

# PRATT

Henry Pratt Company

## Cone Valves



**Engineering Creative Solutions  
for Fluid Systems Since 1901**

## A Tradition of Excellence

With the development of the first rubber seated butterfly valve more than 70 years ago, the Henry Pratt Company became a trusted name in the flow control industry, setting the standard for product quality and customer service. Today Pratt provides the following range of superior products to the water, wastewater and power generation industries.

**Butterfly Valves:** from 3" to 162"

**Rectangular Valves:** 1' x 1' to 14' x 16'

**Ball Valves —**

**Rubber Seated:** from 4" to 60"

**Metal Seated:** from 6" to 48"

**Plug Valves:** from 1/2" to 36", 3 ways

**Hydraulic Control Systems**

**Valve Controls**

**Energy Dissipating Valves  
and Fixed Energy Dissipaters**

**Cone Valves**

**Check Valves**

**Plunger Valves**

## A Commitment to Meeting The Customers' Needs

Henry Pratt valves represent a long-term commitment to both the customer and to a tradition of product excellence. This commitment is evident in the number of innovations we have brought to the industries we serve. In fact, the Henry Pratt Company was the first to introduce many of the flow control products in use today, including the first rubber seated butterfly valve, one of the first nuclear N-Stamp valves, and the bonded seat butterfly valve.

## Innovative Products For Unique Applications

Though many of the standard valves we produce are used in water filtration and distribution applications, Pratt has built a reputation on the ability to develop specialized products that help customers to meet their individual operational challenges.

## Creative Engineering for Fluid Systems

Pratt's ability to provide practical solutions to complex issues is demonstrated by the following case histories.

### Earthquake Proof Valves

Pratt designed and manufactured hydraulically actuated valves for a water storage application so that the valves would automatically operate in the event of earthquakes. This led to the development of a valve that will withstand acceleration forces of up to 6g's.

### Custom Actuation/Isolation Valves

Pratt designed and manufactured valves that would isolate a working chamber in the event of a nuclear emergency during the decommissioning of armed nuclear warheads. The valves were able to close in a millisecond using specially designed Pratt electro-pneumatic actuators.

### Valves Designed for Harsh Environments

Pratt designed and manufactured a 144" diameter butterfly valve for the emergency cooling system at a jet engine test facility. The valve was designed to supply water to help dissipate the tremendous heat generated by the engines during testing.



**Through experience, commitment and creative engineering, Pratt is uniquely suited to provide superior products for our customers' special needs. For more information, contact our corporate headquarters in Aurora, Illinois.**

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## Introduction



Cone Valve

In July 2001, the Henry Pratt Company acquired a cone valve product line from RMI Holland. RMI's history dates back to the 1800's as a leading manufacturer of valves and fittings with manufacturing facilities based in Holland.

By acquiring the RMI cone valve product line, Henry Pratt continues to expand our product offering to those customers who require specialty valves for applications with high velocity and pressure, to maintain constant pressure downstream, and to regulate flow. The cone valve is used in pump control, flow control, and shut off applications.

