Vulcan Encapsulated O-rings

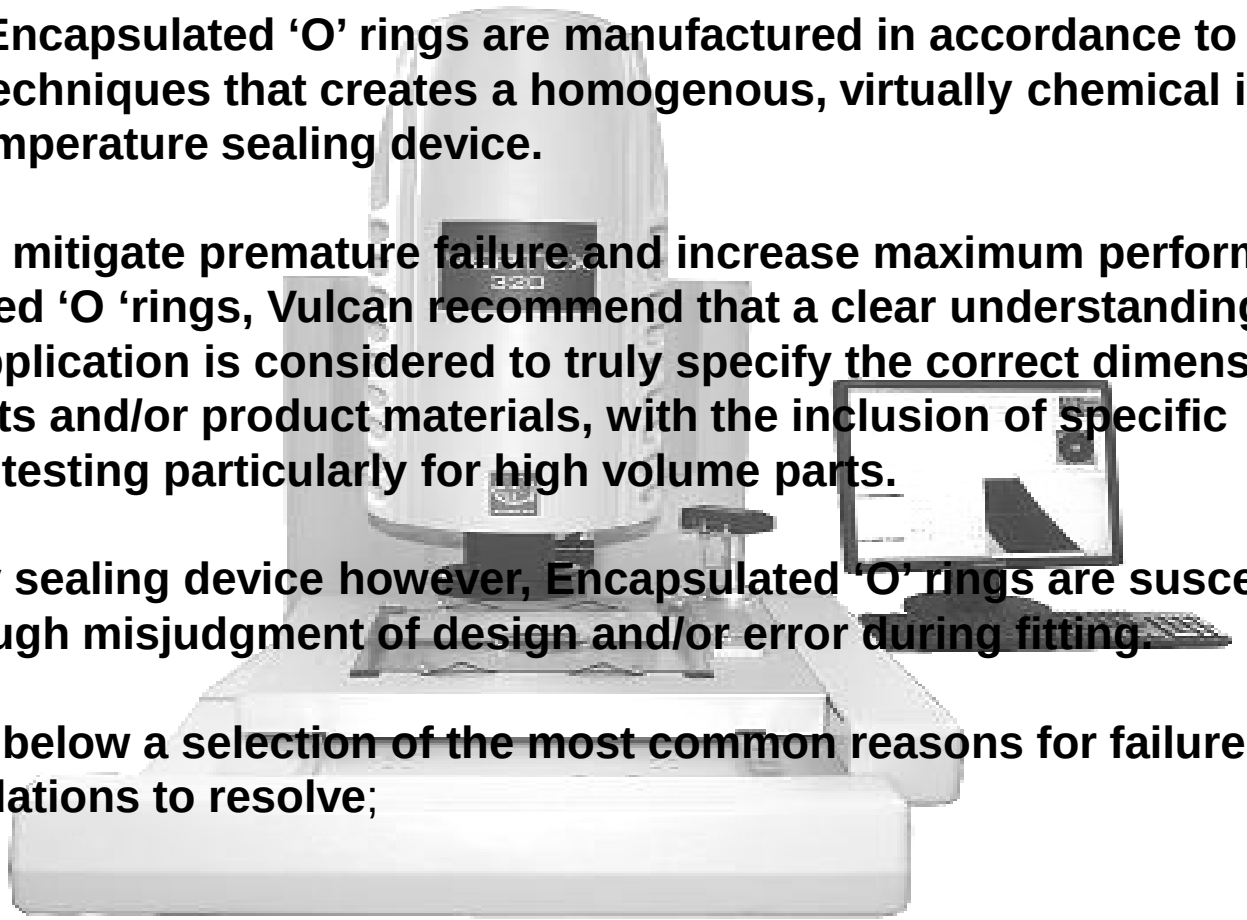
Failure Analysis

All Vulcan Encapsulated ‘O’ rings are manufactured in accordance to highly advanced techniques that creates a homogenous, virtually chemical inert, high/low temperature sealing device.

It is said, to mitigate premature failure and increase maximum performance of Encapsulated ‘O ‘rings, Vulcan recommend that a clear understanding of the intended application is considered to truly specify the correct dimensional requirements and/or product materials, with the inclusion of specific application testing particularly for high volume parts.

As with any sealing device however, Encapsulated ‘O’ rings are susceptible to failure through misjudgment of design and/or error during fitting.

