphere in the stationary hood part of the Valve Chamber, as shown on the drawings. The valves shall be capable of withstanding temperatures in the range of -30°F (-34°C) to +120°F (+49°C) as exposure to a wide range of weather conditions.

PART 2 – DETAIL – PRODUCTS

2.01 VALVE CONSTRUCTION

A. Valve Body. Each valve body shall consist of a cylinder, a fixed internal deflector cone on the downstream end, internal radial vanes and an upstream flange for attachment to a flanged pipe spool piece. The internal vanes and deflector cone shall extend beyond the downstream end of the valve body cylinder a sufficient distance to permit the rated discharge capacity and to eliminate the possibility of the flow control point shifting from the end of the sliding valve gate onto the end of the body cylinder. The vanes shall be of constant thickness through the waterway and their leading edges shall be contoured to eliminate vibrations and shall be stainless steel, not less than 1/8” thick. The thickness of the radial ribs shall be designed based on the Mercer coefficient, but shall not be less than 3 percent or more than 5 percent of the valve inside diameter. The vanes for the fixed cone valve shall be oriented such that there are no vanes in the vertical plane.
The sealing and sliding surfaces of each valve body shall be stainless steel. Bearing surfaces of the body upon which the valve gate will slide shall be stainless steel.
Each valve flange shall be structurally adequate to support the entire valve assembly under all conditions of operation when bolted to the companion flange. The valve body flange shall be drilled to AWWA C207, Class E dimensions. Flanges shall be flat faced and finished to true plane surfaces within a tolerance limit of 0.005 inch. Each finished face shall be perpendicular to the longitudinal axis of the valve within a maximum angular variation tolerance of 0.002 inch per foot of flange diameter. Flange faces shall be provided with an O-ring groove. O-rings shall be provided.

B. Valve Gate. Bearing surfaces on the gate which slide upon the valve body shall be bronze to provide a stainless steel on bronze sliding contact bearing surface. The gate cylinder shall be sufficiently flanged or ribbed to provide both rigidity and a place for mounting the operating screw stems and the threaded nuts.

C. Lifting Support. Furnish lifting lugs for connection to crane hook to allow for installation.

D. Seating Surfaces. The valve body shall have a removable stainless steel seat attached with gasket and stainless steel bolts to the downstream end of the valve body.

The downstream end of the gate shall be provided with a replaceable stainless steel seat, machined to a contour to provide a satisfactory hydraulic profile. The upstream end of the gate shall be machined to receive a U-shaped packing or other appropriate seal shape which has demonstrated long-term successful operation to seal between the gate and the valve body. The seal shall always slide upon a stainless steel surface finished for long seal life. The seal shall be retained with a bronze or stainless steel gland and fasteners.

E. Required Material Standards for Major Components. Materials used in the manufacture of the fixed cone valves shall be as follows:

Body Inlet Flange	Steel, ASTM A516 GR 70
Body Cylinder Tube	Stainless Steel, ASTM A240, Type 304304/L
Body Ribs/Vanes	Stainless Steel, ASTM A240, Type 304/304L
Body Nose Cone/End Flange	Steel, ASTM A516 GR 70
Gate	Steel, ASTM A516 GR 70
Power Screw Stems	Stainless Steel, ASTM A276, Type 304/304L
Body/Gate Seat (Seal) Rings	Stainless Steel, ASTM A240, Type 304/304L
Thrust Nuts	Bronze, ASTM B584, C86300

F. Certified Material Test Reports (CMTR's). Certified material test reports indicating physical and mechanical properties and heat treatment (as applicable) shall be furnished for all major components as identified by the Engineer.

Traceability to original heat numbers shall be maintained for all major valve and actuator components noted in 2.01 E above. All such components shall be traceable to the original heat and/or lot numbers in accordance with the material traceability requirements of ISO 9001, unless otherwise approved.

G. Operating Gear Unit. The operating gear unit for each valve shall consist of two threaded nuts, two jacking screw stems, two bevel gear reducers mounted to the valve body, 1 triple pinion bevel gear box, drive shafts and one vertical shaft extending into the actuator mounted above the valve. Operating shafts shall not extend through the waterway. The threaded nuts shall be made of bronze and shall be machined and drilled on their bases for bolting to the upstream end of the gate at points diametrically opposite each other on the centerline of the valve. They shall be accurately threaded to fit the jacking screw stems.