## Scope of Line: Cone Valve

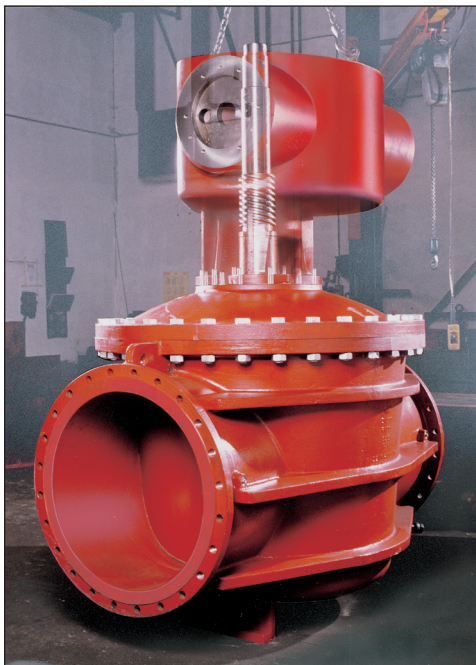
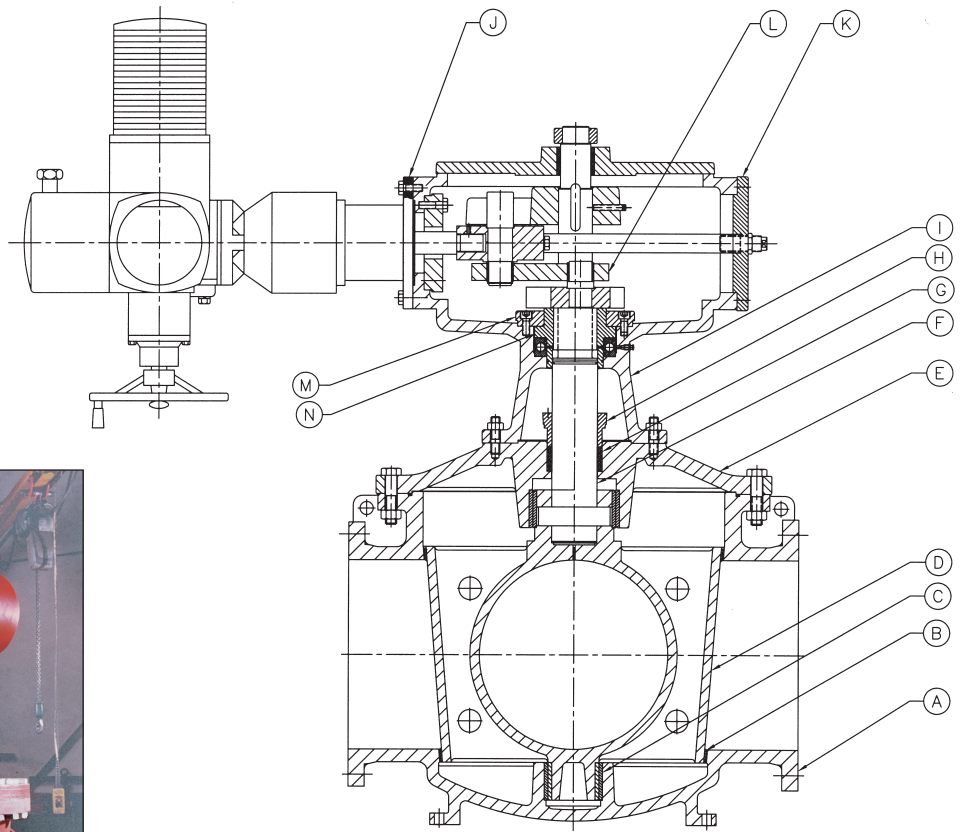
- Available in sizes 8" to 48"
- Full bore circular valve body
- Ductile iron body
- Metal to metal seats
- Ductile iron plug with bronze top and bottom bearings
- Available in ASTM B16.1 class 125 and 250 pressure classes
- Ductile iron cover with mounted operating mechanism
- Available with manual, hydraulic and electric actuators
- Other materials available upon request



48" Cone Valve in assembly



## Design Details: Cone Valves



*Mounting of the gearbox on top of the body.*



*Inside of the gearbox.*

ITEM NO.	DESCRIPTION	MATERIAL
<b>A</b>	Body	Ductile Iron
<b>B</b>	Body and Plug Seat	Monel or Nickel weld overlay
<b>C</b>	Bearing	Bronze
<b>D</b>	Plug	Ductile Iron
<b>E</b>	Cover	Ductile Iron
<b>F</b>	Shaft	304 Stainless Steel
<b>G</b>	Packing	PTFE impregnated Aramid
<b>H</b>	Retainer Plate	Steel
<b>I</b>	Gearbox	Cast Iron
<b>J</b>	Mounting Flange for actuator	Steel
<b>K</b>	End Cover	Steel
<b>L</b>	Arm for Lift Nut Lever	Steel
<b>M</b>	Retaining Ring for Lift Nut	Ductile Iron
<b>N</b>	Lift Nut	Bronze

