Rodney Hunt

A ZURN *Company*

Fixed Cone Valves

Howell-Bunger® and Ring Jet Valves

Fixed Cone

Valves

Rodney Hunt Howell-Bunger® Valve:
Over Half a Century of Dependable Service

The Rodney Hunt Howell-Bunger® (fixed cone) valve manufactured today is remarkably similar to the first designs introduced by C. H. Howell and H. P. Bunger in 1935. Their first units were two 48" valves installed at El Vado Dam in Charna, New Mexico. Shortly thereafter, the S. Morgan Smith Company obtained the patent rights and proceeded to further develop these valves. The S. Morgan Smith Company was purchased by Allis-Chalmers Corporation in 1959 and subsequently the Valve Division of Allis-Chalmers was purchased by AC Valve in 1988. In 1990 Rodney Hunt Company acquired all product lines of AC Valve, continuing the design established by Mssrs. Howell and Bunger in 1935. As of 1978, over 250 Howell-Bunger® Valves had been built and were successfully installed in applications ranging from an 8" valve with 1400' of head, to a 108" valve with 471' of head. The largest Howell-Bunger® Valve built to date is a 112" valve with 209' of head. The Howell-Bunger® Valve has been the valve of choice where easy control of water flow under free discharge is demanded.

Located in Orange, Massachusetts, Rodney Hunt facilities include a modern foundry, advanced fabrication and machining areas, complete hydraulic actuation capabilities, and hydrostatic test facilities. Design expertise and a commitment to ongoing technological developments help Rodney Hunt achieve outstanding levels of quality and value in every project. Rodney Hunt Company is an international leader in the design and manufacture of cast and fabricated gates, valves, and actuation equipment for liquid control applications. Founded in 1840, Rodney Hunt products can be found in thousands of projects around the world.

Valve Operation

The Howell-Bunger Valve is typically operated by a manual, electric or hydraulic actuator mounted above the bevel gear. The bevel gear transmits torque to the drive shafts on either side, which operate through the actuator on each side, turning the operating screw which slide the cylinder gate forward to restrict or shut-off flow, and backward to open the valve for full flow. In the open or partially open position, flow is directed radially outward around the deflector head. The resulting spray pattern effectively dissipates hydraulic energy and allows a free flow discharge without erosion damage to the surrounding area.

Howell-Bunger® and Ring Jet Valves Provide Reliable Service in Demanding Applications

Howell-Bunger® Valves are used to pass a controlled amount of water downstream with no damage to the immediate environment. Howell-Bunger and Ring-Jet Valves are ideally suited for power projects, flood control structures, irrigation facilities, and to drain reservoirs or ponds. Water with low dissolved oxygen content, a characteristic of discharges from impoundments, can be aerated very effectively when discharged into the atmosphere through Howell-Bunger Valves.

Typical Howell-Bunger® and Ring Jet Valve Applications

- Power
- Flood control
- Irrigation
- Storm water
- Turbine bypass
- Water aeration
- Treatment plant discharge

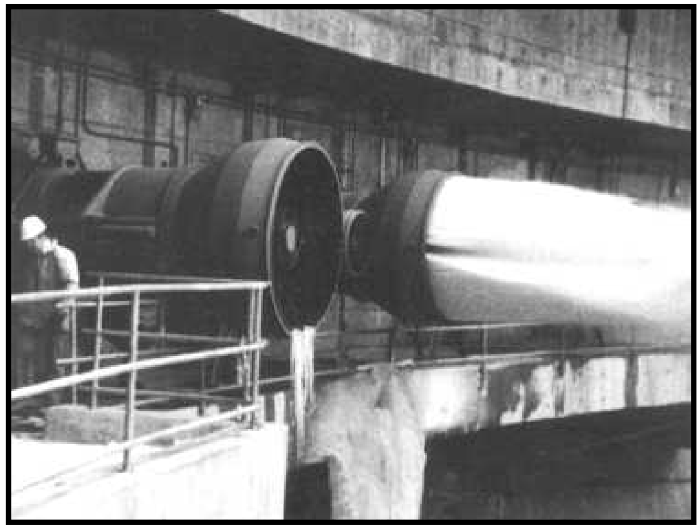
Howell-Bunger® Valves:
Easy, efficient control of water under free discharge.

Howell-Bunger® Valves are proven performers in applications requiring control of water under free discharge (into the atmosphere). The radial discharge capacity of the valve eliminates the need to overcome hydrostatic forces common to most valves, and has made the Howell-Bunger® Valve the leader among balanced free-discharge valves. The Howell-Bunger® Valve is also lower in cost than any other type of balanced free-discharge valve.

