

Installation, Operation and Maintenance of Airflex[®] VC Element Assemblies

Warning

Forward this manual to the person responsible for Installation, Operation and Maintenance of the product described herein. Without access to this information, faulty Installation, Operation or Maintenance may result in personal injury or equipment damage.



Caution

Use Only Genuine Airflex[®] Replacement Parts.
The Airflex Division of Eaton Corporation recommends the use of genuine Airflex replacement parts. The use of non-genuine Airflex replacement parts could result in substandard product performance, and may void your Eaton warranty. For optimum performance, contact Airflex:

In the U. S. A. and Canada: **(800) 233-5926**
Outside the U. S. A. & Canada: **(216) 281-2211**
Internet: **www.airflex.com**

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Component Parts for Airflex Type VC Element

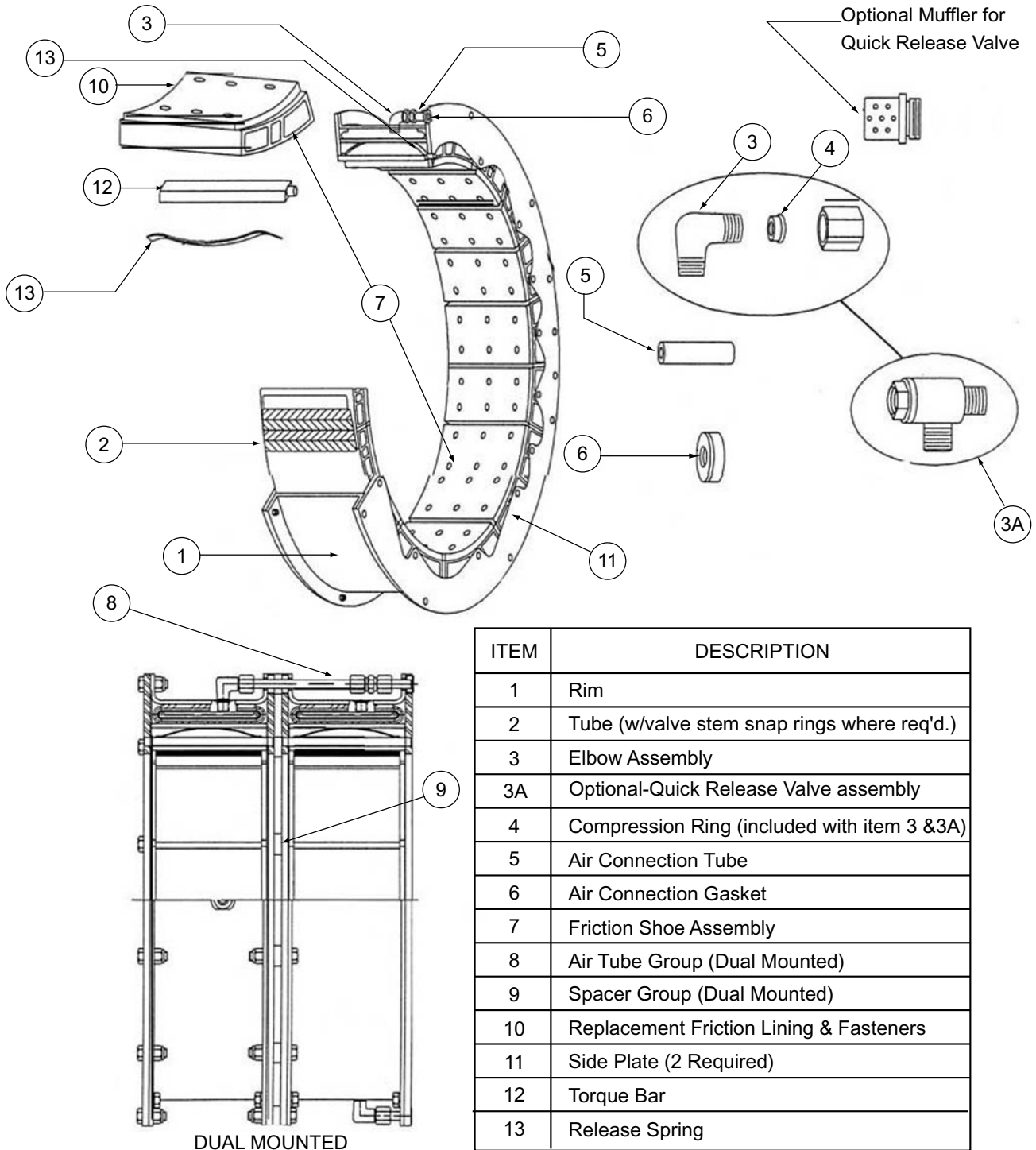



Figure 1 - Component Parts for Airflex Type VC Element

1.0 INTRODUCTION

Throughout this manual there are a number of **HAZARD WARNINGS** that must be read and adhered to in order to prevent possible personal injury and/or damage to equipment. Three signal words “**DANGER**”, “**WARNING**”, and “**CAUTION**” are used to indicate the severity of a hazard, and are preceded by the safety alert symbol. 

Danger

Denotes the most serious hazard, and is used when serious injury or death **WILL** result from misuse or failure to follow specific instructions.

Warning

Used when serious injury or death **MAY** result from misuse or failure to follow specific instructions.

Caution

Used when injury or product/equipment damage may result from misuse or failure to follow specific instructions.

It is the responsibility and duty of all personnel involved in the installation, operation and maintenance of the equipment on which this device is used to fully understand the:

Danger

Warning

Caution

procedures by which hazards can be avoided.

1.1 Description

- 1.1.1 The **Airflex**[®] air-actuated VC element assembly is specifically designed and manufactured for severe clutch or brake applications on heavy equipment where high starting loads or sustained slippage would normally lower clutch or brake efficiency and reduce operating life. Constricting action and ventilated construction make high torque capacity and rapid heat dissipation possible.
- 1.1.2 All Airflex VC element assemblies are supplied with long wearing NON-ASBESTOS friction material.

- 1.1.3 Airflex element assemblies are available for drum diameters from 11.5 inches through 76 inches. The element size designation indicates the nominal drum diameter in inches, the clutch model and the width of the friction material. For example, size “38VC1200” indicates the element operates on a drum having a nominal diameter of 38 inches, is an Airflex “VC” series clutch or brake (the scope of this manual) and has friction material which is 12 inches wide.

- 1.1.4 Where diametral space is limited, or the torque required is greater than a single element can transmit, all sizes of Airflex VC elements can be supplied as dual units.

1.2 How It Works

- 1.2.1 Referring to **Figure 1** and **Figure 2**, the neoprene and cord actuating tube is contained within a steel rim which is drilled for mounting to the driving component (or reaction bracket in the case of a VC brake application). As air pressure is applied to the air actuating tube, the tube inflates, forcing the friction shoe assemblies uniformly against the drum which is attached to the driven component. The friction shoe assemblies, which consist of friction blocks attached to aluminum backing plates, are guided by torque bars which are secured to side plates. In the case where the VC element is being used as a clutch and is attached to the driving shaft, the torque flow is from the driving shaft, through the element mounting component (typically an iron spider), through the rim/side plate structure, through the torque bars to the backing plates and friction material, where the torque is transmitted through the friction couple to the components mounted on the driven shaft (clutch drum and drum mounting component). As actuating air is exhausted, release springs and centrifugal force assure positive disengagement.

1.3 Element Adjustment

- 1.3.1 Airflex VC elements are completely self adjusting and automatically compensate for lining and drum wear. Lubrication is not required. The torque developed is dependent upon rotating speed and applied air pressure. By limiting the applied pressure, the element will act as a torque limiting device and provide overload protection.
- 1.3.2 To accomplish regulated or cushioned engagement of the element, a flow control valve may be installed in the element air supply line and adjusted to restrict air flow to the element while allowing free flow away from the element for rapid disengagement. By adjusting the flow, the rate of engagement may be varied. Note that the flow control valve does not regulate air pressure the supply pressure must always be adequate to transmit the maximum required torque. Refer to the OPERATION section of this manual for air piping configurations.

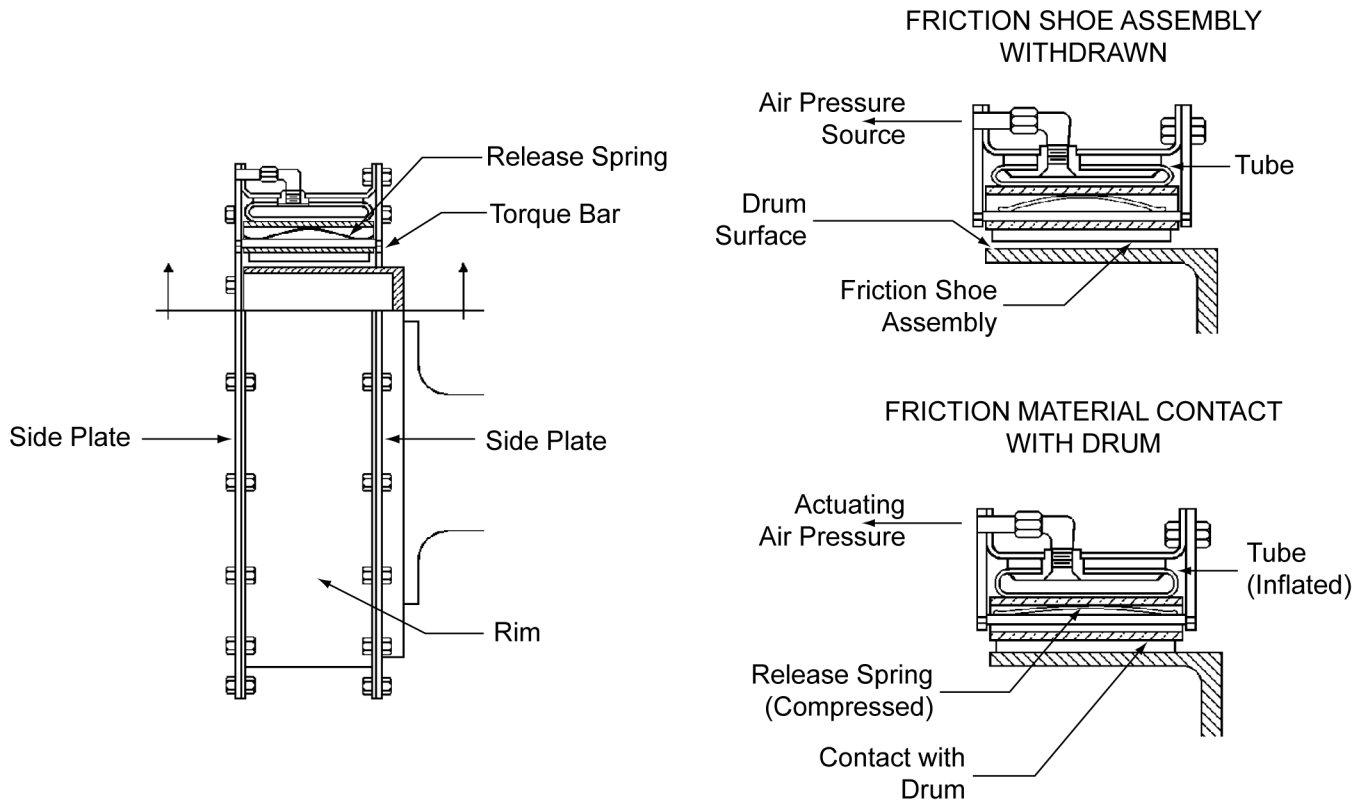


Figure 2

2.0 INSTALLATION

Warning

Only qualified personnel should install, adjust or repair these units. Faulty workmanship will result in exposure to hazardous conditions or personal injury.

