

Bettis CBB/CBA300-Series Pneumatic Valve Actuator

Component Material List

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Section 1: Major Component Material List

1.1 Typical CBB-Series Major Component Material List

Figure 1 CBB-Series Major Components

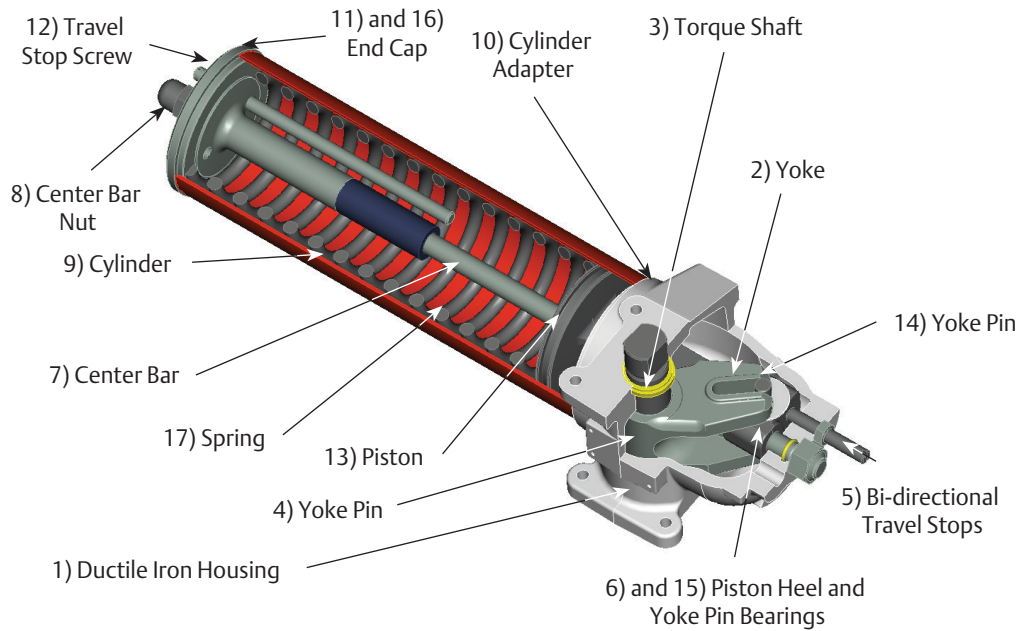


Table 1. Material List

| Item | Description | Material | |
|---------------------------------|-------------------------|-----------------------------------|------------------------|
| Housing | | | |
| 1 | Housing | Cast Ductile Iron or Carbon Steel | ASTM A395 or ASTM A352 |
| 2 | Yoke, CBBx15 and CBBx20 | Cast steel | ASTM A732 |
| | Yoke, CBBx25 | Cast Ductile Iron | ASTM A536 |
| 3 | Torque shaft | Alloy steel | ASTM A311 |
| 4 | Yoke key | Steel | ASTM A108 |
| 5 | Travel stop screw | Alloy steel, Zinc plated | ASTM A193 |
| | Travel stop screw nut | Alloy steel, Zinc plated | ASTM A194 |
| 6 | Yoke / Yoke pin bearing | UHMWPE plastic | - |
| 7 | Centerbar | Alloy steel, Nitrided | ASTM A193 |
| 8 | Centerbar nut | Alloy steel, Zinc plated | ASTM A194 |
| Pneumatic Power Cylinder | | | |
| 9 | Cylinder | Steel, TFE lined | ASTM A513 |
| 10 | Cylinder adapter | Cast Ductile Iron or Steel | ASTM A395 or ASTM A516 |
| 11 | Outer endcap, DA | Steel | ASTM A516 |
| 12 | Travel stop screw | Alloy steel, Zinc plated | ASTM A193 |
| | Travel stop screw nut | Alloy steel, Zinc plated | ASTM A194 |
| 13 | Piston, standard | Cast Ductile Iron | ASTM A536 |
| 14 | Yoke pin | Steel, TFE coated | ASTM A108 |
| 15 | Piston heel bearing | Steel / Bronze / TFE | Garlock DU Style |
| Spring Cartridge | | | |
| 16 | Outer endcap, SR | Cast Ductile Iron or Carbon Steel | ASTM A536 or ASTM A352 |
| 17 | Spring | Alloy steel | ASTM A229 |

