The Guideline Concept ............................................. C2
The Guideline System .......................................... C3
Overview & Descriptions ..................................... C4
General Facts & Dimensions ................................ C5
Load and Moment Ratings ................................... C6
GDL Roller Guides / Accessories ....................... C7
Wipers / Butt-jointed Rail Options ..................... C8
Conversion Tables ............................................. C9
Technical information ..................................... C10-C13
Ordering Information ........................................ C14
GDL Application Sheet ..................................... C15
Light, Smooth and FAST

Aluminum roller guides in a cutting machine for spectacle lenses. Both the work piece carriers and the motorized X-Y table axis are equipped with roller guides. The smooth operation and precision of the equipment ensures a fine cutting action.

Aluminum roller guides in an automatic vibrator for flattening printed sheets of paper. To guarantee even pressure on the sheets of paper, the roller bridge is supported by precision roller guides.

Handling units for medical equipment. Smooth, easy movement with guideline roller guides.

Aluminum roller guides in the sliding carriage of a machine for producing cables. The projecting arm of the carriage is guided by two double rails each with two roller cassettes and can be moved manually with minimal force because of the low friction properties.

Single rail and roller shoe versions of the aluminum roller guide in a handling arrangement for stacks of paper. Various fittings and limit stops for stacking are moved on two axes horizontally and vertically. The robustness and reliability of the roller guides allows for continuous operation under high load conditions.

- Light weight (anodized aluminum)
- Smooth and quiet operation
- Speeds up to 10 m/s
- Acceleration/deceleration up to 40 m/s²
- Loading from any direction
- Permanently lubricated guidance system
- Broad product range in various series high performance, standard and stainless steel versions
- High load and moment capacities
- Very cost effective
- Flexible mounting dimensions
GDL Linear Guides Offer a Variety of Series and Options — High Performance... “Smooth Guidance”

Aluminum roller guides provide smooth operation and high load carrying capacity for industrial automation.

By the use of lightweight aluminum components the moving masses are minimized, travel speeds are increased and actuation energy is saved.

Aluminum roller guides are designed to carry medium weight loads economically. Their smooth action and speeds up to 10 m/s make them ideal for widespread use in many areas of application.

Aside from a main featured High Performance guide, others such as the Standard, Corrosion Resistant, High Dynamics and Grease-free versions are also available.

Aluminum roller guides are available in sizes 12, 15, 20, 25, 35 and 45mm. Rail lengths are from 200 mm to 4000 mm. For longer travel lengths, guide rails can be butt-jointed together.

Rollers arranged crosswise to handle loading from any direction

High Performance Rollers on needle bearings for smooth operation at speeds up to 10 m/s. Acceleration / deceleration up to 40 m/s².

Precision polished and calibrated guideways

Rail profiles and roller cassettes made of anodized aluminum

Axial needle roller bearings of High Performance roller cassette.
GDL Product Line Overview

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full profile wipers</td>
<td></td>
<td>Rollershoe and cassette are provided with snap-on full profile wipers. The snap-on full profile wipers are easily replaceable with available wiper kits. See page 8 for respective wiper kit order numbers.</td>
</tr>
<tr>
<td>Mounting</td>
<td></td>
<td>Rollershoe and cassette use ISO screw quality 8.8 and DIN 433 washers. ISO screw quality 8.8 is recommended for mounting the rails also.</td>
</tr>
<tr>
<td>Loads</td>
<td></td>
<td>See load and moment rating tables on page 6 for respective load, moment and weight data per size and series.</td>
</tr>
<tr>
<td>Acceleration and Deceleration</td>
<td>m/s² (ft/sec²)</td>
<td>40 m/s² maximum (131 ft/s² maximum)</td>
</tr>
<tr>
<td>Guide installation</td>
<td></td>
<td>Possible in any position. See technical information on page 10 for specific instructions on installing various guide configurations.</td>
</tr>
<tr>
<td>Drag adjustment set screw</td>
<td></td>
<td>Cassettes can be adjusted at the factory or by the customer. Rollershoe can be set up by the customer to incorporate the drag adjustment set screw feature. The drag adjustment set screw components are supplied with each pair of rollershoe.</td>
</tr>
<tr>
<td>Coefficient of friction</td>
<td></td>
<td>Variable, but .001 set at standard slide resistance adjustment.</td>
</tr>
<tr>
<td>Standard Lubrication</td>
<td></td>
<td>Lifetime lubrication with standard grease-packed roller bearings.</td>
</tr>
<tr>
<td>Speed</td>
<td>m/s (ft/s)</td>
<td>Up to 10 m/s (or up to 33 ft/s)</td>
</tr>
<tr>
<td>Materials for High Performance or Standard versions</td>
<td></td>
<td>Rail: Aluminum alloy Guideways: Hardened high alloy spring steel Cassettes/rollershoe/top plates: Aluminum alloy Rollers: Bearing steel</td>
</tr>
<tr>
<td>Bearing types</td>
<td></td>
<td>Steel axial needle, Specials on request (ex: anti-magnetic, grease free, high dynamics) - consult factory</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>C (F)</td>
<td>-10° to 80°C (+14 to 176°F) temperature range</td>
</tr>
<tr>
<td>Specials available</td>
<td></td>
<td>Custom length cassettes and rollershoe for 100 piece lots minimum. Keyed butt-jointed rail sections for continuous rail lengths over 4000mm. Solid continuous rails between 4000. Offset or non-standard “L11” dimensions on opposite ends of cut rails. Integrated metal scraper with standard full profile wiper currently available. Rail underside blind mounting holes.</td>
</tr>
</tbody>
</table>

Descriptions of the Various GDL Series Available:

**High Performance Series:**
(Sizes FDC12HP-... thru FDC45HP-...)

The High Performance series is the basis for GDL’s development, which is used in the majority of applications. High Performance guides consist of 8 axial needle roller bearings, running on precision polished and hardened alloy spring steel guideways. These guide bearings are grease packed and shielded, while offering the highest load and moment rating capacities within the GDL product line.