Caution

Do not inflate the element without having a drum in place. Inflation of the element without a drum in place will result in permanent damage to the element components.

2.1 Mounting Arrangements

- 2.1.1 **Figure 3** illustrates the gap-mounting arrangement. In this arrangement, the element is attached to a spider which is typically mounted on the driving shaft. The drum is attached to a drum hub which is typically mounted on the driven shaft. The gap between the two shafts allows the element and drum to be removed without disturbing either shaft.

Note : The text in the Installation, Alignment and Removal sections refer to this type of mounting arrangement.

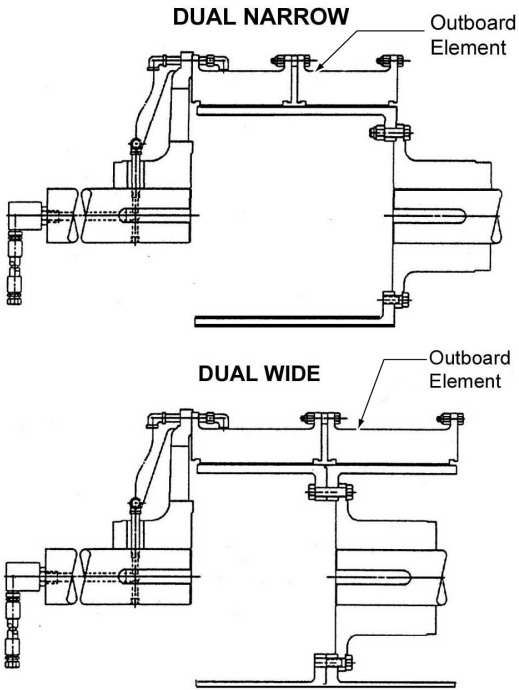
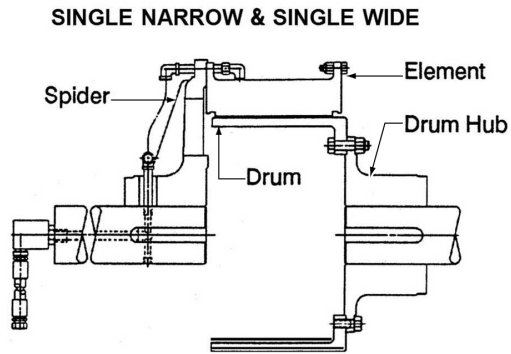


Figure 3

2.1.2 **Figure 4** illustrates the gap-mounting arrangement with an axial locking device. The axial locking device restricts the relative axial motion between the driving and driven shafts. This arrangement is typically used where a synchronous motor armature with plain bearings must be held on magnetic center.

2.1.3 **Figure 5** illustrates a typical VC brake application. The drum and drum hub are attached to the shaft which is to be stopped. The element is attached to a rigid reaction bracket.

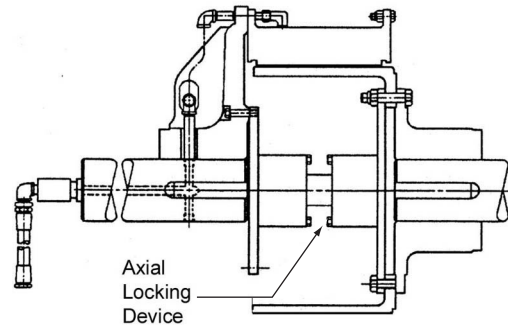


Figure 4

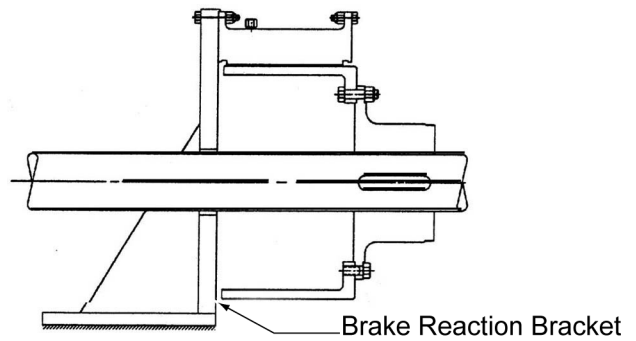


Figure 5

2.1.4 **Figure 6** illustrates a typical marine main propulsion application. In this arrangement, the element is attached to a pinion adapter plate and the drum and drum hub are attached to a quill shaft. A manifold is attached to the outboard end of the element for bearing support of the quill shaft.

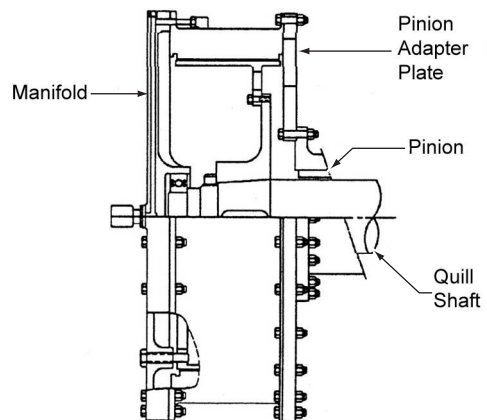


Figure 6

- 2.1.5 Illustrates a typical marine main propulsion application where the clutch is mounted between the engine and reduction gear. In this arrangement, the VC clutch is combined with a **Geislinger®** flexible torsional coupling.

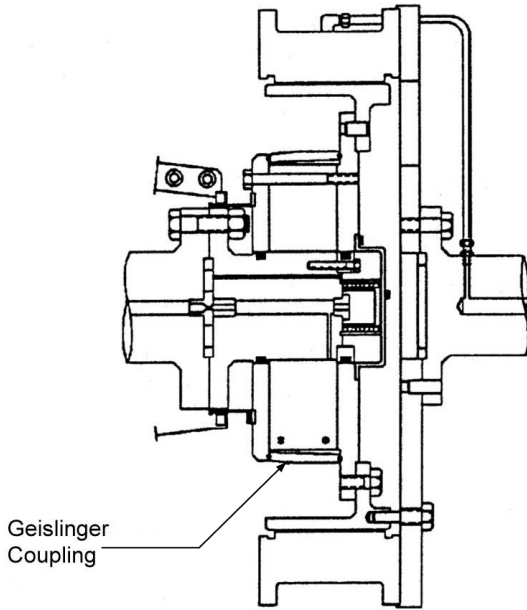


Figure 7

- 2.1.6 **Figure 8** illustrates a VC clutch mounting for punch press applications. The drum and drum hub are attached to the crankshaft or backshaft and the element is attached to a bearing-supported flywheel or bullgear. VC clutches on punch presses are typically used in **combination** with Air-flex type CTE and DBA brakes.

- 2.1.7 **Airflex** can provide specific drawings covering the different mounting arrangements mentioned. The maintenance of the element assembly, tolerances and wear limits of friction material, and alignment specifications in this manual apply to all VC applications.

2.2 Mounting Considerations

- 2.2.1 For clutch and brake applications, shaft alignment must be within the tolerances indicated in the Alignment section of this manual.

⚠ Caution

Operation with shaft misalignment exceeding the limits indicated in the Alignment section of this manual will result in accelerated wear of the element components. Severe misalignment will result in excessive vibra-

tion and/or overheating when disengaged due to dragging of the friction shoes.

- 2.2.2 The element must be protected from contamination from oil, grease or excessive amounts of dust.

⚠ Caution

Oil or grease contamination will result in a reduction of developed clutch or brake torque. Excessive dust contamination may result in incomplete disengagement. Either of these conditions will result in clutch or brake slippage and overheating.

⚠ Caution

All rotating equipment must be guarded to comply with applicable safety standards.

- 2.2.3 All mounting fasteners must be of the proper size and grade, and torqued to the appropriate value. See Table 1.

⚠ Warning

Use only the proper grade and number of mounting fasteners. Using commercial grade fasteners (Grade 2) in place of Grade 8 fasteners (where called for) may result in failure under load, causing personal injury or equipment damage.