1.2 Typical CBA300-Series Major Component Material List

Figure 2 CBA300-Series Major Components

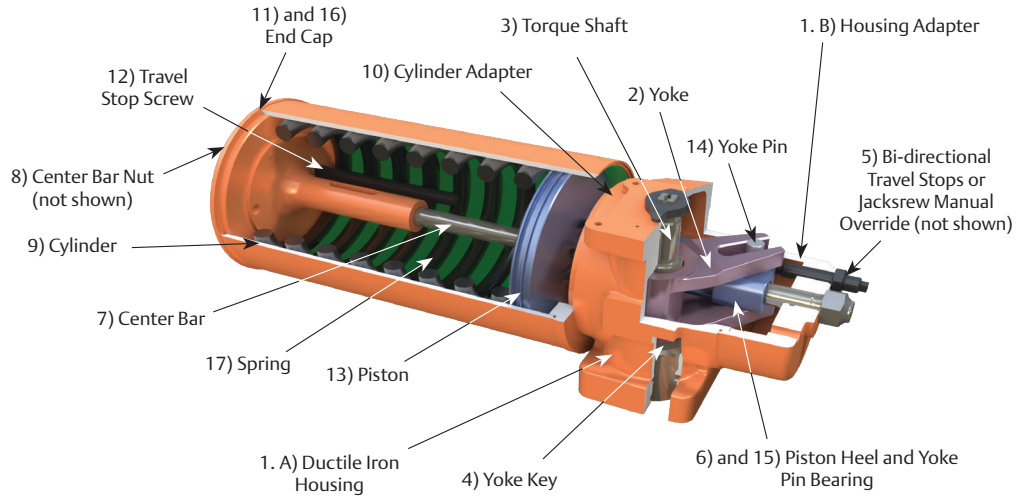


Table 2. Material List

| Item | Description | Material | |
|---------------------------------|-------------------------|-----------------------------------|------------------------|
| | Housing | | |
| 1. A | Housing | Cast Ductile Iron or Carbon Steel | ASTM A395 or ASTM A352 |
| 1. B | Housing adapter | Cast Ductile Iron or Carbon Steel | ASTM A395 or ASTM A352 |
| 2 | Yoke | Cast Ductile Iron | ASTM A536 |
| 3 | Torque shaft | Alloy steel, Nitrided | AISI 4140 HT |
| 4 | Yoke key | Steel | ASTM A108 |
| 5 | Travel stop screw | Alloy steel, Zinc plated | ASTM A193 |
| | Travel stop screw nut | Alloy steel, Zinc plated | ASTM A563 |
| 6 | Yoke / Yoke pin bearing | UHMWPE plastic | - |
| 7 | Center bar | Alloy steel, Nitrided | ASTM A193 |
| 8 | Center bar nut | Alloy steel, Zinc plated | ASTM A194 |
| Pneumatic Power Cylinder | | | |
| 9 | Cylinder | Steel, TFE lined | ASTM A513 |
| 10 | Cylinder adapter | Steel | ASTM A516 |
| 11 | Outer endcap, DA | Steel | ASTM A516 |
| 12 | Travel stop screw | Alloy steel, Zinc plated | ASTM A193 |
| 12 | Travel stop screw nut | Alloy steel, Zinc plated | ASTM A563 |
| 13 | Piston | Cast Ductile Iron | ASTM A536 |
| 14 | Yoke pin | Alloy steel | AISI 4140 HT |
| 15 | Piston heel bearing | Steel / Bronze / TFE | Garlock DU Style |
| | Yoke pin bearing | Steel / Bronze / TFE | Garlock DU Style |
| | Rod bushing | Acetal plastic | - |
| | Piston bearing | TFE | - |
| Spring Cartridge | | | |
| 16 | Outer endcap, SR | Cast Ductile Iron or Carbon Steel | ASTM A536 or ASTM A352 |
| 17 | Spring | Alloy steel | ASTM A689 |

Section 2: Seal Material List

2.1 Typical CBB/CBA300-Series Seal Material List

Table 3.

| Description | Type | Application |
|-------------------------|-----------------|-------------|
| Piston OD / Cylinder ID | O-ring / D-ring | Dynamic |
| Piston / Centerbar | O-ring / T-seal | Dynamic |
| Torque shaft | O-ring | Rotary |
| All remaining seals | O-ring | Static |

Section 3: Typical Coatings

3.1 Nitriding

Bettis utilizes a Nitride surface finish on many component parts instead of Chrome or Nickel plating.

The nitrided surface is not a coating, it is an integral part of the component base material. Because of this, it will not pitted, crack, chip or flake off and any possibility of hydrogen embrittlement (a common problem in any plating process) is eliminated.

The Nitride surface layer is extremely hard and displays improved wear resistance when compared with plated coatings. Dent resistance is also improved.

The Nitride surface layer has also been shown to display superior corrosion resistance to plated coatings.

Nitride surface finishing has become very popular in the fluid power industry in the past decade replacing chrome and nickel plating in many applications.

Typical components - piston rods, tie bars, CBB centerbars, cylinder bores, pistons.

Typical process results in a thin surface layer of iron oxide over the second layer of porous Iron Nitride over the third layer of non-porous Iron Nitride are all fused on top of the base substrate steel material.

3.2 Teflon Lined Cylinder Bores

The standard coating on all Bettis pneumatic cylinder bores is Xylan, a proprietary Teflon coating.

The use of this Teflon lining results in superior corrosion resistance while improving seal life and overall actuator performance.

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