METAL SEATED
NELES ZEROLEASE™
NELDISC® BUTTERFLY VALVES,
SERIES L1 & L2

Neldisc series L1 is a wafer type and series L2 a lug type metal seated high performance butterfly valve. With close to equal percentage characteristics and superior tightness Neldisc butterfly valves operate both in control and shut-off applications. As a result of the unique geometry of Neldisc, the contact between disc and seat is mechanically induced and does not rely on assistance from differential pressure. The valve is very tight even in low ∆p applications. Due to a number of special constructions developed from the versatile Neldisc design, these valves offer a powerful tool for standardization and are true high performance valves.

ZeroLeak™ features
- Metal to metal
- Bidirectional long term tightness
- Low friction
- Excellent wear resistance
- Extended life cycle
- Lower operational torque

Applications
The Neldisc butterfly valves are widely used in applications such as:
- Liquids
- Gases
- Steam
- Pulpstocks both on control and shutoff services.

FEATURES

Bidirectional tight seat
- Unique all-metal seat design assures superior tightness in difficult applications over long time periods.
- Contact between disc and seat is mechanically induced and does not rely on assistance from differential pressure.

Abrasion resistant
- Solid metal seat design offered in a variety of materials to suit your application.
- Fully metal seated construction with no resilient parts exposed to the medium.

Wide pressure and temperature range
- Differential pressure/temperature ratings in accordance with ASME B16.34.
- Appropriate constructions perform equally well from -200 °C to +800 °C / -330°F to +1480°F.

Low cost of ownership
- Extremely high cycle life minimizes need for maintenance.
- Change packing without removing actuator.
- Totally interchangeable seats can be replaced without disassembly of the disc and shaft.

Offset shaft and eccentric disc
- No seat/disc contact in the open or intermediate position.
- Eliminates wear points at top and bottom of disc.

Anti-blow out shaft
- Anti-blow out shaft construction standard in all valves, see page 2 exploded view.
### PARTS LIST

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PART DESCRIPTION</th>
<th>MATERIAL</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>BODY</td>
<td>Carbon steel, ASTM A 216 gr. WCB</td>
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<td></td>
<td>Stainless steel, ASTM A 351 gr. CF8M</td>
</tr>
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<td>2</td>
<td>CLAMP RING</td>
<td>Carbon steel, 1.0425 (Type ASTM A 515 gr. 55)</td>
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<td>Stainless steel, ASTM A 351 gr. CF8M</td>
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<td>3</td>
<td>DISC</td>
<td>Stainless steel, ASTM A 351 gr. CF8M</td>
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<td>4</td>
<td>SEAT RING</td>
<td>Ni-Fe-base superalloy + Hard chrome, ASTM B 424 (Incoloy 825) or W.no. 1.4418</td>
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<td>9</td>
<td>GLAND</td>
<td>Stainless steel, ASTM A 351 gr. CF8M</td>
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<td>10</td>
<td>BLIND FLANGE</td>
<td>DN 450-500 Stainless steel, ASTM A 351 gr. CF8M</td>
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<tr>
<td></td>
<td></td>
<td>DN 600+ Carbon steel, ASTM A 216 gr. WCB or equal</td>
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<td>Stainless steel, ASTM A 351 gr. CF8M</td>
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<tr>
<td>11</td>
<td>DRIVE SHAFT</td>
<td>L1/L2C AISI 329 (SS 14 2324)</td>
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<td>L1/L2D Stainless steel, ASTM A 564 gr. 630 (17-4PH)</td>
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<td>SHAFT</td>
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<td>14</td>
<td>PIN</td>
<td>L1/L2C AISI 329 (SS 14 2324)</td>
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<tr>
<td>15</td>
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<td>PTFE on stainless steel net</td>
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<tr>
<td>16</td>
<td>BEARING</td>
<td>PTFE on stainless steel net</td>
</tr>
<tr>
<td>18</td>
<td>GASKET</td>
<td>Graphite</td>
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<tr>
<td>19</td>
<td>BODY SEAL</td>
<td>Graphite</td>
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<td>GLAND PACKING</td>
<td>Polytetrafluoroethylene (PTFE)</td>
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<td>STUD</td>
<td>Stainless steel, ISO 3506 A4-80 or A4-70</td>
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<tr>
<td>25</td>
<td>HEXAGON NUT</td>
<td>Stainless steel, ISO 3506 A4-80</td>
</tr>
<tr>
<td>26</td>
<td>HEXAGON SCREW</td>
<td>DN 450-500 Stainless steel, ISO 3506 A4-80</td>
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<tr>
<td></td>
<td></td>
<td>DN 600+ Steel, zinc plated, ASTM A 320 gr. L7M</td>
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<tr>
<td></td>
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<td>Stainless steel, ISO 3506 A4-80</td>
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<td>27</td>
<td>HEXAGON SOCKET SCREW</td>
<td>Stainless steel, ISO 3506 A4-80</td>
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<td>28</td>
<td>LIFTING EYE BOLT (DN 600-)</td>
<td>Steel</td>
</tr>
<tr>
<td>29</td>
<td>IDENTIFICATION PLATE</td>
<td>Stainless steel, AISI 304</td>
</tr>
<tr>
<td>42</td>
<td>RETAINING PLATE</td>
<td>Stainless steel, DIN 17440-1.4435 (AISI 316L)</td>
</tr>
</tbody>
</table>