The jacking screw stems shall be made of rolled or cut ACME threaded stainless steel and shall extend from the bronze nuts, mounted on the upstream end of the valve gate, into the bevel gear reducers mounted on the valve body. A means for adequate grease lubrication of the screw stems shall be provided. The equipment shall be designed to be located in a wet environment. The screw shall be designed such that if the gate encounters additional forces when operating, the operator will trip out on overload protection and the means of retaining the screw to the bevel gear will not fail.

A coated steel or stainless steel pipe cover shall be provided on the valve gate to enclose the jacking screw stems when the gate is opening. These covers shall be enclosed on one end and shall be threaded on the opposite end for screwing into a tapped hole in operating nuts. The pipe covers shall be equipped with button head grease fittings to supply grease to the screw stems.

The bevel gear reducers shall consist of coated steel or cast iron housings suitable for a wet environment, with gaskets or "O"-ring seals. The gears and bearings shall be designed for operation in grease at the specified minimum temperature, and the necessary lubrication parts and fittings shall be provided.

The triple pinion bevel gear box shall consist of cast-iron housing and cover plate enclosing the three machine-cut steel bevel gears for the transmission of torque from the operating equipment into the bevel gear reducers and screw stems. Each bevel gear shall rotate on a ball thrust bearing. Two of the bevel gears shall be keyed on the bevel gear shafts rising obliquely from the bevel gear reducers and one miter gear on the lower end of the shaft extending down from the operating equipment. The triple pinion bevel gear box shall be watertight and shall be machined and drilled on its base for mounting on the top of the valve body and shall be aligned in the same plane normal to the axis of the valve as the bevel gear reducer.

All shafts connecting the gear reducers and the actuator shall be made of stainless steel, and shall be provided with all necessary universal joints and/or couplings and coupling bolts, to facilitate ready dismantling of the operating gear units and the actuator. All universal joints, couplings and fasteners shall be stainless steel.

3.01 ELECTRIC MOTOR OPERATED VALVE ACTUATOR.

A. General Requirements.

1. The actuator shall be for modulating service suitable for use on a nominal 480 Volt, 3 phase 60Hz power supply and shall incorporate a high torque motor, worm gear reduction, absolute position encoder, electronic torque sensor, mechanically and electrically interlocked integral reversing starter, with thermal overload protection, local control facilities, and terminals for remote control and indication connections. The actuator shall operate the valve to the specified flow rate range when subjected to the maximum operating pressure at the rate presented in the Fixed Cone Valves Schedule. Actuator shall be as specified herein and capable of holding the valve in any position from fully closed to fully open without drift. Operating torques and loads shall be provided by the Fixed Cone Valve manufacturer and coordinated with the actuator manufacturer for actuator sizing. Valve manufacturer shall furnish the valve and actuator as a unit.

2. Front panel of enclosure shall be fitted with Local/Off/Remote pad-lockable selector switch, Open/Close 110VAC indication lamps, and OPEN/CLOSE/STOP pushbuttons. Control logic for the indication lamps will be derived from control relays internal to the actuator.

3. A local mechanical position indicator shall be included, along with a potentiometer for remote position indication. Valve position shall be sensed by an 18 bit optical encoder and displayed in 1% increments in a LCD window. Remote position indication shall be via a 4-20mA proportional signal

4. It shall be possible to carry out the setting of the torque, turns, and configuration of the indication contacts without the necessity to remove any electrical compartment covers or additional tools. Additionally, diagnostic information shall be available from an actuator-mounted display window with a non-intrusive means of reading and writing data to the actuator. Non intrusive half duplex communication shall be possible to facilitate the downloading of actuator set-up characteristics.

5. The actuator shall be capable of functioning in an ambient temperature ranging from minus -30°F (-30°C) to +120°F (+70°C).

6. Hydraulic or pneumatic actuators in lieu of electric motor/gear mechanical type actuators will not be acceptable.

7. Actuators shall be IQ as manufactured by Rotork Controls, Rochester, New York 14621, or MX as manufactured by Flowserve (Limitorque) Corporation, Lynchburg, VA, 24506, SA as manufactured by AUMA Actuators Inc., Canonsburg, PA 15317, TEC or M2 CP as manufactured by ElM Missouri City, Texas, 33619, or approved equal.

