FL & FLS Gate Valves

Drilling and Production
Gate Valves for
Pressures to 15,000 psi
Cameron FL and FLS Gate Valves: The Industry Standard

The FL and FLS gate valves provide proven Cameron features and low maintenance for drilling and production applications. Cooper Oil Tool Division offers the Cameron FL and FLS gate valves with the security and reliability of metal-to-metal sealing in a wide range of working pressures.

The FL and FLS valves feature a simple and reliable gate-and-seat assembly which minimizes inventory requirements and eases maintenance while still providing true metal-to-metal sealing.

These valves also offer the durability and integrity of a forged steel body and bonnet; the performance characteristics of the basic proven Cameron design; low maintenance costs; and, ease of service.

Cameron FL and FLS gate valves are available in all popular bore sizes. Pressure ratings for the FL are 2000, 3000, 5000 and 10,000 psi. The FLS gate valve is available in 10,000 and 15,000 psi pressure ratings.

These models of gate valves are offered in all API 6A temperature and materials classes and in product specification levels (PSL) 1 through 4. Cameron gate valves are also available in SSV and USV configurations to comply with API 14D and NACE MR-01-75 where applicable.

Reduced hardness bonnet bolting materials can be provided without downrating the valve working pressure.

Cameron FL and FLS Valve Features:

- **Metal-to-Metal Sealing**
  Sealing at gate-to-seat and seat-to-body is metal-to-metal. All Cameron gate valves feature a metal bonnet seal. FL and FLS models in 10,000 and 15,000 psi pressure ratings have a pressure-energized bonnet gasket.

- **Simple Gate and Seat Design**
  One-piece seats, a solid slab gate and a single stainless steel grease retainer plate mean reliable sealing plus ease of field service. No special tools are required to replace the gate and seats.

- **Improved Seat Seal Design**
  In addition to the metal-to-metal seal between the seats and valve body, FL gate valves incorporate a spring-loaded, pressure-energized, non-elastomeric lip-seal between each seat and the body. This seal protects the metal seal surfaces of the seat, gate and body from damage and improves valve performance at very low pressures.

  The FLS design includes two spring-loaded lip-seals on each seat at the seat-to-body interface. This double-seal design provides maximum protection against intrusion of particle contaminants into the valve cavity. This prevents sand particles from affecting the metal-to-metal seals between the body, seats and gate, and also prevents body erosion in drilling mud applications.

- **Bidirectional Sealing**
  The gate-and-seat assembly seals in both directions. The gate and seats can be reversed for increased service life.

- **Backseating Stem**
  The stem shoulder can be backseated against the bonnet to seal off the stuffing box. This allows the stem seal to be replaced while the valve is under pressure.

- **Non-Rising Stem**
  Valve operation does not cause an increase in cavity pressure and does not displace cavity filler grease.

- **Stem Seal**
  Cooper Oil Tool offers several stem seal designs to cover the full range of temperatures, pressures and fluids encountered in wellhead and drilling manifold service.

  The U and J seals are elastomeric seals which are protected from the well bore fluid by a special low-friction PTFE jacket. The Varipak and HT-20 stem seals are inert, non-elastomeric, pressure-energized stem seals for use with more severe temperatures, pressures and fluids.

  FL and FLS gate valves are supplied with stem seals which are compatible with the valves service ratings although substitutions are available upon request.

- **Grease Injection Fitting**
  Body filler grease is injected through a simple, metal-to-metal sealing, grease fitting which is located on the downstream side of the stem backseat for safety. This handles all necessary lubrication for the valve cavity.

- **Positive Bearing Lubrication**
  A grease fitting located on the bearing cap provides positive bearing lubrication to ensure easy opening and closing.

- **Easy Closing and Sealing**
  The valves close without excessive force. After the required number of closure turns, the handwheel should be backed off one-quarter turn. The valve is then fully closed and securely sealed.

- **Forged Steel Construction**
  The body and bonnet are constructed of forged steel for maximum reliability and safety. Forged stainless steel is also available. For severe service applications, weld-clad or CAM CLAD™ corrosion-resistant alloy linings can be applied to base forgings for maximum protection for the valve’s internal service area.