### NELDISC TRIPLE OFFSET SEATING PRINCIPLE

The disc of the valve is machined to close tolerances to create an elliptical shape similar to an oblique slice taken from a solid metal cone. When the valve is closed, the elliptical disc at the major axis displaces the seat ring outward, causing the seat ring to contact the disc at the minor axis. When the valve is opened, the contact is released and the seat ring returns to its original circular shape.
METAL SEATED NELES ZEROLEAK™ NELDISC® BUTTERFLY VALVES, SERIES L1 & L2

TECHNICAL SPECIFICATION

Product type
High performance butterfly valve
Metal seated fully rated
L1 - Wafer type
L2 - Lug type

Pressure data

Cv tables of L1 and L2 valves in pressure classes ASME 150 and ASME 300.

<table>
<thead>
<tr>
<th>ASME 150</th>
<th>ASME 300</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body:</strong></td>
<td><strong>Trim:</strong></td>
</tr>
<tr>
<td>L1C, L2C</td>
<td>ASME 150/DIN PN 25</td>
</tr>
<tr>
<td>L1D, L2D</td>
<td>ASME 300/DIN PN 40</td>
</tr>
</tbody>
</table>

Size range
L1C: DN 450 - DN 1200 / 18" - 48"
L1D: DN 450 - DN 900 / 18" - 36"
L2C: DN 450 - DN 750 / 18" - 30"
L2D: DN 450 - DN 750 / 18" - 30"

Temperature range
-200 °C … +600 °C / -330°F…+1480°F
(over +600°C/+1480°F please consult with factory).

Design standards
Body: ASME B16.34.
Face to face: ISO 5752, L2D face to face according Metso Automation.

Standard materials
Body: ASTM A216 gr. WCB
ASTM A351 gr. CF8M
ASTM A351 gr. CG8M

Disc:  ASTM A351 gr. CF8M
ASTM A351 gr. CG8M

Clamp ring:  DIN 17155 - 1.0425
ASTM A351 gr. CF8M
ASTM A351 gr. CG8M

Shaft and pins:
AISI 329 (SS 14 2324) in Class ASME 150
ASTM A664 gr. 630 (17-4 PH) in Class ASME 300

Seat ring:
ASTM B424 (Incoloy 825) in DN 450 - DN 600 / 18"-24"
W.Nr. 1.4418 (Avesta 248SV) in DN 700 - DN 1200 / 28" - 48"
Seat ring is always hard chrome plated.

Bearing:
PTFE + AISI 316 net

Certification
Body and clamp ring:  EN 10 204 - 3.1B
Disc:  EN 10 204 - 3.1B on request

Approvals
Fire safe test according to BS 6755/API 607 4th edition.
TA-Luft:  Chapter 3.1.8.4

Valve testing
Each valve undergoes a shell test and a seat test. The shell test pressure is 1.5 x PN. The seat test pressure is 1.1 x PN. The test medium is inhibited water.

Valve tightness:Bidirectionally ISO 5208 Rate D or ANSI Class V (Zeroleak tightness available on request).

