Airflex® Expanding Type Clutches and Brakes
Section C

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Airflex® Expanding Features
Section C

How They Work
E, EB, ER and VE elements utilize a rugged tire-like neoprene and cord tube that expands radially outward when pressurized. The expanding tube forces a friction surface against an inner cylindrical drum surface. The rate at which the tube is pressurized determines the rate at which element torque increases. Final tube pressure determines the element torque capacity.

Design Features

• Uniform contact velocity
Friction shoe contact occurs across the cylindrical surface of the drum where the contact velocity is constant unlike plate types where the contact velocity varies across the friction plate face.

• Force applied at maximum radius from axis
Airflex expanding elements concentrate the frictional force on the inside drum diameter thereby achieving maximum torque. The torque lever arm is the drum radius, not a reduced radius as occurs in plate clutches. Not only is the force generated at the optimum radius, it is also applied uniformly around the drum circumference.
Airflex® Expanding Features

Section C

- **Heat Dissipation**
  Heat, generated at the inner drum surface, is quickly conducted to the drum’s exposed outer surface area where it is dissipated by radiation and convection. This feature is ideal for slip clutch and tension brake applications where heat must be dissipated continuously.

- **Self-adjustment**
  As friction surfaces wear, the tube expands further and compensates for the wear. Normal wear will not reduce torque capacity.

- **No lubrication**
  There are no close fitting sliding components which require lubrication.

- **Operates in any plane**
  Drum design permits operation in any plane. A plate type unit operates best in a vertical plane.
E and VE Construction

Type E and VE elements combine rugged design and rigid construction features which make them ideal for moderate to heavy duty clutch and brake service. They are suited for medium speed cyclic applications which are subject to large thermal loads. When used with an air agitating ventilated drum they provide excellent slip clutch and tension brake service.

A neoprene rubber and cord tube is contained by two side housings. Friction shoes are held in position on the tube periphery by leaf springs which pass through the shoe back plates and side housings. The springs counteract centrifugal force acting on the shoes and insure shoe disengagement. Torque is transmitted by torque bars which are held in position by the side housings. Pressurizing the tube forces the friction shoes to engage an inside drum diameter.

The expanding design allows the element to behave as a centrifugal clutch. The element’s operating speed determines the spring force required to retract the shoes upon tube exhaust. When a large spring force is required, side housings with reinforced spring slots are furnished.

The VE element differs from the E element in that the VE side housings and friction shoe backing plates have open construction and ventilating features which permits a greater flow of cooling air and greater heat dissipation.

Element torque is dependent upon the applied pressure, release spring force and speed. Catalog ratings are given at 75 psi (5.2 bar) and zero rpm. Maximum recommended pressure is 125 psi (8.6 bar). Adjustment for operating pressure, spring force and speed is explained under Selection Procedure.

E elements are available in 10 sizes; VE elements in 3 sizes. They are identified by the inside drum diameter in inches to which they expand and the width in inches of their friction lining. For instance, size 16E475 is designed to expand to a 16 inch diameter drum and has a friction lining width of 4.75 inches. The smallest E element will expand to a 12 inch (305 mm) diameter drum and the largest to a 40 inch (1016 mm) diameter drum.

Two elements can be bolted to an adapter ring to form a dual element having twice the torque capacity of a single element. E elements are available with split side housings. They are used in applications having limited axial access for element maintenance. Butt end actuating tubes are also available for replacement purposes.

Where used:

- Construction Equipment
- Marine Winches
- Metalworking Machinery
- Slip Clutches
- Tension Brakes
### Airflex® E and VE Component Descriptions

#### Section C

**Size** | **Torque Rating**
--- | ---
| **English** | **SI**
| **lb · in @ 75 psi** | **N · m @ 5, 2 bar**
12E475 | 11300 | 1280
14E475 | 16000 | 1810
16E475 | 21500 | 2430
19E475 | 31500 | 3560
21.5E475 | 40500 | 4580
24E475 | 52000 | 5880
27E475 | 67000 | 7570
30E600 | 106000 | 12000
34E600 | 137000 | 15500
40E700 | 225000 | 25400
19VE475 | 25500 | 2880
24VE475 | 45200 | 5110
27VE475 | 58500 | 6610

**Item** | **Component Description**
--- | ---
1 | Housing half
2 | Housing half with valve hole
3 | Tube
4 | Torque bar (nuts required for VE)
5 | Friction shoe assembly
6 | Release spring
7 | Tube nut
8 | Friction block & rivet kit
4, 5, 6 | Torque bars, friction shoes & release springs kit
# Airflex® Single E Elements

## Section C

Form E 601 — Technical Data — Sizes 12 to 40

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<th>rpm</th>
<th>ps/rpm²</th>
<th>lb · ft²</th>
<th>lb</th>
<th>in²</th>
<th>in</th>
<th>in</th>
<th>in²</th>
<th>in</th>
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### Notes:

1. Refers to basic part number only. When ordering, the release spring force and type of friction linings must be specified.

2. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.

3. Tolerances for sizes:
   - 12 thru 27:
     - +0.010/-0.000 in (+0.25/-0.00 mm)
     - 30 thru 40:
       - +0.005/-0.000 in (+0.13/-0.00 mm)

4. American National Pipe Thread

5. Drum contact with worn shoes

6. Figures shown are with teflon or graphite slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.

7. Refer to page C-42 for maximum idle RPM.
## Airflex® Single E Elements

### Section C

#### Form E 601 — Dimensional Data — Sizes 12 to 40

### English

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<thead>
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<th>Part Number</th>
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<th>D25</th>
<th>D46</th>
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<th>H2</th>
<th>H6</th>
<th>H13</th>
<th>L</th>
<th>O4 (Deg.)</th>
<th>V</th>
<th>W</th>
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### SI

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<th>D24</th>
<th>D25</th>
<th>D46</th>
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<th>H2</th>
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<th>O4 (Deg.)</th>
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### Note

- **N - m** Dimensions in millimeters
- **SI** Dimensions @ 5.2 bar
### Airflex® Dual E Elements

Section C

Form E 603 — Technical Data — Sizes 12 to 34

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<th>Centrifugal Gain Constant</th>
<th>Weight Constant</th>
<th>Friction Area</th>
<th>Lining Thickness</th>
<th>Air Tube Cavity</th>
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Notes:

1. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.
2. Tolerance +0.005/-0.000 (+0.13/-0.00 mm)
3. Refer to Form E613. Integral adapter hub used which is bored and keyed for direct shaft mounting.
4. Includes two elements and dual adapter.
5. Drum contact with worn shoes.
6. Figures shown are with teflon or graphite slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
7. American National Pipe Thread Size 40 has four inlet valves.
8. Refer to page C-42 for maximum idle RPM.
Airflex® Dual E Elements