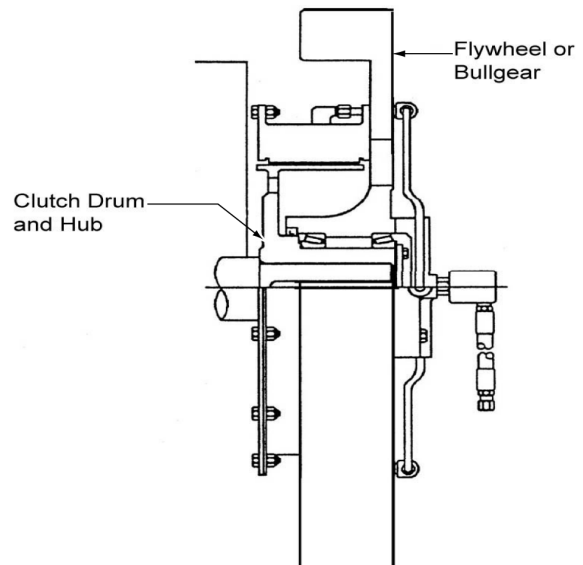


Figure 8

**Table 1
Fastener Assembly Torque**

| Size | Element To Spider/Side Plate To Rim | Torque | Drum to Hub | Torque |
|-------------|-------------------------------------|-------------|----------------|-------------|
| SN11.5VC500 | 3/8-16NC GR 2 | D 15 (20) | 1/2-13NC GR 2 | D 38 (51) |
| SN14VC500 | 1/2-13NC GR 2 | D 38 (51) | 1/2-13NC GR 2 | D 38 (51) |
| SN16VC600 | 1/2-13NC GR 2 | D 38 (51) | 3/4-10NC GR 2 | L 93 (126) |
| SN20VC600 | 1/2-13NC GR 2 | D 38 (51) | 3/4-10NC GR 2 | L 93 (126) |
| SN24VC650 | 5/8-11NC GR 2 | D 77 (104) | 3/4-10NC GR 2 | L 93 (126) |
| SN28VC650 | 5/8-11NC GR 2 | D 77 (104) | 3/4-10NC GR 2 | L 93 (126) |
| SN33VC650 | 3/4-10NC GR 2 | L 93 (126) | 3/4-10NC GR 2 | L 93 (126) |
| SN37VC650 | 3/4-10NC GR 2 | L 93 (126) | 3/4-10NC GR 2 | L 93 (126) |
| SN42VC650 | 3/4-10NC GR 2 | L 93 (126) | 3/4-10NC GR 2 | L 93 (126) |
| | | | | |
| DN11.5VC500 | 3/8-16NC GR 2 | D 15 (20) | 1/2-13NC GR 8 | D 109 (148) |
| DN14VC500 | 1/2-13NC GR 8 | D 87 (118) | 1/2-13NC GR 2 | D 38 (51) |
| DN16VC600 | 1/2-13NC GR 2 | D 38 (51) | 3/4-10NC GR 8 | L 245 (332) |
| DN20VC600 | 1/2-13NC GR 8 | D 87 (118) | 3/4-10NC GR 8 | L 211 (286) |
| DN24VC650 | 5/8-11NC GR 2 | D 77 (104) | 3/4-10NC GR 2 | L 93 (126) |
| DN28VC650 | 5/8-11NC GR 2 | D 77 (104) | 3/4-10NC GR 2 | L 93 (126) |
| DN33VC650 | 3/4-10NC GR 2 | L 93 (126) | 3/4-10NC GR 2 | L 93 (126) |
| DN37VC650 | 3/4-10NC GR 2 | L 93 (126) | 3/4-10NC GR 2 | L 93 (126) |
| DN42VC650 | 3/4-10NC GR 2 | L 93 (126) | 3/4-10NC GR 2 | L 93 (126) |
| | | | | |
| SW14VC1000 | 1/2-13NC GR 2 | D 38 (51) | 1/2-13NC GR 8 | L 109 (148) |
| SW16VC1000 | 1/2-13NC GR 2 | D 38 (51) | 3/4-10NC GR 2 | L 93 (126) |
| SW20VC1000 | 1/2-13NC GR 2 | D 38 (51) | 3/4-10NC GR 2 | L 93 (126) |
| SW24VC1000 | 5/8-11NC GR 2 | D 77 (104) | 3/4-10NC GR 2 | L 93 (126) |
| SW28VC1000 | 5/8-11NC GR 2 | D 77 (104) | 3/4-10NC GR 2 | L 93 (126) |
| SW32VC1000 | 5/8-11NC GR 2 | D 77 (104) | 3/4-10NC GR 2 | L 93 (126) |
| SW38VC1200 | 3/4-10NC GR 2 | L 93 (126) | 3/4-10NC GR 2 | L 93 (126) |
| SW42VC1200 | 3/4-10NC GR 2 | L 93 (126) | 3/4-10NC GR 2 | L 93 (126) |
| SW46VC1200 | 7/8-9NC GR 2 | L 109 (148) | 1-8NC GR 2 | L 163 (221) |
| SW52VC1200 | 7/8-9NC GR 2 | L 109 (148) | 1-8NC GR 2 | L 163 (221) |
| SW51VC1600 | 7/8-9NC GR 2 | L 109 (148) | 1-8NC GR 2 | L 163 (221) |
| SW60VC1600 | 1-8NC GR 2 | L 163 (221) | 1 1/2-6NC GR 2 | L 566 (767) |
| SW66VC1600 | 1 1/4-7NC GR 2 | L 325 (441) | 1 1/2-6NC GR 2 | L 566 (767) |
| | | | | |
| DW16VC1000 | 1/2-13NC GR 8 | D 87 (118) | 3/4-10NC GR 8 | L 245 (332) |
| DW20VC1000 | 1/2-13NC GR 8 | D 87 (118) | 3/4-10NC GR 8 | L 245 (332) |
| DW24VC1000 | 5/8-11NC GR 8 | D 174 (236) | 3/4-10NC GR 8 | L 245 (332) |
| DW28VC1000 | 5/8-11NC GR 8 | D 174 (236) | 3/4-10NC GR 8 | L 245 (332) |
| DW32VC1000 | 5/8-11NC GR 8 | D 174 (236) | 3/4-10NC GR 8 | L 245 (332) |
| DW38VC1200 | 3/4-10NC GR 8 | L 245 (332) | 3/4-10NC GR 8 | L 245 (332) |
| DW42VC1200 | 3/4-10NC GR 8 | L 245 (332) | 3/4-10NC GR 8 | L 245 (332) |
| DW46VC1200 | 7/8-9NC GR 2 | L 109 (148) | 1-8NC GR 8 | L 510 (692) |
| DW52VC1200 | 7/8-9NC GR 2 | L 109 (148) | 1-8NC GR 8 | L 510 (692) |
| DW51VC1600 | 7/8-9NC GR 2 | L 109 (148) | 1-8NC GR 8 | L 510 (692) |
| DW60VC1600 | 1-8NC GR 2 | L 190 (258) | 1 1/2-6NC GR 2 | L 650 (881) |
| DW66VC1600 | 1 1/4-7NC GR 2 | L 380 (515) | 1 1/2-6NC GR 2 | L 650 (881) |
| DW76VC1600 | 1 1/4-7NC GR 2 | L380 (515) | 1 1/2-6NC GR 2 | L 650 (881) |

SN = SINGLE NARROW

SW = SINGLE WIDE

L = LUBED TORQUE - FT.-LB.(Nm) (30 WT MOTOR OIL OR ANTI-SEIZE)

D = DRY TORQUE -FT.-LB. (Nm)

DN = DUAL NARROW

DW = DUAL WIDE

Hex Sizes (in.)

| Size | Bolt | Nut | Size | Bolt | Nut | Size | Bolt | Nut |
|-------|-------|-------|-------|--------|--------|---------|-------|---------|
| 3/8NC | 9/16 | 9/16 | 3/4NC | 1-1/8 | 1-1/16 | 1-1/4NC | 1-7/8 | 1-13/16 |
| 1/2NC | 3/4 | 3/4 | 7/8NC | 1-5/16 | 1-1/4 | 1-1/2NC | 2-1/4 | 2-3/16 |
| 5/8NC | 15/16 | 15/16 | 1NC | 1-1/2 | 1-7/16 | | | |

2.3 Mounting Spider and Drum Hub

- 2.3.1 The spider and drum hub are bored for a press fit onto their respective shafts. The interference is approximately .0005 in. per inch (.0005mm/mm.) of shaft diameter.
- 2.3.1.1 Ensure the shaft is clean and free of nicks or burrs and check the shaft and bore diameters for proper fit.
- 2.3.1.2 Tap the key into the keyway, making sure it bottoms.
- 2.3.1.3 Apply a light coat of anti-seizing compound to the shaft and key.
- 2.3.1.4 Heat the drum hub or spider uniformly to 250 °F (121 °C) to expand the bore.

Caution

It is recommended the drum hub or spider be heated in oil or an oven; however, since this is not always possible, torches may be used. When using torches, use several with “rosebud” (broad-flame) tips and keep them moving to avoid “hot spots”. Check bore temperature frequently to avoid over heating.

- 2.3.1.5 Slide the heated drum hub or spider onto the shaft until the hub face is flush with the end of the shaft. Hold in position and allow to cool.

2.4 Shaft Alignment

Note : The text in this section applies to gap mounted applications; however, the alignment tolerances apply to all types of mountings.

Parallel Alignment Tolerance (Off set):

Not to exceed 0. 010 inch (. 254mm) Total Indicator Reading (0. 005 in. (. 127mm) maximum off-set).

Angular Alignment Tolerance (Gap):

Not to exceed 0. 0005 inch per inch (. 0005mm/mm.) diameter at which readings are taken (“D” on Fig. 9).

Note : The alignment procedure described below has been used successfully on many VC clutch and brake applications. Other procedures, of course, may be used; however, the alignment tolerances are the same regardless of the technique used.

- 2.4.1 Foundations must be set so distance “X”, shown on **Figure 9**, is established. If the clutch is mounted on a shaft having plain bearings, make sure the shaft is centered within the bearings when establishing the “X” dimension. Refer to Table 2 for appropriate “X” dimensions.

Note : It is presumed that one of the shafts has been properly located and anchored.

**Table 2
“X” DIMENSIONS (FIG 9)**

| SIZE | “X” in. (mm) | SIZE | “X” in. (mm) | SIZE | “X” in. (mm) | SIZE | “X” in. (mm) |
|-------------|---------------|-------------|----------------|------------|--------------------|------------|----------------|
| SN11.5VC500 | 6.750 (171.5) | DN11.5VC500 | 13.375 (339.7) | SW14VC1000 | 11.875 (301.6) | DW16VC1000 | 12.750 (323.9) |
| SN14VC500 | 6.812 (173.0) | DN14VC500 | 13.438 (341.3) | SW16VC1000 | 11.875 (301.6) | DW20VC1000 | 12.750 (323.9) |
| SN16VC600 | 8.062 (204.8) | DN16VC600 | 15.938 (404.8) | SW20VC1000 | 11.875 (301.6) | DW24VC1000 | 12.750 (323.9) |
| SN20VC600 | 8.062 (204.8) | DN20VC600 | 15.938 (404.8) | SW24VC1000 | 11.875 (301.6) | DW28VC1000 | 12.750 (323.9) |
| SN24VC650 | 8.562 (217.5) | DN24VC650 | 16.688 (423.9) | SW28VC1000 | 11.875 (301.6) | DW32VC1000 | 12.812 (325.4) |
| SN28VC650 | 8.562 (217.5) | DN28VC650 | 16.688 (423.9) | SW32VC1000 | 11.938 (303.2) | DW38VC1200 | 15.000 (381.0) |
| SN33VC650 | 8.562 (217.5) | DN33VC650 | 16.750 (425.5) | SW38VC1200 | 14.125 (358.7) | DW42VC1200 | 15.125 (384.2) |
| SN37VC650 | 8.562 (217.5) | DN37VC650 | 16.750 (425.5) | SW42VC1200 | 14.125 (358.7) | DW46VC1200 | 15.250 (387.4) |
| SN42VC650 | 8.562 (217.5) | DN42VC650 | 16.750 (425.5) | SW46VC1200 | 14.125 (358.7) | DW52VC1200 | 15.750 (400.0) |
| | | | | SW52VC1200 | 14.625 (371.5) | DW51VC1600 | 20.000 (508.0) |
| | | | | SW51VC1600 | 18.875 (479.4) | DW60VC1600 | 20.375 (517.5) |
| | | | | SW60VC1600 | 18.750 (476.3) | DW66VC1600 | 22.000 (558.8) |
| | | | | SW76VC1600 | Contact Factory | DW76VC1600 | 20.375 (517.5) |

