

# Glenfield Invicta

## Series 54 'Reservoir Specification' Gate Valves

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## Introduction

Gate valves are generally designed to be used for infrequent isolation applications and are commonly installed for this purpose in water and wastewater systems.

Standard water systems with a pressure rating of PN16 are commonly designed with flow velocities ranging up to and including a maximum of 4m/s as per EN1074-1, Table 2. However, there are instances when this maximum flow velocity must be exceeded and for these special installations, it is important to select a suitable isolation gate valve that can perform and operate safe and well under these conditions.

Typical examples involving increased flow velocities may occur on older existing piped systems that require an increased flow rate and also on dam and reservoir installations. A large percentage of UK Reservoirs incorporate draw-off pipework that facilitates the release of water from the reservoir. This draw-off can be used for several functions including flow compensation. However, it is commonly used to enable the scour of silt and also to provide a means of emergency drawdown of the reservoir to prevent issues such as flooding and over-loading of the dam structure.

The emergency drawdown rates can be different depending on the reservoir requirements however, the resulting flow velocities through the pipework and valves can be considerable.

Increased flow velocities can be problematic for piped systems as they can lead to an increased risk of cavitation, vibration, noise and accelerated wear and tear.

The use of standard gate valve products in these applications could be considered as sacrificial and by selecting a suitable gate valve for isolation on high velocity systems, this will ensure that the valve will achieve a longer service life resulting in reduced downtime, reduced valve repairs, reduced whole-life costs and an overall increase in system efficiency.

Water Companies in the UK have gate valves that have been in use for several decades and in some cases in excess of 100 years. These assets are understandably at the end of their service lives and Water Companies require a more robust gate valve that will provide a longer lifetime compared to standard gate valve products - especially in applications that are deemed to have a high cost of failure, such as reservoirs. At Glenfield Invicta, we recognise the importance of this application and are pleased to offer a product that meets these high velocity requirements.

## **This product is the Series 54 Reservoir Specification Gate Valve.**

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## Series 54 Reservoir Specification Gate Valve

The Reservoir Specification gate valve is an enhanced version of the AVK Series 54 product range and has several key features which allows it to be used under more extreme conditions and can be used for isolation of piped systems with flow velocities of up to 9m/s. These key features are:

### (A) Shoes & Channels

The inclusion of aluminium bronze shoes and channels as standard has a number of important benefits, each of which are described here. This feature greatly reduces the potential for vibration and fatigue damage as it ensures there is a small and uniform clearance between the body and wedge throughout the complete valve stroke. Therefore, the potential for excessive movement is greatly reduced compared to standard wedge gate valves and the risk of wear and tear is reduced. Operational torques are also reduced due to the reduced frictional coefficients of the smooth machined finish of the shoe and channel surfaces. These shoes and channels are installed on both sides of the valve as standard, providing full flexibility of installation. The inclusion of this feature also has the added benefit of allowing the gate valve to be installed with the valve on its side and the stem in the horizontal orientation as these components reduce the bearing stresses on the contact surfaces between the body and wedge as well as improving the alignment and sealing performance of the valve. This can be greatly important, especially in installations where space limitations exist. Figure 1 shows a cross-sectional and elevational view of the valve with the shoes and channels installed. The number and size of fasteners varies depending on valve size.

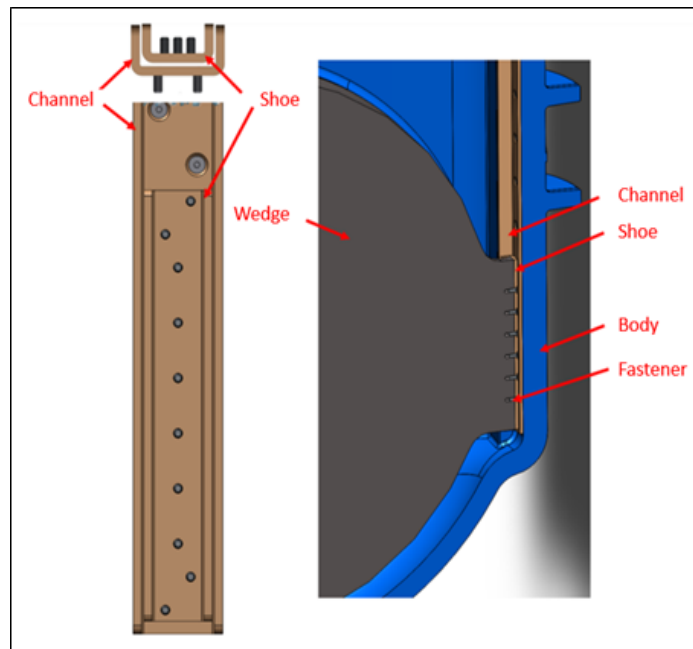


Figure 1 - Shoe & Channel feature

## (B) Jacking Screw (or Easing Screw)

The addition of one or two jacking screws (depending on valve size) fitted as standard on the underside of the valve body allows an axial thrust to be applied directly to the base of the wedge. If the valve has been closed for long periods of time, it can become increasingly difficult to operate. By rotating the jacking screw(s), this pushes the wedge up a small distance that is sufficient to crack the valve off of its seated position. Any build up or residue between the body seat and wedge face rings will tend to be flushed through the valve. Operation of the valve from the main valve stem can then be carried out as normal. The jacking screw also acts as a mechanical stop which prevents over travel of the wedge which can cause considerable operational issues with metal seated gate valves. It is important that the jacking screw(s) be adjusted afterwards to its original position. This feature not only protects the valve from becoming jammed shut but also greatly reduces the long-term maintenance requirements for the valve.