The low-maintenance valve provides efficient free-discharge operation for high and low heads, and operates through the entire stroke range without vibration or pitting. The valve's high coefficient of discharge allows the use of smaller than line-size valves, reducing construction costs. The cylinder gate that seats against the fixed cone requires little effort to operate, and is the only moving part of the assembly in contact with water flow.

The Howell-Bunger® Valve controls and dissipates enormous amounts of energy by breaking up the discharge water into a large, hollow, expanding jet. Adaptable to almost any type of actuator, Rodney Hunt can provide manual, hydraulic, or electric options. For stations located in remote areas, Howell-Bunger® Valves can be equipped with remote control devices that open or close the valves to hold a pre-determined constant level upstream or downstream of the valves.

One of two Ring-Jet Valves used for irrigation bypass at Tulloch Dam, California. Shown here at full discharge under 145 feet of head.



Battery of Ring-Jet Valves controls flow while dissipating energy and reducing spray – even in cold climates.

Howell-Bunger® Valves are presently being used as relief valves on hydraulic turbines. They may be adapted to cold climates by properly designing discharge chambers and/or using electric heaters on the cylinder gate. Howell-Bunger Valves can be used for submerged applications.

Ring-Jet Valves: The compact answer for minimizing spray while controlling discharge.

Ring-Jet Valves are similar to the Howell-Bunger® Valve, with an important difference. Instead of dispersing the discharge spray like the Howell-Bunger Valve, the Ring-Jet Valve incorporates an integral steel hood that concentrates the discharge spray into a "jet." These hoods reduce the spray while also providing satisfactory dissipation of energy.

With uncomplicated construction, radially balanced hydraulic design, and easy operation, the Ring-Jet Valve very nearly matches the high discharge co-efficient of the Howell-Bunger Valve. The Ring-Jet "hood" effectively cuts objectionable spray, keeps the operating mechanism dry, and reduces space requirements.

Ring-Jet Valves are not suitable for use in submerged applications, nor at heads above 175 feet.

RODNEY HUNT®

Sizing and Dimensions

The size of the valve is determined by the minimum available net head at the valve inlet and the maximum discharge flow required. Net head is the distance between the head water elevation and the centerline of the valve (or if the valve is submerged – the tail water elevation) less the inlet, conduit, bend or other friction losses. The graph below shows the maximum calculated discharge for valve sizes 8 inch to 108 inches, based on net heads up to 500 feet.

This graph is based on an average coefficient of discharge of .85. Maximum discharge values for other heads can be determined from the formula:

$$Q = C \times \sqrt{2gH} \times A$$

where Q = Cubic feet per second (cfs)
C = coefficient of discharge with valve full open = .85
g = acceleration due to gravity = 32.2
H = net head in feet.
A = area of valve in square feet (based on nominal inside diameter).

Using a coefficient of discharger of .85, this formula can also be expressed as:

$$Q = .85 \times \frac{\pi D^2}{4} \times \sqrt{2gH}$$

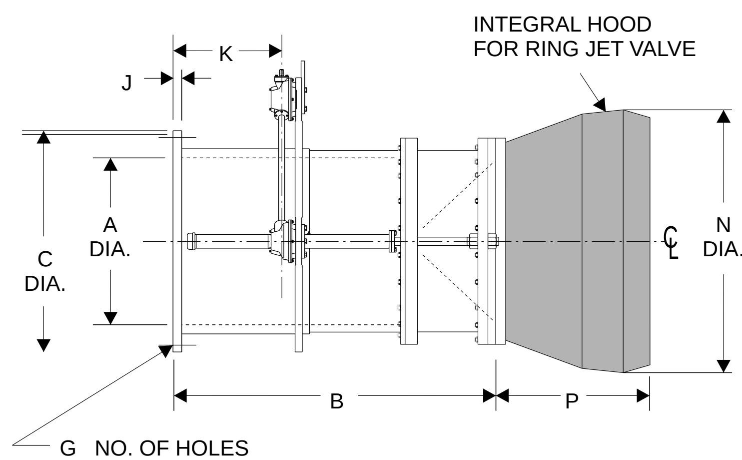
Ring-Jet Sizing

Use the following formula to size Ring-Jet Valves (C = .78):