Options
- Cryogenic.
- High temperature.
- Heating jacket.
- S-disc, flow balancing trim, see bulletin 2S-L1 20.
- NACE.
- High cyclic design.
- Erosion resistant design.

Flow data
Cv tables of L1 and L2 valves in pressure classes ASME 150 and ASME 300.

<table>
<thead>
<tr>
<th>ASME 150</th>
<th>ASME 300</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disc:</strong></td>
<td><strong>Clamp ring:</strong></td>
</tr>
<tr>
<td>ASTM A351 gr. CF8M</td>
<td>ASTM A351 gr. CG8M</td>
</tr>
<tr>
<td>Clamp ring:</td>
<td>DIN 17155 - 1.0425</td>
</tr>
<tr>
<td>ASTM A351 gr. CF8M</td>
<td>ASTM A351 gr. CG8M</td>
</tr>
</tbody>
</table>

* Permissible but not recommended for prolonged usage above about +424°C/+800 °F.
ACTUATOR SELECTION

EXAMPLE: Valve L1CMA24 for control and shut-off service, flow direction B. Supply pressure $P_s=6$ bar
Initial values: $\alpha=62^\circ$, $\Delta p=0.6$ bar, $\alpha=0^\circ$, $\Delta p=8.5$ bar

a) In the range 10°...90° the torque requirement is 1600 Nm. The torque of actuator B1C25 is sufficient (scale "control"). When a spring-return actuator is required, B1J25 is selected in "spring-to-close" service and B1JA25 in "spring-to-open" service (scale "control").

b) In the range 0°...10° the torque requirement is 4400 Nm when $\Delta p=8.5$ bar and the leakage rate is specified according to the ISO 5208 Rate D standard. In this application sufficient actuators are B1C32 (scale "on-off"), B1J32 in "spring-to-close" service and B1JA32 in "spring-to-open" service (scale "on-off").

ACTUATORS WILL BE CHOSEN ACCORDING TO THE ALTERNATIVE b!

c) If the leakage rate is specified according to the 10xISO 5208 Rate D standard, sufficient actuators are B1C25 (scale "on-off"), B1J32 in "spring-to-close" service and B1JA25 in "spring-to-open" service (scale "on-off").

THE TORQUE REQUIREMENT IN THE RANGE 0°...10°

*) Leakage specified according to the ISO 5208 Rate D:

**) Leakage specified according to the 10xISO 5208 Rate D

L1CMA: Max. differential pressure across a fully closed valve $\Delta p=10$ bar

L1CMH: Max. differential pressure across a fully closed valve $\Delta p=7$ bar

Cryogenic valve L1CMC:
The opening torque is obtained by multiplying the opening torque of L1CMA by 1.3.

If supply pressure is below the $P_s$ min values, choose the spring actuator as follows:

<table>
<thead>
<tr>
<th>$P_s$ (bar)</th>
<th>Actuator in on-off service</th>
<th>Actuator in control service</th>
<th>Output torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 3,5</td>
<td>B1J</td>
<td></td>
<td>1.0 x torque of B1J</td>
</tr>
<tr>
<td>2,5...3,5</td>
<td>B1JK</td>
<td></td>
<td>0,7 x torque of B1J</td>
</tr>
<tr>
<td>3...4</td>
<td></td>
<td>B1JK</td>
<td></td>
</tr>
</tbody>
</table>

1) Spring to close

2) Spring to open

Differential pressure $\Delta p$ = differential pressure across a fully closed valve (bar)

Actuator = output torque of actuator B1C in on-off service

Actuator = output torque of actuator B1C in control service

Actuator = output torque of actuators B1J and B1JA and operator M

Actuator = output torque of operator TORKMATIC

Note: Alternatively Nelprof® Selection Software can be used for actuator selection or torque prediction.
CLASS 300

Dynamic torque
Flow direction a, opening angle 10°…90°

Note: Alternatively Nelprof® Selection Software can be used for actuator selection or torque prediction.