B. Operating Requirements.

1. The electric motor actuator shall be designed for modulating service at the rate specified in the Fixed Cone Valve schedule. The actuators shall be designed to operate the valve, with or without secondary gearbox as required for specific valve application, at the maximum static pressure (74 psi) as well as the rated valve operating design head during maximum flow rate as specified in the Fixed Cone Valve schedule.

2. The actuator shall be sized to guarantee valve opening and closure at the valve rated differential pressure plus safety factor as specified in A WWA C542. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10% below nominal.

C. Mechanical Requirements.

1. Actuator shall be of the self-locking worm gear type, 0-ring sealed and lubricated for underground service and watertight to IP68 7 meters-72 hours, NEMA 6P. All external hardware shall be made of Type 316 or Type 630 stainless steel as approved.

2. Calculations shall be submitted to the Engineer to substantiate the selection of, and for approval of the proposed actuator. These calculations shall be readily checkable and detailed. A computer printout of just the critical torque values will not be acceptable.

3. Gearing- The actuator gearing shall be totally enclosed in an oil-filled gear case suitable for operation at any angle. Power transmission shall be completely bearing supported and consist of a hardened alloy steel worm and bronze alloy worm gear. All other gears and components associated with the primary output drive shall be manufactured from appropriate alloy steels. For rising stem valves, a bronze removable thrust bushing (stem nut) shall be provided to accept a rising stem. A thrust base attached to the bottom of the actuator shall incorporate thrust bearings of the ball or roller type and the design should be such as to permit the gear case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service. Food grade gear oil shall be used to lubricate the gear case.

4. Hand wheel - A manual hand wheel with a 2 inch square drive nut and requiring no more than 40 lbs. rim pull to operate valve at the maximum operating pressure shall be provided for manual operation. Hand operation shall be engaged using a hand/auto selection lever with the drive being restored to power automatically by starting the motor. The local/remote hand/auto selection lever shall be pad lockable in both "local" and "remote" positions. It shall be possible to select hand operation while the actuator is running or start the actuator motor while the local/remote selection lever is locked in "local" without damage to the drive train.

4.01 FACTORY SHOP SURFACE PREPARATION, PAINTING AND COATING.

A. Shop Painting and Coating. All interior and exterior ferrous metal surfaces, except seating and machined surfaces and stainless steel, bronze, or PTFE components of valves and accessories, shall be prepared for coating by blasting to a “Near White Metal Finish” per SSPC-SP10. These surfaces shall then be coated with a two- part thermosetting polyamide epoxy in two or more uniform coats to a minimum dry film thickness of 10 mils. Epoxy coating shall conform to AWWA C550 and shall be TNEMEC's Pota-Pox™ Plus Series N140F, or pre-approved equal. Color shall be red.

B. Cleaning, surface preparation, coating application, and thickness shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations. When equivalent products are acceptable to the Contracting Officer or designated representative, Contractor shall comply with this specification and the coating manufacturer's recommendations.

C. Surfaces shall be free of cracks, pits, projections, or other imperfections that would interfere with the formation of a smooth, unbroken coating film. Surfaces of welds shall be scraped and ground smooth and blended. All weld spatter and slag shall be removed.

D. Coating shall be applied in a neat manner that will produce an even film of uniform and proper thickness, with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be thoroughly dry and hard before the next coat is applied. In no case shall coating be applied at a rate of coverage greater than the maximum rate recommended by the coating manufacturer.

E. Coatings showing sags, checks, blisters, teardrops, or fat edges will not be accepted and the non-conformity shall be entirely removed and the area of the non-conforming surface recoated.

F. Edges, corners, crevices, welds, and bolts shall be given a brush coat of primer before application of the primer coat. Special attention shall be given to filling all crevices with coating. Flange faces shall be shop coated with a rust preventive compound.

G. Coating Test. The valve interior linings shall be tested at the factory with a low-voltage (22.5 to 80 volts, with approximately 80,000 ohm resistance) holiday detector, using a sponge saturated with a 0.5 percent sodium chloride solution. The lining shall be holiday free.

H. A minimum of five spot measurements shall be taken in a given area to assure proper coat dry film thickness. The average of these measurements shall not be less than the specified thickness. No single spot measurement shall be less than 80 percent, nor more than 120 percent, of the specified thickness.