- **Standard Cameron Actuators**
  FL or FLS gate valves can be converted to automatic safety valves with the addition of a Cameron PLS (pneumatic) or HLS (hydraulic) actuator or a W-K-M ® Saf-T-Gard® diaphragm or piston actuator. These actuators are available with a full range of accessories. For drilling and manifold service, FL and FLS gate valves are available with a double-acting hydraulic actuator on a balance-stem valve configuration.
FL and FLS Gate Valve

Dependable Service and Performance for Drilling and Production Operations

Metal-to-Metal Seal
The FL metal bonnet seal is for pressure ratings of 10,000 psi and the FLS metal bonnet seal is for pressure ratings of 15,000 psi.

Forced Steel Body

Floating Gate and Seat Design

Grease Injection Fitting

Non-Rising Backseating Stem

Stem Packing

SD11031

SD11031

SD10118
Testing:

Major components and materials for FL and FLS gate valves are subjected to rigorous performance verification testing before these are supplied in a Cameron valve.

All gate and seat materials and coatings are functionally tested in a 20,000 psi valve, with blow-downs at full differential pressure. The test valve is opened with a pneumatic actuator, which opens the valve much faster than hydraulic or manual operation and provides the most rigorous test condition.

All stem and gate thread materials for manual gate valves are tested in a specially designed fixture which applies both tensile and compressive loads as well as external bending loads to the threaded connection as it is repeatedly torqued back and forth.

Stem packings are tested in test fixtures which allow the application of heat, subzero temperatures, pressures up to 30,000 psi and either linear or rotary stem movement.

These engineering tests have been used to verify the performance of FL and FLS valve pressure-controlling components for many years. Acceptance criteria meet or exceed the 200-cycle design requirement of API 6A PR-2.

Fully automated computer-controlled test equipment has been constructed to perform performance verification testing of gate valves and gate valve actuators in accordance with the recommendations of API Specification 6A.

<table>
<thead>
<tr>
<th>API 6A Materials Classification</th>
<th>Body &amp; Bonnet Material</th>
<th>Stem Material/Coating</th>
<th>Gate Material/Coating</th>
<th>Seat Material/Coating</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA — General Service</td>
<td>Low alloy steel</td>
<td>AISI 41XX nitrided</td>
<td>AISI 41XX nitrided</td>
<td>AISI 41XX nitrided</td>
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<tr>
<td>BB — General Service</td>
<td>Low alloy steel</td>
<td>AISI 410 SS nitrided</td>
<td>AISI 410 SS</td>
<td>Stellite™ 3</td>
</tr>
<tr>
<td>CC — General Service</td>
<td>AISI 410 SS</td>
<td>AISI 410 SS nitrided</td>
<td>AISI 410 SS</td>
<td>Stellite™ 3</td>
</tr>
<tr>
<td>DD — Sour Service*</td>
<td>Low alloy steel</td>
<td>AISI 41XX nickel-plated</td>
<td>AISI 41XX hard-faced</td>
<td>Stellite™ 3</td>
</tr>
<tr>
<td>EE — Sour Service*</td>
<td>Low alloy steel</td>
<td>AISI 410 SS nitrided</td>
<td>AISI 410 SS hard-faced</td>
<td>Stellite™ 3</td>
</tr>
<tr>
<td>FF — Sour Service*</td>
<td>AISI 410 SS</td>
<td>AISI 410 SS nitrided</td>
<td>AISI 410 SS hard-faced</td>
<td>Stellite™ 3</td>
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<tr>
<td>HH — Sour Service*</td>
<td>Low alloy steel clad with alloy 625 or solid alloy 718</td>
<td>Alloy 718</td>
<td>Alloy 718 hard-faced</td>
<td>Stellite™ 3</td>
</tr>
</tbody>
</table>

*As defined by NACE Standard MR-01-75

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Notes:
1. Specifications are subject to change without notice.
2. Special trims are available on request.