**Standard Performance Series:**
(Sizes FDC12SP-... thru FDC45SP-...)

The Standard Performance series is intended for minor loads and moments for particularly economical guidance solutions. Standard Performance guides consist of 8 radial ball roller bearings, running on precision polished and hardened alloy spring steel guideways. These guide bearings are grease packed and sealed, while offering the lowest load and moment ratings available within the GDL product line, with the exception of the Grease-Free and the Anti-Friction / Corrosion Resistant series. Standard Performance series is the second most commonly used GDL guides for various applications and also provides excellent running behavior.
**General Facts Pertaining to all Series:**

**Snap-on full profile wipers:** Rollershoes and cassettes can be provided with snap-on full profile wipers. The snap-on full profile wipers are easily replaceable with available wiper kits. See page C14 for respective wiper kit order numbers.

**Cassette adjustment:** Cassettes can be adjusted at the factory or by the customer.

**Fasteners:** Rollershoes and cassettes use ISO screw quality 8.8 and DIN 433 washers. ISO screw quality 8.8 is recommended for mounting the rails also. Special stainless steel fasteners can be requested as necessary.

**Carrying Capacity:** See load and moment rating tables on page C6 for your guide series of interest.

**Guide mounting position:** Optional.

**Lengths:** For longer than standard rail lengths, see keyed butt-jointed rail option on page C8.

**Lubrication:** GDL Aluminum Roller Guides are permanently lubricated with contained roller bearings grease. See part numbering schemes on pages C14 to define your desired GDL guide features for ordering.

**Drawing for Cassette with Double Sided Rail**

**Dimensions for both Standard FDC Version Guides**

| Size | Length | Width | B | BS | B1 | Height | B2 | h3 | h9 | as | d2 | D2 | e | fs | h7 | h8 | h10 | h11 | L8 | L12 | i2 | i3 | N1 | N2 | N3 | PF1 | PF2 | S1 | S2 | S3 |
|------|--------|-------|---|----|----|--------|----|----|----|----|----|----|---|----|----|----|-----|-----|---|----|----|----|----|-----|-----|----|----|----|
| 12   | 64     | 12.00 | 12.0 | 37 | 24.4 | 11.9 | 15.0 | 14.7 | 19 | 30 | 3.4 | 6 | 12.50 | 25 | 6.0 | 8 | 4.0 | 6 | 29 | 57 | 10 | 5 | 40 | 5.5 | 1.4 | M4 | M3 | M4 | 5.5 | 3.4 | 3.4 | 4.9 | 9.7 |
| 15   | 78     | 15.25 | 15.5 | 47 | 30.9 | 15.2 | 19.0 | 18.7 | 24 | 38 | 4.5 | 8 | 15.75 | 30 | 7.5 | 10 | 5.0 | 8 | 34 | 68 | 10 | 60 | 6.0 | 2.0 | M5 | M4 | M6 | 7.0 | 4.4 | 4.9 | 5.0 | 12.4 |
| 20   | 92     | 20.00 | 21.0 | 63 | 40.9 | 20.4 | 23.0 | 22.6 | 30 | 53 | 5.5 | 10 | 21.00 | 40 | 8.0 | 12 | 7.0 | 11 | 42 | 80 | 10 | 60 | 7.0 | 2.0 | M6 | M5 | M6 | 9.5 | 4.9 | 5.0 | 5.9 | 16.9 |
| 25   | 98     | 25.00 | 23.0 | 70 | 48.4 | 22.9 | 27.5 | 27.0 | 36 | 57 | 6.6 | 11 | 23.50 | 45 | 5.0 | 16 | 8.5 | 13 | 48 | 84 | 10 | 60 | 10.0 | 2.5 | M8 | M8 | M8 | 12.0 | 6.4 | 7.4 | 8.9 | 19.4 |
| 35   | 135    | 35.00 | 32.0 | 100 | 68.8 | 32.9 | 37.5 | 37.0 | 48 | 82 | 9.0 | 15 | 34.00 | 62 | 7.5 | 20 | 10.5 | 20 | 67 | 117 | 12 | 80 | 11.5 | 3.5 | M10 | M8 | M8 | 17.0 | 8.9 | 8.9 | 28.4 | 19.4 |
| 45   | 165    | 45.00 | 45.0 | 120 | 82.4 | 36.4 | 46.5 | 46.0 | 60 | 100 | 11.0 | 18 | 37.50 | 80 | 9.5 | 24 | 13.5 | 22 | 83 | 146 | 16 | 105 | 14.5 | 4.0 | M12 | M8 | M8 | 22.0 | 9.9 | 9.9 | 9.8 | 20.9 |