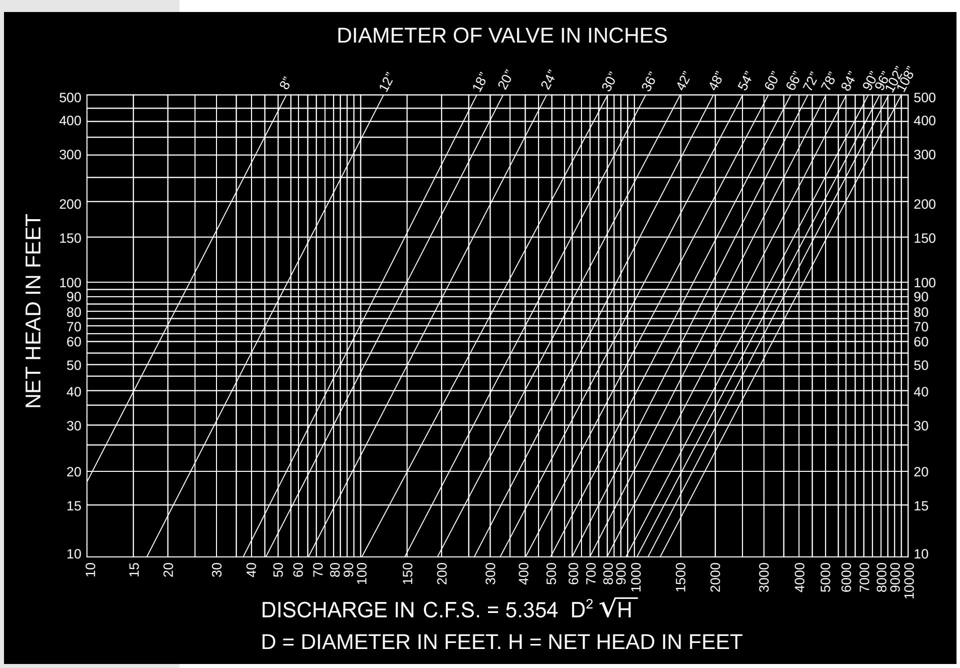
$$Q = .78 \times \frac{\pi D^2}{4} \times \sqrt{2gH}$$

where Q = discharge in cfs
D = diameter in feet

* C207 CLASS D (175 PSI.)								RING JET VALVE	
A	B	* C	* D	* G	* H	* J	K	N	P
6	28	11.00	9.00	8	0.87	0.69	8	11	6
8	30	13.50	11.75	8	0.87	0.69	8	14	8
10	32	16.00	14.25	12	1.00	0.69	8	18	10
12	38	19.00	17.00	12	1.00	0.82	10	21	12
14	40	21.00	18.75	12	1.12	0.93	10	25	14
16	42	23.50	21.25	16	1.12	1.00	10	29	16
18	48	25.00	22.75	16	1.25	1.06	12	32	18
20	50	27.50	25.00	20	1.25	1.12	12	35	20
24	54	32.00	29.50	20	1.37	1.25	12	42	24
30	64	38.75	36.00	28	1.37	1.50	14	52	30
36	70	46.00	42.75	32	1.62	1.62	14	62	36
42	76	53.00	49.50	36	1.62	1.75	14	72	42
48	86	59.50	56.00	44	1.62	1.75	16	82	48
54	92	66.25	62.75	44	1.87	2.12	16	92	54
60	102	73.00	69.25	52	1.87	2.25	18	102	60
66	108	80.00	76.00	52	1.87	2.50	18	112	66
72	118	86.50	82.00	60	1.87	2.62	20	122	72
78	124	93.00	89.00	64	2.12	2.75	22	USE SEPARATE HOOD	
84	134	99.72	95.00	64	2.12	2.75	22		
90	140	106.50	102.00	68	2.37	3.00	22		
96	150	113.25	108.50	68	2.37	3.00	24		



G NO. OF HOLES
H DIAMETER
D BOLT CIRCLE DIAMETER, STRADDLES CENTER LINE



VALVE SELECTION CHART. To determine discharge of any size valve, follow horizontal line for given head to point where it crosses diagonal line representing valve size. From this point, follow vertical line to bottom of chart, and read discharge in cfs.

Specification

Fixed Cone Valve

General: The fixed cone valve(s) will be of the Howell-Bunger® type as manufactured by Rodney Hunt Company, Orange, Massachusetts. The valve will be ____inches in diameter and will be designed to discharge____cfs at ____feet of net head. The valve will be used to control the free discharge of water into the atmosphere and will be designed to operate at any position between fully open and fully closed without injurious vibration.

Design: The construction of the valve(s) win be sufficiently rugged and all parts will be designed for safe and satisfactory operation within the specified operating conditions. Liberal factors of safety will be used throughout especially in the design of parts subject to intermittent and/or alternating stresses. In general, working stresses will not exceed one-third of the yield strength or one-fifth of the ultimate strength of the material.

