

# Shieldseal®

663

## Case Study: Radiation resistant sealing for nuclear waste flasks

### Problem

A third party design agency working for a global leader involved in fuel production through to decommissioning and containment. They were required to support the seal design on containers carrying radioactive waste for up to 40 years. The highly irradiated fluids being contained represented a significant performance challenge for the sealing materials due to the level and duration of exposure.

## Material and seal design advice required

### Application

**Heavily irradiated fluids and equipment with 40 year service life**

- Size: approximately 1.25 m x 1.25 m.
- Pressure: up to 1.5 bar.
- Temperature: typically 0 - 20°C with an additional requirement to perform at elevated temperatures for shorter time periods.

### Existing solution

Originally an extruded hollow double-seal profile, although this represented a number of avoidable sealing challenges which James Walker was aware of and alerted the customer to.

### James Walker solution

After discussions with the customer, their design sub-contractor and knowledge gained from the end user, James Walker put forward a dual O-ring design solution. Each O-ring was approximately 1.6 m diameter x 10 mm cross section, supplied as a finished part, with both seals requiring individual tooling. James Walker identified Shieldseal® 663, a material well known to end users as the next generation EPDM material for nuclear applications. The selection was backed up by existing test reports from AMEC demonstrating the radiation resistance of this elastomer. James Walker designed a dual dovetail groove arrangement to house the seals and prevent them from dropping out of the housing once retained.



### Results and benefits

The customer has been able to demonstrate the integrity of the sealing solution through pressure testing. The end user has confidence in the overall solution in part due to the sealing products offered by James Walker, supported by third party reports, and our reputation in the industry. In addition to offering seal design and manufacture, James Walker solved further challenges with flatness of the container caps, application of consistent bolt loads around the entire lid using RotaBolt® technology and the application of engineering thermoplastics for bolting and flange insulation sleeves and washers.



Demonstrable long-term performance of proposed material



James Walker able to provide technical support on seal and housing design



Zero leakage shown during testing



Continued leak free operation through a full assessment of lid flatness, bolt loads and flange insulation

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