**Dimensions for both Underside Mounting Hole FDC Version Guides**

(Ref. ordering instructions)

| Size | Length | Width | B | BS | B1 | Height | B2 | h3 | h9 | as | d2 | D2 | e | fs | h7 | h8 | h10 | h11 | L8 | L12 | i2 | i3 | N1 | N2 | N3 | PF1 | PF2 | S1 | S2 | S3 |
|------|--------|-------|---|----|----|--------|----|----|----|----|----|----|---|----|----|----|-----|-----|---|----|----|----|----|-----|-----|----|----|----|
| 12   | 64     | 12.00 | 12.0 | 37 | 24.4 | 11.9 | 15.0 | 14.7 | 19 | 30 | 3.4 | 6 | 12.50 | 25 | 6.0 | 8 | 4.0 | 6 | 29 | 57 | 10 | 5 | 40 | 5.5 | 1.4 | M4 | M3 | M4 | 5.5 | 3.4 | 3.4 | 4.9 | 9.7 |
| 15   | 78     | 15.25 | 15.5 | 47 | 30.9 | 15.2 | 19.0 | 18.7 | 24 | 38 | 4.5 | 8 | 15.75 | 30 | 7.5 | 10 | 5.0 | 8 | 34 | 68 | 10 | 60 | 6.0 | 2.0 | M5 | M4 | M6 | 7.0 | 4.4 | 4.9 | 5.0 | 12.4 |
| 20   | 92     | 20.00 | 21.0 | 63 | 40.9 | 20.4 | 23.0 | 22.6 | 30 | 53 | 5.5 | 10 | 21.00 | 40 | 8.0 | 12 | 7.0 | 11 | 42 | 80 | 10 | 60 | 7.0 | 2.0 | M6 | M5 | M6 | 9.5 | 4.9 | 5.0 | 5.9 | 16.9 |
| 25   | 98     | 25.00 | 23.0 | 70 | 48.4 | 22.9 | 27.5 | 27.0 | 36 | 57 | 6.6 | 11 | 23.50 | 45 | 5.0 | 16 | 8.5 | 13 | 48 | 84 | 10 | 60 | 10.0 | 2.5 | M8 | M8 | M8 | 12.0 | 6.4 | 7.4 | 8.9 | 19.4 |
| 35   | 135    | 35.00 | 32.0 | 100 | 68.8 | 32.9 | 37.5 | 37.0 | 48 | 82 | 9.0 | 15 | 34.00 | 62 | 7.5 | 20 | 10.5 | 20 | 67 | 117 | 12 | 80 | 11.5 | 3.5 | M10 | M8 | M8 | 17.0 | 8.9 | 8.9 | 28.4 | 19.4 |
| 45   | 165    | 45.00 | 45.0 | 120 | 82.4 | 36.4 | 46.5 | 46.0 | 60 | 100 | 11.0 | 18 | 37.50 | 80 | 9.5 | 24 | 13.5 | 22 | 83 | 146 | 16 | 105 | 14.5 | 4.0 | M12 | M8 | M8 | 22.0 | 9.9 | 9.9 | 9.8 | 20.9 |

Dimensions (mm)
Load & Moment Rating Capacities
(for cassettes on double sided rail)

<table>
<thead>
<tr>
<th>Cassette Series</th>
<th>Dynamic Load Rating C (N)</th>
<th>Static Load Rating C0 (N)</th>
<th>Static Moment Rating Capacities:</th>
<th>Dynamic Moment Rating Capacities:</th>
<th>Cassette Weight (kg)</th>
<th>Rail Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Roll Mocx (Nm)</td>
<td>Pitch Mocy (Nm)</td>
<td>Yaw Mocz (Nm)</td>
<td>Roll Mcx (Nm)</td>
<td>Pitch Mcy (Nm)</td>
<td>Yaw Mcz (Nm)</td>
</tr>
<tr>
<td>High Performance Series</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDC12HP-....</td>
<td>2800</td>
<td>3000</td>
<td>27</td>
<td>43</td>
<td>43</td>
<td>25</td>
</tr>
<tr>
<td>FDC15HP-....</td>
<td>4200</td>
<td>3400</td>
<td>37</td>
<td>58</td>
<td>58</td>
<td>45</td>
</tr>
<tr>
<td>FDC20HP-....</td>
<td>5400</td>
<td>5400</td>
<td>76</td>
<td>111</td>
<td>111</td>
<td>76</td>
</tr>
<tr>
<td>FDC25HP-....</td>
<td>9000</td>
<td>10100</td>
<td>158</td>
<td>222</td>
<td>222</td>
<td>142</td>
</tr>
<tr>
<td>FDC35HP-....</td>
<td>12500</td>
<td>18000</td>
<td>423</td>
<td>559</td>
<td>559</td>
<td>294</td>
</tr>
<tr>
<td>FDC45HP-....</td>
<td>21200</td>
<td>25900</td>
<td>827</td>
<td>983</td>
<td>983</td>
<td>678</td>
</tr>
</tbody>
</table>
GDL Aluminum Roller Guides

High Performance cassettes with lock device

The locking cassette with star grip handle can be stopped at any desired location on the rail. The clamping device does not exert forces on the rail guideways.

The clamping device is used in fixtures which are movable manually, clamping and stop ledgers, feeding of tools and work pieces. Also available with L-ratchet handle.

End of Stroke Stop screws

The stop screws are screwed into threads (option) on the guide rails. The end of stroke stopping energy is reduced by a rubber cap. With guide rails where the L11 is less than the standard minimum, we offset the mounting hole by half of its diameter.

Note: Customer must drill and tap the holes for the stop screws.

GDL Accessories

Rail Mounting Screw Covers

Material: Wear resistant plastic, resistant to oil and aging.