Closing and opening torque
Opening angle 0°…10°

Differential pressure Δp (bar)
Torque (Nm)

Actuator
Cylinder
Spring cylinder
Manual operator

Supply pressure ps (bar)
1, 2, 3, 4, 5, 6, 7, 8, 9, 10

If supply pressure is below the Ps min values, choose the spring actuator as follows:

1) Spring to close
Ps (bar)
Actuator in on-off service
Actuator in control service
Output torque

≥ 3,5
B1J
–
1,0 x torque of B1J

2,5…3,5
B1JK
–
0,7 x torque of B1J

3…4
–
B1JK

2) Spring to open

Ps (bar)
Actuator

4,5
B1JA
–
0,7 x torque of B1JA

4
B1JKA
–
0,6 x torque of B1JA

3,5
B1JKA
–
0,7 x torque of B1JA

3,5…4,5
–
B1JKA

Note: Δps = differential pressure across a fully closed valve (bar)
= output torque of actuator B1C in on-off service
= output torque of actuator B1C in control service
= output torque of actuators B1J and B1JA and operator M
= output torque of actuator B1JA in control service
= output torque of operator TORKMATIC
**L1/L2C, ASME 150**

- **Δp** = max. differential pressure across a closed valve allowed by the mechanical strength of the valve.
- **Δp70°** = max. differential pressure across a 70° open valve allowed by its mechanical strength.
- **Cv70°** = capacity coefficient of the valve across a 70° open valve.
- **Cv90°** = capacity coefficient of the valve across a 90° open valve.

Flange drilling alternatives are ANSI 150, PN10, 16 and 25.

When ordering, please state the type required and the flange drilling.

**Note:** S-Disc option does not effect to the face-to-face dimension.
### L1/L2D, ANSI 300

<table>
<thead>
<tr>
<th>DN</th>
<th>L1</th>
<th>L2</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>A1</th>
<th>S</th>
<th>K</th>
<th>T</th>
<th>( \Delta p_{\text{ps}} )</th>
<th>( \Delta p_{70^\circ} )</th>
<th>( C_v )</th>
<th>L1 Weight</th>
<th>L2 Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>450</td>
<td>180</td>
<td>565</td>
<td>410</td>
<td>655</td>
<td>710</td>
<td>655</td>
<td>230</td>
<td>525</td>
<td>90</td>
<td>1</td>
<td>5/8</td>
<td>70</td>
<td>750</td>
<td>250</td>
<td>19.05</td>
</tr>
<tr>
<td>500</td>
<td>200</td>
<td>625</td>
<td>465</td>
<td>705</td>
<td>775</td>
<td>655</td>
<td>100</td>
<td>575</td>
<td>90</td>
<td>1</td>
<td>5/8</td>
<td>85</td>
<td>750</td>
<td>250</td>
<td>22.23</td>
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<td>525</td>
<td>860</td>
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<td>1</td>
<td>5/8</td>
<td>85</td>
<td>750</td>
<td>250</td>
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<td>875</td>
<td>760</td>
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<td>575</td>
<td>90</td>
<td>1</td>
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<td>970</td>
<td>1000</td>
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<td>120</td>
<td>730</td>
<td>330</td>
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<td>1100</td>
<td>730</td>
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<td>–</td>
<td>–</td>
<td>160</td>
<td>360</td>
<td>885</td>
<td>130</td>
<td>11/4</td>
<td>1</td>
<td>165</td>
<td>330</td>
<td>38.10</td>
</tr>
</tbody>
</table>

\( \Delta p_{70^\circ} \) = max. differential pressure across a closed valve, \( \Delta p_{70^\circ} \) = max. differential pressure across a 70° open valve allowed by its mechanical strength.

\( C_v \) = capacity coefficient of the valve across a 90° open valve, \( C_v \) = capacity coefficient of the valve across a 70° open valve.

**Note:** S-Disc option does not effect to the face-to-face dimension.

### Size

<table>
<thead>
<tr>
<th>Size</th>
<th>Dimensions, mm</th>
<th>Dimensions, inch</th>
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<tr>
<td>18</td>
<td>22.24 x 16.14</td>
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<td>20</td>
<td>24.61 x 18.31</td>
<td>0.97 x 0.72</td>
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<tr>
<td>24</td>
<td>29.25 x 20.67</td>
<td>1.15 x 0.81</td>
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<tr>
<td>28</td>
<td>33.39 x 24.21</td>
<td>1.31 x 0.95</td>
</tr>
<tr>
<td>30</td>
<td>37.09 x 25.79</td>
<td>1.46 x 1.02</td>
</tr>
<tr>
<td>36</td>
<td>43.31 x 28.74</td>
<td>1.69 x 1.13</td>
</tr>
</tbody>
</table>

\( \Delta p_{70^\circ} \) = max. differential pressure across a 70° open valve allowed by its mechanical strength.

