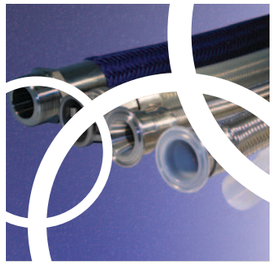
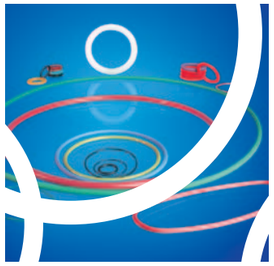
Focus on food and beverage

Materials testing adds to food safety

EXTRACTION TESTING PROTECTS FOODSTUFFS FROM MIGRATION CONTAMINATION BY INGREDIENTS USED IN RUBBER AND POLYMER BASED COMPONENTS.





Food safety is a critical issue, not only for consumers, but for manufacturers and processors that must take into account strict regulation, ensure quality standards and simultaneously protect profitability. One key area that is continually under the microscope in the drive towards improved safety standards is the migration of contaminants from compounds and polymers that come into direct contact with food during the production process.

Discussions and research into migration of chemicals from packing materials, production and handling equipment are rife at the moment with gaps in knowledge being exploited by some to raise levels of concern. Much of the impetus is driven by the changes in European legislation, it seams that this debate is covering an increasing number of additives in materials and is raising even more questions, ERIKS believes its important that we offer a new level of clarity.

The relevant European Framework Regulation (EC) 1935/2004 (L338/4), concerning contamination from migration states that: 'Food contact materials shall be safe. They shall not transfer their components into the food in quantities that could endanger human health, change the composition of the food in an unacceptable way or deteriorate the taste and odour of foodstuffs'.

The Regulation, introduced in 2004, also established 17 groups of materials and articles which may be covered by specific measures. These include common materials as ceramics, plastics, glass, paper and board, metals and alloys, cork, rubber, and many more not so common. The problem however, is that, up to the present time, specific measures exist only for ceramics, regenerated cellulose and plastics. This leaves rubber and elastomeric polymers; two of the primary materials that come into contact with food products, without a unified European testing protocol.

These materials are typically used to manufacture seals and hose components such as O-rings, gaskets and hose liners, all of which are manufactured by ERIKS, and all of which benefit from extraction testing to ensure that they comply fully with the available regulations – rather than treating them as 'guidelines' and self-certifying the individual ingredient materials that go to make-up the finished product material, as other manufacturers do. The risk with this process is that by not testing the final product, if anything were to go wrong and a track-and-trace procedure uncovered a product that was made from a material that was not fully tested then product liability would be a very real prospect. When the additional part cost per item is often just pence, is it worth taking the risk?

Extraction testing in detail:
This lack of a unified European protocol has resulted in suppliers to the food industry adopting the US FDA 177.2600 regulation, because this norm is the widely used international compliancy standard. However, even this is not straightforward, as there are two ways of stating compliancy.

1) By stating that the ingredients in the rubber are compliant to the white list of FDA.

2) By stating that the ingredients in the rubber are compliant to the white list of the FDA, and by stating that the migration values are following the FDA norms.

The first method of stating compliancy is widely used, because it is by far the easier and lower cost of the two. However, it is by no means comprehensive; it only talks about ingredients compatibility, which is no guarantee that these ingredients won't leak out into foodstuffs. The second method, extraction testing, is the superior of the two, providing the most security for the food producer by actually testing the material in question to establish whether ingredients will migrate over. It is seldom used, because it is far more exacting, requiring actual laboratory testing of contact materials.

The obvious benefits to the food producer have convinced ERIKS, one of Europe's largest seal manufacturers and suppliers, to take the lead in using the extraction testing method to prove that the compounds in the O-rings and moulded parts that it manufactures for food use have minimal migration values. Furthermore, as a result of these minimum migration values the organoleptic properties of the foodstuffs coming into contact will not be changed.

ERIKS has its own Materials Sealing Technology Centre at Warrington, UK and it is here that the extraction tests are undertaken. Certified ISO 9001, the Centre has comprehensive dedicated test facilities for O-rings and rubber parts, oil seals, mechanical seals, FEA and clean rooms.

In order to guarantee maximum customer confidence in its tests, ERIKS has decided to publish the exact procedures undertaken. These are:

- Extraction in n-hexane at reflux temperature; time 7 hours: max migration: 175 mg/inch
- Further extraction in n-hexane at reflux temp; time 2 hours: max migration: 4 mg/inch
- Extraction in deionised water at reflux temp; time 7 hours: max migration: 20 mg/inch

"The FDA regulation demands documented proof of safety; and with these tests we are able to deliver that proof; that the ingredients we use are securely bonded into the rubber of our O-rings, hose liners and moulded parts," said Chris Dixon, Divisional Sales Director for ERIKS Sealing Technology. "The ability to prove our maximum migration values means that we outperform our competitors technically, as most only state white list compliancy."

Testing application specific materials
There are five general tests performed on materials that come into contact with liquid foodstuffs all of which are performed by ERIKS.

Recently added, Test D (b), a test with Ethanol at 50% shows that migration of plasticisers occurs from PVC. This means that only suitable rubber food grade products, such as the RX range of Rubber Food Grade Hose, should be used for transferring milky and fatty oily foodstuffs.

In addition to extraction testing, ERIKS also meets the legislation demands for labelling on all of its food sealing products. All component materials are also guaranteed to be animal derived ingredient (ADI) free ensuring protection from specific health risks due to source contamination of animal products being carried through. It also provides certificates of compliancy (COC) and product traceability both as demanded by the legislation. Finally the company keeps records of all certifications of tests and certificates of compliancy in the Materials Sealing Technology Centres of the individual countries from where the products are manufactured and supplied.

Migration testing for food and beverage materials:

	Stimulant :	In treatment of:
• **Test A**	Distilled water	Aqueous food or alcoholic beverages
• **Test B**	Acetic acid 3%	Sour – beverages containing <5% alcohol
• **Test C**	Ethanol 15%	Alcoholic beverages with >5% alcohol
• **Test D**	Oil or derivative	Fats and oils
• **Test Db**	Ethanol 50%	Dairy products

Of the 40+ ERIKS materials that have been subject to extraction testing, here we illustrate three specific examples and all their approvals to demonstrate how we ensure that these materials are suitable for contact with aqueous or fatty food stuffs.

ERIKS 55985: EPDM 70 IRHD; EC1935; FDA; WRC; KTW; W270; NSF 61. This EPDM compound is typically used in drinking water, process water and steam applications. It provides excellent resistance against ageing by weathering and UV light.

ERIKS 366287: NBR 70 IRHD; EC 1935; FDA; 3A. A Nitrile material with a broad spectrum of applications, it is compatible with water and oils and greases, and also has approval for dairy applications.

ERIKS 714177: Silicone 70 IRHD; EC 1935; FDA. A red-coloured silicone that has the ability to provide effective sealing at more demanding temperatures. It has good flexibility at very low temperatures (down to –60°C), and can withstand continuous temperatures up to 220°C.

Chris Dixon
Sales Director,
ERIKS Sealing Technology