

# Engineered Solutions

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## New Diaphragm Design Provides Compensation Inside Narrow Enclosures

### Radial Compensation Diaphragm

Parker's new patent-pending Radial Compensation Diaphragm (RCD) offers many advantages when it comes to achieving reliable fluid volumetric compensation, especially inside narrow enclosures such as tubes.

### Problem

Traditional compensation diaphragms used in tubes and other similar enclosures are typically constructed with straight walls or with axially-arranged convolutes.

The effectiveness of a straight-walled diaphragm is limited by stress developed in the elastomer as the diaphragm expands.

Manufacturability of a typical convoluted diaphragm is limited by the elasticity needed to permit removal of the part from a convoluted core pin in the molding process.

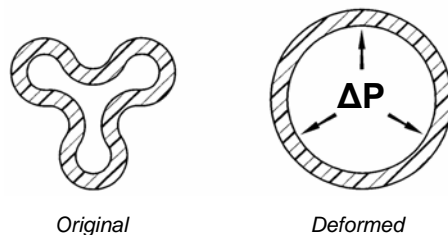
Traditional convoluted shapes may experience failures as the parting line crosses convolutes and can act as a fatigue crack initiation site.



Parker's RCD is effective in achieving reliable long-term volumetric compensation in tubes

### Solution

Parker's innovative Radial Compensation Diaphragm accommodates volume changes inside enclosures by simply unfolding its radially-patterned corrugations. This enables the elastomer to experience minimal stretch during volume expansion, greatly reducing the potential for failures due to overstress. In one typical example, strain in the elastomer was reduced over 70% versus the previous expansion-type diaphragm.



The design can consist of any number of axial corrugations ranging from a single fold to as many as the enclosure permits. The RCD has been successfully tested and proven to be a reliable long-term alternative in critical industries like semiconductor and energy, oil and gas.

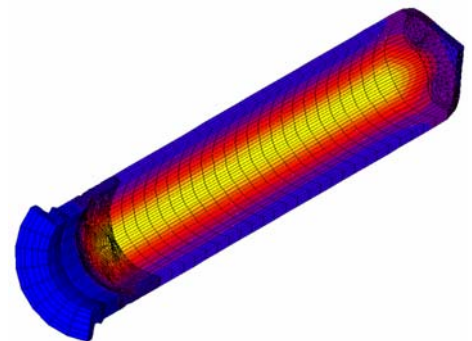
Molding an RCD offers further benefits including:

- permits use of a two-plate mold for reduced tool cost
- shorter cycle time reduces part cost
- avoids parting lines across the membrane for improved part integrity

### Applications

The range of applications and markets where this product can be used is vast, encompassing semiconductor, life sciences, energy oil and gas, automotive, industrial and many more.

Parker's Engineered Seals Division headquartered in Syracuse, Indiana, can design a custom RCD to meet the needs of your specific application.



A three-dimensional finite element model showing deformation of a tri-lobed RCD after full expansion; analysis is done on 1/3<sup>rd</sup> of geometry

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