CLARKSON L&M REPLACEABLE POLYMER LINER KNIFE GATE VALVES
MODEL M145/M202/M345/M345-HP

Unique Clarkson L&M valves with the three-piece replaceable polymer liner offer reliability and long life in a wide variety of tough applications.

FEATURES
- Proven design features a three-piece replaceable polymer liner.
- Superior shut-off, not to exceed 20 cc water per inch of diameter per minute at 2.8 bar (40 psi), half of MSS.
- Available with ASME Class V shut-off in select applications.
- Every valve is tested for shut-off in both directions.
- Can be installed without worry as to direction of flow.
- 100% full port opening reduces pressure drop allowing greater flow and minimizing wear.
- T-Lock insert is firmly retained by the body liner, helping ensure maximum performance.
- Liner provides all-around gate support and helps prevent lateral movement of the gate, giving you longer packing life and a more consistent valve seal.
- Positive seal packing chamber.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Size range:</th>
<th>DN 50 - 1500 (NPS 2 - 60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M145:</td>
<td>10 bar (150 psi) CWP at ambient temperature. Flanges drilled and tapped to ASME B16.5/150 or as required.</td>
</tr>
<tr>
<td>M202:</td>
<td>10 bar (150 psi) CWP at ambient temperature. Flanges drilled and tapped to ASME B16.5/150 or as required.</td>
</tr>
<tr>
<td>M345:</td>
<td>21 bar (300 psi) CWP at ambient temperature. Flanges drilled and tapped to ASME B16.5/300 as standard, B16.5/150 is available up to 69 bar (900 psi) CWP in select applications ambient temperature.</td>
</tr>
<tr>
<td>M345-HP:</td>
<td>Higher pressures are drilled and tapped as required.</td>
</tr>
</tbody>
</table>

DESIGNED FOR AND PROVEN IN SOME OF THE MOST DIFFICULT APPLICATIONS, CLARKSON L&M VALVES OFFER SUPERIOR SHUT-OFF, FLOW AND RELIABILITY COMPARED TO OTHER KNIFE GATE VALVES. ADDITIONALLY, IT PERFORMS VERY WELL IN MANY SERVICES NOT NORMALLY CONSIDERED TO BE TYPICAL KNIFE GATE APPLICATIONS.

GENERAL APPLICATION
- Designed to provide superior performance in a wide variety of industries and applications: Pulp and paper, Mining, Power, Wastewater, Chemical, Food and beverage, Powder and bulk.

NOTES
- Stated leak rates apply to standard polymer lined versions only.
THREE-PIECE FIELD REPLACEABLE LINER ASSEMBLY

The three-piece liner of Clarkson L&M valves acts as the valve seat, gate support and packing support, providing you with excellent performance. The close tolerance fit of the valve liner, along with the line pressure, is designed to deliver a tight shut-off. The liner also provides all-around gate support, resulting in longer packing life and a consistent valve seal.

Each liner is precision cut, placed into the valve frame and bonded with a silicone compound to help ensure perfect alignment and a superior seal. Liners are available in different materials to suit many applications.

UHMWPE - 82°C (180°F), Ultra-high-molecular-weight polyethylene (UHMWPE) has excellent chemical, abrasion and impact resistant properties with a good temperature range. It is widely used in the pulp and paper, textile, packaging and mining industries.

Polypropylene - 107°C (225°F), A thermoplastic polymer with good impact and fatigue properties. It is resistant to acids, alkalis and solvents.

PTFE - 177°C (350°F), A polytetrafluoroethylene plastic with superior chemical resistant properties at elevated temperatures. It has excellent anti-stick properties, however, it has a relatively poor resistance to wear and is not recommended for abrasive applications.

Other custom liners are available for special and unique applications. Contact your sales representative for additional information.

AVAILABLE CLARKSON L&M VALVE INSERT STYLES

Clarkson L&M valves are designed for the demanding requirements found in many industrial applications. Standard Clarkson L&M valves feature a T-Lock Insert that retains the perimeter section of the liner to the outer sides. This helps ensure maximum liner and seat performance in heavy solids.

Also available is the ZP configuration, with a reinforced elastomer insert that acts as the insert section which is built to match the valve port ID, providing an uninterrupted, straight through flow that reduces turbulence. This helps deliver maximum liner and seat performance in heavy solids.

To enhance performance, Clarkson L&M valves can be provided with special fixed or replaceable retaining rings that help deliver long life in abrasive applications:

- Tungsten Carbide Coated
- Hard surface overlay
- UHMWPE, and others

SPECIAL ALLOYS AND CONFIGURATIONS

Clarkson L&M Models M145, M345 and M345-HP can be provided with high grade alloy gates and rings such as titanium, Hastelloy, Alloy 20, etc. for aggressive applications. Combine this with a PTFE liner, and you have a very effective high performance knife gate valve.