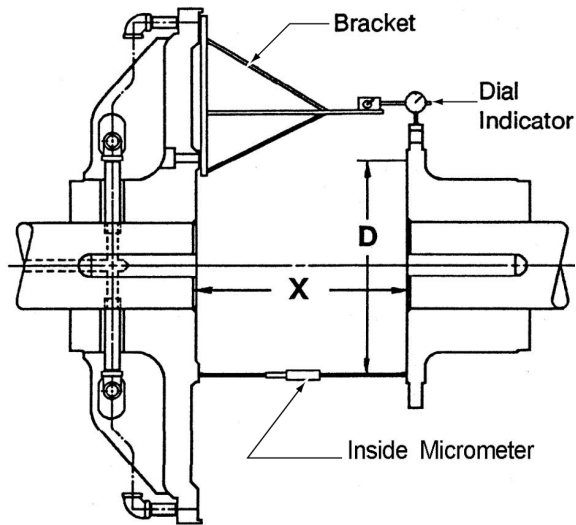


Figure 9

- 2.4.2 Fabricate a rigid bracket for supporting a dial indicator and attach to the spider. See **Figure 9**
- 2.4.3 Thoroughly clean the flange O. D. and the face of the drum hub where alignment readings are to be taken
- 2.4.4 Rotate the spider and take parallel alignment readings off the drum hub flange O. D. If both shafts can be rotated together, the alignment readings are less influenced by any surface irregularities.

! Caution

When recording parallel alignment readings, "sag" of the indicator/ indicator bracket must be accounted for.

- 2.4.5 Angular alignment readings can be made by accurately measuring the gap between the spider and drum hub faces with an inside micrometer. If a dial indicator is used, make sure to monitor and correct for any axial movement of the shaft. To reduce the influence any surface irregularities may have on the angular alignment readings, index the spider 90 degrees after taking the initial set of readings. Take an additional set of readings and index the spider another 90 degrees. Continue in this manner until four sets of readings have been taken. For misalignment correction, use the average of the four readings at each position. In other words, average the four top readings, the four bottom readings, and each of the four side readings.
- 2.4.6 Shim and shift the base of the movable shaft to correct the misalignment. After tightening the base, recheck the alignment and correct if necessary. Make sure to check for a "soft foot" condition. Dowel or

chock into position after satisfactory alignment has been achieved.

Note : On many applications, thermal growth of the driving or driven machinery may result in unacceptable shaft alignment in a running condition. It is always good practice to make a "hot" alignment check and re-shim if necessary.

2.5 Installation of Element and Drum (Narrow, Dual Narrow and Single Wide)

- 2.5.1 Note the orientation of the drum flange with respect to the air connection(s) on the element and slide the drum into the element.
- 2.5.2 Separate the shafts as far as the bearing clearances will allow and hoist the element/ drum into position.
- 2.5.3 Attach the drum to the drum hub with the appropriate fasteners. See Table 1. Make sure the bore in the drum flange fully engages the pilot on the drum hub.

! Warning

Use only the proper grade and number of fasteners. Using commercial grade fasteners (Grade 2) in place of Grade 8 fasteners (where called for) may result in failure of the fasteners under load, causing personal injury or equipment damage.

- 2.5.4 Install the air connection gaskets onto the air tubes. The metal backup washer is to be positioned toward the elbow (away from the spider). See **Figure 10**
- Note :** Some older elements use a flanged air connection tube and a thin gasket. See Table 3 for correct part numbers.

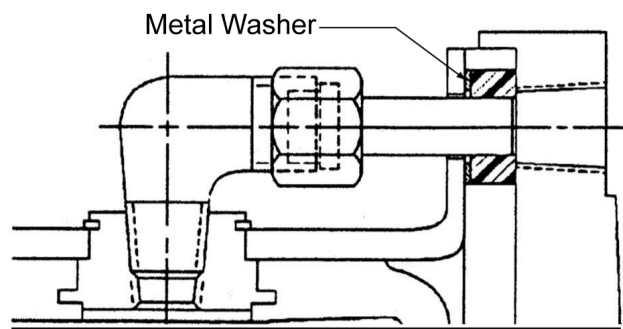
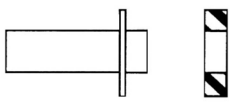



Figure 10

- 2.5.5 Align the element air connections with the passages in the spider and attach the element to the spider with the appropriate fasteners. See Table 1. Make sure the element fully engages the register in the spider.

**Table 3
AIR CONNECTIONS FOR VC ELEMENTS**

| SIZE | AIR TUBE | WASHER | AIR TUBE | WASHER |
|-----------|---|---------|--|-----------|
| | OLD METHOD  (FLANGED TUBE) | | CURRENT METHOD  (STRAIGHT TUBE) | |
| 11.5VC500 | 201402 | 72 x 15 | 412178-02 | 412324-01 |
| 14VC500 | 201302 | 72 x 11 | 412178-03 | 412324-02 |
| 16VC600 | 201302 | 72 x 11 | 412178-03 | 412324-02 |
| 20VC600 | 201302 | 72 x 11 | 412178-03 | 412324-02 |
| 24VC650 | 201286 | 72 x 12 | 412178-05 | 412324-03 |
| 28VC650 | 201286 | 72 x 12 | 412178-05 | 412324-03 |
| 33VC650 | 201284 | 72 x 13 | 412178-06 | 412324-04 |
| 37VC650 | 201284 | 72 x 13 | 412178-08 | 412324-04 |
| 42VC650 | 201284 | 72 x 13 | 412178-06 | 412324-04 |
| 14VC1000 | 201302 | 72 x 11 | 412178-03 | 412324-02 |
| 16VC1000 | 202408 | 72 x 11 | 412178-03 | 412324-02 |
| 20VC1000 | 201302 | 72 x 11 | 412178-03 | 412324-02 |
| 24VC1000 | 201286 | 72 x 12 | 412178-05 | 412324-03 |
| 32VC1000 | 201286 | 72 x 12 | 412178-05 | 412324-03 |
| 38VC1200 | 201284 | 72 x 13 | 412178-06 | 412324-04 |
| 42VC1200 | 201284 | 72 x 13 | 412178-06 | 412324-04 |
| 46VC1200 | 202081 | 72 x 13 | 412178-07 | 412324-04 |
| 52VC1200 | 202751 | 72 x 14 | 412178-08 | 412324-05 |
| 51VC1600 | 304213 | 72 x 14 | 412178-09 | 412324-05 |
| 60VC1600 | 304213 | 72 x 14 | 412178-18 | 412324-06 |

Warning

Use only the proper grade and number of fasteners. Using commercial grade fasteners (Grade 2) in place of Grade 8 fasteners may result in failure of the fasteners under load, causing personal injury or equipment damage.

2.6 Installation of Element and Drums (Dual Wide)

- 2.6.1 Separate the shafts as far as the bearing clearance will allow
- 2.6.2 Attach the drum having the female register on the drum flange to the drum hub with screws and lock washers. There are tapped holes in the drum flange to accept the screws. Make sure the bore in the drum flange fully engages the pilot on the drum hub. See **Figure 3**

- 2.6.3 Disassemble the dual element into two halves and, noting the orientation of the air connections, place the element onto the drum installed in 2. 6. 2
- 2.6.4. Noting the orientation of the flange on the remaining drum with respect to the air connections on the remaining element, slide the drum into the element.
- 2.6.5 Hoist the element/drum into position, align the tapped holes in the drum having the male pilot with the tapped holes in the drum attached to the drum hub, and attach both drums to the drum hub with the appropriate fasteners. See Table 1. Make sure the male pilot fully engages the female register.

Warning

Use only the proper grade and number of fasteners. Using commercial grade fasteners (Grade 2) in place of Grade 8 fasteners (where called for) may result in failure of the fasteners under load, causing personal injury or equipment damage.

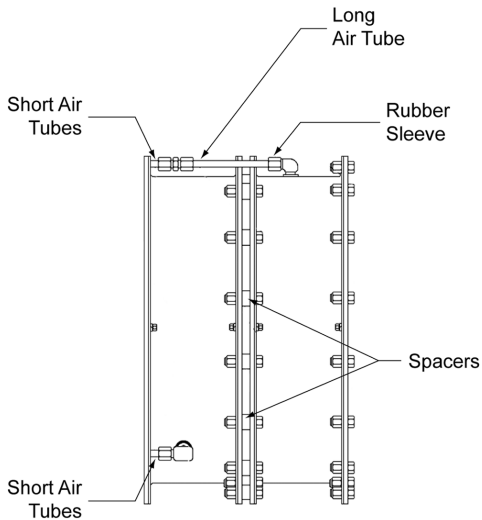


Figure 11

- 2.6.6 Align the air connections and reassemble the element halves, making sure the spacers are in place between the elements. See **Figure 11**.
- 2.6.7 Reassemble the air connection tubes. If an elbow has been removed, use a good quality pipe sealant on the threads. See **Figure 11**.
Note : The elbow assemblies on the outboard element (farthest from the spider) use rubber compression sleeves. Make sure the sleeves are securely on the long air tubes.
- 2.6.8 Install the air connection gaskets onto the air tubes. The metal backup washer is to be positioned toward the elbow (away from the spider). See **Figure 10**.
- 2.6.9 Align the element air connections with the corresponding passages in the spider and attach the element to the spider with the appropriate fasteners. See Table 1. Make sure the element fully engages the register in the spider.

Warning

Use only the proper grade and number of fasteners. Using commercial grade fasteners (Grade 2) in place of Grade 8 fasteners may result in failure of the fasteners under load, causing personal injury or equipment damage.