Mounting: Put a plastic plate on top and pound in uniformly. Remove residual burrs with a soft brush or fingernail.

Note: Use respective order numbers for ordering separately or include in rail part number.

<table>
<thead>
<tr>
<th>Size</th>
<th>φ</th>
<th>d</th>
<th>D</th>
<th>K</th>
<th>L11 min.</th>
<th>P</th>
<th>Order Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>N/A</td>
<td>12</td>
<td>12</td>
<td>8</td>
<td>15.0</td>
<td>6.0</td>
<td>63504A</td>
</tr>
<tr>
<td>15</td>
<td>25</td>
<td>59.5</td>
<td>19.0</td>
<td>200</td>
<td>FDC15HP-00010000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>25</td>
<td>77.5</td>
<td>23.0</td>
<td>250</td>
<td>FDC20HP-00010000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>32</td>
<td>71</td>
<td>28.0</td>
<td>250</td>
<td>FDC25HP-00010000</td>
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<td>35</td>
<td>63</td>
<td>96</td>
<td>38.5</td>
<td>350</td>
<td>FDC35HP-00010000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>78</td>
<td>116</td>
<td>48.0</td>
<td>750</td>
<td>FDC45HP-00010000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dimensions (mm)

Catalog 0980

GDL Aluminum Roller Guides

Accessories
**GDL Aluminum Roller Guides**

**Version with wipers**
Integrated into an additional cover, a felt wiper is saturated with oil. Although dependent on the degree of contaminants, these wipers last for some 6000km, after which they can either be washed or replaced. For optimal cassette rolling performance, all holes in the guide rails should be filled with the plastic rail mounting screw covers (see page C7).

Order numbers for replacement wiper kits

<table>
<thead>
<tr>
<th>FDC Series and Size</th>
<th>Respective Order Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>84457B</td>
</tr>
<tr>
<td>15</td>
<td>84480B</td>
</tr>
<tr>
<td>20</td>
<td>84481B</td>
</tr>
<tr>
<td>25</td>
<td>84482B</td>
</tr>
<tr>
<td>35</td>
<td>84483B</td>
</tr>
<tr>
<td>45</td>
<td>84484B</td>
</tr>
</tbody>
</table>

*Wiper kits are sold in pairs.

NOTE: Use respective order numbers for ordering separately as replacements, or specify in cassette part number. See cassette part numbering on pages C14.

**GDL's Keyed Butt-Jointed Rail Option**

GUIDELINE rails can be precisely fastened together using a factory offered keyed butt-joint option for continuous rail lengths, as shown in Figures 1 & 2.

Two rail sections are clamped together with mating round bar stock pieces that seat tangent to both rail section guideways on each side of the rail. While the rail sections are clamped together, a keyway slot is machined in the top and bottom sides of the rail, across the butt-joint. Screw holes are then drilled through the rail inside the keyway slot, so the opposing keyways can be drawn together tightly with screws. The round bar stock clamp is then removed, providing a rigid and well aligned keyed butt-joint.

The keyed butt-joint option provides optimum alignment of all guideways from one rail section to the next. This allows for optimum “smooth” guidance of the cassette bearings, while crossing rail butt-joints.

The keyed butt-jointed rail option is currently available in the FDR version 25, 35, & 45 mm rail sizes. For a keyed butt-joint on rail sizes 25, 35 or 45 mm, specify P/N:# GDL-BJK

Consult factory for other size possibilities.

---

*GDL's Keyed Butt-Jointed Rail Option* [Image]

---

*GDL Coupled with structural aluminum extrusion material and OSP-E actuator* [Image]

---

*GDL linear guides couple well with various structural aluminum extrusions and Parker-Origa OSP-P and OSP-E actuators. Mounting can be easily accomplished using standard fasteners and mounting brackets. See Figure 3 above.* [Image]
### Units Conversion Tables

#### Force Conversions:

<table>
<thead>
<tr>
<th>Multiply</th>
<th>By Conversion Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>pound-force</td>
<td>4.448</td>
<td>Newton</td>
</tr>
<tr>
<td>Newton</td>
<td>0.225</td>
<td>pound-force</td>
</tr>
<tr>
<td>kilogram-force</td>
<td>9.807</td>
<td>Newton</td>
</tr>
<tr>
<td>Newton</td>
<td>0.102</td>
<td>kilogram-force</td>
</tr>
</tbody>
</table>

#### Acceleration Conversions:

<table>
<thead>
<tr>
<th>Multiply</th>
<th>By Conversion Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>feet/second²</td>
<td>0.305</td>
<td>meter/second²</td>
</tr>
<tr>
<td>meter/second²</td>
<td>3.281</td>
<td>feet/second²</td>
</tr>
<tr>
<td>inch/second²</td>
<td>0.025</td>
<td>meter/second²</td>
</tr>
<tr>
<td>meter/second²</td>
<td>39.370</td>
<td>inch/second²</td>
</tr>
</tbody>
</table>

#### Mass Conversions:

<table>
<thead>
<tr>
<th>Multiply</th>
<th>By Conversion Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>ounce</td>
<td>28.349</td>
<td>gram</td>
</tr>
<tr>
<td>gram</td>
<td>0.035</td>
<td>ounce</td>
</tr>
<tr>
<td>kilogram</td>
<td>35.279</td>
<td>ounce</td>
</tr>
<tr>
<td>gram</td>
<td>0.001</td>
<td>kilogram</td>
</tr>
<tr>
<td>pound</td>
<td>0.453</td>
<td>kilogram</td>
</tr>
<tr>
<td>kilogram</td>
<td>2.205</td>
<td>pound</td>
</tr>
</tbody>
</table>

