# Bonded piston seals

Robust one-piece design offers many benefits

## One-piece design eases assembly and promotes long service life

The one-piece design of the the rubber-to-metal bonded piston seal lowers total system costs, reduces weight and saves space. On our design, the one continuous rubber seal bonds directly to the metal insert, reducing the overall cost and complexities of installation. The integral one-piece construction reduces the normal tight tolerances required in machined piston designs, while providing superior inner and outer seal characteristics.

Bonded piston seals can easily incorporate addional features such as, check valves, metering orifices, spring retainers and other added attributes.

## Contact Information:

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## Applications:

- Clutch pistons
- Servo pistons
- Balance dam pistons
- Accumulator pistons

## Benefits:

- Cost effective
- Ease of installation
- Weight reduction
- Robust design
- Integrated features

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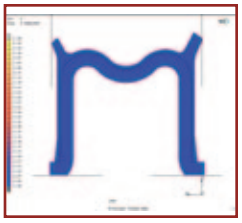
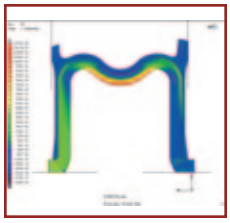
Bonded rubber pistons are primarily made out of two materials; ethylene acrylic (AEM) and fluorocarbon (FKM). Ethylene acrylic displays high resistance to Dex 6 transmission fluid. Fluorocarbon is recommended for applications involving gasoline, ethanol, engine coolant and water up to 200°C. Both of these compounds listed below show outstanding heat stability and resistance to motor oil, AFT, ozone and weather. Additional elastomer compounds are available to custom fit your applications.

| **Material** | | **AE513-85 (60111-1)** | **VA514-75(65711)** |
|---|---|---|---|
| **Polymer Type** | | Ethylene Acrylic (AEM) | Fluorocarbon (FKM) |
| **Temperature Range** | | -40 to 160°C | -30 to 200°C |
| **Original Properties** | **Method** | | |
| Specific Gravity, g/cc | D297 | 1.30 | 1.86 |
| Hardness, Shore "A" pts. | D2240 | 82 | 75 |
| Tensile, MPa | D412 | 14.0 | 10.3 |
| Elongation, % | D412 | 158 | 225 |
| 100% Modulus, MPa | D412 | 11.6 | 4.9 |
| Tear Strength, kN/m | D624 | 40.8 | 33.3 |
| **Compression Set - 70 hrs @ 150°C** | | | |
| % Deflection | D395 Method B | 23.5 | 14.3 |
| **Automatic Transmission Fluid - 70 hrs @150°C** | | | |
| Hardness Change, pts. | D471 | -6 | -3 |
| Tensile Change, % | D471 | +3.7 | -11.7 |
| Elongation Change, % | D471 | -7.0 | -4.0 |
| Volume Change, % | D471 | +9.8 | +3.4 |
| **IRM - 903 Oil - 70 hrs @ 150°C** | | | |
| Hardness Change, pts. | D471 | -17 | -4 |
| Tensile Change, % | D471 | -16.9 | -4.9 |
| Elongation Change, % | D471 | -14.6 | -0.4 |
| Volume Change, % | D471 | +36.7 | +4.6 |
| **Heat Aged - 70 hrs** | | **@150°C** | **@250°C** |
| Hardness Change, pts. | D865 | +3 | +6 |
| Tensile Change, % | D865 | +2.2 | +25.4 |
| Elongation Change, % | D865 | -3.8 | -28.5 |
| **Low Temperature Transition** | | | |
| TR-10, °C | D1329 | -39.5 | -17.6 |

3D Finite element analysis (FEA) provides our engineers with the data needed to achieve a robust, yet cost effective design. The example shown to at the right, considers a 400 psi pressure application and required design materials to minimize piston wall thickness and maximize seal life.



*Bonded Piston Seal at 0 psi*



*Bonded Piston Seal under 400 psi*





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