Clarkson L&M valves can also be built in square or rectangular configurations specific to your dimensions and application.
CLARKSON L&M REPLACEABLE POLYMER LINER KNIFE GATE VALVES
MODEL M145/M345/M345-HP

FEATURES

- Cast ductile iron handwheel *
- Self-locking handwheel retaining nut
- Acid-resistant bronze stem nut smooth operation
- Heavy cross-section 304 stainless steel stem, single-lead ACME threads for ease of operation
- Heavy fabricated yoke
- Heavy reinforced packing gland
- Locknuts used on all bolting
- Multiple rows of packing
- Three-piece field replaceable polymer liner, available in UHMWPE, PTFE and Polypropylene, supports gate on all sides
- Gate finished ground on both sides for superior bi-directional shut-off and minimum rim-pull
- Flanges drilled and tapped to ASME B16.5
- Stainless steel retaining rings/raised face
- Full port flow area to DN 600 (NPS 24)
- Fabricated steel body provides superior strength

The rugged construction of Clarkson L&M valves helps set the standard for a true, heavy duty, high performance knife gate valve.

SPECIFICATION

Bonnetless, universal knife gate valve, Clarkson L&M Model [M145, 10 bar (150 psi) CWP] [M345, 21 bar (300 psi) CWP], [M345-HP for pressures up to 69 bar (900 psi)] design, wafer type with bidirectional shut-off up to the full rated pressure. Valve shall have a maximum leakage rate of no more than 20 cc per inch of diameter per minute at 2.8 bar [40 psi] in both directions without the use of O-rings, guides or wedges obstructing the port. The liner shall be made from a polymer material suitable for the application and field replaceable. Typically made from three-separate pieces, the front, back and T-Lock insert, the liner shall line the interior of the valve body, supporting the gate. The liner insert is to be “T” shaped to accommodate the front and back liner pieces, helping prevent insert pullout in severe applications. To deter atmospheric leakage, the valve features an adjustable packing assembly consisting of multiple layers of braided packing around gate, evenly compressed by a one-piece packing gland. The valve is to have 100% full port flow area with no guides or wedges obstructing the port. The gate shall be finished ground on both sides made from stainless steel (or as required for application). The body material shall be fabricated carbon steel or other material depending on application needs, drilled and tapped to ASME B16.5 or as required. Specify Clarkson L&M Model [M145] [M345] [M345-HP] from Emerson.

NOTES

* Bevel gear recommended for sizes DN 300 (NPS 12) and larger on the M145 and DN 250 (NPS 10) and larger for M345 versions.
**CLARKSON L&M REPLACEABLE POLYMER LINER KNIFE GATE VALVES**

**MODEL M145**

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### DIMENSIONS mm (inches)