#### Bending Moment or Torque Conversions:

<table>
<thead>
<tr>
<th>Multiply</th>
<th>By Conversion Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>pound-foot</td>
<td>1.356</td>
<td>Newton-meter</td>
</tr>
<tr>
<td>Newton-meter</td>
<td>0.737</td>
<td>pound-foot</td>
</tr>
<tr>
<td>Newton-meter</td>
<td>0.102</td>
<td>kilogram-meter</td>
</tr>
<tr>
<td>Kilogram-meter</td>
<td>9.807</td>
<td>Newton-meter</td>
</tr>
</tbody>
</table>

#### Velocity conversions:

<table>
<thead>
<tr>
<th>Multiply</th>
<th>By Conversion Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>mile/hour</td>
<td>1.609</td>
<td>kilometer/hour</td>
</tr>
<tr>
<td>kilometer/hour</td>
<td>0.621</td>
<td>mile/hour</td>
</tr>
<tr>
<td>feet/second</td>
<td>0.305</td>
<td>meter/second</td>
</tr>
<tr>
<td>meter/second</td>
<td>3.281</td>
<td>feet/second</td>
</tr>
<tr>
<td>inch/minute</td>
<td>0.025</td>
<td>meter/minute</td>
</tr>
<tr>
<td>meter/minute</td>
<td>39.370</td>
<td>inch/minute</td>
</tr>
</tbody>
</table>

#### Length conversions:

<table>
<thead>
<tr>
<th>Multiply</th>
<th>By Conversion Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
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<td>25.4</td>
<td>millimeter</td>
</tr>
<tr>
<td>millimeter</td>
<td>0.039</td>
<td>inch</td>
</tr>
<tr>
<td>inch</td>
<td>0.025</td>
<td>meter</td>
</tr>
<tr>
<td>meter</td>
<td>39.370</td>
<td>inch</td>
</tr>
<tr>
<td>foot</td>
<td>0.305</td>
<td>meter</td>
</tr>
<tr>
<td>meter</td>
<td>3.281</td>
<td>foot</td>
</tr>
</tbody>
</table>
1. **Features of the Guide System**
   Aluminum roller guides consist of a double sided rail and a roller cassette or two single sided rails and two roller shoes. Aluminum roller guide rails and cassettes are made of aluminum alloy. The rollers are very smooth running on precision polished guideways made of high alloy spring steel. The special cross pattern orientation of the running rollers provides high load and moment capacity in all directions. Their special features are: light weight, small dimensions, and high speed of displacement. Aluminum roller guides are economical and universal handling components, which are mostly or all corrosion-resistant and available at a favorable price.

2. **Size of the Guide System**
   To select the right guide size, first the moments and forces acting on the bearing having to be determined.
   Recommended safety factors (with ISO screws quality 8.8):
   - Thrust load \( S > 1.3 \)
   - Tensile load \( S > 4.0 \)
   - Moment load \( S > 6.0 \)

3. **Material**
   The basic body of GDL aluminum roller guides is made of aluminum alloy. The guideways consist of hardened, high alloy spring steel or of stainless steel. By using basic bodies of aluminum, the moved masses are reduced which allows light-weight construction requiring lower moving forces and reduced energy consumption. Still the integrated GDL system sustains high load and moment ratings.

4. **Operating Temperature**
   GDL linear guides can be operated within a temperature range from \(-10^\circ\) C up to \(+80^\circ\) C. For other temperatures, please consult factory.

5. **Screwed Connections**
   GDL linear guides are fixed to the mating structure by the mounting holes in the rails and the cassettes. ISO screw quality 8.8 should be used with DIN 433 washers. To secure the screwed connections, we recommend that suitable locking means be utilized as necessary. Mounting screw torque specifications:

<table>
<thead>
<tr>
<th>M3</th>
<th>M4</th>
<th>M5</th>
<th>M6</th>
<th>M8</th>
<th>M10</th>
<th>M12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>2.5</td>
<td>5.0</td>
<td>8.5</td>
<td>21.0</td>
<td>41.0</td>
<td>71.0</td>
</tr>
</tbody>
</table>

6. **Wipers**
   The guideways of aluminum roller guides are equipped with wipers to protect against coarse environmental contamination.

7. **Slide Resistance / Adjustment**
   **Do not measure sliding resistance with wipers on.**
   Follow the steps on how to adjust GDL cassettes to the rail.
   The new GDL catalog has many changes due to an expanded product line. The change to feature descriptive part numbering was done to accommodate all current and future offerings of the GDL product. The goal is to have standard features and options available, for a perfect fit into your application.
   Included in the chart below are hex sizes, drag resistance and torque ratings for adjusting the cassette.