Section C

Form E 603 — Dimensional Data — Sizes 12 to 34

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque Rating</th>
<th>( M_1 )</th>
<th>( D_4 )</th>
<th>( D_{40} )</th>
<th>( D_m )</th>
<th>( G )</th>
<th>( H_2 )</th>
<th>( H_4 )</th>
<th>( H_{13} )</th>
<th>( L )</th>
<th>( Q )</th>
<th>( H_a )</th>
<th>( O_a )</th>
<th>( V )</th>
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<td>17.23</td>
<td>6</td>
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<td>1.03</td>
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<td>32</td>
<td>10.88</td>
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<td>0.63</td>
<td>5.50</td>
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<td>0.78</td>
<td>3/8-18</td>
<td>0.38</td>
<td>36</td>
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<tr>
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<td>0.75</td>
<td>7.03</td>
<td>15.000</td>
<td>17.00</td>
<td>29.91</td>
<td>24.94</td>
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<td>1/2-14</td>
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<tr>
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<td>7.03</td>
<td>19.000</td>
<td>21.00</td>
<td>33.91</td>
<td>28.94</td>
<td>12</td>
<td>1.03</td>
<td>1/2-14</td>
<td>0.50</td>
<td>32</td>
<td>13.81</td>
<td></td>
</tr>
</tbody>
</table>

**English** | **lb • in @ 75 psi** | **Dimensions in inches**
---|---|---
12E475 | 22600 | 11.75 | N/A | N/A | 11.91 | 8.40 | N/A | N/A | 1/4-18 | 0.38 | 16 | 11.00
14E475 | 32000 | 11.75 | N/A | N/A | 13.91 | 9.73 | N/A | N/A | 1/4-18 | 0.38 | 20 | 11.00
16E475 | 43000 | 11.63 | 0.50 | 5.56 | 5.50 | 6.75 | 15.91 | 11.73 | 8 | 0.78 | 3/8-18 | 0.38 | 24 | 10.88
19E475 | 63000 | 11.63 | 0.50 | 5.56 | 8.00 | 9.50 | 18.91 | 14.73 | 10 | 0.78 | 3/8-18 | 0.38 | 24 | 10.88
21.5E475 | 81000 | 11.63 | 0.63 | 5.50 | 9.625 | 11.00 | 21.41 | 17.23 | 6 | 0.78 | 3/8-18 | 0.38 | 28 | 10.88
24E475 | 104000 | 11.63 | 0.63 | 5.50 | 11.500 | 13.50 | 23.91 | 19.73 | 8 | 1.03 | 3/8-18 | 0.38 | 32 | 10.88
27E475 | 134000 | 11.63 | 0.63 | 5.50 | 14.625 | 16.00 | 26.91 | 22.73 | 8 | 0.78 | 3/8-18 | 0.38 | 36 | 10.88
30E600 | 212000 | 14.81 | 0.75 | 7.03 | 15.000 | 17.00 | 29.91 | 24.94 | 12 | 1.03 | 1/2-14 | 0.50 | 28 | 13.81
34E600 | 274000 | 14.81 | 0.75 | 7.03 | 19.000 | 21.00 | 33.91 | 28.94 | 12 | 1.03 | 1/2-14 | 0.50 | 32 | 13.81

**SI** | **N • m @ 5.2 bar** | **Dimensions in millimeters**
---|---|---
12E475 | 2550 | 298 | N/A | N/A | 303 | 213 | N/A | N/A | 1/4-18 | 10 | 16 | 279
14E475 | 3620 | 298 | N/A | N/A | 353 | 247 | N/A | N/A | 1/4-18 | 10 | 20 | 279
16E475 | 4860 | 295 | 13 | 141 | 139,7 | 171,5 | 404 | 298 | 8 | 20 | 3/8-18 | 10 | 24 | 276
19E475 | 7120 | 295 | 13 | 141 | 203,2 | 241,3 | 480 | 374 | 10 | 20 | 3/8-18 | 10 | 24 | 276
21.5E475 | 9150 | 295 | 16 | 140 | 244,5 | 279,4 | 544 | 438 | 6 | 20 | 3/8-18 | 10 | 28 | 276
24E475 | 11800 | 295 | 16 | 140 | 292,1 | 342,9 | 607 | 501 | 8 | 26 | 3/8-18 | 10 | 32 | 276
27E475 | 15100 | 295 | 16 | 140 | 371,5 | 406,4 | 684 | 577 | 8 | 20 | 3/8-18 | 10 | 36 | 276
30E600 | 24000 | 376 | 19 | 179 | 381,0 | 431,8 | 760 | 633 | 12 | 26 | 1/2-14 | 13 | 28 | 351
34E600 | 31000 | 376 | 19 | 179 | 482,6 | 533,4 | 861 | 735 | 12 | 26 | 1/2-14 | 13 | 32 | 351

Note: The table above provides dimensional data for Airflex® Dual E Elements sizes 12 to 34. The data includes ratings, dimensions in both English and SI units, and other specifications such as hole sizes and thread sizes. The diagram illustrates the internal components and dimensions of the dual E elements. Adapter hub for sizes 12 and 14E475 only.
## Airflex® E Clutch Application

### Section C

Form E 604 — Coupling Arrangement — Dimensional Data Sizes

12 to 40

<table>
<thead>
<tr>
<th>Size</th>
<th>English</th>
<th>lb @ 75psi</th>
<th>Dimensions in inches</th>
<th>lb</th>
<th>Dimensions in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>12E475</td>
<td>11300</td>
<td>150</td>
<td>1.50 2.50 1.50 2.75 10.25 3.75 8.00 3.75</td>
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<td>3.20 1.25 18.00 1/4-18 2.75</td>
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<tr>
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<td>183</td>
<td>1.50 3.00 1.50 3.00 10.75 3.75 8.00 3.75</td>
<td>4.25</td>
<td>3.21 1.75 20.00 1/4-18 2.75</td>
</tr>
<tr>
<td>16E475</td>
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<td>237</td>
<td>1.75 3.50 1.75 3.25 12.00 4.25 7.00 4.25</td>
<td>5.00</td>
<td>3.72 2.75 22.00 3/8-18 2.75</td>
</tr>
<tr>
<td>19E475</td>
<td>31500</td>
<td>327</td>
<td>2.25 4.50 2.25 4.75 14.44 5.75 8.00 4.60</td>
<td>6.60</td>
<td>4.10 4.50 25.00 3/8-18 2.68</td>
</tr>
<tr>
<td>21.5E475</td>
<td>40500</td>
<td>383</td>
<td>2.25 4.50 2.75 4.75 14.44 5.75 8.00 4.75</td>
<td>5.20</td>
<td>3.50 29.50 3/8-18 2.68</td>
</tr>
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<td>24E475</td>
<td>52000</td>
<td>514</td>
<td>3.00 6.50 2.75 5.25 18.06 6.50 9.00 5.19</td>
<td>6.37</td>
<td>5.30 32.00 3/8-18 2.68</td>
</tr>
<tr>
<td>27E475</td>
<td>67000</td>
<td>580</td>
<td>2.75 5.25 2.75 5.50 16.56 6.50 9.00 7.50</td>
<td>5.30</td>
<td>4.87 35.00 3/8-18 2.56</td>
</tr>
<tr>
<td>30E600</td>
<td>106000</td>
<td>740</td>
<td>2.75 5.50 2.75 5.50 17.31 6.50 9.75 5.60</td>
<td>6.42</td>
<td>38.00 1/2-14 3.31</td>
</tr>
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<td>3.00 6.00 3.00 6.00 20.31 8.00 9.75 9.00</td>
<td>6.90</td>
<td>7.07 42.00 1/2-14 3.31</td>
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<tr>
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<td>8.13</td>
<td>7.50 48.00 1/2-14 3.75</td>
</tr>
</tbody>
</table>