Please find below a selection of the most common reasons for failure and recommendations to resolve;



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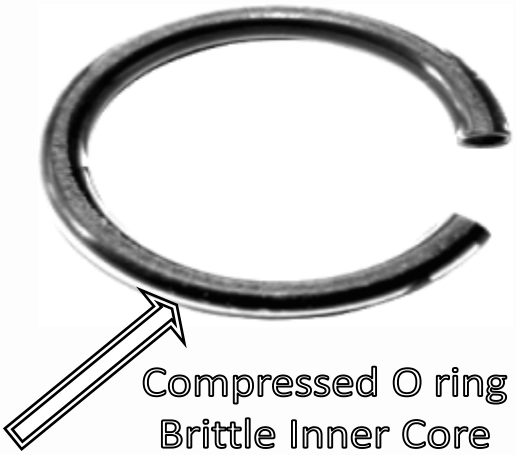
Extrusion

Failure Mode	Solutions
Incorrect size O-ring fitted.	*Review application design and select appropriate O-ring size.*
Excessive clearances.	*Decrease clearances*
Irregular clearance gaps.	*Review the application design. Check the eccentricity.*
Improper surface finish of the application.	*A 30 micro-inch finish is recommended on the bore and a 15 micro-inch finish on the shaft*
Excessive pressure.	*Review application design i.e. is the system malfunctioning and thus, causing high pressure.*

Compression Set



Failure Mode	Solutions
Excessive Compression.	*Review the application design and select the appropriate O-ring size.*
Excessive temperature causing the O-ring to harden and reduce its elastic properties.	• *Select an Encapsulated O-ring with the appropriate temperature capabilities.* • *Reduce system operating temperatures.*
Incompatible chemical being sealed.	*Contact Vulcan. Vulcan shall asses our compatibility guide and recommend the correct material composition.*

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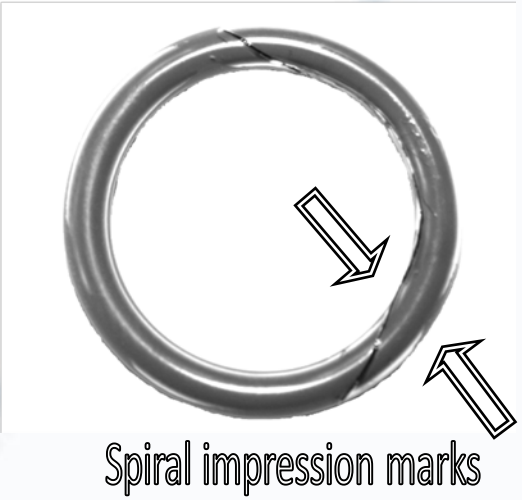
Spiral Failure

Failure Mode	Solutions
Difficult/Tight Installation	*Please refer to Vulcan's recommended installation guide.*
Excessive gland width	*Look to specify an alternative 'O' ring size and/or, review the design of the gland.*
Inadequate or improper lubrication	*Provide adequate lubrication.*
Improper surface finish of the application.	*A 30 micro-inch finish is recommended on the bore and a 15 micro-inch finish on the shaft*



Spiral impression marks

Abrasion

Coarse finish

Failure Mode	Solutions
Improper surface finish of the application.	*A 30 micro-inch finish is recommended on the bore and a 15 micro-inch finish on the shaft*
Excessive temperatures	• *Select an Encapsulated O-ring with the appropriate temperature capabilities.* • *Reduce system operating temperatures.*
Cotamination of the sealing fluid with abrasive media	*•Consider installing a filtration unit* *•Consider testing Vulcan PFA Encapsulated 'O' rings*

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Installation Damage

Failure Mode	Solutions
Incorrect size O-ring fitted.	*Review application design and select appropriate O-ring size.*
Excessive clearances.	*Decrease clearances*
Irregular clearance gaps.	*Review the application design. Check the eccentricity.*
Improper surface finish of the application.	*A 30 micro-inch finish is recommended on the bore and a 15 micro-inch finish on the shaft*
Excessive pressure.	*Review application design i.e. is the system malfunctioning and thus, causing high pressure.*

The failure of an Encapsulated O-ring, during service , can usually be attributed by any number of conditions as noted above. Such conditions are generally described as the most 'common' causes of failure. Vulcan recommend a full review of the application to identify the correct failure cause. Example;

1) Temperature of the application.
2) Pressure of the application.
3) Media being sealed and concentrations.
4) O-ring Groove dimensions.
5) Installation practices.

Please do contact Vulcan should you require any further assistance, whatsoever, to conclude your immediate enquiry. We are always happy to help.