Figure 2 shows a cross-sectional view of a valve with two jacking screws installed. Note the flat sections integrally cast onto the wedge that provides the landing surface for the jacking screws to contact and move the wedge upwards.

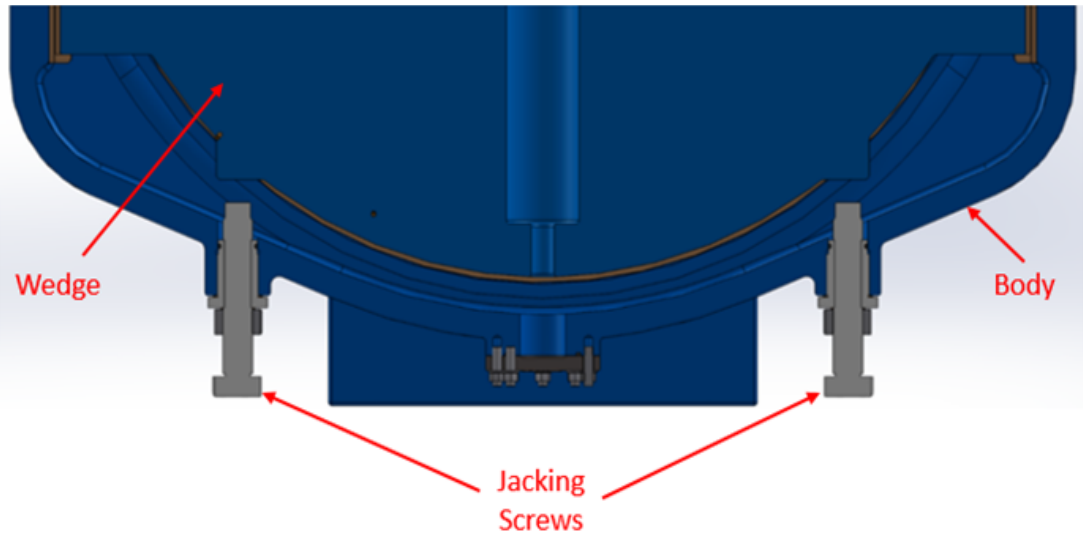


Figure 2 – Jacking screw arrangement

### **(C) Fixation of body seat and wedge face rings**

The fixation of the seats to the body and wedge is of paramount importance when gate valves are used in high velocity applications. The increased hydraulic forces and turbulent effects can cause the rings to separate from the casting. If this occurs, the rings obstruct the movement of the wedge resulting in damaged rings rendering the valve inoperable. The dams and reservoir specification gate valve incorporates a combination of methods used to secure the rings to the body and wedge. The standard method of securing the rings is to screw them onto the casting or to press them into place. Both methods provide suitable levels of security for standard gate valve applications. However, for our reservoir specification gate valves, all rings have additional mechanical pins which provide increased security, providing a considerable increase in product longevity.

### **(D) Corrosion protection**

Because of the conditions prevalent with typical reservoir locations, enhanced corrosion protection of the valve is a key factor. The Reservoir Specification gate valve has been designed with increased corrosion protection in mind. The valve stem and all fasteners are manufactured from stainless steel and the abrasion resistant coating is supplied with a minimum dry film thickness of 300µm on both the internal and external surfaces of the valve. By incorporating these features, the Reservoir Specification gate valve will provide increased product longevity compared to standard wedge gate valve designs.

### **Options**

The Reservoir Specification gate valve can be supplied with a range of options. The main ones are described here:

#### **i) Bypass valve**

All valves within this range can be supplied with an integral bypass valve. The bypass valve is used to reduce the differential pressure acting on the main gate valve (which reduces the operating effort and, when utilised, can greatly reduce the gearbox / actuator size and cost). The bypass valve also allows a more gradual release of flow from to the downstream section and also to prevent stagnation of water in the line.

#### **ii) Direction of operation**

All valves can be supplied to operate in either a clockwise to open or clockwise to close direction.

#### **iii) Gearbox**

It is always recommended to operate larger size valves with gearboxes to allow the user to safely operate the valve. The full range of Reservoir Specification gate valves are offered with either bevel or spur gearboxes. These gearboxes are sized to provide the most economical unit that can meet the operating conditions of the valve at a particular differential pressure. For valve sizes of DN700 and above, these must be operated using either a gearbox or actuator as the thrust is taken in the operator units and not the valve.

#### **iv) Electrical actuation**

The Electrical actuator provides several benefits including, reduced manual input, quicker, smoother and more regular operation compared to a human operator.

Electrical actuators also allow the user to operate the valve remotely which can be hugely beneficial for more difficult installations. The electrical actuator is supplied according to the customer's specification.

**v) Hydraulic actuation**

Where installations are extremely remote in location and where an electrical supply would prove logistically and financially prohibitive, we can supply this range of gate valves with hydraulic operation, as shown in the picture below.



**vi) Extension spindle arrangements**

These valves can be supplied with bespoke extension spindle arrangements to meet any system layout. The assortment of any spindles, couplings, floor pillars, support brackets etc can be supplied with the main valve so that the full package is supplied.

**vii) Mechanical fittings**

We manufacture and supply a wide range of mechanical fittings which include dismantling joints, couplings and adaptors.

**viii) Site services**

We also provide site services including installation and commissioning to ensure that the products supplied are installed correctly and are performing as they should. This is particularly beneficial where electrical and hydraulic actuation is involved.

Please contact our Projects Team ([enquiries@glenfieldinvicta.co.uk](mailto:enquiries@glenfieldinvicta.co.uk)) to discuss your requirements.

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