### Notes:

1. Refer to Rotorseal Section for mounting and dimension information.
2. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.
3. Total weight or mass with minimum hub bores. Rotorseal and hose not included.
4. Refer to component catalog pages for component details.
Airflex® E Clutch Application

Section C

Form E 605 — Coupling Arrangement — Dimensional Data

Sizes Dual 12 to Dual 34

<table>
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<tr>
<th>Size</th>
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<th>Dimensions in inches</th>
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<td>14E475</td>
<td>349</td>
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<td>670</td>
<td>C2</td>
</tr>
<tr>
<td>24E475</td>
<td>893</td>
<td>C2</td>
</tr>
<tr>
<td>27E475</td>
<td>1010</td>
<td>C2</td>
</tr>
<tr>
<td>30E600</td>
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<tr>
<td>34E600</td>
<td>274000</td>
<td>3/4 RH</td>
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</tbody>
</table>

Notes:

1. Refer to Rotorseal Section for mounting and dimension information.
2. Dynamic torque shown, static torque approximately 25% greater.
   Torque in each application is dependent upon release spring force, air pressure and speed.
3. Total weight or mass with minimum hub bores. Rotorseal and hose not included.
5. Locate radial shaft hole just beyond element hub.
6. Figures shown are with teflon or graphite slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
Airflex® E Clutch Application

Section C

Form E 606 — Bearing Mounted Arrangement — Dimensional Data

Sizes 12 to 40

Notes:

1. Refer to Rotorseal Section for mounting and dimension information.
2. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.
3. Total weight or mass with minimum hub bores. Rotorseal and hose not included.
4. Locate radial shaft hole just beyond element hub.
5. American National Pipe Thread
6. Figures shown are with slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.

<table>
<thead>
<tr>
<th>English</th>
<th>lb - in @ 75 psi</th>
<th>lb</th>
<th>Dimensions in inches</th>
</tr>
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<td>B3</td>
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<td>390</td>
<td>B3</td>
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<td>B3</td>
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Notes:

1. Refer to Rotorseal Section for mounting and dimension information.
2. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.
3. Total weight or mass with minimum hub bores. Rotorseal and hose not included.
4. Locate radial shaft hole just beyond element hub.
5. American National Pipe Thread
6. Figures shown are with slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
Airflex® E Clutch Application

Section C

Form E 607 — Bearing Mounted Arrangement — Dimensional Data

Sizes Dual 12 to Dual 34

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<th>Size</th>
<th>Torque Rating</th>
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<th>Rotorseal Size</th>
<th>Bore Range</th>
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<th>( D_6 )</th>
<th>( D_{45} )</th>
<th>( D_{30} )</th>
<th>( D_{40} )</th>
<th>( H )</th>
<th>( J_{\max} )</th>
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Notes:

1. Refer to Rotorseal Section for mounting and dimension information.
2. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.
3. Total weight or mass with minimum hub bores. Rotorseal and hose not included.
5. Figures shown are with slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
### Airflex® E Brake Application

**Section C**

Form E 608 — Air-Cooled Arrangement — Dimensional Data

Sizes 12 to 40

---

**Notes:**

1. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.

2. Total weight or mass with minimum hub bores.

3. Maximum length with drum hub reverse mounted.

---

#### English

<table>
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<th>Size</th>
<th>Mr Weight</th>
<th>Torque Rating</th>
<th>Weight</th>
<th>Dimensions in inches</th>
<th>Bore Range</th>
<th>D</th>
<th>D6</th>
<th>D7</th>
<th>D38</th>
<th>H</th>
<th>O4</th>
<th>P</th>
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<tr>
<td></td>
<td>lb - in @ 75 psi</td>
<td>lb</td>
<td>Dimensions in inches</td>
<td></td>
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#### Notes:

- Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.
- Total weight or mass with minimum hub bores.
- Maximum length with drum hub reverse mounted.

---

#### SI

| Size      | N - m @ 5.2 bar | kg | Dimensions in millimeters | |
|-----------|-----------------|----|---------------------------||
|           |                 |    |                           | |

---

**Notes:**

1. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.

2. Total weight or mass with minimum hub bores.

3. Maximum length with drum hub reverse mounted.

---

**Notes:**

1. American National Pipe Thread.

2. Figures shown are with slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
Airflex® E Brake Application

Section C

Form E 609 — Air-Cooled Arrangement — Dimensional Data

Sizes Dual 12 to Dual 34

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Notes:

1. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.
2. Total weight or mass with minimum hub bores.
3. Maximum length with drum hub reverse mounted.
5. Figures shown are with slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
## Airflex® E Brake Application

**Section C**

*Form E 610 — Water cooled Arrangement — Dimensional Data*

**Sizes 12 to 34**

### English

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<th>D₆</th>
<th>H</th>
<th>M</th>
<th>Ø O₄</th>
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<td>3/8-18</td>
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**Notes:**

1. Refer to Rotorseal Section for mounting and dimension information.

2. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon release spring force, air pressure and speed.

3. Total weight or mass with minimum hub bores. Rotorseal and hose not included.


5. Figures shown are with teflon or graphite slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
### Airflex® VE Element

#### Section C

Form VE 602 — Dimensional Data — Sizes 19 to 27

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**Airflex® VE Element**

---

### VE Elements can be furnished in the clutch and brake applications shown for the E elements.

---

#### Notes:

1. Refers to basic part number only. When ordering, the release spring force and type of friction linings must be specified.
2. Dynamic torque shown, static torque approximately 25% greater.
   Torque in each application is dependent upon release spring force, air pressure and speed.
3. Tolerances for sizes:
   - 12 thru 27: +0.010/-0.000 in (+0.25/-0.00 mm)
   - 30 thru 40: +0.005/-0.000 in (+0.13/-0.00 mm)
5. Drum contact with worn shoes.
6. Figures shown are with teflon or graphite slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
7. Refer to page C-42 for maximum idle RPM.

---

### Dimensions in inches

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<th>D24</th>
<th>D25</th>
<th>D46</th>
<th>G</th>
<th>H1</th>
<th>H2</th>
<th>H13</th>
<th>L</th>
<th>Q4</th>
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### Dimensions in millimeters

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**Notes:**

1. Refers to basic part number only. When ordering, the release spring force and type of friction linings must be specified.
2. Dynamic torque shown, static torque approximately 25% greater.
   Torque in each application is dependent upon release spring force, air pressure and speed.
3. Tolerances for sizes:
   - 12 thru 27: +0.010/-0.000 in (+0.25/-0.00 mm)
   - 30 thru 40: +0.005/-0.000 in (+0.13/-0.00 mm)
5. Drum contact with worn shoes.
6. Figures shown are with teflon or graphite slip linings. Multiply values by 1.5 for standard linings, and contact factory for possible need of reinforced housings.
7. Refer to page C-42 for maximum idle RPM.

---

130 EATON Airflex® Clutches & Brakes 10M1297GP November 2012
## Airflex® E and VE Mounting Components

Section C

Form E 611 — Element Hubs — Dimensional and Technical Data

Sizes 12 to 40

### Thru Tapped Holes

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### Notes:
- Based upon minimum bores.
## Airflex® E and VE Mounting Components

### Section C

Form E 614 — Drum Hubs — Dimensional and Technical Data

Size 12 to 40

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<th>Dimensions in inches</th>
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### Notes:

- Based upon minimum bores.