<table>
<thead>
<tr>
<th>Valve size DN (NPS)</th>
<th>ØA</th>
<th>ØB</th>
<th>C</th>
<th>ØD</th>
<th>E</th>
<th>F</th>
<th>Weight kg (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 (2)</td>
<td>305 (12)</td>
<td>196.9 (7¾)</td>
<td>50.8 (2)</td>
<td>50.8 (2)</td>
<td>511.2 (20¼)</td>
<td>584.2 (23)</td>
<td>22 (48)</td>
</tr>
<tr>
<td>80 (3)</td>
<td>305 (12)</td>
<td>215.9 (7¾)</td>
<td>50.8 (2)</td>
<td>76.2 (3)</td>
<td>511.2 (20¼)</td>
<td>584.2 (23)</td>
<td>22 (48)</td>
</tr>
<tr>
<td>100 (4)</td>
<td>305 (12)</td>
<td>228.6 (9)</td>
<td>50.8 (2)</td>
<td>101.6 (4)</td>
<td>555.6 (21¼)</td>
<td>660.4 (26)</td>
<td>26 (58)</td>
</tr>
<tr>
<td>125 (5)</td>
<td>406 (16)</td>
<td>260.4 (10½)</td>
<td>57.2 (2¼)</td>
<td>127.0 (5)</td>
<td>676.3 (26½)</td>
<td>796.9 (31¾)</td>
<td>39 (86)</td>
</tr>
<tr>
<td>150 (6)</td>
<td>406 (16)</td>
<td>279.4 (11)</td>
<td>57.2 (2¼)</td>
<td>152.4 (6)</td>
<td>714.4 (28½)</td>
<td>860.4 (33¾)</td>
<td>40 (88)</td>
</tr>
<tr>
<td>200 (8)</td>
<td>406 (16)</td>
<td>342.9 (13¼)</td>
<td>69.9 (2½)</td>
<td>203.2 (8)</td>
<td>816.0 (32¼)</td>
<td>1016.0 (40)</td>
<td>64 (140)</td>
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<tr>
<td>250 (10)</td>
<td>406 (16)</td>
<td>406.4 (16)</td>
<td>69.9 (2½)</td>
<td>254.0 (10)</td>
<td>876.3 (34½)</td>
<td>1149.4 (45½)</td>
<td>90 (199)</td>
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<td>300 (12)</td>
<td>610 (24)</td>
<td>489.0 (19¼)</td>
<td>76.2 (3)</td>
<td>304.8 (12)</td>
<td>1057.3 (41¼)</td>
<td>1355.7 (53¼)</td>
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<tr>
<td>350 (14)</td>
<td>610 (24)</td>
<td>539.8 (21½)</td>
<td>76.2 (3)</td>
<td>355.6 (14)</td>
<td>1155.7 (45½)</td>
<td>1498.6 (59½)</td>
<td>191 (420)</td>
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<tr>
<td>400 (16)</td>
<td>610 (24)</td>
<td>603.3 (23½)</td>
<td>88.9 (3½)</td>
<td>406.4 (16)</td>
<td>1295.4 (51¼)</td>
<td>1698.6 (66½)</td>
<td>247 (545)</td>
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<tr>
<td>450 (18)</td>
<td>610 (24)</td>
<td>641.4 (25½)</td>
<td>88.9 (3½)</td>
<td>457.2 (18)</td>
<td>1434.2 (57½)</td>
<td>1895.5 (74½)</td>
<td>304 (670)</td>
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<tr>
<td>500 (20)</td>
<td>610 (24)</td>
<td>704.9 (27¼)</td>
<td>114.3 (4½)</td>
<td>508.0 (20)</td>
<td>1584.4 (61¼)</td>
<td>2038.4 (80½)</td>
<td>422 (930)</td>
</tr>
<tr>
<td>600 (24)</td>
<td>610 (24)</td>
<td>819.2 (32¼)</td>
<td>114.3 (4½)</td>
<td>509.6 (24)</td>
<td>1771.7 (69¾)</td>
<td>2371.7 (93¾)</td>
<td>533 (1175)</td>
</tr>
</tbody>
</table>

**NOTE**

Dimensions are not certified and weights are estimates. Contact your sales representative for complete details.
### CLARKSON L&M REPLACEABLE POLYMER LINER KNIFE GATE VALVES
**MODEL M345/M345-HP**

**DIMENSIONS mm (inches)**

<table>
<thead>
<tr>
<th>Valve size</th>
<th>DN (NPS)</th>
<th>ØA</th>
<th>ØB</th>
<th>C</th>
<th>ØD</th>
<th>E</th>
<th>F</th>
<th>MSS-SP135</th>
<th>Weight (kg lbs)</th>
</tr>
</thead>
</table>

**NOTES**

Dimensions are not certified and weights are estimates. Contact your sales representative for complete details.

The M345 is available with take-out to match the face to face dimensional requirements of MSS-SP135 (long).

The DN 200 [NPS 8] size must be flat faced design.

*MSS-SP135 does not include a DN 125 [NPS 5] size.
Clarkson L&M polymer lined valves are also available for select applications such as a slide gate valves, specify the M202. The M202 provides all the advantages of the M145 and M345, except in a slide gate configuration.

- Ideal valve for dense slurry applications.
- Slide through gate design cuts through solids providing consistent operation in the most difficult applications.
- Will close through a static column of material.
- Bidirectional flow and shut-off, can be installed without worry as to direction of flow.
- 100% Full port opening reduces pressure drop allowing greater flow and minimizing wear.
- The four-piece field replaceable polymer liner provides all-around gate support and prevents lateral movement of the gate, giving you longer packing life and a consistent valve seal.
- Positive seal packing chambers.
- Standard leak rate per MSS-SP81, not to exceed 40 cc of water per inch of diameter per minute at 2.8 bar (40 psi).
- Standard design is 10 bar (150 psi) CWP with higher pressures up to 50 bar (740 psi) available.