2.7 Air Control System

- 2.7.1 A typical air control system is shown on **Figure 12**. Since the air control system used will be dependent on the specific application, a detailed description cannot be made in this manual. Following are some general guidelines for installing and adjusting air controls.
 - 2.7.1.1 The air receiver tank must be located as close to the rotor seal as possible for consistent clutch or brake response.
 - 2.7.1.2 Use full size piping and valves consistent with the rotor seal size.
 - 2.7.1.3 Keep the number of elbows to a minimum.
 - 2.7.1.4 Use poppet-type solenoid valves. Spool valves are not recommended.
 - 2.7.1.5 An air line lubricator is not required for the element; however, if one is used, it must be a non-adjustable, mist-type.
 - 2.7.1.6 If a flow control valve is used, it must have free flow (indicated by an arrow on the valve body) directed away from the element.
 - 2.7.1.7 The final connection to the rotor seal **MUST** be made with flexible hose and place no radial load upon the rotor seal.

Caution

Do not use rigid pipe at the connection to the rotor seal. Rigid piping will result in excessive loads on the rotor seal bearings, shortening life.

Caution

Maximum applied air pressure is 125 psig (8.5 bar). Operation at pressures exceeding 125 psig may result in damage to the element. Consult the factory if operation at pressures greater than 125 psig is desired.

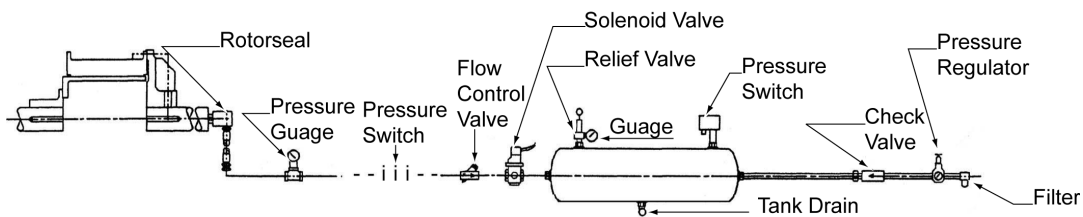


Figure 12

**Table-4
MAXIMUM SAFE OPERATING SPEEDS**

| Size (Narrow) | Maximum RPM | Size (Narrow) | Maximum RPM | Size (Wide) | Maximum RPM | Size (Wide) | Maximum RPM |
|---------------|-------------|---------------|-------------|-------------|-------------|-------------|-------------|
| 11.5VC500 | 1800 | 28VC650 | 1000 | 14VC1000 | 1800 | 42VC1200 | 670 |
| 14VC500 | 1500 | 33VC650 | 900 | 16VC1000 | 1400 | 46VC1200 | 600 |
| 16VC600 | 1400 | 35VC650 | 900 | 20VC1000 | 1300 | 52VC1200 | 550 |
| 20VC600 | 1200 | 37VC650 | 800 | 24VC1000 | 1250 | 51VC1600 | 550 |
| 24VC650 | 1050 | 42VC650 | 800 | 28VC1000 | 1100 | 60VC1600 | 520 |
| | | | | 32VC1000 | 1050 | 66VC1600 | 520 |
| | | | | 38VC1200 | 740 | | |

3.0 OPERATION

Warning

Exceeding the operating limits described in this section may result in personal injury or equipment damage.

3.1 Torque, RPM and Pressure Limits

3.1.1 The developed torque is directly proportional to the applied air pressure. If the developed torque seems inadequate, check for oil, grease or dust contamination.

Caution

Maximum applied air pressure is 125 psig (8.5 bar). Operation at pressures exceeding 125 psig may result in damage to the element. Consult the factory if operation at pressures greater than 125 psig is desired.

Caution

The non-asbestos friction material used in Airflex VC units may not develop rated torque initially, as a short “wear in” period is required. It is very important that clutch or brake operation be monitored closely to prevent excessive heat generation from slippage.

3.1.2 Maximum safe operating speeds are shown on Table 4.

Danger

Do not exceed the operating speeds shown on Table 4. Operation at speeds greater than allowable will result in permanent damage to the element, personal injury or death.

4.0 MAINTENANCE

Warning

Only qualified personnel should maintain and repair these units. Faulty workmanship may result in personal injury or equipment damage.

Caution

When replacing clutch or brake components, use only genuine, Airflex replacement parts.

4.1 Periodic Inspection

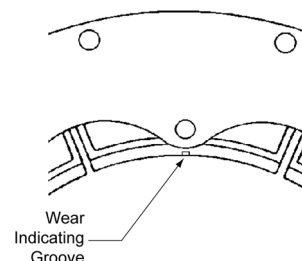
4.1.1 The following items may be inspected without disassembly of the element.

4.1.1.1 **Friction Shoe Assembly Lining Wear** -Check the lining thickness and compare to the values shown on Table 5. If the linings have worn to minimum allowable thickness or less, they must be replaced as a complete set.

Caution

Operation with friction material worn to less than minimum allowable thickness will result in damage to the drum.

Note : A wear indicating groove (see figure below) is provided on each end of the friction block. The maximum wear point, which coincides with the values shown on Table 5, is at the bottom of the groove.



| Table 5 FRICTION MATERIAL THICKNESS | | |
|--|---|--------------------------------------|
| NARROW SERIES | | |
| Element Size | Minimum Allowable Lining Thickness, in. (mm.) | Original Lining Thickness, in. (mm.) |
| 11.5VC500 thru 20VC600 | .15 (3,8) | .33 (8,4) |
| 24VC650 thru 28VC650 | .15 (3,8) | .45 (11,4) |
| 33VC650 thru 42VC650 | .28 (7,1) | .58 (14,7) |
| WIDE SERIES | | |
| 12VCI000 thru 20VC1000 | .15 (3,8) | .33 (8,4) |
| 24VC1000 thru 28VC1000 | .15 (3,8) | .45 (11,4) |
| 32VCI000 thru 42VC1200 | .38 (9,5) | .58 (14,7) |
| 46VC1200 and 52VC1200 | .38 (9,5) | .69 (17,5) |
| 51,60, and 76 VC1600 | .30 (7,6) | .67 (17,0) |

4.1.1.2 **Contamination of Shoes or Drum** - Oil or grease contamination will reduce the developed torque of the clutch or brake. Disassembly will be required to clean any oil or grease build-up. In extremely dusty environments, dust may accumulate in the backing plate cavities to the point where the friction shoes will not properly retract. Dust accumulations may be vacuumed out of the cavities.

⚠ Caution

Do not attempt to use a solvent to remove oil or grease without first removing the element. While squirting a solvent into an installed clutch or brake may improve performance temporarily, a fire hazard exists from the heat generated during slippage.

⚠ Caution

Do not use compressed air to blow dust accumulations out of the backing plates. Although the friction material does not contain asbestos, the dust created as the friction material wears, along with the dust from the operating environment, may irritate the respiratory system.

4.1.1.3 **Air Control Components** - Check for proper adjustment of the air control components. Make sure the safety pressure switches, if used, are set correctly. Repair any air leaks as discovered.

4.1.2 Partial or complete disassembly is required to inspect the following items.

4.1.2.1 **Drum Diameter Wear** - Check the O. D. of the drum and compare to the values shown on Table 6. Minor heat-checking may be removed by machining the drum O. D. If the drum has been subjected to excessive heat, the open end may flare out, giving the impression that the drum has not worn. It is therefore important to check the diameter at several locations across the face.

⚠ Caution

Operation of the clutch or brake on a drum that has worn or has been machined to less than minimum allowable diameter will result in damage to the element components

| Table 6 DRUM WEAR LIMITS | |
|-----------------------------|---|
| NARROW SERIES | |
| Element Size | Minimum Allowable Wear on Drum Diameter * in. (mm.) |
| 11.5VC500 thru 16VC600 | .09 (2) |
| 20VC600 thru 24VC650 | .12 (3) |
| 28VC650 | .19 (5) |
| 33VC650 thru 42VC650 | .19 (5) |
| WIDE SERIES | |
| 12VCI000 thru 16VCI000 | .09 (2) |
| 20VCI000 thru 24VCI000 | .13 (3) |
| 28VCI000 | .19 (5) |
| 32VCI000 thru 38VC1200 | .19 (5) |
| 42VC1200 thru 46VC1200 | .25 (6) |
| 52VC1200 thru 76VC1600 | .25 (6) |

* Note: The number preceding the letters "VC" in the element size designates the original drum diameter in inches.

Example: 16VC600 - Original Drum Diameter = 16.00 inches (406mm).

Minimum allowable drum diameter is:
 $16(406) - .09(2) = 15.91(404)$.

4.1.2.2 **Air Actuating Tube** - Check that the tube has not been damaged by excessive heat. If any portion of the tube is hard or charred, the tube must be replaced. Check for any blisters, which would indicate ply separation. A tube in this condition must also be replaced.

4.1.2.3 **Friction Shoe Lining Wear** - If the linings are glazed, they may be lightly sanded to remove the glazing PROVIDING THEY DO NOT CONTAIN ASBESTOS.

Warning

Clean the edge of the lining and note the presence of a blue stripe and a white stripe along with brass flakes in the friction material. If the above exists, the linings contain asbestos. Using the appropriate precautions for working with asbestos, remove the linings and dispose of properly. **DO NOT ATTEMPT TO SAND FRICTION MATERIAL CONTAINING ASBESTOS.**

Caution

When working with any friction material, regardless of whether or not it contains asbestos, always wear approved safety equipment.

- 4.1.2.4 **Uneven Friction Lining Wear** - Tapered wear across the friction surface typically indicates a worn drum and/or misalignment. If two or more adjacent shoes are worn on one end only, the air actuating tube has most likely developed a ply separation at that location.
- 4.1.2.5 **Backing Plate Wear** - Wear on the ends of the backing plates from bearing against the side plates is indicative of misalignment or thrusting. If wear is on one end only, and uniform for all backing plates, a worn drum may be causing the shoes to thrust as the element engages. If wear exists on both ends of all of the backing plates, excessive misalignment is probably the cause. Slight notching in the torque bar cavity is normal; however, if the notching occurs in a short amount of time, check shaft alignment. If both walls in the torque bar cavity are notched, there may be a significant vibration (torsional) problem.
- 4.1.2.6 **Release Springs and Torque Bars** - Excessive wear at the ends of the torque bars where the release spring rides indicates excessive parallel misalignment.
- 4.1.2.7 **Side Plates** - Any wear on the backing plates will also be reflected as elongation of the torque bar holes in the side plates.
- 4.1.2.8 **Contamination of Friction Shoes** - Mild oil or grease contamination may be removed with a solvent. Linings which have become saturated must be replaced. Also, linings that have been charred from excessive heat must be replaced.

Caution

When using any solvent, always follow the appropriate safety precautions.