*Other materials available upon request.*

## Features & Benefits

Feature	Benefit
<b>Full bore opening</b>	<ul style="list-style-type: none"> <li>The valve has a circular waterway through the plug and is full bore in the open position</li> </ul>
<b>Metal to metal seats</b>	<ul style="list-style-type: none"> <li>Seat replacement is not required</li> <li>Suitable for high velocities</li> </ul>
<b>High reliability</b>	<ul style="list-style-type: none"> <li>The design of the valve offers a long service life</li> </ul>
<b>Low maintenance</b>	<ul style="list-style-type: none"> <li>Maintenance is limited to lubrication of moving parts and replacement of packing in the stuffing box</li> </ul>
<b>Drop tight shut off</b>	<ul style="list-style-type: none"> <li>Accurate machining of the metal seats and plug ensures that each plug fits exactly into the mating body</li> </ul>
<b>Custom made to specifications</b>	<ul style="list-style-type: none"> <li>Pratt cone valves are designed to meet the customer's specific application</li> </ul>
<b>Solid bronze bearings</b>	<ul style="list-style-type: none"> <li>Bronze construction offers longer trouble-free service</li> </ul>
<b>Reduced pressure loss</b>	<ul style="list-style-type: none"> <li>Ability to handle wide pressure ranges</li> <li>Ideal for throttling applications</li> </ul>

## Cost Efficiency: Low Head Loss Advantage

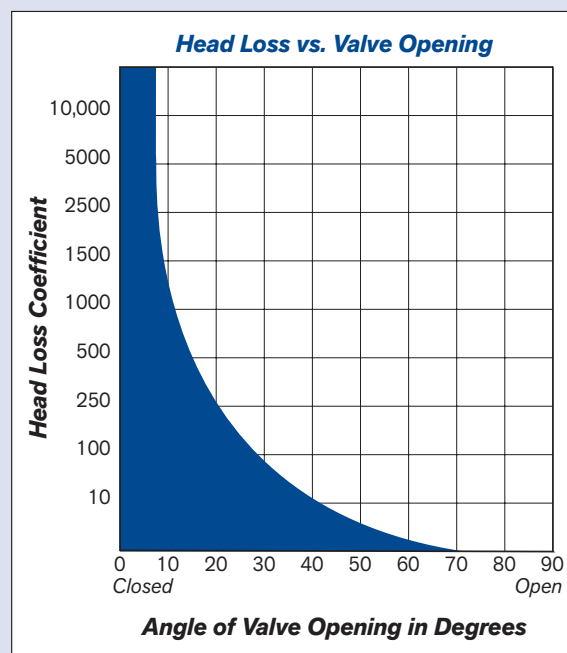
In the open position the cone valve has a full bore opening through the valve. The flow is unobstructed which results in a headloss that is comparable to that of a straight pipe the same length and diameter.

Figure 1 illustrates the head loss between 5% and 70% of the valve opening angle. Precise flow is achieved by the smooth operation and long stroke of the valve actuator in rotating the valve plug.

The cone valve requires very little maintenance due to its high strength design, metal seats, and long service life. These features allow for a low yearly operating cost.

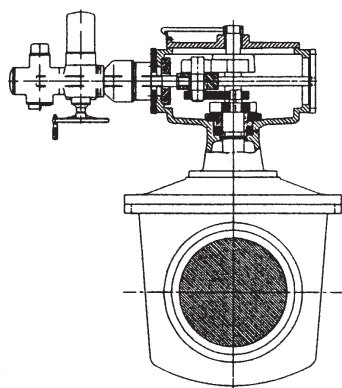
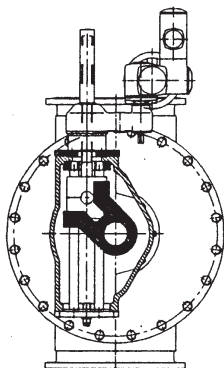


*Plug with full bore opening and weld on metal seats.*



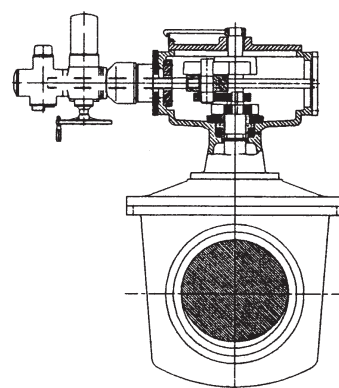
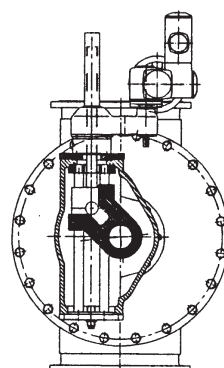
*Figure 1: Cone valve characteristic curve*