**Dimensions mm (inches)**

<table>
<thead>
<tr>
<th>Valve size DN (NPS)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 (2)</td>
<td>300 (12)</td>
<td>163 (6½)</td>
<td>64 (2½)</td>
<td>50 (2)</td>
<td>539 (21½)</td>
<td>615 (24¼)</td>
<td>355 (14)</td>
</tr>
<tr>
<td>80 (3)</td>
<td>300 (12)</td>
<td>201 (7½)</td>
<td>64 (2½)</td>
<td>80 (3)</td>
<td>583 (22½)</td>
<td>685 (26½)</td>
<td>420 (16½)</td>
</tr>
<tr>
<td>100 (4)</td>
<td>300 (12)</td>
<td>239 (9½)</td>
<td>64 (2½)</td>
<td>100 (4)</td>
<td>628 (24½)</td>
<td>755 (29½)</td>
<td>485 (19)</td>
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<tr>
<td>150 (6)</td>
<td>400 (16)</td>
<td>290 (11½)</td>
<td>70 (2½)</td>
<td>150 (6)</td>
<td>727 (28½)</td>
<td>905 (35½)</td>
<td>630 (24½)</td>
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<tr>
<td>200 (8)</td>
<td>400 (16)</td>
<td>354 (13½)</td>
<td>80 (3½)</td>
<td>200 (8)</td>
<td>797 (31½)</td>
<td>995 (39)</td>
<td>750 (29½)</td>
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<tr>
<td>250 (10)</td>
<td>600 (24)</td>
<td>418 (16½)</td>
<td>80 (3½)</td>
<td>250 (10)</td>
<td>893 (35)</td>
<td>1128 (44½)</td>
<td>880 (34½)</td>
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<td>300 (12)</td>
<td>600 (24)</td>
<td>494 (19½)</td>
<td>89 (3½)</td>
<td>300 (12)</td>
<td>1007 (39½)</td>
<td>1320 (51½)</td>
<td>1055 (41½)</td>
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<td>350 (14)</td>
<td>600 (24)</td>
<td>545 (21½)</td>
<td>89 (3½)</td>
<td>350 (14)</td>
<td>1097 (43½)</td>
<td>1460 (57½)</td>
<td>1120 (47)</td>
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<td>400 (16)</td>
<td>600 (24)</td>
<td>609 (23½)</td>
<td>96 (4)</td>
<td>400 (16)</td>
<td>1192 (46½)</td>
<td>1607 (63)</td>
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<td>450 (18)</td>
<td>600 (24)</td>
<td>647 (25½)</td>
<td>96 (4½)</td>
<td>450 (18)</td>
<td>1434 (56½)</td>
<td>1712 (67½)</td>
<td>1480 (58)</td>
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<tr>
<td>500 (20)</td>
<td>600 (24)</td>
<td>711 (27½)</td>
<td>115 (4½)</td>
<td>500 (20)</td>
<td>1517 (59½)</td>
<td>1844 (72½)</td>
<td>1600 (63)</td>
</tr>
<tr>
<td>600 (24)</td>
<td>600 (24)</td>
<td>826 (32½)</td>
<td>115 (4½)</td>
<td>600 (24)</td>
<td>1811 (71½)</td>
<td>2241 (87½)</td>
<td>1860 (73)</td>
</tr>
</tbody>
</table>

**NOTE**
Dimensions are not certified and weights are estimates. Contact your sales representative for complete details.
SPECIAL COATINGS TO ENHANCE SERVICE LIFE

SSEC: Synergistic surface enhancement coating
Well suited for use in applications where corrosive media or abrasion is a problem, SSEC is ideal for applications with sticky, viscous media, scaling/plating or where galling is a problem. The low coefficient of friction eliminates “stick-slip” problems, reduces drag and increases sleeve life. Often improves microfinish of a gate or body. SSEC is a synergistic coating that combines the advantages of anodizing, plating or thermal spraying with the controlled infusion of polymers, dry lubricants and other materials to provide an entirely new composite with improved properties to the base metal. This coating will work on most metal surfaces and creates a harder-than-steel surface, excellent release (non-stick) properties, protects against wear, corrosion and chemical attack and provides permanent lubricity and a superior resistance to static buildup of material. SSEC has a hardness/wear and abrasion rating of up to Rc 68 Equilibrium Wear Rate (EWR) using Taber abrasion testing methods (CS-10 wheel): 2.0 - 4.0 mg per 1000 cycles. SSEC is also very corrosion resistant and will survive 500 hours in ASTM B-117 salt spray. (Coating thickness will affect corrosion resistance.) Suitable for use on steel, stainless, copper, brass, bronze, titanium, and aluminum.