- 4.1.2.9 **Excessive Dust Accumulation** - If dust becomes packed in the backing plate cavities, a pressurized enclosure should be considered. Excessive accumulations will prevent complete shoe retraction.

4.2 Removal of Element Assembly and Drum (Narrow, Dual Narrow and Single Wide)

Warning

Prior to removal of the clutch or brake, make sure the machinery is in, and will remain in, a safe condition.

- 4.2.1 Match mark the element to the spider and the drum to the drum hub.
- 4.2.2 Disconnect the element from the spider and allow it to rest on the drum.
- 4.2.3 Connect an overhead support to the element and apply enough tension to support the weight of the element and drum.
- 4.2.4 Remove the fasteners attaching the drum to the drum hub and hoist the element/drum out from between the shafts.

Caution

Use extreme care when disconnecting the drum from the hub. Shear points exist at the mounting holes.

4.3 Removal of Element Assemblies and Drums (Dual Wide)

- 4.3.1 Match mark the element assemblies to each other and to the spider. Also, match mark the drums to each other and to the drum hub.
- 4.3.2 Disconnect the dual element from the spider and allow it to rest on the drums. Remove the air connection tubes.
- 4.3.3 Remove the fasteners and spacers attaching the element halves together.
- 4.3.4 Attach an overhead support to the spider side element and apply enough tension to support the weight of the element half and one of the drums.

- 4.3.5 Remove the through bolts and nuts attaching the drums to the drum hub. **DO NOT REMOVE THE SHORT SCREWS AND LOCKWASHERS WHICH HOLD THE FEMALE DRUM ONTO THE DRUM HUB.** Carefully hoist the spider side element and drum out from between the shafts.
- 4.3.6 Attach an overhead support to the remaining element and apply enough tension to support the weight of the element and drum.
- 4.3.7 Remove the short screws and lock washers holding the drum onto the drum hub and carefully hoist the element and drum out from between the shafts.

⚠ Caution

Use extreme care when disconnecting the drums from the drum hub. Shear points exist at the mounting holes.

4.4 Removal of Spider and Drum Hub

- 4.4.1 Puller holes are provided for removal. It will usually require heating along with the puller. When heating, heat uniformly to prevent hot spots.

4.5 Disassembly of the Element

- 4.5.1 **Lay** the element flat on a clean work surface.

- 4.5.2 Remove the side plate and clean for reassembly. If the torque bar holes are elongated more than one-half the diameter of the pin on the end of the torque bar, the side plate must be replaced.
- 4.5.3 Remove the friction shoe assemblies, torque bars and release springs. If the torque bars and springs come out of the element with the friction shoe assemblies, carefully tap them out of the backing plate cavities. Note wear and replace as necessary.

⚠ Caution

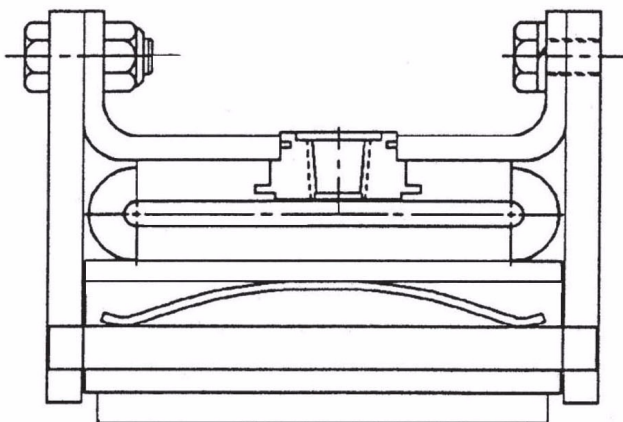
Whenever the element is removed and disassembled, it is always good practice to replace the release springs.

- 4.5.4 Remove the air connection elbows and spiral snap rings which secure the air actuating tube to the rim. Smaller size elements do not use snap rings. Carefully remove the air actuating tube from the rim and thoroughly inspect. Replace if necessary.

Note : The snap rings may no longer be required on certain size elements. Also, rims manufactured before 1984 were counterbored at the tube valve hole to accept the snap ring. This counterbore has been eliminated, and a second snap ring groove has been added to the tube valve. See **Figure 13.**

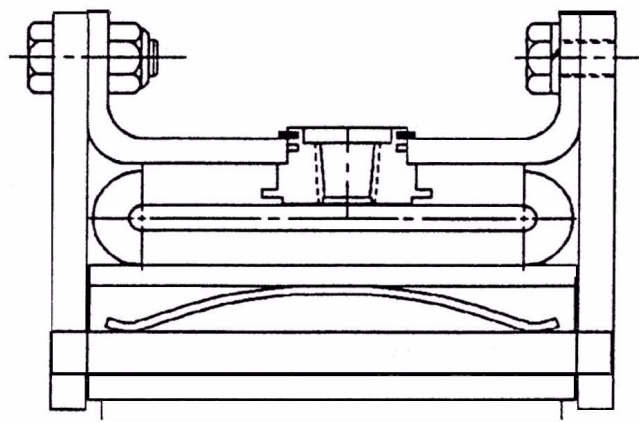
- 4.5.5 Remove the remaining side plate only if it is to be replaced.

Snap ring and Counterbore Eliminated



- 11.5VC500 24VC650 42VC650 24VC1000
- 14VC500 28VC650 14VC1000 28VC1000
- 16VC600 33VC650 16VC1000 32VC1000
- 20VC600 37VC650 20VC1000

Counterbore Eliminated and Second Snap Ring Groove Added



- 38VC1200 46VC1200 51VC1600
- 42VC1200 52VC1200 60VC1600
- 66VC1600

Figure 13

4.6 Friction Lining Replacement

Caution

Use only genuine Airflex replacement parts.

- 4.6.1 Make sure the torque bars and release springs have been removed from the backing plates.
- 4.6.2 For riveted friction shoe assemblies, drill the rivets with a **15/64"** (6mm) drill and tap the rivet body out. Larger elements have linings attached with flat head screws and locknuts. Air-flex special wrench p/n **304572** will aid in holding the locknuts during removal. See Table 7.

| Table 7 FRICTION SHOE ASSEMBLY FASTENERS | | | |
|---|----------|----------|----------|
| DRIVE PIN RIVETS | | | |
| 11.5VC500 | 24VC650 | 42VC650 | 24VCI000 |
| 14VC500 | 28VC650 | 14VCI000 | 28VC1000 |
| 16VC600 | 33VC650 | 16VC1000 | |
| 20VC600 | 37VC650 | 20VC1000 | |
| FLAT HEAD SCREWS* (BRASS) AND LOCKNUTS | | | |
| 32VCI000 | 42VC1200 | 52VC1200 | 60VC1600 |
| 38VC1200 | 46VC1200 | 51VC1600 | 66VC1600 |
| * Screws are 3/8-16NC-2 x 1.25 long flat head | | | |

- 4.6.3 Attach the new lining to the backing plate with new screws and locknuts or drive pin rivets (See **Figure 14**), as applicable. Work from the center of the friction lining out to the ends. The rivets are installed by driving the pin flush with the head.

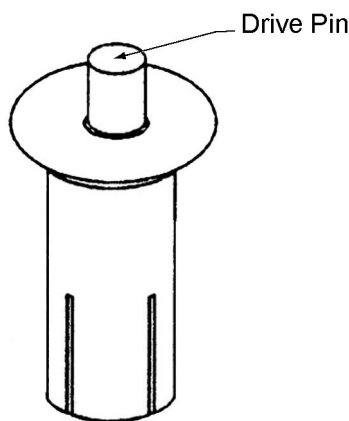


Figure 14

4.7 Assembly of the Element

- 4.7.1 Make sure that all of the components have been cleaned and any damaged or worn components have been repaired or replaced.
- 4.7.2 Assemble one of the side plates to the rim with cap screws and lock washers. It is not necessary to install through bolts and locknuts at this time.
- 4.7.3 Lay the rim/side plate assembly on a clean, flat work surface, side plate down.
- 4.7.4 Carefully insert the air actuating tube into the rim. Push the valves on the tube through the corresponding holes in the rim and install the spiral snap rings (if applicable).
- 4.7.5 Place a torque bar in each mating hole in the side plate, slide a friction shoe assembly onto each torque bar and carefully tap a release spring (51VC1600, 60VC1600 and 76VC1600 elements have two release springs in each cavity) into place. Make sure the spring is positioned on the side of the torque bar opposite the friction lining. Also, the spring must contact the torque bar at two points, not one. See **Figure 15**.

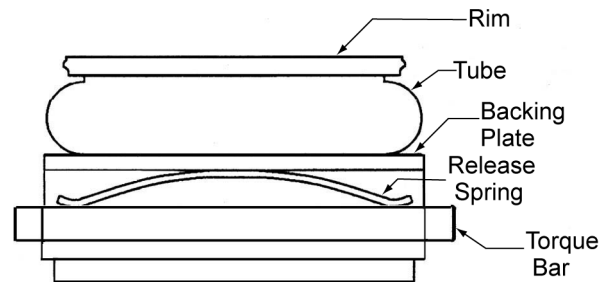


Figure 15

- 4.7.6 Lay the remaining side plate in position so the air connections and torque bar holes are properly aligned.
- 4.7.7 Carefully guide the torque bars into the corresponding holes in the side plate. It is often helpful to install four equally spaced screws and nuts through the rim and side plate to keep some tension on the side plate throughout this step.
- 4.7.8 Attach the side plate to the rim with cap screws and lock washers, making sure all of the torque bars are seated in their side plate holes.
- 4.7.9 Note the orientation of the air connections and install the through bolts and locknuts where applicable.

- 4.7.10 Reinstall the elbows (or quick release valves), using a good quality sealant on the pipe threads. Install the air connections on single narrow, dual narrow and single wide elements. Install only the short air connections (element closest to spider) on dual wide elements.

- 4.7.11 Reinstall per 2. 0.

5.0 SPARE PARTS STORAGE

5.1 Element Assemblies

- 5.1.1 Element assemblies must always be stored flat. Storage in the standing position may cause the rims to go out-of-round.

5.2 Drums

- 5.2.1 Drums must be stored open end down. Similar to element assemblies, storage of a drum in the standing position will adversely affect roundness.

5.3 Air Actuating Tubes

- 5.3.1 Air actuating tubes are shipped from the Airflex plant folded to conserve shipping space. Upon receipt,

remove the tube from its crate and allow it to assume its natural shape. Store in a cool, dry area, away from electrical equipment and ultraviolet light.