# Operation of the Cone Valve



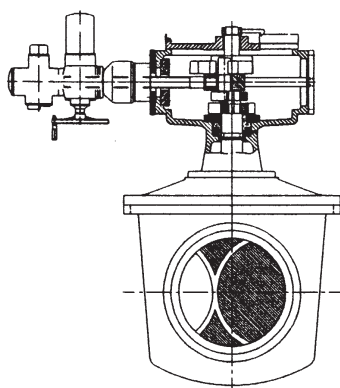
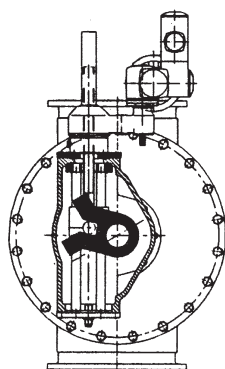
## Position 1

The valve is fully closed and the plug seats are in full contact with the seats of the body. This creates drop tight sealing of the valve.



## Position 2

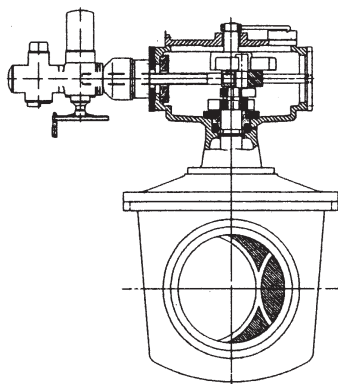
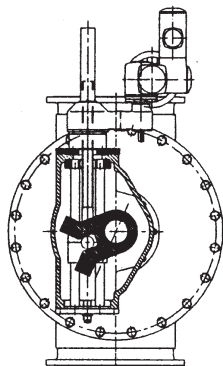
By means of the lever the plug is lifted from its seats, to eliminate seat wear and decrease torque.



## Position 3

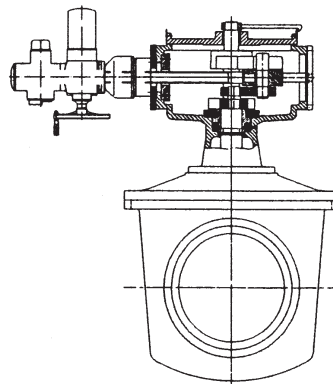
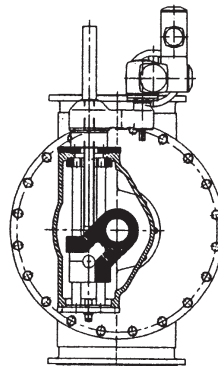
By pushing against the rotator lever, the plug starts rotating, only in contact with the double bearing.

## Operation of the Cone Valve



### Position 4

The plug is still rotating, causing the opening to become larger.



### Position 5

After the plug has reached the open position the plug reseats into the body. In the full open position the cone valve has very low headloss which can be compared with the headloss of a straight pipe with the same length and diameter.



# Applications

## Pump Control Valve

- The Pratt Cone Valve is commonly used as a pump control valve. The unobstructed flow allows for very low headloss that results in low pumping costs. The valve also offers drop tight closure which prevents back flow. The valve has an uninterrupted operating cycle that allows for precise regulation of flow and prevention of water hammer.

## Control Valve

- The Pratt Cone Valve is suitable to maintain constant flow or pressure downstream when used in combination with a flow pressure measuring device and a regulating actuator.

## Shut Off Valve

- The Pratt Cone Valve offers a drop tight closure that is suitable for use to shut off a pipeline. The valve is commonly used in applications where high velocities and pressures can occur.



*24" cone valves in operation since 1956.*

# Suggested Specification for Cone Valves

## Valve construction

The cone valve shall be of the conical plug type employing axial motion to unseat the plug, followed by a rotary motion to open or close the valve, and then followed by an axial motion to reseat the plug.

