RODNEY HUNT®

Howell-Bunger® Discharge Valves

Flow control and energy dissipation

VAG® Valve and Gate Group

RODNEY HUNT®

Excellence in Engineering

For over 170 years, the engineering team at Rodney Hunt has pioneered safe and reliable flow control systems in thousands of applications around the world. We have worked with municipalities, utilities, contractors, consulting engineers, and plant operators to meet their flow control needs and solve some of their toughest design, operation, and application problems.

Superior Quality

Rodney Hunt brings exceptional quality to every project with one of the most flexible and comprehensive metal fabrication, machining, assembly, and testing operations in North America. This allows us to monitor and ensure quality in all aspects of production and provide consistent, reliable and superior products. All processes used by Rodney Hunt are ISO-9001 certified.

Comprehensive Product Offering

Our total product offering is among the most comprehensive in the flow control industry. From cast and fabricated gates — including Fontaine standard designs — to custom valves, gates, and actuation options, Rodney Hunt brings a total solution to your project. Our capability to design, manufacture, and test large custom valves is unrivaled in the world.

Responsive Service

Rodney Hunt brings not only an incredible wealth of knowledge and expertise to your project, but also a genuine responsiveness to your needs throughout the design, manufacturing, and installation process. From the factory to the field, we offer the most experienced and knowledgeable service team in the industry.

Two 72” Howell-Bunger® Valves with stationary hood of 144” installed in Rur Dam, Germany. Each valve handles a discharge of 1766cfs

On the cover: The 108” Howell-Bunger® Valve at West Virginia’s Summersville Dam outlet handles a full head and discharge jet of over 6500cfs.

Howell-Bunger® Discharge Valves

Flow control and energy dissipation

Howell-Bunger® Valves were first developed and introduced for dam outlet works service in the early 1930's by Mr. C. H. Howell and Mr. Howard P. Bunger, with the United States Bureau of Reclamation. Rodney Hunt acquired the product line from Allis-Chalmers in 1990 and has continued to develop the design for optimal performance.

Howell-Bunger® valves provide controlled discharge of water while protecting the downstream environment. The valve breaks up the water into a large, hollow, expanding spray and can be used in most situations, including submerged applications. An additional steel stationary hood concentrates the discharge spray into a "jet" for a more controlled flow stream. They are ideally suited for low level outlet works for power projects, turbine bypass, gate surge relief, flood control systems, irrigation facilities, and draining reservoirs or ponds.

Easy, efficient control of water under free discharge.

Proven Performance

Howell-Bunger® Valves are proven performers with over 500 installations in the past 80 years.

Smooth, Vibration Free Operation

Cylindrical sleeve with adjustable sliding caps provide efficient, free-discharge operation for high and low heads, operating through the entire stroke range without vibration or cavitation.

Certified to ISO 9001:2008

Drip-Tight Sealing

Downstream primary metallic sealing, secondary flexible sealing, and upstream quad o-ring provide optimal sealing performance and prevent twist, roll, and point loading.

Easy to Operate and Maintain

Long guides with adjustable sliding caps provide smooth, non-binding movement. Sealing can be replaced without dismantling the valve.

Sizing and Dimensions

The size of the valve is determined by the maximum available net head at the valve. 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 upstream pipeline head losses caused by inlet, conduit, reducer, bend, etc.

The graph on the next page shows the maximum calculated discharge for valve sizes 8 to 108 inches, based on net heads up to 500 feet.

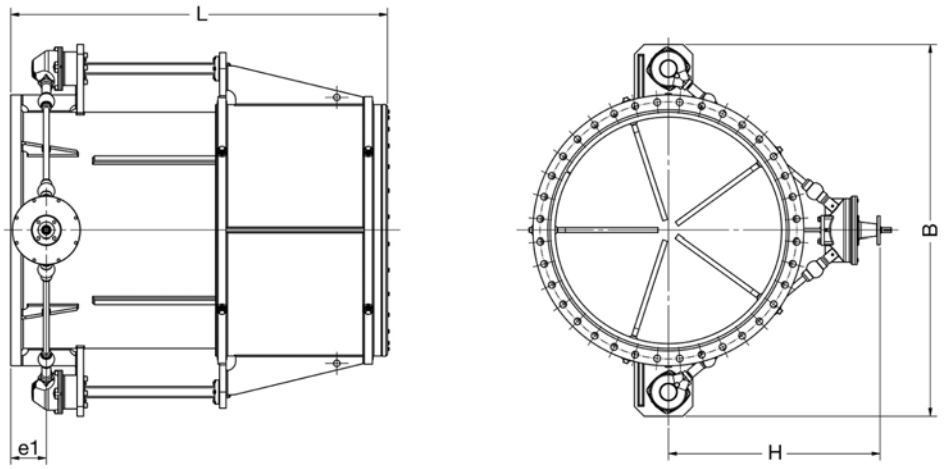
This graph is based on an average coefficient of discharge of 0.85. Maximum discharge values for other heads can be determined from the formula:

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

where Q = Cubic feet per second (cfs)
C = coefficient of discharge with valve full open = .85
g = acceleration due to gravity = 32.174
H = net head in feet
A = area of valve in square feet (based on nominal inside diameter)

Using a coefficient of discharge of 0.85, this formula can be expressed as:

$Q = 0.85 \times \frac{\pi D^2}{4} \times \sqrt{2gH}$



Size (inch)	16	18	20	24	28	30	32
B	40.94	43.70	443.31	48.82	56.69	57.48	58.27
H	25.08	24.88	26.26	27.83	32.56	33.46	35.71
L	40.39	43.70	46.85	52.56	58.27	61.02	63.58
e1	8.66	8.66	8.66	9.84	9.84	11.81	12.99
Approximate Weight (Lb)	992	1,190	1,323	2,425	3,086	3,086	3,748

Size (inch)	36	40	42	44	48	52	54
B	73.23	70.87	76.77	80.31	84.25	92.13	95.67
H	34.53	39.45	41.34	42.60	45.75	45.75	49.21
L	68.70	73.62	75.59	78.35	82.68	87.01	87.40
e1	11.81	11.81	11.81	11.81	9.84	11.81	12.80
Approximate Weight (Lb)	3,638	5,512	5,842	6,173	8,818	10,141	10,362

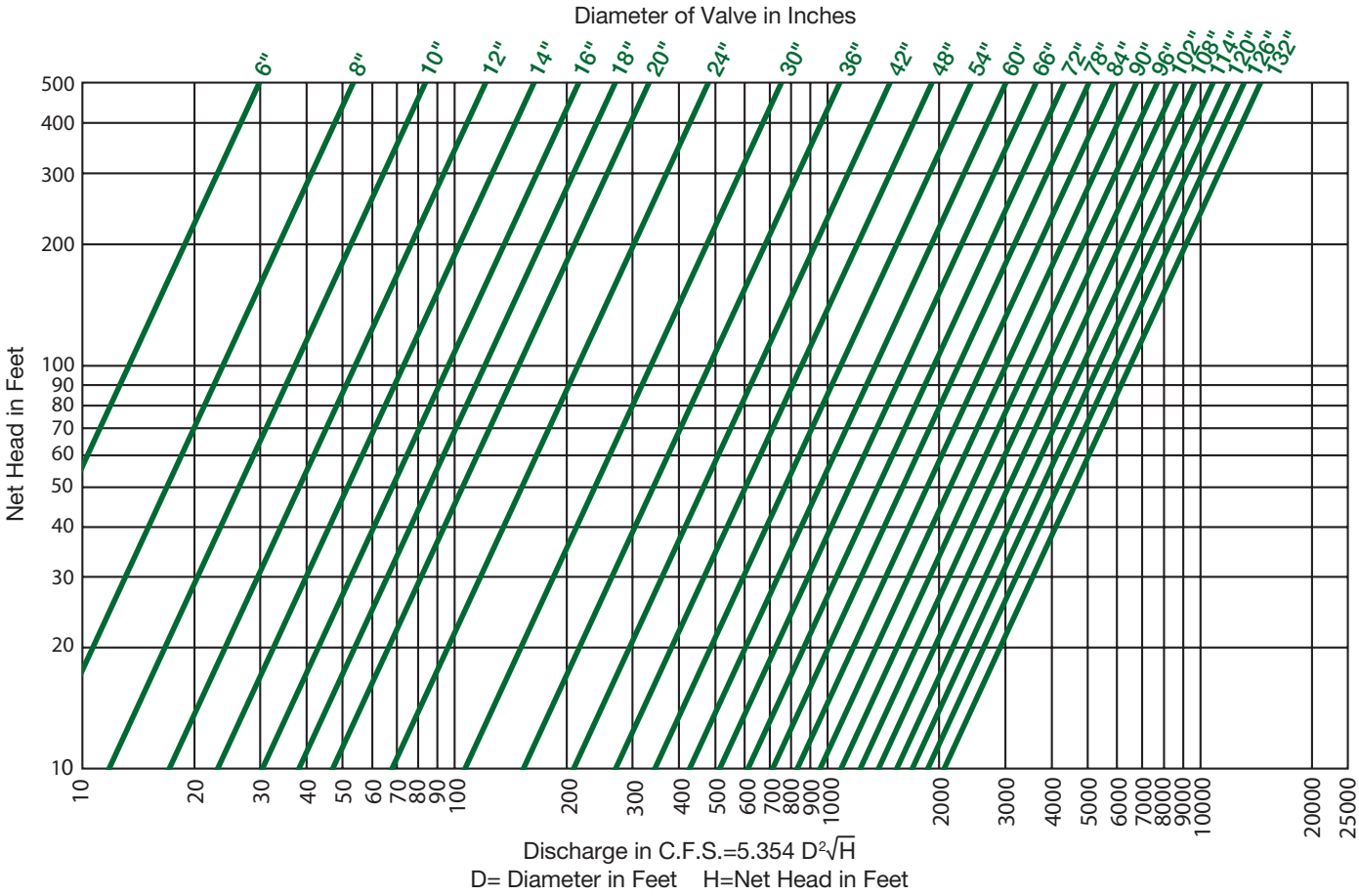
Size (inch)	56	60	64	72	78
B	98.43	94.49	105.12	125.98	126.38
H	53.43	59.21	58.35	62.24	77.44
L	87.80	94.49	98.11	104.33	109.69
e1	13.78	10.63	11.81	11.81	19.69
Approximate Weight (Lb)	10,582	13,228	14,991	19,841	23,148