Valve Body: The valve body will consist of a cylinder with a conical deflector head on the downstream end, internal radial ribs and an upstream mounting flange for attachment to a conduit liner or penstock The internal ribs and deflector head will extend beyond the downstream end of the valve body a sufficient distance to permit the rated discharge capacity. The sealing and sliding surfaces of the valve body will be stainless steel. The mounting flange will be in accordance with AWWA C207 Class "D" and will be provided with an O-ring gasket. The valve body will be constructed of steel plate conforming to ASTM A516 grade 70.

Valve Gate: The valve gate will consist of a cylinder designed to slide over the valve body. The gate will slide upstream to open and downstream to close off the valve ports. The upstream end of the gate will be counterbored to receive the body seal. The downstream end will have a stainless steel seat machined to fully contact the valve body seat. The interior sliding surface of the gate will be bronze. The valve gate will be constructed of steel plate conforming to ASTM A516 grade 70.

Seals: The valve body shall have a removable seat attached to the downstream end of the valve body with bolts and gasket. The sealing contact surface of the seat shall be stainless steel. The downstream end of the gate shall have a removable seat attached to the gate with bolts and gasket. The sealing contact surface shall be stainless steel and machined to a contour to provide a satisfactory hydraulic profile. The upstream end of the gate shall be counter-bored to receive a U shape packing to seal between the gate and the stainless steel outside the valve body. The U packing shall be retained by a bronze or stainless steel gland and fasteners.

Hood (Ring Jet Valve only): A steel jet deflector hood will be bolted to the downstream end of the cylinder gate. The hood will reduce the discharge spray by confining the exiting water jet. The hood will have several radial internal rib supports coming together at the valve centerline to form a support ring fitted with a self-lubricated sleeve bushing. The rib supports shall be hollow with an opening of sufficient size to provide aeration of the jet. The upstream edge of the ribs shall he contoured to provide proper hydraulic shape. The center support ring shall ride an a stainless steel guide rod attached to the downstream end of the valve body.

Operating System: Valve operation will be by either a mechanical dual screw stem system or dual hydraulic cylinders.
The mechanical screw stem actuating system will consist of two screw stem actuators mounted diametrically opposite and connected to a miter gearbox. Inter-connecting shafting shall be stainless steel and shall be connected by flexible couplings. Screw stems shall be type 304 stainless steel and drive nuts shall be bronze.

If hydraulic cylinders are used, the two cylinders shall be mounted diametrically opposite. Hydraulic valving and plumbing shall be arranged to provide synchronous operation of the two hydraulic cylinders. The hydraulic cylinders shaft be of materials and seals suitable for submergence. Piston rods shall be stainless steel and hard chrome plated. Piston seals shall be of the lip seal type. Rods shall be equipped with rod scrapers.

Electric Motor Actuator: The electric motor actuator shall operate from ____volt, ____phase, ____hertz electric power. The electric motor actuator shall be manufactured by Limitorque, EIM, Auma, Rotork or approved equal.
The actuator will include: electric motor, gearing, limit switches, torque switches, control transformer, reversing starter, overload relays, "open" - "stop" - “close" push-button station, "open" and "close" indicating lights, lockable "local" - "off " - "remote" selector switch, and auxiliary hand wheel. All electrical controls shall be integrally mounted in a NEMA 4 enclosure mounted directly on the valve actuator housing.
The motor shall be specifically designed for valve service, and be of high torque, totally enclosed, non-ventilated construction. The motor shall be of sufficient size to open and close the valve against the maximum differential pressure when the voltage is 10 percent above or below the nominal voltage.
An auxiliary hand wheel shall be provided for manual operation. The hand wheel shall not rotate during electric operation. The maximum hand wheel effort shall not exceed 60 pounds.
Four sets of independently adjustable limit switches shall be provided.
A mechanical dial position indicator shall be provided. A slide wire type, 2-wire transmitter, 4 to 20 mA output potentiometer shall be provided for remote valve position indication.
The motor and control compartments shall have heaters.

Shop Testing: The fully assembled valve shall be hydrostatically tested at a pressure of two times the rated valve pressure for 30 minutes. There shall not be any evidence of' leakage except at the valve seats.
The fully assembled valve shall be leak tested at the rated pressure for 5 minutes. The allowable leakage through the seats shall not exceed 0.4 ounces per minute per inch of valve diameter.
The valve shall be opened and closed three times using the actuating mechanism.

Painting: All unmachined portions of the valve shall be blast cleaned per SSPC-SP 10 (near white) and shall receive two coats of high solids epoxy paint.