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**EATON Airflex® Clutches & Brakes 10M1297GP November 2012**
### Airflex® E and VE Mounting Components

#### Section C

Form E 618 — Dual Adapter Ring Hubs — Dimensional and Technical Data

Sizes 16 to 34

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#### SI

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<th>kg · m²</th>
<th>Dimensions in millimeters</th>
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#### Notes:

- Based upon minimum bores.
Airflex® E and VE Mounting Components

Section C

Form E 615 — Ventilated Drums — Dimensional and Technical Data — Sizes 12 to 40

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<th>lb in</th>
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Notes:
1. Tolerance: +0.005/-0.000 in (0,13/-0,00 mm)
### Airflex® E and VE Mounting Components

**Section C**

**Form E 612 — Adapter Rings — Dimensional and Technical Data — Sizes 12 to 40**

**English  lb lb . ft² Dimensions in inches**

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**SI kg kg . m² Dimensions in millimeters**

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<th>Dₙ₁</th>
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**Notes:**

1. Tolerance +0.000/-0.005 in (+0,00/-0,13 mm)
2. Contact factory for this dimension.
Airflex® E and VE Mounting Components
Section C
Form E 613 — Dual Adapter Rings — Dimensional and Technical Data —
Sizes 12 to 34

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<td>201.6</td>
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Notes:
1️⃣ Based upon minimum bores.
2️⃣ Tolerance ±0.005/-0.000 in (+0.13/-0.00 mm)
3️⃣ Adapter ring bored and key seated for shaft mounting. Bore 2.75 in (70 mm) minimum, 3.75 in (95 mm) maximum.
Airflex® EB and ER Construction

Section C

EB elements are suited to slow speed applications having moderate starting and stopping loads. They are used as slip clutches and tension brakes for lighter torque and horsepower applications.

EB elements are similar in design and construction to the CB elements and have many of the CB features. A neoprene rubber and cord tube is bonded on its inside diameter to a cylindrical surface. Friction shoes are attached with pins and held in position with lockwires to the outside diameter of the tube. Torque is transmitted by the sidewalls of the rubber tube. Pressurizing the tube forces the friction shoes to engage an inside drum diameter.

The expanding design allows the element to behave as a centrifugal clutch. The radial stiffness of the rubber tube determines the element speed at which the friction shoes will retract.

The rubber tubes of the three small elements are bonded to the outside diameters of solid hubs, which, in turn, are bored and keyseated for direct shaft mounting. The pressurizing passage can be either a radial hole thru the hub or a port provided in the hub face. Larger element sizes are attached to the shaft by a separate element hub.

Element torque is dependent upon the applied pressure and speed. Catalog ratings are given at 75 psi (5.2) and zero rpm. Maximum recommended pressure is 110 psi (7.6 bar). Adjustment for operating pressure and speed is explained under Selection Procedure.

EB elements are available in 11 sizes. They are identified by the inside drum diameter in inches to which they expand and the width in inches of their friction lining. For instance, size 16EB475 is designed to expand to a 16 inch diameter drum and has a friction lining width of 4.75 inches. The smallest EB element will expand to a 4 inch (102 mm) diameter drum and the largest to a 24 inch (610 mm) diameter drum. Due to its small diameter, the 4EB125 does not have replaceable friction shoes. Instead, the friction material is bonded to its rubber tube.

Construction of the ER element is similar to the EB element, except for friction shoes. ER elements engage their drums directly with the outside rubber surface of their actuating tubes. This interface results in a friction force which provides a large torque in a relatively small package. It also provides electrical isolation between connecting shafts.

ER elements are used as shaft couplings or holding brakes where engagement occurs at zero speed differential between element and drum. They are ideal for applications in which a disconnect is required without stopping the prime mover or in which the driving and or driven equipment must be frequently withdrawn from the drive.

ER elements are identified similar to the EB elements. They are available in ten sizes. The smallest expands to a 3 inch (51 mm) diameter drum and the largest to a 24 inch (610 mm) diameter drum.

Where Used:
- Centrifuges
- Core Expanders
- Laundry Machines
- Textile Machines
- Tire Building Machines
### Airflex® EB Components Descriptions

**Section C**

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque Rating</th>
<th>English</th>
<th>SI</th>
</tr>
</thead>
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<td></td>
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<td>N·m @ 5, 2 bar</td>
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<td>910</td>
<td>103</td>
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<td>251</td>
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#### Size Torque Rating

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<td>4</td>
<td>Air connection gasket</td>
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<td>5</td>
<td>Friction shoe</td>
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<tr>
<td>6</td>
<td>Shoe pin</td>
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<td>7</td>
<td>Lockwire</td>
</tr>
<tr>
<td>8</td>
<td>Pipe plug</td>
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<tr>
<td>5, 6, 7</td>
<td>Friction shoe, pin and lockwire kit</td>
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**4, 6 & 8 EB Elements**

**9 thru 24 EB Elements**
## Airflex® EB Elements

### Section C

Form EB 701 — Dimensional and Technical Data — Sizes 4 to 8

---

### English Dimensions in inches

<table>
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<th>D&lt;sub&gt;2&lt;/sub&gt;</th>
<th>D&lt;sub&gt;za&lt;/sub&gt;</th>
<th>H&lt;sub&gt;1&lt;/sub&gt;</th>
<th>H&lt;sub&gt;2&lt;/sub&gt;</th>
<th>H&lt;sub&gt;za&lt;/sub&gt;</th>
<th>L</th>
<th>Ø</th>
<th>Ø&lt;sub&gt;Q4&lt;/sub&gt; (Deg)</th>
<th>V</th>
<th>W</th>
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### SI Dimensions in millimeters

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<th>H&lt;sub&gt;1&lt;/sub&gt;</th>
<th>H&lt;sub&gt;2&lt;/sub&gt;</th>
<th>H&lt;sub&gt;za&lt;/sub&gt;</th>
<th>L</th>
<th>Ø</th>
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</table>

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### Notes:

1. Refers to basic part number only. When ordering, it must be specified which air entry hole, O or O<sub>4</sub> is to be used
2. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon air pressure and speed.
4. Based upon minimum bores.
5. Lining molded into rubber tube. Complete element should be replaced when dimension H<sub>2</sub> is worn to 3.88 in (98 mm) diameter.
6. Drum contact with worn shoes.
### Airflex® EB Elements

#### Section C

Form EB 702 — Technical Data — Sizes 9 to 24

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<th>Air Cavity</th>
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#### Notes:

1. Refers to basic part number only.
2. Dynamic torque shown, static torque approximately 25% greater.
   Torque in each application is dependent upon air pressure and speed.
3. Tolerances for sizes:
   - 9 thru 14
     +0.005/-0.000 in (0,13/-0,00 mm)
   - 16 thru 24
     +0.010/-0.000 in (0,25/-0,00 mm).
4. Drum contact with worn shoes.
Airflex® EB Elements

