

Standard VG-231 Valve Technical Description

Use of the field proven Vetco Gray series VG-231 gate valve is proposed. The operational features of the series VG-231 valve, shown on drawing no A601906-10, are as follows:

Bi-directional sealing is an inherent feature of the series VG-231 gate valve. The one-piece slab gate is free to float within the valve cavity and this design allows cavity pressure to be self-relieving into the wellbore, thereby preventing pressure locking and also minimising load transfer to the valve stem during operation.

The seat-to-valve body seal is effected by a thermoplastic CT seal acting between the seat body and the bore of the valve body seat pocket with redundant metal-to-metal sealing between seat and pocket face. Metal-to-metal sealing surfaces at the gate / seat interface are hardfaced with tungsten carbide.

Valve seats are spring-loaded against the gate, using wave springs located in the back face of the seat body and this is primarily to maintain sealing contact with the gate at low pressures, although this constant contact also prevents small particles of debris from becoming trapped between the gate and seats.

The VG-231 manual valve design utilises a modified Acme stem thread that, in conjunction with precision rolling element thrust bearings, ensures that minimum operating torques are required.

A stem shear pin is located under the handwheel on standard manual valves to protect the valve stem and other internal components from over-torque. The stem shear pin is replaceable in the field with the valve under pressure.

The stem packing used in the proposed VG-231 gate valve is the standard Vetco Gray CT non-elastomer stem packing which is not susceptible to inhibitors and is also inert to flow media. This self-energising, pressure-energising stack consists of high and low pressure seal elements with engineered plastic back-up rings that prevent explosive decompression during blowdowns.

The CT stem packing arrangement incorporates a three-element design consisting of two spring-energised lip seals backed up by a chevron element. In addition, a front junk ring helps to prevent debris from reaching the sealing elements.

Materials used for the CT stem packing are a combination of filled teflons with PEEK (polyetheretherketone) back-ups and Egiloy corrosion-resistant springs.

The CT stem packing is fully qualified to meet the requirements of 'HH' service, temperature range -50°F to +400°F and has been PR2 cycle-tested in a valve up to 18,000 psi at 450°F.

No pre-load is required for the CT stem packing arrangement, as the design incorporates self-energising low-pressure seal elements.

A single multi-purpose injection fitting is located on the valve bonnet between the metal-to-metal backseat and the stem packing, thereby eliminating the requirements for valve body penetrations. The multi-purpose fitting allows for injection of stem packing sealant when the valve is backseated if operating conditions will not permit packing changeout, and allows injection of body lubricant into the valve cavity when the backseat is not engaged.

In the event of stem packing failure in normal operation, a “telltale” vent port is located in the bonnet cap downstream of the stem packing to allow the leak to be detected.

Full metal-to-metal sealing between the valve body and bonnet connection is provided by a flat gasket arrangement.

Manual VG-231 gate valves incorporate a metal-to-metal selective backseat that forms an integral part of the valve stem.