6.0 ORDERING INFORMATION/ TECHNICAL ASSISTANCE

6.1 Equipment Reference

- 6.1.1 In any correspondence regarding Air-flex equipment, refer to the information on the product nameplate. If not available, note the drum diameter, air connection configuration, mounting arrangement or any other special features and call or write:

Eaton Corporation

Airflex Division

9919 Clinton Road

Cleveland, Ohio 44144

Tel.: (216)281-2211

Fax: (216) 281-3890

Internet: www.airflex.com

THE PARTS LISTS ON THE FOLLOWING PAGES APPLY TO STANDARD ELEMENT ASSEMBLIES ONLY. ELEMENTS USED ON SLIP OR HIGH-TORQUE APPLICATIONS WILL HAVE DIFFERENT COMPONENT PARTS. CONSULT THE AIRFLEX FACTORY OR AN AUTHORIZED AIRFLEX DISTRIBUTOR PRIOR TO ORDERING REPLACEMENT PARTS FOR ANY ELEMENT NOT APPEARING ON THE FOLLOWING LISTS.

7.0 PARTS LISTS

7.1 Single Narrow Element Assemblies

| | | ITEM | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|---------------|------------------------------|---------------------|----------|------------------|------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|--------|------------------|----------|------------------|--------|------------------|----------|------------------|--------|------------------|--------|------------------|--------|---------|
| Element Description | # of Air In/L | Part No. of Complete Element | 1 | | 2 | | 3 | | 3A | | 4 | | 5 | | 6 | | 7 | | 10 | | 11 | | 12 | | 13 | | | | |
| | | | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | Part No. 1 Req'd | Qty. | |
| 11.5 VC 500 | 1 or 2 | 142639HA | Minus Side Conn. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | Side Conn. | 131 X 11 | 1 | - | - | 412178-02 | 1 | 412324-01 | 1 | 412178-02 | 1 | 412324-01 | 1 | 414576 | 8 Req'd | 130 X 72 | 48 Req'd | 414576 | 8 Req'd | 130 X 72 | 48 Req'd | 412123 | 412123 | 201372 | 8 Req'd | 201373 | 8 Req'd |
| | | | Side Conn. | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 14 VC 500 | 1, 2 or 4 | 143829HA | Minus Side Conn. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | Side Conn. | 92 X 6 | 1 | - | - | - | 87 X 12 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Quick Release Valve | - | - | - | 145406DF | 1 | 72 X 31 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Side Conn. | 92 X 6 | 2 | - | - | - | 87 X 12 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Quick Release Valve | - | - | - | 145406DF | 2 | 72 X 31 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Side Conn. | 92 X 6 | 4 | - | - | - | 87 X 12 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Quick Release Valve | - | - | - | 145406DF | 4 | 72 X 31 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 16 VC 600 | 1, 2 or 4 | 142640HA | Minus Side Conn. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | Side Conn. | 92 X 6 | 1 | - | - | - | 87 X 12 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Quick Release Valve | - | - | - | 145406DF | 1 | 72 X 31 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Side Conn. | 92 X 6 | 2 | - | - | - | 87 X 12 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Quick Release Valve | - | - | - | 145406DF | 2 | 72 X 31 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Side Conn. | 92 X 6 | 4 | - | - | - | 87 X 12 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | Quick Release Valve | - | - | - | 145106DF | 4 | 72 X 31 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

ITEM

| Element Description | # of Air InL | Part No. of Complete Element | 1 | | 2 | | 3 | | 3A | | 4 | | 5 | | 6 | | 7 | | 10 | | 11 | 12 | 13 | | | |
|---------------------|--------------|------------------------------|----------|---------|----------|---------|----------|------|----------|------|----------|------|----------|------|----------|------|----------|------|----------|------|--------|-------|----------|----------|---|---|
| | | | Part No. | 1 Req'd | Part No. | 1 Req'd | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Lining | Rivet | Part No. | Part No. | | |
| 20 VC 600 | 1, 2 or 4 | 142641HA | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| | | | 92 X 6 | 1 | - | - | 87 X 12 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | - | - | 145406DF | 1 | 72 X 31 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | 92 X 6 | 2 | - | - | 87 X 12 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | - | - | 145406DF | 2 | 72 X 31 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | 92 X 6 | 4 | - | - | 87 X 12 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | - | - | 145406DF | 4 | 72 X 31 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 24 VC 650 | 1, 2 or 4 | 142642HA | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| | | | 92 X 7 | 1 | - | - | 87 X 14 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | - | - | 145407DF | 1 | 72 X 32 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | 92 X 7 | 2 | - | - | 87 X 14 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | - | - | 145407DF | 2 | 72 X 32 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | 92 X 7 | 4 | - | - | 87 X 14 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | - | - | 145407DF | 4 | 72 X 32 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 28 VC 650 | 1, 2 or 4 | 142643HA | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| | | | 92 X 7 | 1 | - | - | 87 X 14 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | - | - | 145407DF | 1 | 72 X 32 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | 92 X 7 | 2 | - | - | 87 X 14 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | - | - | 145407DF | 2 | 72 X 32 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | 92 X 7 | 4 | - | - | 87 X 14 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | - | - | 145407DF | 4 | 72 X 32 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| ITEM | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|--------------------------------|------------------------------|-----------|-----------|----------|----------|----------|---------|----------|------|----------|------|----------|------|----------|------|----------|------|----------|------|--------|-------|----------|---------|----------|------|----------|------|
| Element Description | # of Air In/L | Part No. of Complete Element | 1 | | 2 | | 3 | | 3A | | 4 | | 5 | | 6 | | 7 | | 10 | | 11 | | 12 | | 13 | | | |
| | | | Part No. | 1 Req'd | Part No. | 1 Req'd | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Part No. | Qty. | Lining | Rivet | Part No. | 2 Req'd | Part No. | Qty. | Part No. | Qty. |
| 33 VC 650 | Minus Side Conn. | 142644HA | 1, 2 or 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | 92 X 8 | 1 | - | 87 X 16 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142644HM | 1 | - | - | 145141DF | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 2 | - | 87 X 16 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142644HN | 2 | - | - | 145141DF | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142644HC | 4 | - | - | 145141DF | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142644HE | 4 | - | - | 145141DF | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 37 VC 650 | Minus Side Conn. | 142645HA | 1, 2 or 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | 92 X 8 | 1 | - | 87 X 16 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Side Conn. Quick Release Valve | | 142645HJ | 1 | - | - | 145141DF | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 2 | - | 87 X 16 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Side Conn. Quick Release Valve | | 142645HN | 2 | - | - | 145141DF | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Side Conn. Quick Release Valve | | 142645HM | 4 | - | - | 145141DF | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Side Conn. Quick Release Valve | | 142645HE | 4 | - | - | 145141DF | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 42 VC 650 | | Minus Side Conn. | 142647HA | 1, 2 or 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | 92 X 8 | 1 | - | 87 X 16 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142647HJ | 1 | - | - | 145141DF | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 2 | - | 87 X 16 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142647HP | 2 | - | - | 145141DF | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142647HN | 2 | - | - | 145141DF | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142647HC | 4 | - | - | 145141DF | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Side Conn. Quick Release Valve | 142647HE | 4 | - | - | 145141DF | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | 92 X 8 | 4 | - | 87 X 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

7.2 Dual Narrow Element Assemblies

| | | ITEM | | | |
|-------------|--|-----------------------|---------------------|---------|--------|
| | | Complete Dual Element | Single Elements* | 8 | 9 |
| 11.5 VC 500 | Element with two Side Connections | 142112 | 142639HA 2 Req'd | 105808 | 105898 |
| | Element with four Side Connections | 142112C | | 105808A | 105898 |
| 14 VC 500 | Element with two Side Connections | 143114 | 143829HA 2 Req'd | 105809 | 105899 |
| | Element with two Quick Release Valves | 143114E | | 105809B | 105899 |
| | Element with four Side Connections | 143114C | | 105809A | 105899 |
| | Element with four Quick Release Valves | 143114D | | 105809C | 105899 |
| 16 VC 600 | Element with two Side Connections | 142115 | 142640HA 2 Req'd | 105810 | 105900 |
| | Element with two Quick Release Valves | 142115E | | 105810B | 105900 |
| | Element with four Side Connections | 142115C | | 105810A | 105900 |
| | Element with four Quick Release Valves | 14215D | | 105810C | 105900 |
| 20 VC 600 | Element with two Side Connections | 142116 | 142641HA 2 Req'd | 105810 | 105900 |
| | Element with two Quick Release Valves | 142116E | | 105810B | 105900 |
| | Element with four Side Connections | 142116C | | 105810A | 105900 |
| | Element with four Quick Release Valves | 142116D | | 105810C | 105900 |
| 24 VC 650 | Element with two Side Connections | 142117 | 142642HA 2 Req'd | 105811 | 105901 |
| | Element with two Quick Release Valves | 142117E | | 105811B | 105901 |
| | Element with four Side Connections | 142117C | | 105811A | 105901 |
| | Element with four Quick Release Valves | 142117D | | 105811C | 105901 |
| 28 VC 650 | Element with two Side Connections | 142118 | 142643HA 2 Req'd | 105811 | 105901 |
| | Element with two Quick Release Valves | 142118E | | 105811B | 105901 |
| | Element with four Side Connections | 142118C | | 105811A | 105901 |
| | Element with four Quick Release Valves | 142118D | | 105811C | 105901 |
| 33 VC 650 | Element with two Side Connections | 142119 | 142644HA 2 Req'd | 105812 | 105902 |
| | Element with two Quick Release Valves | 142119E | | 105812B | 105902 |
| | Element with four Side Connections | 142119C | | 105812A | 105902 |
| | Element with four Quick Release Valves | 142119D | | 105812C | 105902 |
| 37 VC 650 | Element with two Side Connections | 142120 | 142645HA 2 Req'd | 105812 | 105903 |
| | Element with two Quick Release Valves | 142120E | | 105812B | 105903 |
| | Element with four Side Connections | 142120D | | 105812A | 105903 |
| | Element with four Quick Release Valves | 142120D | | 105812C | 105903 |
| 42 VC 650 | Element with two Side Connections | 142121 | 142647HA 2 Req'd | 105812 | 105904 |
| | Element with two Quick Release Valves | 142121E | | 105812B | 105904 |
| | Element with four Side Connections | 142121C | | 105812A | 105904 |
| | Element with four Quick Release Valves | 142121D | | 105812C | 105904 |

* The second column under "ITEM" lists the part numbers of the two single elements that make up the dual mounted element assembly. To find part numbers of components, locate the element number in the parts list for single element application. Find the part numbers in the corresponding item column.