Section C

Form EB 702 — Dimensional Data — Sizes 9 to 24

### Dimensions in inches

<table>
<thead>
<tr>
<th>Size</th>
<th>Part Number</th>
<th>Torque Rating</th>
<th>( D_2 )</th>
<th>( D_{24} )</th>
<th>( D_{25} )</th>
<th>( G )</th>
<th>( H_2 )</th>
<th>( H_6 )</th>
<th>( H_7 )</th>
<th>( H_{13} )</th>
<th>( L )</th>
<th>( O_3 ) (Deg)</th>
<th>( V )</th>
<th>( W )</th>
</tr>
</thead>
<tbody>
<tr>
<td>9EB325</td>
<td>143274</td>
<td>4375</td>
<td>4.13</td>
<td>1.86</td>
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<td>8.84</td>
<td>4.62</td>
<td>6.00</td>
<td>8</td>
<td>0.50</td>
<td>0.31</td>
<td>22.5</td>
</tr>
<tr>
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<td>0.16</td>
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<td>5.25</td>
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<td>5.56</td>
<td>7.00</td>
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<td>0.50</td>
<td>0.31</td>
<td>22.5</td>
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<td>9.56</td>
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<td>12</td>
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<td>2.50</td>
<td>0.25</td>
<td>8.250</td>
<td>9.63</td>
<td>15.81</td>
<td>9.62</td>
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<td>8</td>
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<tr>
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<td>27000</td>
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<td>9.625</td>
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<td>18.81</td>
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<td>23.81</td>
<td>16.00</td>
<td>19.38</td>
<td>8</td>
<td>0.75</td>
<td>0.38</td>
<td>22.5</td>
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</table>

### Dimensions in millimeters

<table>
<thead>
<tr>
<th>Size</th>
<th>Part Number</th>
<th>Torque Rating</th>
<th>( D_2 )</th>
<th>( D_{24} )</th>
<th>( D_{25} )</th>
<th>( G )</th>
<th>( H_2 )</th>
<th>( H_6 )</th>
<th>( H_7 )</th>
<th>( H_{13} )</th>
<th>( L )</th>
<th>( O_3 ) (Deg)</th>
<th>( V )</th>
<th>( W )</th>
</tr>
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<tbody>
<tr>
<td>9EB325</td>
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<td>424</td>
<td>105</td>
<td>47</td>
<td>5</td>
<td>88,9</td>
<td>117</td>
<td>225</td>
<td>117</td>
<td>152</td>
<td>8</td>
<td>13</td>
<td>8</td>
<td>22.5</td>
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<td>10EB300</td>
<td>143119</td>
<td>483</td>
<td>99</td>
<td>40</td>
<td>4</td>
<td>108,0</td>
<td>133</td>
<td>250</td>
<td>141</td>
<td>178</td>
<td>8</td>
<td>13</td>
<td>8</td>
<td>22.5</td>
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<td>12EB350</td>
<td>143122</td>
<td>848</td>
<td>111</td>
<td>48</td>
<td>5</td>
<td>158,8</td>
<td>184</td>
<td>301</td>
<td>192</td>
<td>229</td>
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<td>13</td>
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<td>209,6</td>
<td>235</td>
<td>352</td>
<td>243</td>
<td>279</td>
<td>12</td>
<td>13</td>
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<td>15.0</td>
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<td>162</td>
<td>64</td>
<td>6</td>
<td>209,6</td>
<td>245</td>
<td>402</td>
<td>244</td>
<td>289</td>
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<td>13</td>
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<td>19EB475</td>
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<td>162</td>
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<td>6</td>
<td>244,5</td>
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<td>478</td>
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<td>365</td>
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<td>605</td>
<td>406</td>
<td>492</td>
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</table>

SI

@ 5.2 bar Dimensions in millimeters
Airflex® EB Clutch Application

Section C
Forms EB 705 and 706 — Coupling Mounting Arrangement —
Dimensional Data — Sizes 6 to 12

Notes:

1. Refer to Rotorseal Section for mounting and dimension information.
2. For larger sizes, it is recommended that the E product line be used. See Form E604.
3. Refers to basic part number only and does not include the rotorseal and hose.
4. Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon air pressure and speed.
5. Based upon minimum bores. Rotorseal and hose not included.
Airflex® EB Clutch Application

Section C

Forms EB 707 and 708 — Bearing Arrangement — Dimensional Data —

Sizes 6 to 12

<table>
<thead>
<tr>
<th>English</th>
<th>lb · in @ 75 psi</th>
<th>lb</th>
<th>Dimensions in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>6EB200</td>
<td>106914</td>
<td>910</td>
<td>0.88 1.75 6.75 2.00</td>
</tr>
<tr>
<td>8EB250</td>
<td>106915</td>
<td>2200</td>
<td>1.25 2.50 7.75 2.50</td>
</tr>
<tr>
<td>10EB300</td>
<td>106935</td>
<td>4275</td>
<td>1.50 2.50 10.00 3.75</td>
</tr>
<tr>
<td>12EB350</td>
<td>106936</td>
<td>7500</td>
<td>1.63 3.00 10.50 4.25</td>
</tr>
</tbody>
</table>

Notes:

• Refer to Rotorseal Section for mounting and dimension information.
• For larger sizes, it is recommended that the E product line be used. See Form E604.

Shaft and keys by customer. Refer to component catalog pages for component details.

Dynamic torque shown, static torque approximately 25% greater. Torque in each application is dependent upon air pressure and speed.

Based upon minimum bores. Rotorseal and hose not included.
Airflex® EB Brake Application

Section C

Forms EB 709 and 710 — Dimensional Data — Sizes 6 to 12

Notes:

1. Refers to basic part number only.
2. Dynamic torque shown, static torque approximately 25% greater.
   Torque in each application is dependent upon air pressure and speed.
3. Based upon minimum bores.

Shaft, key, and reaction members by customer.
Refer to component catalog pages for component details.

---

### English

<table>
<thead>
<tr>
<th>Size</th>
<th>Part Number</th>
<th>Torque @ 75 psi [lb - in]</th>
<th>Dimensions in inches</th>
<th>Weight [lb]</th>
<th>Bore Range [in]</th>
<th>D</th>
<th>Ds</th>
<th>D7</th>
<th>D9</th>
<th>D38</th>
<th>D45</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>6EB200</td>
<td>104308</td>
<td>910</td>
<td>lb</td>
<td>103</td>
<td>22</td>
<td>44</td>
<td>187</td>
<td>99</td>
<td>89</td>
<td>25</td>
<td>83</td>
<td>16</td>
</tr>
<tr>
<td>8EB250</td>
<td>104309</td>
<td>2220</td>
<td>lb</td>
<td>251</td>
<td>32</td>
<td>64</td>
<td>213</td>
<td>111</td>
<td>102</td>
<td>25</td>
<td>89</td>
<td>16</td>
</tr>
<tr>
<td>10EB300</td>
<td>104310</td>
<td>4275</td>
<td>lb</td>
<td>483</td>
<td>38</td>
<td>64</td>
<td>238</td>
<td>133</td>
<td>102</td>
<td>29</td>
<td>102</td>
<td>19</td>
</tr>
<tr>
<td>12EB350</td>
<td>104311</td>
<td>7500</td>
<td>lb</td>
<td>848</td>
<td>41</td>
<td>76</td>
<td>251</td>
<td>152</td>
<td>108</td>
<td>27</td>
<td>102</td>
<td>19</td>
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</table>

