Found on internet 6/29/18 – talks about water impact on Freescale pressure sensors:

Hi Paul,

Please be advised, that for all Freescale standard pressure sensor products, any environment other then dry air, will have some impact on the reliability and lifetime of the product. Freescale's silicon pressure sensors are NOT compatible with oil, gas, petrol and water or water vapors, or chemicals.

In any case, the use of our pressure sensors in hazardous areas applications being e.g. explosive, our sensor in such an application carries some legal responsibility if something goes wrong which causes property damage or harm to a person...! As such, I think we would demand a letter to relieve us of any responsibility for accidents associated with this application.

As for the "Level of reliability, Lifetime, Mean Time Between Failure", our data is for dry air only (as specified in the datasheet).

A determination must be made if this impact is acceptable for the application.

Possible solutions to use our sensors in applications with other media than dry air:

Besides the mechanical stresses to the inside of the package, there would also be a need to evaluate stresses the hardening/ed material induce on the outside of the package. To minimize these, a low stress encapsulant should be used. And, of course, any recalibration/autozeroing of the device after a point of potential stress induction would be highly recommended and could alleviate any mechanical stress concerns if done before a measurement (and the temp delta's are minimal during the readings).

Following to your inquiry, we would recommend to use Parker O-lube silicone grease or DMS-T46 or T51. This type of grease is used by most of our customer without problems. In fact the basic recommendation is to use silicone oil (or preferably grease) with high viscosity and high molecular weight. In this case the size of the molecules are big enough to limit the penetration of the grease inside our protective silicone gel which is over the die. In terms of contaminants, the silicon grease must be free of halogenures (Cl content < 50 ppm) to reduce the risk of bond pad corrosion. On the other hand, don't forget that whatever the material you will use, as soon as you put something on our gel you have a high probability to see some offset drift. This is coming from additional mechanical stress and/or gel swelling. The amount of gel and global mechanical design are usually also part of the offset drift.

Protecting pressure sensors with silicon grease is definitely the best way to use our products in harsh media. We don't have so much experience in how to implement this solution 'industrially'. The grease fill is done under vacuum to avoid air bubbles. Usually, an offset calibration is necessary because the grease brings some mechanical stress that may shift the offset value. This solution was tested and seems conclusive.

As said, you can use any silicon oil or preferably grease from other suppliers with high viscosity and high molecular weight.

IMPORTANT: Additional gel filled inside the sensor e.g. is not possible. There is a feature internal to the package that the gel is filled to, a gel stop, this feature is used to control the gel dispense and the resultant meniscus of the gel in the package to ensure good die and wire coverage.

We can suggest Gelest, Inc. in the United States, e.g. Gelest, Inc. 11 East Steel Road, Morrisville, PA 19067 TEL (215)547-1015 FAX (215)547-2484 <u>http://www.gelest.com/</u> or alternatively a gel from Shin-Etsu Chemical Co., Ltd. in Japan. Their URL is: <u>http://www.sifel.jp</u>

You can use any silicon oil or preferably grease from other suppliers with high viscosity and high molecular weight.

I would like refer to the following application note that would be worth to be considered in addition to the provided information.

AN3728: Media Compatibility for IPS PRT Pressure Sensors http://www.freescale.com/files/sensors/doc/app_note/AN3728.pdf

In this application at page# 3, you can see that we have tested a couple of medias, mainly on parts having media resistant gel, but we cannot give a guarantee about the long term reliability of these devices under these conditions.

For further information, and more details, I would like refer to the "Quality and Reliability" at DL200 Data Library at pages 1-3 to 1-12, and at "Sensor Media Compatibility" at pages 1-18 to 1-29.

Please see at the data book DL200/D that is available at our web site via the following URL for this purpose:

http://www.freescale.com/webapp/sps/site/overview.jsp?code=LPSNSRLIT

Please see at Data Libraries 'Sensor Products Device Data Handbook' right after the Brochures. Please note that the size of the book will require ~25MB).

Freescale uses two different types of gels, in order to isolate the die from the environment. The Fluorosilicone Gel (Type FE-53) is being used for all our standard type of pressure sensors. The Media Resistant Gel (Sifel) is being used for our pressure sensors that are used e.g. in high temperature environments, mainly in automotive applications. All pressure sensors with the designator MPXAZ, MPXVZ, MPXHZ are those using Media Resistant Gel (Sifel). This series of devices uses our automotive grade gel which is much more resistant to harsh media. The customer however must perform the validation in their application, but the product will be more robust then the existing standard pressure sensors. But here again these pressure sensors are NOT compatible with oil, gas, petrol and water or water vapors, or chemicals.

Since there tends to be an endless amount of various applications and conditions there has been no way Freescale can validate the application impact on product reliability or lifetime. Freescale encourages customers when the application involves possibly harsh media, to seek an industrial type of sensors to fulfill their requirement. If a customer wants to use the Freescale sensor, they must validate the product performance in their application and assume all risk and liability.

I hope you will find this information useful. If I can be of additional assistance, or have misinterpreted your request, please let me know.

Have a great day, Jose Reyes

Note: If this post answers your question, please click the Correct Answer button. Thank you!