SSEC+: Synergistic surface enhancement coating plus
Select SSEC+ for additional corrosion resistance, about 3 times better than the base SSEC coating (based on ASTM B117 salt spray testing). Abrasion resistance, lubricity, corrosion resistance are similar to the base SSEC. SSEC+ is not recommended for strong acids.

TBSEC: Tungsten-based surface enhancement coating
For applications where maximum wear resistance on ferrous and nonferrous metals is needed over a broad temperature range, Emerson offers TBSEC - Tungsten-based surface enhancement coating. TBSEC is a specific combination of ceramics, metals and proprietary polymers that produces a moisture proof and nonporous structural integrity matrix. Adding TBSEC improves the base metal surface properties and is ideal for applications where galling or sticky media and scaling/plating is a problem. Applied by a thermal spray process, this coating will work on most all metal surfaces and has excellent release (non-stick) properties, protects against wear and chemical attack as well as it features excellent abrasion and galling resistance, and provides permanent lubricity and a superior resistance to static buildup of material. TBSEC has excellent abrasion resistance as well as various chemical and acid resistances. Used on steel, stainless, copper, brass, bronze, titanium, and aluminum.

PBSEC: Polymer-based surface enhancement coating
PBSEC is a polymer-based impregnated surface enhancement coating ideal for applications where maximum corrosion resistance on ferrous and nonferrous metals is needed over a broad temperature range. Like SSEC, PBSEC exhibits a very low coefficient of friction, providing improved lubricity and reducing friction as the gate slides through the sleeves thus increasing the sleeve life. It is ideal for applications where galling or sticky media and scaling/plating is a problem. It will work on most all metal surfaces and has excellent release (non-stick) properties. PBSEC features excellent abrasion and galling resistance and a superior resistance to static buildup of material. It has excellent chemical and abrasion resistance as well as high oxidative stability. Can be applied to steel, stainless, copper, brass, bronze, titanium, and aluminum.

PBSEC-80: Polymer-based surface enhancement coating
PBSEC-80 takes all the great qualities of the PBSEC coating and amplifies them. Those qualities include; release (non-stick) properties, protection against wear, chemical attack, corrosion, galling and abrasion resistance. PBSEC-80 also provides permanent lubricity and a superior resistance to static buildup of material. PBSEC-80 is a proprietary blend of engineered polymers that exhibit a very low coefficient of friction. This is placed on top of an inert ceramic base coating that becomes infused with the PBSEC coating. Used on steel, stainless, brass, copper, titanium, bronze and aluminum.

NOTE
Emerson does not recommend coatings be used as an attempt to reduce metallurgy of the base material required for the application. Coatings from Emerson are used on all our knife gate and slurry valve products.
## CLARKSON L&M REPLACEABLE POLYMER LINER KNIFE GATE VALVES
### MODEL M145/M202/M345/M345-HP

<table>
<thead>
<tr>
<th>Coating</th>
<th>Coefficient of friction</th>
<th>Temperatures (a)</th>
<th>Thickness (Mils)</th>
<th>pH range</th>
<th>Abrasion</th>
<th>Anti-stick (lubricity)</th>
<th>Chemical resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSEC</td>
<td>As low as 0.09</td>
<td>-157°C - 288°C (-250°F - 550°F)</td>
<td>0.2 to 3</td>
<td>5 to 8.5</td>
<td>Good</td>
<td>Excellent</td>
<td>Fair</td>
</tr>
<tr>
<td>SSEC+</td>
<td>Static as low as 0.10</td>
<td>-157°C - 260°C (-250°F - 500°F)</td>
<td>0.5 to 2.0</td>
<td>5 to 8.5</td>
<td>Good</td>
<td>Excellent</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>Dynamic as low as 0.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TBSEC</td>
<td>As low as 0.06</td>
<td>-129°C - 288°C (-200°F - 550°F)</td>
<td>2-10</td>
<td>4 to 10</td>
<td>Excellent</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>PBSEC</td>
<td>Static as low as 0.4</td>
<td>Cryogenic to 135°C (275°F)</td>
<td>3-5</td>
<td>Below 0 to 14</td>
<td>Fair</td>
<td>Not Recommended</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td>Dynamic as low as 0.3</td>
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<tr>
<td>PBSEC-80</td>
<td>0.19</td>
<td>Cryogenic to 149°C (300°F)</td>
<td>10 to 20</td>
<td>0 to 14</td>
<td>Excellent</td>
<td>Fair</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

### NOTES
a. Stated temperatures are above normal operating temperature of the valve and are not to be considered as the rated temperature of the valve.
b. SSEC will survive temperatures of 760°C (1400°F) but all lubricant will dissipate above 425°C (800°F).
c. Short term exposure up to 175°C (350°F).