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### SI

<table>
<thead>
<tr>
<th>Size</th>
<th>Part Number</th>
<th>Torque @ 5.2 bar [N - m]</th>
<th>Dimensions in millimeters</th>
<th>Weight [kg]</th>
<th>Bore Range [mm]</th>
<th>D</th>
<th>Ds</th>
<th>D7</th>
<th>D9</th>
<th>D38</th>
<th>D45</th>
<th>H</th>
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</thead>
<tbody>
<tr>
<td>6EB200</td>
<td>104308</td>
<td>103</td>
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<td></td>
<td>22</td>
<td>44</td>
<td>187</td>
<td>99</td>
<td>89</td>
<td>25</td>
<td>83</td>
<td>16</td>
</tr>
<tr>
<td>8EB250</td>
<td>104309</td>
<td>251</td>
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<td>64</td>
<td>213</td>
<td>111</td>
<td>102</td>
<td>25</td>
<td>89</td>
<td>16</td>
</tr>
<tr>
<td>10EB300</td>
<td>104310</td>
<td>483</td>
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<td></td>
<td>38</td>
<td>64</td>
<td>238</td>
<td>133</td>
<td>102</td>
<td>29</td>
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<tr>
<td>12EB350</td>
<td>104311</td>
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<td>76</td>
<td>251</td>
<td>152</td>
<td>108</td>
<td>27</td>
<td>102</td>
<td>19</td>
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144
# Airflex® ER Elements

## Section C

Form ER 703 — Dimensional and Technical Data — Sizes 3 to 8

---

### Airflex® ER Elements

**English**

<table>
<thead>
<tr>
<th>Size</th>
<th>Part Number</th>
<th>Torque Rating</th>
<th>Bore Range</th>
<th>D</th>
<th>D1</th>
<th>D24</th>
<th>H2</th>
<th>H6</th>
<th>H13</th>
<th>L</th>
<th>Ø</th>
<th>Ø4 (Deg)</th>
<th>V</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min</td>
<td>Max.</td>
<td>No.</td>
<td>Size</td>
<td>Depth</td>
<td></td>
<td></td>
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<tr>
<td>3ER125</td>
<td>512175</td>
<td>45,2</td>
<td>25</td>
<td>38</td>
<td>44</td>
<td>NA</td>
<td>75</td>
<td>44</td>
<td>NA</td>
<td>10</td>
<td>NA</td>
<td>NA</td>
<td>6</td>
<td>32</td>
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<td>6ER200</td>
<td>145158</td>
<td>174</td>
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<td>51</td>
<td>78</td>
<td>25</td>
<td>64</td>
<td>150</td>
<td>86</td>
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<td>3/8-16</td>
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<td>8</td>
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<td>145159</td>
<td>401</td>
<td>32</td>
<td>89</td>
<td>64</td>
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<td>201</td>
<td>137</td>
<td>4</td>
<td>3/8-16</td>
<td>22</td>
<td>8</td>
</tr>
</tbody>
</table>

### Notes:

1. Refers to basic part number only. When ordering, it must be specified which air entry hole, Ø or Ø4, is to be used.
2. Static torque.

### Dimensions in inches

<table>
<thead>
<tr>
<th>Size</th>
<th>Part Number</th>
<th>Torque Rating</th>
<th>Bore Range</th>
<th>D</th>
<th>D1</th>
<th>D24</th>
<th>H2</th>
<th>H6</th>
<th>H13</th>
<th>L</th>
<th>Ø</th>
<th>Ø4 (Deg)</th>
<th>V</th>
<th>W</th>
</tr>
</thead>
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</table>

### Dimensions in millimeters

<table>
<thead>
<tr>
<th>Size</th>
<th>Part Number</th>
<th>Torque Rating</th>
<th>Maximum Speed</th>
<th>Wk</th>
<th>Weight</th>
<th>Ø</th>
<th>J</th>
<th>Ø4 (Deg)</th>
<th>Ø</th>
<th>Maximum Air Cavity</th>
<th>Maximum Drum Diameter</th>
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<tbody>
<tr>
<td>3ER125</td>
<td>512175</td>
<td>45,2</td>
<td>1800</td>
<td>0.001</td>
<td>0.5</td>
<td>0.07</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6ER200</td>
<td>145158</td>
<td>174</td>
<td>1800</td>
<td>0.004</td>
<td>3.2</td>
<td>0.33</td>
<td>155</td>
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<td></td>
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<tr>
<td>8ER250</td>
<td>145159</td>
<td>401</td>
<td>1800</td>
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<td>0.57</td>
<td>205</td>
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</tbody>
</table>

### Notes:

- American National Pipe Thread
- Drum contact with worn shoes.
- Based upon minimum bores.
- This element has six equally spaced rubber pads on the tube diameter instead of circumferential grooves.

---

**EATON Airflex® Clutches & Brakes 10M1297GP November 2012**
## Airflex® ER Elements

### Section C

Form ER 704 — Technical Data — Sizes 10 to 24

<table>
<thead>
<tr>
<th>Size</th>
<th>Part Number</th>
<th>Mr. Torque Rating</th>
<th>Maximum Speed</th>
<th>Mr. Tube Cavity</th>
<th>MAX. Drum Diameter</th>
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<tbody>
<tr>
<td>10ER300</td>
<td>145161</td>
<td>746</td>
<td>1800</td>
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<td>12ER350</td>
<td>145164</td>
<td>1390</td>
<td>1800</td>
<td>0.08</td>
<td>1.31</td>
</tr>
<tr>
<td>14ER400</td>
<td>145168</td>
<td>2550</td>
<td>1500</td>
<td>0.17</td>
<td>1.72</td>
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<tr>
<td>16ER475</td>
<td>145171</td>
<td>3680</td>
<td>1300</td>
<td>0.29</td>
<td>2.21</td>
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<td>19ER475</td>
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<td>5380</td>
<td>1100</td>
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<td>5.41</td>
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<td>145177</td>
<td>7120</td>
<td>1000</td>
<td>1.13</td>
<td>5.49</td>
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<td>24ER475</td>
<td>145180</td>
<td>9440</td>
<td>900</td>
<td>1.72</td>
<td>6.15</td>
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</table>

**Notes:**

1. Refers to basic part number only.
2. Static torque.
3. Drum contact with worn shoes.
Airflex® ER Elements

Section C

Form ER 704 — Dimensional Data — Sizes 10 to 24
Airflex® ER Coupling Application
Section C
Form ER 716 — Dimensional Data — Sizes 6 and 8

<table>
<thead>
<tr>
<th>Size</th>
<th>lb·in @ 75 psi</th>
<th>lb</th>
<th>Dimensions in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>6ER200</td>
<td>1540</td>
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<td>6.00 2.00 4.50 2.75 1.25 6.63 1.00 0.28 0.75</td>
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<tr>
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<td>50</td>
<td>7.00 2.50 5.00 3.25 1.75 8.63 1.25 0.28 0.75</td>
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<table>
<thead>
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<th>Size</th>
<th>M, Torque Rating</th>
<th>Mass @ D</th>
<th>D</th>
<th>D1</th>
<th>D45</th>
<th>H</th>
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Notes:
1. Refer to Rotorseal Section for mounting and dimension information.
2. Static torque.
3. Based on minimum bores.
Airflex® ER Coupling Application
Section C
Form ER 717 — Dimensional Data — Sizes 10 to 24