\( C_v \) = capacity coefficient of the valve across a 70° open valve, \( C_v \) = capacity coefficient of the valve across a 90° open valve.

When ordering, please state the type required and the flange drilling.

Note: S-Disc option does not effect to the face-to-face dimension.
VALVE + MANUAL GEAR OPERATOR SERIES M

* See dimensions ØB and K on page 6 and 7.

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions, mm</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td>M15</td>
<td>532</td>
<td>468</td>
</tr>
<tr>
<td>M16</td>
<td>642</td>
<td>468</td>
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</tbody>
</table>

VALVE + PNEUMATIC ACTUATOR / B1C / B1J / B1JA

* See dimensions ØB and K on page 6 and 7.

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions, mm</th>
<th>NPT</th>
<th>kg</th>
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<td>X</td>
<td>G</td>
<td>F</td>
</tr>
<tr>
<td>B1C25</td>
<td>265</td>
<td>710</td>
<td>1040</td>
</tr>
<tr>
<td>B1C32</td>
<td>395</td>
<td>910</td>
<td>1330</td>
</tr>
<tr>
<td>B1C40</td>
<td>505</td>
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<td>B1C50</td>
<td>610</td>
<td>1350</td>
<td>1970</td>
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<table>
<thead>
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<th>Dimensions, inch</th>
<th>NPT</th>
<th>lbs</th>
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<td></td>
<td>X</td>
<td>G</td>
<td>F</td>
</tr>
<tr>
<td>B1C25</td>
<td>10.43</td>
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<td>B1C32</td>
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<td>B1C40</td>
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<tr>
<td>B1C50</td>
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<td>53.15</td>
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<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions, mm</th>
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<th>kg</th>
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<tbody>
<tr>
<td></td>
<td>X</td>
<td>G</td>
<td>F</td>
</tr>
<tr>
<td>B1J, B1JA20</td>
<td>395</td>
<td>935</td>
<td>1200</td>
</tr>
<tr>
<td>B1J, B1JA25</td>
<td>505</td>
<td>1200</td>
<td>1530</td>
</tr>
<tr>
<td>B1J, B1JA32</td>
<td>540</td>
<td>1410</td>
<td>1630</td>
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</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions, inch</th>
<th>NPT</th>
<th>lbs</th>
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<tbody>
<tr>
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<td>X</td>
<td>G</td>
<td>F</td>
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<tr>
<td>B1J, B1JA20</td>
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<td>B1J, B1JA32</td>
<td>21.26</td>
<td>55.51</td>
<td>72.05</td>
</tr>
</tbody>
</table>
### HOW TO ORDER

<table>
<thead>
<tr>
<th>Example</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L2</td>
<td>C</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

#### 1 VALVE TYPE
- L1: Wafer type.
- L2: Lug type.

#### 2 PRESSURE RATING
- C: ASME Class 150.
- D: ASME Class 300.

#### 3 SEAT TYPE
- M: Metal seat.
- N: Non-tight.

#### 4 CONSTRUCTION TYPE
- A: Standard.
- C: Cryogenic.
- H: High-temp.
- Y: Special, to be specified.

#### 5 VALVE SIZE
- 18": See Engineering Dimensions on page 6-7.
- 40":

#### 6 BODY MATERIAL
- A: ASTM A351 gr CF8M.
- C: ASTM A351 gr CG8M.
- P: ASTM A216 gr WCB.
- Y: Special, to be specified.

#### 7 DISC MATERIAL
- A: ASTM A351 gr CF8M.
- C: ASTM A351 gr CG8M.
- P: ASTM A216 gr WCB.
- Y: Special, to be specified.

#### 8 SHAFT AND PIN MATERIAL
- C: 17-4PH.
- J: SIS 2324.
- Y: Special, to be specified.

#### 9 SEAT MATERIAL
- A: Incoloy 825.
- B: SS Avesta 248 SV.
- C: Incoloy 825, polymer impregnated hard chrome plated.
- Y: Special, to be specified.