<table>
<thead>
<tr>
<th>GDL CHART</th>
<th>FDC 12</th>
<th>FDC 15</th>
<th>FDC 20</th>
<th>FDC 25</th>
<th>FDC 35</th>
<th>FDC 45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top plate hex (mm)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Top plate torque (in lbs)</td>
<td>n/a</td>
<td>22.1</td>
<td>44.3</td>
<td>44.3</td>
<td>75.2</td>
<td>186</td>
</tr>
<tr>
<td>Adjustment hex (mm)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Drag resistance (oz)</td>
<td>1.8</td>
<td>3.6</td>
<td>3.6</td>
<td>7.2</td>
<td>10.8</td>
<td>18</td>
</tr>
<tr>
<td>Drag resistance (oz)</td>
<td>7.9</td>
<td>10.8</td>
<td>16.2</td>
<td>21.6</td>
<td>32.4</td>
<td>37.7</td>
</tr>
<tr>
<td>Drag resistance (oz)</td>
<td>.7</td>
<td>1.8</td>
<td>3.6</td>
<td>7.2</td>
<td>10.8</td>
<td>14.4</td>
</tr>
<tr>
<td>Drag resistance (oz)</td>
<td>3.6</td>
<td>7.2</td>
<td>14.4</td>
<td>9-</td>
<td>18</td>
<td>18-</td>
</tr>
</tbody>
</table>

   **7.1 GDL Adjustment Procedure**
   1) Lay the rail out on the flat surface with the datum line facing away from you. Anchor the rail to keep it from shifting when sliding resistance is applied to the cassette.
   The datum line is a reference groove on one side of the rail.
   2) Set the roller cassette on the rail with the adjustment screw facing towards you, while the datum line on the rail is away from you. Do not install the wipers on the cassette yet.
   Do not install the wipers yet.
   3) Make sure the four bolts on the adjustable side of the cassette are slightly loose and the bolts on the fixed side are tight before adjusting the drag screw.
   One side of the cassette is fixed and the other side is floating.
   4) The drag hex screw is located on one side of the cassette. Adjust the screw in for more drag and out for less. Do not try to adjust cassette with top plates bolts tight.
   See the chart for drag adjustment hex screw size.
   5) Adjust the drag on the cassette by sliding as it slides down the rail. Feel for an even amount of resistance as you turn the hex screw in and out.
   6) Tighten down the top plate bolts to the proper torque specification. The tightening of the top plate bolts will add some resistance. If necessary, the adjustment procedure can be repeated for better sliding resistance for your application.
   See the chart for top plate hex size and torque rating.
   7) If the adjustment is done without a scale, it should move evenly. Some examples of improper adjustment are: If the...
To change the clearance setting, first the slave adjustable shoe screws on the cassette top plate are slightly loosened. Afterwards, the drag adjustment set screw is turned to increase or decrease slide resistance of the cassette. Turning the drag adjustment set screw effects a displacement of the roller shoe in relation to the cassette top plate. After re-tightening of the cassette top plate, the slide resistance can be checked. This procedure can be repeated until the desired slide resistance is achieved.

7.4 Rails and Rollershoes

When installing, it is important to distinguish between the master fixed side and the slave adjustable side rollershoe and rail. The rail on the master fixed side is aligned to the mating structure and fastened securely by all screws. The rail on the slave adjustable side should be lightly tightened and movable with light force during initial alignment of parallel rails. Gauge blocks should be used between the parallel rails, by locating off the aligned and mounted master rail, in order to align the slave rail parallel to the master rail. Slave rail mounting bolts should be tightened as the slave rail is aligned at each bolt position. See paragraph 11.3 for further instructions on mounting parallel single sided rails.

7.5 Centering Groove on the Master Fixed Shoe and Custom Top Plate

Each pair of rollershoes are provided with centering grooves for optimum alignment to their mating top plate during mounting. One rollershoe should be designated as the master fixed rollershoe, even though both are designed with a centering groove on their top surface. The other shoe will serve as the slave adjustable side rollershoe. The mating customized top plate should be machined with a centering shoulder according to the following data.

7.2 Double Sided Rail and Cassette

Aluminum roller guides are adjusted in such a way that the required stiffness under load is obtained. If self adjustment is preferred, we recommend that you measure the slide resistance as shown below. Before doing so, the mating structure should be checked for dimensional accuracy and flatness.

The cassettes which are mounted on the rails are adjusted clearance-free, without play. This adjusting method is required at the point on the rail where the cassette travels with the least slide resistance. Adjustment is completed in the non-loaded condition. The tolerances below refer to this condition.

<table>
<thead>
<tr>
<th>Slide resistance adjustment tolerance (N)</th>
<th>FDC__HP, FDC__HC, FDC__AM, FDC__GF, FDC__VA</th>
<th>FDC__SP, FDC__SC</th>
<th>FDC__HD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>FDC__HP, FDC__HC, FDC__AM, FDC__GF, FDC__VA</td>
<td>FDC__SP, FDC__SC</td>
<td>FDC__HD</td>
</tr>
<tr>
<td>Size</td>
<td>12</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Adjust. value</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Max. value</td>
<td>2.0</td>
<td>3.0</td>
<td>4.5</td>
</tr>
</tbody>
</table>

All values are without wipers

Tolerances in the guide system may cause slight variations in the slide resistance, when the adjusted cassette is moved along the guide rail.

7.3 Double Sided Rail and Roller Cassette

- **Master fixed shoe**
- **Slave adjustable shoe**
- **Drag adjustment set screw**

![Diagram of Double Sided Rail and Roller Cassette]

**Catalog 0980**

**Technical Information**

**GDL Aluminum Roller Guides**

**Technical Data**

To change the clearance setting, first the slave adjustable shoe screws on the cassette top plate are slightly loosened. Afterwards, the drag adjustment set screw is turned to increase or decrease slide resistance of the cassette. Turning the drag adjustment set screw effects a displacement of the roller shoe in relation to the cassette top plate. After re-tightening of the cassette top plate, the slide resistance can be checked. This procedure can be repeated until the desired slide resistance is achieved.