### Dimensions in inches

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### SI @ 5.2 bar kg Dimensions in millimeters

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**Notes:**

- Refer to Rotorseal Section for mounting and dimension information.
- Static torque.
- Based upon minimum bores.
## Airflex® EB and ER Mounting Components

### Section C

#### Form EB 711 — Element Hub — Dimensional and Technical Data

**Sizes 10 to 24**

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<thead>
<tr>
<th>Size</th>
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<th>Tapped Holes</th>
<th>lb</th>
<th>lb · ft²</th>
<th>Dimensions in inches</th>
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<tbody>
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<th>D₂</th>
<th>D₄</th>
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<th>H₂</th>
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### Notes:

- Based upon minimum bores.
### Airflex® EB and ER Mounting Components

#### Section C

**Form EB 712 — Hub for Non-Ventilated Internal Flange Drum —**

**Dimensional and Technical Data — Sizes 6 to 24**

#### Thru or Tapped Holes

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<th>Thru Holes</th>
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<th>lb</th>
<th>lb \cdot ft^2</th>
<th>Dimensions in inches</th>
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#### SI Holes

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<th>D (mm)</th>
<th>H (mm)</th>
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#### Notes:

- Based upon minimum bores.
Airflex® EB Mounting Components

Section C

Form EB 713 — Hub for Ventilated Internal Flange Drum —
Dimensional and Technical Data — Sizes 6 to 12

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<th>Tapped Holes</th>
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<th>lb · ft²</th>
<th>Dimensions in inches</th>
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<th>Mass</th>
<th>J</th>
<th>Dₗ</th>
<th>Dₜₓ</th>
<th>Dᵢ</th>
<th>H₁₁</th>
<th>Hₗ₁</th>
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Notes:
- Based upon minimum bores.
Airflex® EB Mounting Components
Section C
Form EB 714 — Ventilated Internal Flange Drum —
Dimensional and Technical Data — Sizes 6 to 12

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<th>lb · ft²</th>
<th>Dimensions in inches</th>
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<table>
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<th>kg · m²</th>
<th>Dimensions in millimeters</th>
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**Notes:**

1. Tolerance ±0.005/-0.000 in (0,13/-0,00 mm)
### Airflex® EB and ER Mounting Components

#### Section C

**Form EB 715 — Non-Ventilated Internal Flange Drum —**
**Dimensional and Technical Data — Sizes 6 to 24**

#### English

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<th>J</th>
<th>Dₜₜ</th>
<th>Dₜₜ</th>
<th>Jₜ</th>
<th>H</th>
<th>Hₜ</th>
<th>L</th>
<th>Kg</th>
<th>Kg . m²</th>
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<td>343</td>
<td>8</td>
<td>20</td>
<td>3/4-10</td>
</tr>
<tr>
<td>19EB&amp;ER475</td>
<td>10142</td>
<td>35</td>
<td>1.93</td>
<td>229</td>
<td>19</td>
<td>371,6</td>
<td>502</td>
<td>406</td>
<td>8</td>
<td>20</td>
<td>3/4-10</td>
</tr>
<tr>
<td>21.5EB&amp;ER475</td>
<td>10144</td>
<td>41</td>
<td>2.90</td>
<td>229</td>
<td>19</td>
<td>425,5</td>
<td>565</td>
<td>470</td>
<td>10</td>
<td>20</td>
<td>3/4-10</td>
</tr>
<tr>
<td>24EB&amp;ER475</td>
<td>10145</td>
<td>44</td>
<td>3.99</td>
<td>229</td>
<td>19</td>
<td>495,3</td>
<td>629</td>
<td>546</td>
<td>14</td>
<td>20</td>
<td>3/4-10</td>
</tr>
</tbody>
</table>

#### Notes:

1. Tolerance +0.003/-0.000 in (0,08/-0.00 mm)
2. American National Standard for Unified Screw Threads
Airflex® Selection Procedure

Section C
Element Torque Calculations

General

Technical Section Y of the catalog contains useful information pertaining to the selection, mounting, alignment and control of clutches and brakes in general. Formulas, symbols and units are also identified. It is recommended that Section Y be reviewed before attempting to size a specific product for an application.

Operating Speed

Design of expanding type elements allows them to behave as centrifugal clutches. To counteract the centrifugal effect and to permit them to idle or freewheel when disengaged, E and VE elements are furnished with release springs. Available springs and the resulting maximum element idle speeds are given in the following table.

<table>
<thead>
<tr>
<th>Size</th>
<th>Spring Force (lb)</th>
<th>30 lb</th>
<th>80 lb</th>
<th>150 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>12E475</td>
<td>450</td>
<td>720</td>
<td>1010</td>
<td></td>
</tr>
<tr>
<td>14E475</td>
<td>400</td>
<td>640</td>
<td>900</td>
<td></td>
</tr>
<tr>
<td>16E475</td>
<td>390</td>
<td>620</td>
<td>870</td>
<td></td>
</tr>
<tr>
<td>19E475</td>
<td>300</td>
<td>480</td>
<td>690</td>
<td></td>
</tr>
<tr>
<td>21.5E475</td>
<td>280</td>
<td>450</td>
<td>640</td>
<td></td>
</tr>
<tr>
<td>24E475</td>
<td>300</td>
<td>480</td>
<td>680</td>
<td></td>
</tr>
<tr>
<td>27E475</td>
<td>280</td>
<td>450</td>
<td>640</td>
<td></td>
</tr>
<tr>
<td>30E600</td>
<td>N/A</td>
<td>350</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>34E600</td>
<td>N/A</td>
<td>340</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>40E700</td>
<td>N/A</td>
<td>230*</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>19VE475</td>
<td>390</td>
<td>620</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>24VE475</td>
<td>280</td>
<td>450</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>27VE475</td>
<td>300</td>
<td>480</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

*100 lb. spring

EB and ER elements rely upon the resiliency of their rubber actuating tube to counteract the centrifugal effect. Their idle speeds are given in the following table.

<table>
<thead>
<tr>
<th>Size</th>
<th>Idle RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>3ER125</td>
<td>1200</td>
</tr>
<tr>
<td>4EB125</td>
<td>1100</td>
</tr>
<tr>
<td>6EB&amp;ER200</td>
<td>800</td>
</tr>
<tr>
<td>8EB&amp;ER250</td>
<td>650</td>
</tr>
<tr>
<td>9EB325</td>
<td>600</td>
</tr>
<tr>
<td>10EB&amp;ER300</td>
<td>520</td>
</tr>
<tr>
<td>12EB&amp;ER350</td>
<td>420</td>
</tr>
<tr>
<td>14EB&amp;ER400</td>
<td>340</td>
</tr>
<tr>
<td>16EB&amp;ER475</td>
<td>270</td>
</tr>
<tr>
<td>19EB&amp;ER475</td>
<td>200</td>
</tr>
<tr>
<td>21.5EB&amp;ER475</td>
<td>120</td>
</tr>
<tr>
<td>24EB&amp;ER475</td>
<td>100</td>
</tr>
</tbody>
</table>

ER elements utilize rubber friction couples. They are intended for use as holding brakes or shaft couplings and are only to be engaged at zero speed differential between element and drum.

