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How to ensure compliance of your "NORSOK-approved materials"

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1 Abstract

Polymer materials used in Oil & Gas for products such as seals and gaskets quite often require compliance to NORSOK M-710 and/or ISO23936-1&2.
End-users, OEM's and even some suppliers of materials or seals/gaskets do not have the correct understanding or awareness on how to ensure compliance to these standards. In this paper the most common shortcomings are described alongside recommendations on how to secure compliance to NORSOK M-710 and/or ISO23936-1&2.

2 Background

Seals made of polymer materials used in Oil & Gas often require compliance to NORSOK M-710 and/or ISO23936-1 & 2. For the purpose of this paper, they can be considered as the same.
These standards have several requirements, not all of them necessarily applicable for a given application.
Over the years we have experienced that there is a great deal of inaccuracies from OEM's and end-users when it comes to specifying materials according to these standards, possibly due to lack of understanding or awareness.
A typical requirement would be for a "NORSOK-approved material" without further specification. Without further processing such a requirement could lead to unnecessary costs associated with compliance to the different requirements in these standards.
Even worse would be to select materials which are not in compliance with the actual requirements.

To avoid this, due care must be exercised between the all the parties involved, from end-user to supplier of the polymer material or product.

3 Understanding NORSOK M-710 (ISO 23936-1 & 2)

NORSOK M-710 consists of three main elements:

- Documentation requirements
- Ageing; resistance to chemical and physical change of the material
- Resistance to rapid gas decompression (RGD)

Both ageing and RGD-requirements have several options for which test conditions to apply, necessitating further details to ensure that any pre-existing qualifications are in accordance with the requirements for a given case.

Unless otherwise agreed, a standard design life for the materials in the defined environment shall be 25 years.

3.1 Documentation requirements

The documentation requirements in terms of data sheet and QC-certificate are quite straightforward and shall always be adhered to.
Although not in line with the standard, in some cases these requirements are what the customer actually means when specifying a "NORSOK-approved material". This is a clumsy way of specifying the need for traceability and batch-wise documentation of relevant material properties.
The result might be that more costly and less available materials than required are proposed, and potentially ends up in the application unless detected along the way.

As a customer, if your requirement is limited to a certain traceability and material certificate, make sure to specify this correctly and avoid a general reference to "NORSOK-approved" or similar.

3.2 Ageing

The requirement for ageing has arguably the biggest potential for costly mistakes as there are many factors to consider for an "ageing approved compound".

First thing to consider is required design life. For applications with relatively short design life, for instance days or weeks, other standards than NORSOK M-710 might be more relevant.
Although for already approved compounds they cover design life up to what is stated in the certificate.

The most frequent mistakes are connected to not paying attention to service conditions, fluids and temperature. The standards provide several choices when it comes to temperatures and fluid compositions to be used for ageing tests. This includes predefined options as well as bespoke.

The different options are often overlooked, and the customer typically refers only to "ageing approved material" – not necessarily reflecting the service conditions. Other times the requirement is more specific, for instance "sour ageing", but still not necessarily reflecting the service conditions as there are several options also within "sour ageing".

OEM's and end-users are advised to be specific regarding ageing requirements, preferably with reference to the given fluid compositions stated in the standard or defined composition in case of the bespoke option.
Service temperature and requirement for service life must also be specified.

3.2.1 Fluid composition

As stated in the standard, test conditions should be representative for the service conditions.
Even as obvious this requirement appears we still encounter the erroneous belief that "NORSOK approved material" is a kind of general approval for the ageing requirement.

OEM's and end-users may overlook the fact that the fluid composition for a given application is quite different from the options listed in the standard, and do not utilize the bespoke option.

A frequent example is applications with exposure to a glycol-water based control fluid, but still the belief that a given "sweet or sour" - ageing certificate applies.

Depending on material selection and temperature this might lead to premature failure and enormous consequences.

3.3 RGD

Compared to ageing, the RGD-requirement is quite straightforward. A given material usually has a RGD-certificate to one of the two standard gas mixtures stated in the standard combined with standard temperature and pressure. The bespoke option available for all three parameters is not customary.

The standard test conditions might not reflect the service conditions, but relevance of RGD-certificates will not be further explored in this paper. In general, a standard RGD-certificate says something about the RGD-resistance of the material and should not be considered as a guarantee that RGD-damages will not occur.

A common issue regarding RGD-certification is “over specifying”, meaning that RGD-certification is a requirement even for applications where RGD is not a likely event.
An unjustified RGD-requirement will normally drive the cost of the material and thus should be avoided.

4 Summary

Standards NORSOK M-710 and ISO23936-1 & 2 are not really that complicated, but still requires careful reading in order to understand the content.
General requirements such as “NORSOK-approved material” are basically meaningless and needs further investigation in order to make sense.
Special attention towards the service conditions and requirements versus test conditions is crucial to ensure appropriate material selection both in terms of functionality and cost.

5 Pro Tip

Do not assume anything when it comes to compliance of your materials according NORSOK M-710 and ISO23936-1&2.
As an OEM, if your current supplier is not able to guide you to a proper material selection according to these standards you should consider finding yourselves a new supplier.