7.4 Rails and Rollershoes

When installing, it is important to distinguish between the master fixed side and the slave adjustable side rollershoe and rail. The rail on the master fixed side is aligned to the mating structure and fastened securely by all screws. The rail on the slave adjustable side should be lightly tightened and movable with light force during initial alignment of parallel rails. Gauge blocks should be used between the parallel rails, by locating off the aligned and mounted master rail, in order to align the slave rail parallel to the master rail. Slave rail mounting bolts should be tightened as the slave rail is aligned at each bolt position. See paragraph 11.3 for further instructions on mounting parallel single sided rails.

7.5 Centering Groove on the Master Fixed Shoe and Custom Top Plate

Each pair of rollershoes are provided with centering grooves for optimum alignment to their mating top plate during mounting. One rollershoe should be designated as the master fixed rollershoe, even though both are designed with a centering groove on their top surface. The other shoe will serve as the slave adjustable side rollershoe. The mating customized top plate should be machined with a centering shoulder according to the following data.

<table>
<thead>
<tr>
<th>Size</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>4,5</td>
<td>9,6</td>
</tr>
<tr>
<td>15</td>
<td>5,0</td>
<td>12,6</td>
</tr>
<tr>
<td>20</td>
<td>7,5</td>
<td>16,1</td>
</tr>
<tr>
<td>25</td>
<td>10,5</td>
<td>17,6</td>
</tr>
<tr>
<td>35</td>
<td>12,5</td>
<td>26,1</td>
</tr>
</tbody>
</table>

All values are without wipers

Tolerances in the guide system may cause slight variations in the slide resistance, when the adjusted cassette is moved along the guide rail.
7.6 Adjusting Cassette Built with Rollershoes and Custom Top Plate
The centering shoulder on the top plate should be assembled with its respective fixed rollershoe centering groove and securely torqued to recommended specification. See cassette screw torque specifications under step 5, on page C10.
Assemble the adjustable rollershoe to the top plate also, parallel to the fixed rollershoe on the same side of the top plate. Its fasteners should be lightly tightened so that the adjustable rollershoe can be moved with light finger pressure.
As assembled cassette can then be slid onto parallel rails, while keeping the fixed rollershoe on the master fixed rail side. The incorporated drag adjustment set screw can then be turned clockwise to remove cassette play, or counter clockwise to reduce slide resistance while maintaining zero play.
Once the desired slide resistance is achieved with no cassette play, the adjustable rollershoe fasteners can also be torqued to specification.

8. Running accuracy
The running accuracy is measured from the top plate surface of the cassette, to the ideal straight line of travel. Running accuracy of the cassette to the rail is +/- .03mm (.0012") per meter, granted no greater than (.0024") straightness deviation per meter is maintained when mounting the rail.

9. Contact and support surfaces
The contact and support surfaces have a substantial influence on functioning and precision of linear guides. Depending on the functional requirements of the system, the mating structure has to be machined with the corresponding degree of precision.
Machining errors on the mating structure will otherwise add to the running error of the guide system. In order to assure troublefree functioning, we recommend that a max. straightness deviation of ≤ 0.1 mm (.0039") per running meter be maintained when mounting the rail.

10. Design hints
10.1 Parallel double sided rails and cassettes
The master fixed rail should always be established straight and true first, within the maximum straightness deviation specified in paragraph 9. With parallel rail arrangements, both rails should be mounted on the same mounting surface elevation and treated with equal surface preparation and tolerancing practices. Precise alignment in terms of spacing, parallelism and height is very important.
When coupled parallel to a driving actuator system, the adjustable side of the cassette should be placed on the side closest to the driving actuator. This will minimize driving actuator torque transferred to the adjustable side of the cassette.

11. Guide mounting instructions
The useable load capacity is influenced by the connection between the guide elements and the mating structure. For this reason, a flat, straight and solid secure mounting surface should be provided. Adequate support of qualified loads and moments can then be achieved, along with desired running accuracy.

11.1 Mounting Double Sided Rails and Cassette
Depending on the load situation, certain double sided rails should either be screwed or screwed and dowelled, and respectively put into grooves or against a shoulder.

11.2 Mounting Parallel Double Sided Rails and Cassettes
With parallel double sided rail arrangements, we recommend that the master fixed rail side and slave adjustment rail sides of the guide system be identified. This allows optimum tolerances in parallelism to be achieved best by adjusting the slave adjustable rail, parallel to the master rail. The master fixed rail side should be mounted first to achieve the initial line of straight travel.
The example below displays a convenient method for adjusting the slave adjustable rail parallel to the fixed master rail. Once the cassette travel is smooth, without play, one can proceed with rail mounting.

Note that the top plate spanning across the cassettes on opposite rails is completely bolted down to the cassette on the master fixed side only. The top plate end over the slave adjustable side is only bolted in one location, in the center of the slave adjustment side cassette. With one bolt holding the top plate to the slave adjustment side cassette, this cassette can pivot while the slave adjustable rail self-aligns parallel to the fixed master rail side. The floating top plate setup is stroked along the entire rail length, to establish the parallelism between the two rails.

Calibrated gauge blocks can also be used to establish equal integrity in rail parallelism. The installer should seat and temporarily clamp short pieces of precision ground round stock, tangent to the two guideways on the inside of each rail.