Element Torque Adjustment

The catalog element torque ratings $M$, are based upon an effective pressure $P_e$, of 75 psi (5.2 bar). Torque ratings must be adjusted for operating pressure $P_o$, parasitic loss $P_p$ and operating speed $n$.

Maximum allowable operating pressure is dependent upon element construction and frequency of engagement. In general, the pressures listed in the following table should not be exceeded.

Maximum Allowable Pressure

<table>
<thead>
<tr>
<th>Model</th>
<th>English</th>
<th>SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;VE</td>
<td>125</td>
<td>8.6</td>
</tr>
<tr>
<td>EB&amp;ER</td>
<td>110</td>
<td>7.6</td>
</tr>
</tbody>
</table>

The elements have an inherent parasitic pressure $P_p$, required to cause friction shoe contact with its drum which represents the pressure to overcome resiliency of the actuating tube and, for the E and VE elements, the pressure to overcome friction shoe release springs. Parasitic pressures are given in the following tables and must be deducted from the operating pressure.

E and VE Parasitic Pressure $P_p$ vs Spring Force

<table>
<thead>
<tr>
<th>Spring Force (lb)</th>
<th>English</th>
<th>SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>2</td>
<td>0.14</td>
</tr>
<tr>
<td>80</td>
<td>5</td>
<td>0.34</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>0.34</td>
</tr>
<tr>
<td>150</td>
<td>10</td>
<td>0.68</td>
</tr>
</tbody>
</table>

Parasitic Pressure $P_p$

<table>
<thead>
<tr>
<th>Size</th>
<th>English</th>
<th>SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>3ER125</td>
<td>20</td>
<td>1.38</td>
</tr>
<tr>
<td>4EB125</td>
<td>20</td>
<td>1.38</td>
</tr>
<tr>
<td>6and8EB&amp;ER</td>
<td>7</td>
<td>0.48</td>
</tr>
<tr>
<td>10 and 12 EB &amp; ER</td>
<td>6</td>
<td>0.41</td>
</tr>
</tbody>
</table>

The listed torque ratings are for E and VE elements with slip linings. Torque ratings for elements with standard linings are 50% higher. Contact the factory for the possible requirement of reinforced housings if non-slip linings are used.
Airflex® Selection Procedure

Section C
Thermal Capacities

A rotating element must have its torque rating adjusted to include the additional torque resulting from centrifugal effects. The method used is to calculate a centrifugal pressure $P_c$ and add its value to the applied pressure.

$$P_c = C_s \cdot n^2$$

where $P_c = \text{centrifugal pressure}$
($\text{psi or bar}$)

$C_s = \text{speed constant obtained from}$
$
\text{element catalog page}$
($\text{psi/rpm}^2$ or $\text{bar/rpm}^2$)

$n = \text{element rpm}$

Adjusted element torque $M_e$ is then calculated from:

$$M_e = M + \frac{P_c}{P} \cdot M_l$$

The adjusted element torque $M_e$ must then be equal to or greater than the required clutch torque $M_c$ or brake torque $M_b$.

Example 1 at the end of this section illustrates the use of the above formulas.

Continuous Thermal Capacity

Expanding elements, when used in combination with air agitating vaned drums, are ideally suited for continuous thermal dissipation. The air agitating vaned drum should be located on the driving side in a clutch application and on the shaft to be stopped in a brake application. Thermal ratings $P_i$ vary with operating speed and are shown on the Thermal Power Graphs. Refer to Section X, Tensioning to determine the thermal requirements for an application. For good lining life, limit operating pressure to 20 psi (1.4 bar) and the friction couple slipping velocity to 1600 fpm (8 m/s).

For the water-cooled brake application shown on Form E 610 use a friction lining thermal loading of 0.15 HP/in² (0.017 kW/cm²). Dividing the application thermal requirement by the allowable thermal loading determines the friction area requirement of the brake element. Limit operating pressure to 30 psi (2 bar) and friction couple slipping velocity to 2000 fpm (10.1 m/s).

Slip (Lo-Co) friction material must be specified for elements intended for continuous slip service.

Examples 2 and 3 at the end of this section illustrates the above procedure and use of the graphs.

Cyclic Thermal Capacity

Because the expanding elements have only one tube inlet, the rate at which they can be cycled is limited. Allowable rates should be no greater than 10 times per minute. Use the Thermal Power graphs for determining cyclic capacity $P_c$. 

- \( P_i \) vary with operating speed and are shown on the Thermal Power Graphs. Refer to Section X, Tensioning to determine the thermal requirements for an application. For good lining life, limit operating pressure to 20 psi (1.4 bar) and the friction couple slipping velocity to 1600 fpm (8 m/s).

For the water-cooled brake application shown on Form E 610 use a friction lining thermal loading of 0.15 HP/in² (0.017 kW/cm²). Dividing the application thermal requirement by the allowable thermal loading determines the friction area requirement of the brake element. Limit operating pressure to 30 psi (2 bar) and friction couple slipping velocity to 2000 fpm (10.1 m/s).

Slip (Lo-Co) friction material must be specified for elements intended for continuous slip service.

Examples 2 and 3 at the end of this section illustrates the above procedure and use of the graphs.
Airflex® Selection Procedure
Section C
Examples

Example 1

Determine the dynamic torque of a 16E475 element having 80 lb springs and rotating at 1000 rpm with an applied pressure of 100 psi (6.9 bar).

\[ M_e = \frac{P_o}{\rho} + P_c \cdot M_i \]

\[ P_c = C_s \cdot n^2 \]

\[ = 1.3 \cdot E-06 \cdot 1000^2 \]

\[ = 1.3 \text{ psi} \]

\[ M_e = \frac{100 - 5 + 1.3}{75} \cdot 21500 \]

\[ = 27600 \text{ lb \cdot in} \]

Example 2

A tension brake application requires continuous dissipation of 30 HP at 200 rpm. What size E element can be used?

The thermal requirement exceeds the capacity of either a single or dual element; therefore, a water-cooled application is required.

Area required = 30/0.15 = 200 in²

Selected either a single 19E475 or a dual 12E475 element for use in the Form E610 arrangement.

Example 3

A 14E475 element is tentatively selected to accelerate a load up to operating speed in 8 seconds. The thermal energy which must be absorbed is 600,000 ft\cdot lb. Is the 14E475 element capable of handling the thermal load?

\[ W_n = \frac{600000}{139} = 4320 \text{ ft \cdot lb} \]

\[ P_i = \frac{W_n}{550 \cdot t} = \frac{600000}{550 \cdot 8} = 136 \text{ HP} \]

\[ P_{ave} = \frac{P_i}{A} = \frac{136}{139} = 0.978 \text{ HP/ in} \]

The point \((W/A, P_{ave})\) falls outside the acceptable area of the Non-Cyclic Energy Chart; therefore, the 14E475 element is not capable of handling the thermal load. Either a dual 12E475 or a single 21.5E475 element should be used.

Example 4

A shaft coupling is required to transmit 50 HP at 900 rpm. The type of service indicates that a 2 service factor is required.

\[ P_d = P_p \cdot SF \]

\[ P_d = 50 \cdot 2 = 100 \text{ HP} \]

From Power Capacity graphs select the 12ER350 element.