| | | ITEM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|--------------|------------------------------|------------------|--------------|-------------------|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|--------|-------|-----|------------------|----------|----------|----------|----------|---------------------|--------|---|---------------------|---------|---------|----------|-----------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---|-----------|---|-----------|---|
| Element Description | # of Air InL | Part No. of Complete Element | 1 | | 2 | | 3 | | 3A | | 4 | | 5 | | 6 | | 7 | | 10 | | 11 | | 12 | | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Part No. 1 Req'd | Tube 1 Req'd | Snap Ring 4 Req'd | Part No. | Qty | Part No. | Qty | Part No. | Qty | Part No. | Qty | Part No. | Qty | Part No. | Qty | Part No. | Qty | Lining | Screw | Nut | Part No. 2 Req'd | Part No. | Part No. | Part No. | Part No. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 42 VC 1000 | 1,2014 | 142677HA | | | 190 X 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Minus Side Conn. | 92 X 8 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 8 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 8 | 1 | 1454060F | 1 | 72 X 33 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | 1 | 412178-06 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 8 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 8 | 2 | 1454060F | 2 | 72 X 33 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | 2 | 412178-06 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 8 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 8 | 4 | 1454060F | 4 | 72 X 33 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | 4 | 412178-06 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 8 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 8 | 1 | 1454060F | 1 | 72 X 33 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | | | | | | |
| 46 VC 1200 | 1,2014 | 142671HA | 404602 | 190 X 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Minus Side Conn. | 92 X 8 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 8 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 8 | 1 | 1454060F | 1 | 72 X 33 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 8 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 8 | 2 | 1454060F | 2 | 72 X 33 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | 2 | 412178-07 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 8 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 8 | 4 | 1454060F | 4 | 72 X 33 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | 4 | 412178-07 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 8 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 8 | 1 | 1454060F | 1 | 72 X 33 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | 1 | 412178-07 | |
| 52 VC 1200 | 1,2014 | 142841HA | 503985 | 190 X 83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Minus Side Conn. | 92 X 10 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 10 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 10 | 1 | 145413BD | 1 | 87 X 20 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 10 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 10 | 2 | 145413BD | 2 | 87 X 20 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | 2 | 412178-08 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 10 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 10 | 4 | 145413BD | 4 | 87 X 20 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | 4 | 412178-08 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 10 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 92 X 10 | 1 | 145413BD | 1 | 87 X 20 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | 1 | 412178-08 | |
| 51 VC 1600 | 1,2014 | 142835HA | 506674 | 190 X 83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Minus Side Conn. | 92 X 10 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 10 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 92 X 10 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |

| | | ITEM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|--------------|------------------------------|------------------|--------------|-------------------|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|--------|-------|-----|------------------|----------|---------------------|---------------------|-----------|-----------|----------|----------|---------|---------|-----------|-----------|-----------|-----------|--------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|--------|----------|----------|----------|----------|
| Element Description | # of Air InL | Part No. of Complete Element | 1 | | 2 | | 3 | | 3A | | 4 | | 5 | | 6 | | 7 | | 10 | | 11 | 12 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Part No. 1 Req'd | Tube 1 Req'd | Snap Ring 4 Req'd | Part No. | Qty | Part No. | Qty | Part No. | Qty | Part No. | Qty | Part No. | Qty | Part No. | Qty | Part No. | Qty | Lining | Screw | Nut | Part No. 2 Req'd | Part No. | Part No. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 VC 1600 | 1,20r4 | 142915MB | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 153 X 791 | 2 | - | - | 2 | - | - | 2 | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 190 X 15 | 511348 | 2 | 145413BD | 2 | 87 X 20 | 2 | 412178-18 | 2 | 412324-06 | 2 | 511646 | 20 Req'd | 511645 | 40 Req'd | 330 X 208 | 240 Req'd | 110 X 23 | 240 Req'd | 412166 | 304214 | 20 Req'd | 304215 | 40 Req'd |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 153 X 791 | 4 | - | - | 4 | - | 4 | - | 4 | - | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| 66 VC 1600 | 1,20r4 | 142097HA | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Quick Release Valve | 190 X 15 | 511350 | 4 | 145413BD | 4 | 87 X 20 | 4 | 412178-04 | 4 | 412324-06 | 4 | 511646 | 22 Req'd | 511645 | 44 Req'd | 330 X 208 | 240 Req'd | 110 X 23 | 264 Req'd | 509527 | 304214 | 22 Req'd | 304215 | 44 Req'd | |
| 76 VC 1600 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Side Conn | 190 X 15 | 515142 | 4 | - | - | 4 | - | 4 | - | 4 | - | 4 | - | - | - | 330 X 208 | 300 Req'd | 110 X 23 | 300 Req'd | 515140 | 304214 | 25 Req'd | 304215 | 50 Req'd | |

7.4 Dual Wide Element Assemblies

| | Complete Dual Element With Four Side Connections | Single Elements* | ITEM | |
|----------|--|---------------------|---------|--------|
| | | | 8 | 9 |
| 16VCI000 | 142122C | 142821HA 2 Req'd | 105815A | 105905 |
| 20VC1000 | 142123C | 142832HA 2 Req'd | 105815A | 105905 |
| 24VC1000 | 142124C | 142675HA 2 Req'd | 105816A | 105901 |
| 28VC1000 | 142125C | 142674HA2 Req'd | 105816A | 105901 |
| 32VC1000 | 142126C | 142673HA 2 Req'd | 105816A | 105906 |
| 38VC1200 | 142127C | 142739HA 2 Req'd | 105817A | 105907 |
| 42VC1200 | 142128C | 142677HA 2 Req'd | 105817A | 105908 |
| 46VC1200 | 142129C | 142671HA 2 Req'd | 105891A | 105909 |
| 52VC1200 | 142131C | 142841HA 2 Req'd | 105893A | 105910 |
| 51VC1600 | 142130C | 142835HA 2 Req'd | 105892A | 105910 |
| 60VC1600 | 142132AL | 142915MB 2 Req'd | 105894A | 105911 |
| 66VC1600 | 142198C | 142097HA 2 Req'd | 105897A | - |
| 76VC1600 | 146509P | Contact Factory | - | - |

* The second column under "ITEM" lists the part numbers of the two single elements that make up the dual mounted element assembly. To find part numbers of the components, locate the element number in the parts list for single element application. Find the part numbers in the corresponding item column.

All elements are dual drilled

8.0 REPAIR KITS

8.1 Friction Block and Rivet Kits

| ELEMENT SIZE | NARROW SERIES | | | ELEMENT SIZE | WIDE SERIES | | |
|--------------|---------------|----------------------------|-------------------|--------------|-------------|----------------------------|------------------|
| | KIT NUMBER | QTY. FRICTION BLOCKS | QTY. ** RIVETS | | KIT NUMBER | QTY. FRICTION BLOCKS | QTY.** RIVETS |
| 11.5VC500 | 146236AA | 8 | 54 | 14VC1000 | 146237AA | 16 | 102 |
| 14VC500 | 146236AB | 8 | 90 | 16VC1000 | 146237AB | 8 | 90 |
| 16VC600 | 146236AC | 8 | 90 | 20VC1000 | 146237AC | 8 | 90 |
| 20VC600 | 146236AD | 10 | 110 | 24VC1000 | 146237AD | 10 | 110 |
| 24VC650 | 146236AE | 12 | 130 | 28VC1000 | 146237AE | 10 | 110 |
| 28VC650 | 146236AF | 14 | 150 | 32VC1000 | 146237AF | 12 | 130* |
| 33VC650 | 146236AG | 16 | 170 | 38VC1200 | 146237AG | 12 | 130* |
| 35VC650 | 146236AH | 18 | 190 | 42VC1200 | 146237AH | 14 | 150* |
| 37VC650 | 146236AJ | 18 | 190 | 46VC1200 | 146237AJ | 32 | 198* |
| 42VC650 | 146236AK | 20 | 210 | 52VC1200 | 146237AK | 36 | 222* |
| | | | | 51VC1600 | 146237AL | 36 | 222* |
| | | | | 60VC 1600 | 146237AM | 40 | 246* |
| | | | | 66VC 1600 | 146237AN | 44 | 270* |
| | | | | 76VC 1600 | 146237 AR | 50 | 306* |

* Fasteners for these sizes are screws and nuts - all other sizes use rivets.

** Extra fasteners supplied with each kit.

8.2 Friction Shoe Assembly, Torque Bar and Release Spring Kits

| ELEMENT SIZE | NARROW SERIES | | | | ELEMENT SIZE | WIDE SERIES | | | |
|--------------|---------------|---------------------|------------------|--------------|--------------|-------------|---------------------|------------------|--------------|
| | KIT NUMBER | QTY. FRICTION SHOES | QTY. TORQUE BARS | QTY. SPRINGS | | KIT NUMBER | QTY. FRICTION SHOES | QTY. TORQUE BARS | QTY. SPRINGS |
| 11.5 VC500 | 146236A | 8 | 8 | 8 | 14VC1000 | 146237A | 8 | 8 | 8 |
| 14VC500 | 146236B | 8 | 8 | 8 | 16VC1000 | 146237B | 8 | 8 | 8 |
| 16VC600 | 146236C | 8 | 8 | 8 | 20VC1000 | 146237C | 8 | 8 | 8 |
| 20VC600 | 146236D | 10 | 10 | 10 | 24VC1000 | 146237D | 10 | 10 | 10 |
| 24VC650 | 146236E | 12 | 12 | 12 | 28VC1000 | 146237E | 10 | 10 | 10 |
| 28VC650 | 146236F | 14 | 14 | 14 | 32VC1000 | 146237F | 12 | 12 | 12 |
| 33VC650 | 146236G | 16 | 16 | 16 | 38VC1200 | 146237G | 12 | 12 | 12 |
| 35VC650 | 146236H | 18 | 18 | 18 | 42VC1200 | 146237H | 14 | 14 | 14 |
| 37VC650 | 146236J | 18 | 18 | 18 | 46VC1200 | 146237J | 16 | 16 | 16 |
| 42VC650 | 146236K | 20 | 20 | 20 | 52VC1200 | 146237K | 18 | 18 | 18 |
| | | | | | 51VC1600 | 146237L | 18 | 18 | 36 |
| | | | | | 60VC1600 | 146237M | 20 | 20 | 40 |
| | | | | | 66VC1600 | 146237N | 22 | 22 | 44 |
| | | | | | 76VC1600 | 146237V | 25 | 25 | 50 |

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