The valve shall be totally adapted to the flow conditions at the installation site. Cone valves shall be manufactured by Henry Pratt Company or approved equal.

## Valve components

The valve shall consist essentially of four main parts:

- a. A valve body having waterway inlet and outlet diameters equal to the nominal size of the valve.
- b. A conical plug having a clear waterway, minimum diameter equal to the nominal size of the valve.
- c. A head cover to enclose the plug in the body.
- d. An operating mechanism mounted on the head cover.

## Body

The ductile iron body of the valve shall consist of a housing having flanged inlet and outlet waterways and a head flange opening. The head flange opening shall permit removal of the plug. Waterway flanges shall conform to client specifications. Inside the body of the valve, two monel or nickel seat rings shall be welded to the body to engage the seat rings on the plug when the plug is seated. A bronze bearing shall be provided for the integrally cast plug trunnion.

## Plug

The ductile iron plug shall have the shape of a frustrum of a cone with a clear waterway opening through it. The plug shall rotate on large diameter, bronze top and bottom bearings. The operating shaft shall be securely attached to the plug to transmit the lifting force and operating torque. The operating shaft shall be stainless steel. The plug shall be provided with monel or nickel seats welded to the plug to engage the seat rings on the body when seated in both open and closed position.

## Head cover

The valve shall be provided with a ductile iron head cover to close the body head flange opening. The head cover shall make a registered connection with the valve body. A bronze bearing in an integrally cast trunnion shall be provided for the plug.

## Actuation

The actuator shall be mounted on the head cover and shall be provided with a removable cover which shall permit inspection, adjustment and repair of the actuator. The actuator shall consist of a crosshead device which will lift, rotate and lower the plug. The crosshead shall travel in a straight line and shall operate through an independent link and lever arrangement. The lifting action shall be accomplished by means of a lift nut, and rotation shall be accomplished by means of a rotator lever. The operating shaft shall be of sufficient strength to withstand any stresses to which it may be subjected under the design operating conditions. The valve shall be provided with a position indicator which will at all times indicate the position of the valve plug.

Type of actuators

Manual actuator (handwheel or AWWA square nut), electric motor (local or remote controls), or cylinder per AWWA C540 standard for hydraulic or pneumatic control.

## Testing

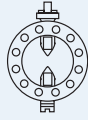
The valve shall be hydrostatically tested for strength at 2 times working (rated) pressure. The valve shall be leak tested at design pressure.

## Coating

Before coatings are applied, blast clean all unmachined areas to SSPC-SP10 standards. Coat surfaces with two coats of high solids epoxy paint or the engineer's recommended coatings.

## Notes

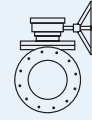
# PRATT PRODUCT GUIDE



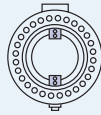
**Model  
2FI**



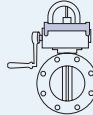
**Monoflange  
MKII**



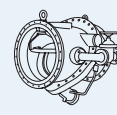
**Plug  
Valve**



**Triton®  
XR70**



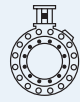
**Indicating Butterfly Valve  
UL & FM approved**



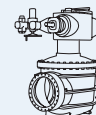
**Tilting Disc  
Check Valve**



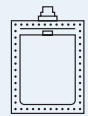
**Triton®  
XL**



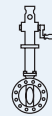
**N-Stamp Nuclear  
Butterfly Valve**



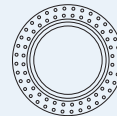
**Cone  
Valve**



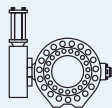
**Rectangular**



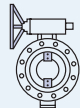
**PIVA Post Indicating Valve Assembly  
UL & FM approved**



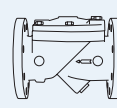
**Sleeve  
Valve**



**Rubber Seated  
Ball Valve**



**Triton®  
HP250**



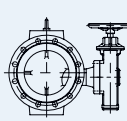
**Check  
Valve**



**Groundhog®  
Valve**

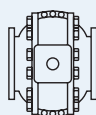


**Control  
Systems**



**Plunger Valve**

**PRATT**



**Metal Seated  
Ball Valve**

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