I. Areas found to have insufficient film thickness or imperfections, such as runs, bridges, shiners, or laps, shall be cleaned and recoated with the specified paint material to obtain the specified coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges, then prime and finish coat in accordance with the specifications.

5.01 FACTOY SHOP TESTING REQUIREMENTS

A. General. The valves and actuators shall be fully assembled and tested in the shop prior to shipment.

Contractor shall furnish all necessary labor, material, and equipment, including test bulkheads, water, pumps, piping, and calibrated pressure gauges and other measuring instruments.

For all testing, the valve, together with the operating mechanism and actuator, shall be completely assembled and set up in the shop in the approximate position it will assume in service.

B. Hydrostatic Test. The valve body shall be tested under an internal hydrostatic pressure equal to 150 percent of the maximum static head for a period of not less than 30 minutes.

Pressure sealing bulkhead(s) shall be bolted to the valve flange(s) using the gasket(s), in such a manner that the valve body between the flange and the conical deflector will be in tension during the hydrostatic test for the fixed-cone valve.

No external restraints will be allowed to hold the fixed-cone valve seated; however, a soft gasket may be used between seating surfaces to hold the internal pressure during this test of the fixed-cone valve.

There shall be no leakage from any part of the valve except the valve seats.

C. Leakage Testing. For the leakage test, the completely assembled fixed-cone valve will be closed, using only the electric actuator and the torque and limit switch at the normal settings. Internal hydrostatic pressure equal to the maximum static head shall be maintained during this test for 15 minutes, during which time the leakage through the seat shall not exceed 0.4 fluid ounces per minute per inch of valve diameter. No leakage will be permitted through the packing gland(s).

D. Shop Performance Testing. After completion of the hydrostatic pressure test, the valve shall be operated under a no-flow condition, from the fully closed to the fully open position, and back to the fully closed position a minimum of 3 cycles. During the test, the valve shall operate satisfactorily, showing no evidence of galling or wear at any friction point, and all moving parts shall be checked for proper operation, as well as the valve closing time.

E. Witness Testing. A technical representative of the Contracting Officer shall witness shop tests of the fixed-cone valve except the coating test. Contractor shall notify the Contracting Officer at least 14 days in advance of the time that the shop tests will be conducted. The number of shop test periods shall be minimized, and approved by the Contracting Officer or designated representative, in consideration of the required valve delivery schedule.

6.01 INSTALLATION AND FIELD TESTING

A. Valve Installation. The new Fixed Cone Valve will be installed as directed by the valve manufacturer and shall fit onto the existing wall flange. All materials required for the fixed cone valve installation shall be supplied by the Contractor. The manufacturer's suggested installation procedure shall be submitted for approval including the torque specifications and procedure for the mounting flange bolts.

B. Valve Field Testing. Valve field testing will be performed in accordance with Contractor's instructions and recommendations. The minimum requirements for field testing are as follows:

1. Testing Valve in the Dry
   a. Operate each valve manually, in the dry, at least three times before watering up the pipeline.

   b. During the dry tests, take motor amperage readings and make electrical continuity checks during the operation and check the proper setting and function of the open and closed limits.

   c. Water up the individual conduit.

   d. Check for any leakage through the valve seals. Make any necessary repair or adjustments.

2. Valve Testing Under Watered Conditions

   a. Operate the valve through a minimum of three opening and closing cycles.

   b. Continue to monitor motor amperage and check for smooth operation of the valve operating mechanism and limit switches during the operating cycles.

   c. Note any vibration at any of the opening and closing positions, if any.

   d. Verify any seal leakage after each closing sequence.

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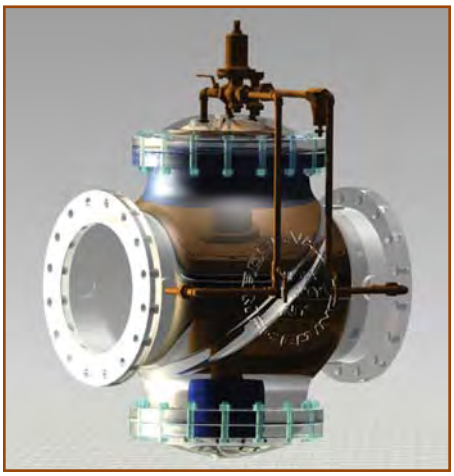

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ROSS 1879 VALVE

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