Versions

- Standard: maximum admissible operating pressure 328 foot water column (145 psi) Higher pressure upon request
- Optional: stationary hood, venting equipment, other coatings
- Actuation: handwheel, electric, or hydraulic
- Other sizes and special designs available upon request

Valve Selection Chart

To determine the discharge of any size Howell-Bunger® Valve, follow the horizontal line for a given head (net head at the valve) to the point where it crosses the diagonal line representing valve size. From this point, follow the vertical line to the bottom of the chart, and read the discharge cfs. The chart is specific to the traditional unhooded Howell-Bunger ® Valve with a C_d of 0.85, and is not suitable for sizing or selecting a hooded Howell-Bunger® Valve.

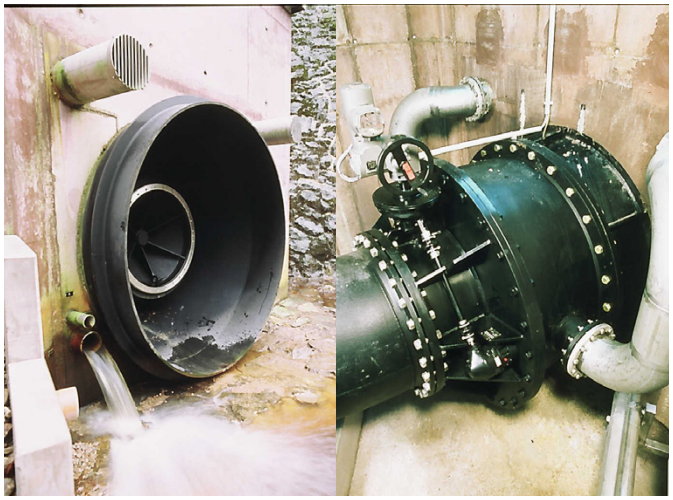


Valve Operation

Howell-Bunger® Valves are typically operated by a manual, electric, or hydraulic actuator mounted above a double bevel gearbox. The gearbox transmits torque to the twin power screws (one on each side of valve) which in turn engage bronze thrust nuts to open (retract) or close (extend) the cylinder gate.

Howell-Bunger® – In open positions, flow is directed outward around the deflector cone at a 45° angle (approximate) in a wide spray pattern into the atmosphere, dissipating remaining hydraulic energy without erosion of the surrounding area.

Stationary hood – The wide spray pattern is redirected in the hood to create a jet-like stream. This is often helpful where the wide spray pattern of a Howell-Bunger® Valve is objectionable or subject to freezing or ice build-up. Depending on the application, a venting device may be required for cavitation-free operation.



One 40” Howell-Bunger® Valve with 96” closed stationary hood and venting device in Brändbach Dam, Germany.

Projects

Since 1935, over 500 Howell-Bunger® Valves have been installed in applications ranging from an 8” valve with 1400’ of head, to a 112” valve with 209’ of head. In settings throughout the world, Howell-Bunger® Valves have been the valve of choice wherever the control of water flow under free discharge is needed. The photos below show a few of our recent installations.