Keyed butt-jointed rails are usually shipped completely assembled, but sometimes must be shipped partially assembled, due to shipping length limitations and shipping care. Partially assembled butt-jointed rails are supplied with a butt-jointing clamping fixture and the keyways and screws for fastening rail section together.

12.2 Mounting of butt-jointed rails
Clean mounting surfaces, then place rail sections loose on the guide path, one behind the other. Lay the rails in their correct sequence of the system design (i.e.: 1, 2, 3, 4…etc.). The orientation of the depth groove on the lower surface of the rail should always be on the same side for all rail sections being butt-jointed.

Any non-assembled rail sections should be aligned with the factory supplied butt-joint clamping fixture as displayed below.

The calibrated gauge blocks can then be used, to locate off the precision round stock on the master fixed rail, in order to set the slave adjustable rail parallel. The gauge blocks are then locating the same way that the floating top plate is, by referencing both the master and slave rail guideway surfaces to establish parallelism.

Once the slave adjustable rail has been self-aligned, its bolts should also be torqued to specification in the order mentioned in paragraph 11.1. The top spanning across both cassettes on opposite rails, can then be securely fastened using all cassette mounting bolt holes.


c|12|15|20|25|35|45|
---|---|---|---|---|---|---|
Precision Round Stock Sizes Ø mm | 11 | 11 | 14 | 16 | 27 | 35 |
Ordering Instructions / Part Numbering System for GDL Rails

**Series**
- FD Double Sided Rail Guide* (Standard)

**Rail Size**
- 1 2”
- 1 5”
- 2 0”
- 2 5”
- 3 5”
- 4 5”

**“L11” Dimension**
- 00 Equal on Both Sides* (Standard)
- ?? Actual Dimension (mm)**

**Guideway Material**
- H High Performance Alloy Steel* (Standard)
- S Stainless Steel

**Rail Type**
- R Standard

**Coatings**
- 0 Anodized Aluminum* (Standard)
- 2 Custom (Consult Factory)

**Mounting Holes**
- 0 Topside Thru Hole* (Standard)
- 1 Underside Blind Thread

**Long Rail Joining Option**
- 0 None* (Standard)
- 1 Keyed Butt Joint (Size 25-45 Only)
- 2 Unkeyed Butt Joint

**Mounting Holes**
- 0 Topside Thru Hole* (Standard)
- 1 Underside Blind Thread

**Grease**
- 0 High Performance* (Standard)
- Z Custom (Consult Factory)

**Bearing Options**
- HP Axial Needle - High Performance Alloy Steel* (Standard)
- SP Single Row Radial Ball - Standard Performance - Alloy Steel* (Standard)
- ZZ Factory** (Consult Factory)

**Lubrication Options**
- 0 None* (Standard)
- Z Custom (Consult Factory)**

**Coatings**
- 0 Anodized and Standard Hardware* (Standard)
- 1 Anodized and Stainless Steel Hardware* (Standard)
- Z Custom (Consult Factory)

**Locking Mechanism**
- 0 None* (Standard)
- 1 L Ratchet Handle*
- 2 Star Grip Handle*

**Wiper Options**
- 0 With Felt Wipers* (Standard)
- 1 Without*
- 2 With Felt Wipers and Scrapers*

**Screw Covers**
- 0 None* (Standard)
- 1 Yes

Note: Maximum length is 4 meters on Size 12.

**Cassette Length**
- 0 Normal Length* (Standard)
- Z Custom (Consult Factory)**

*Stocked Item

**Minimum Order Quantity Required

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Ordering Instructions / Part Numbering System for GDL Cassettes

**Series**
- FD Double Sided Rail Cassette* (Standard)

**Rail Size**
- 1 2”
- 1 5”
- 2 0”
- 2 5”
- 3 5”
- 4 5”

**Coatings**
- 0 Anodized Aluminum* (Standard)
- 2 Custom (Consult Factory)

**Mounting Holes**
- 0 Topside Thru Hole* (Standard)
- Z Custom (Consult Factory)

**Bearing Options**
- HP Axial Needle - High Performance Alloy Steel* (Standard)
- SP Single Row Radial Ball - Standard Performance - Alloy Steel* (Standard)
- ZZ Factory** (Consult Factory)

**Lubrication Options**
- 0 None* (Standard)
- Z Custom (Consult Factory)**

**Coatings**
- 0 Anodized and Standard Hardware* (Standard)
- 1 Anodized and Stainless Steel Hardware* (Standard)
- Z Custom (Consult Factory)

**Locking Mechanism**
- 0 None* (Standard)
- 1 L Ratchet Handle*
- 2 Star Grip Handle*

**Wiper Options**
- 0 With Felt Wipers* (Standard)
- 1 Without*
- 2 With Felt Wipers and Scrapers*

*Stocked Item

**Minimum Order Quantity Required

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GDL Application Sheet

Distributor: ____________________________ End-User: __________________________

Salesperson: ____________________________

Phone: ____________________________ Fax: ____________________________ e-mail: __________________________

Other Information: ___________________________________________________________________________________

---

**Roll**

Roll load

X - Distance

Y - Distance

Z - Distance

---

**Pitch**

Pitch load

X - Distance

Y - Distance

Z - Distance

---

**Yaw**

Yaw load

X - Distance

Y - Distance

Z - Distance

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Technical Data:

Stroke

Horizontal

Vertical

Velocity / Speed

Acceleration

Load / Mass

Load Distances

Lifetime Desired

Environment:

(Dirt, Humidity...)

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