

Innovative Sealing and Venting Solutions for Aerospace Antenna Radomes

Customer Overview

Sealing Devices' customer provides essential satellite communications systems to many leading government and military agencies and defense contractors.

Customer Problem

The customer needed help designing an antenna radome to allow for communication, navigation, and data transmission while remaining resilient under the harsh conditions of aerospace operation.

- **Environmental Conditions:** The system is required to withstand the extreme temperatures (-50°C to +150°C), vacuum conditions, and radiation exposure typical of spaceflight, while remaining water- and dust-tight.
- **Physical Constraints:** The radome is designed for mounting within the nose of the craft, and so had to meet strict requirements for aerodynamics, installed footprint, and low weight.
- **Material Compatibility:** All materials used in the radome, including seals and vents, needed to be thoroughly evaluated for compatibility with the expected temperatures, as well as outgassing and corrosion requirements.
- **Electromagnetic Compliance:** None of the materials in the intended signal path could appreciably interfere with the signals being sent and received. The signal processing electronics, on the other hand, needed shielding from any potential signals not coming directly from the customer's antenna.
- **Venting Requirements:** Pressure differentials due to changes in altitude and temperature need to be effectively managed to prevent damage to the structure and allow incidental outgassing to escape while maintaining the integrity of the seal.



Customer Requirements

- Low outgassing
- Lightweight materials
- Watertight sealing temperatures
- Thermal Management
- EMI Shielding
- Venting

Solution Partners



How did Sealing Devices Get Involved?

The customer reached out to Sealing Devices to request design assistance, since they knew that Sealing Devices was a leading distributor of sealing, venting, EMI, and thermal management solutions from Parker Chomerics, Rogers, Gore, and other leading suppliers to the Aerospace industry.

Additionally, since Sealing Devices is AS9100 certified and ITAR registered, they were able to support sales into the aerospace and defense sectors. The Sealing Devices Applications Engineering team worked with the customer to review the design and make solution recommendations.

Sealing Devices' Solution:

To create an environmental seal on the radome, Rogers closed-cell silicone foam was recommended for its low outgassing and resilience from -55°C to 200°C; this foam is easily compressible and has a high rebound, allowing for a vibration-resistant seal.

The antenna circuitry was enclosed within the radome using a conductive elastomer o-ring and connector gaskets from Parker Chomerics, which provide shielding from electromagnetic interference and an extra layer of environmental protection.

Sealing Devices also provided silicone gap fillers from Chomerics to support heat transfer between the electronics and a heat sink. Since the radome will undergo regular altitude changes, a Gore protective vent was installed on the enclosure wall to prevent excessive stress on the foam seal while maintaining watertightness.

Results:

Sealing Devices fabricated sample parts which were customized for the application and provided to the customer for fitment and performance testing.

Pending their approval, these parts will be produced at volume and combined into kits for future radome production.