Rowallan Dam/Hydro, Tasmania, Australia—One Howell-Bunger® Valve (72”) with stationary hood and venting

Asahan Dam, Indonesia—One Howell-Bunger® Valve (64”) with stationary hood and venting pipes handles max operating head of 976’

Pueblo Dam, Colorado, USA—One Howell-Bunger® Valve (60") with stationary hood and One Rotovalve® Cone Valve (60")

Salt River and Lower Bear Reservoirs, California, USA—Four Howell-Bunger® Valves, with stationary hoods (18", 24", 60", 78")

Hodinova Hydropower Station, Detva, Slovenia - One Howell-Bunger® Valve (78”)

Jozini Dam, South Africa - Three Howell-Bunger® Valves (72”), half-submerged discharge with head of 262’

Specifications

Discharge Valve

General: The fixed cone valve(s) will be of the Howell-Bunger® type as suppplied by Rodney Hunt-Fontaine, 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 damaging vibration.

Design: The construction of the valve(s) will 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.The walls and vanes shall be designed using the guidelines presented in the report "Vane Failures of Hollow-Cone Valves" by Albert G. Mercer.

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 sliding surfaces of the valve body will be stainless steel. The mounting flange will be in accordance with AWWA C207 Class "E". The valve body inlet flange, (body cylinder tube & internal ribs (vanes)) will be constructed of steel plate conforming to ASTM A572 Grade 50.

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 will be counter-bored 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 ASTM C90800 and adjustable. The valve gate will be constructed of steel plate conforming to A240 Type 304L and A572 Grade 50.

Seals: The valve body shall have a removable seat attached to the downstream end of the valve body held by a stainless steel 304L seating ring. The sealing contact surface of the seat shall be stainless steel against primary rubber and secondary stainless steel. The downstream end of the gate shall have a removable and exchangeable seat attached to the gate with bolts. 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 Quad O-Ring made of EPDM to seal between the stainless steel gate and the outside of the valve body. The Quad O-Ring shall be retained by a U shape gland and attached to the valve body. The valve shall provide drip-tight closure.

Stationary Hood: A steel jet deflector hood will be bolted (or not attached) to the valve body. The hood will reduce the discharge spray by confining the exiting water jet. The hood will have several radial and axial external rib enforcements. The venting system shall be several openings of sufficient size to provide evenly distributed aeration around the valve body when the hood is bolted to the valve body. The design of the hood should prevent backsplash and provide vibration-free operation. The hood will be constructed of steel plate conforming to ASTM A572 Grade 50.

Operating System: Valve Operation will be by either a mechanical dual screw 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. Interconnecting shafting shall be stainless steel and shall be connected by flexible couplings. Screw stems shall be AISI type 420 stainless steel and drive nuts shall be bronze.

If the hydraulic cylinders are used, the two cylinders shall be mounted diametrically opposite. Hydraulic valve and plumbing shall be arranged to provide synchronous operation of the two hydraulic cylinders. The hydraulic cylinders shall 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 Rotork, Auma, Limitorque, EIM, or approval 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, if necessary.

Shop Testing: The fully assembled valve shall be hydro-statically tested at a pressure of 1.5 times the rated valve pressure for 30 minutes (no higher than 218 psi). There shall not be any evidence leakage.

The fully assembled valve shall be leak tested at the rated pressure for 5 minutes. The valve shall be drip-tight. 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. Provide valve preparation and coating written QA and QC procedures as approved and endorsed by an independent third party such as NACE, GSK, or SSPC. QA/QC test procedures shall include photographic documentation to communicate quality acceptance levels.

Protective Coating Testing: All valves shall be tested for coating thickness and porosity. Porosity shall be tested using the high voltage spark method. Test shall be taken at all locations. Results and validation shall be signed and dated.

Engineered Flow Control Products from Rodney Hunt

Gates

- Channel Gates
- Weir Gates
- Slide Gates
- Roller Gates
- Bulkhead Gates
- Stop Logs
- Flap Gates

Valves

- Rotovalve® Cone Valves
- Howell-Bunger® Valves
- RIKO® Plunger Valves
- EKN® Butterfly Valves

Actuation

Manual, electric, and hydraulic actuation systems are available.

Service

Rodney Hunt offers the very best in Aftermarket Services that include Field Inspection and Evaluation, Valve and Gate Refurbishment and Repair, Supply and Replacement Parts, Control System Evaluation and Repair, Flow Control Design Support, and a full range of in-house capabilities. Contact our experienced and dedicated team at **service-rhf@vag-group.com** for all of your Aftermarket needs.

For more information about Rodney Hunt products or to contact a sales representative, visit the Rodney Hunt website **www.rodneyhunt.com.**

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VAG® Valve and Gate Group

Rodney Hunt, Fontaine, and GA Industries are now the Valve and Gate Group. We will continue to market our products under our heritage brands — but the breadth and depth of our product offerings, technology options, and engineering capabilities have expanded exponentially.

Together, we provide the most comprehensive line of flow control solutions in the industry. Learn more about us at www.vag-usa.com.

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