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H. FAHRENHOLZ, R. STREHLE
New generation of software from Zwick Roell ......................................................................................... 86

Materials testing is performed in all aspects of plastic processing these days. Many raw materials manufactur-
ers and compounders determine single-point data which is stored in global databases such as the Campus data-
base. Procession perform tensile, flexure, or functional tests on complete products or selected samples, and
monitor production specification limits. A common factor is that the test itself should always be performed
under the same conditions to minimise variation in the test results. The testing machine software plays a
key role in this process as it determines the degree of automation which can be achieved during mechanical
testing as well as containing the necessary algorithms to ensure that the control parameters of the testing
machine are consistent, and test results are reproducible.

A. VERSCHUERE, G. BEUL, J. STEFFENS
New peroxide curable fluoroelastomers with improved resistance to alternative fuels (“biodiesel”).............................. 89

Biodiesel as a prominent alternative fuel is intended to replace a significant portion of conventional fossil
diesel. But biodiesel leads to swell and finally decomposition of standard fluoroelastomers in the fuel sys-
tem. The automotive industry is demanding for materials being long term resistant to biodiesel. Dyneon, a
world leading supplier of fluoropolymers, has developed a superior technology resulting in new products
which withstand biodiesel over longer periods of time and/or at elevated temperatures. The first product
which makes use of this new technology is the peroxide (PO) curable Dyneon FPO 3741 Fluoroelastomer.
It has been designed for the co-extrusion of fuel hoses balancing physical properties and processability.
A second new material in development using the same technology platform is Dyneon E-15978 Fluoroel-
lastomer, a low fluorine terpolymer for various automotive sealing applications. Both grades proved to
have an exceptional resistance to biodiesel, also at elevated temperatures. Even after 1000 hrs at 150 °C
these products show a constant low swell level and retention of physical properties.

Z. MAJOR, K. LEDERER, M. MOITZI, M. MITTERHUBER, T. SCHWARZ, R. W. LANG
Test and failure analysis for elastomeric seals exposed to explosive decompression................................. 93

A phenomenon termed explosive decompression (ED) damage occurs if elastomer seals exposed to high gas
pressure fail upon the sudden release of the gas pressure in a brittle manner. As to the characterisation of the
explosive decompression failure behaviour of pressurised elastomer seals, our research program deals with
the development and implementation of an adequate test methodology to characterise the explosive decompression
resistance of elastomers seals. Moreover, in addition to the component tests, the bulk deformation behaviour
of elastomers under highly confined conditions, the crack initiation and crack growth under high deformation
rates, and the pressure and temperature dependent gas permeability of various elastomers using various types of
gases on test specimen level are investigated.
In the present study the first pressurisation/depressurisation experiments performed in an autoclave on two rubber
grades (HNBR and FKM) and their results are described and discussed. The main focus is given to the analysis
of some selected tests where the pressure, temperature change of the chamber and the expansion of the O-rings
were continuously measured and recorded. Furthermore, the results of the failure analysis performed on the
pressurised O-rings are described and explained.

M. MASBERG, A. POTTHOFF, R. EISENHUBER, G. KAIN
Self-optimising rubber injection moulding unit .......................................................................................... 101

Process time optimisation in injection moulding of rubber compounds places high demands on the
knowledge of the technical production people who have to react appropriately to random variations in
compound properties, on the competence of the operators involved and on the production plant (units,
tools and instruments). All this without negatively affecting the economic viability of the operation.
This article describes how a closely synchronised interaction between direct control of a production unit
and a process optimisation system can help facilitate this task and support the technical personnel via
the integrated self-optimisation system. The objective is a production operation which is independent of
the influences listed, is quality-assured and at the same time economically viable. The results obtained are
presented in comparison with an actual starting situation. The consequences of this technology for the
manufacture are also discussed.
C. DONKER

Hot melt tape formulations, using blends of SIBS and SBS block copolymers and new hydrocarbon tackifying resins................................................................. 106

Adhesive formulators are looking for alternative polymer systems due to the impact of isoprene availability on the supply of SIS block copolymers. These polymers are an essential part of most hot melt pressure sensitive adhesive formulations (HMPSA). This paper discusses the possibility of using blends of different block copolymers in HMPSA formulations, thus minimising the amount of isoprene monomer needed. Such blends need specially designed hydrocarbon resins to formulate adhesives for HMPSA applications.

D. ACHTEN, B. BEST, J. DATO

Therban – New materials for oilfield application............................................................... 110

Simplifying the matter, one could describe fully hydrogenated Therban as a copolymer of ethylene and acrylonitrile. Hence the intrinsic combination of good heat, extreme oil and chemical resistance, coupled with outstanding physical properties and ease of processing. Using Therban HNBR for rubber parts of stators (mud motors), packers, blow out preventors and drill bit seals, significantly extends the life time – and hence replacement cycles – of those parts. This means substantial operational cost – savings without any compromise to safety. The benchmark – study of Therban against current materials of choice reveals superior performance of Therban with respect to physical properties, safety and overall cost effectiveness. Furthermore, in using new Therban AT (Advanced Technology) and XT (Carboxylate Technology) grades, unprecedented latitude of compounding as well as novel ways of processing can be attained, which in turn opens the door for new dimensions of design. Examples will be given in the paper.

H. KOSHIKAWA, Y. TARUMI, M. SHIONO

Perfluoroether elastomer for oilfield engineering............................................................... 118

Perfluoroether elastomer, with the trade name Shin-Etsu Sifel, is based on a perfluoroether polymer backbone combined with silicone functionality for crosslinking. This material family is available with many different appearances from a low viscosity flowing liquid to a gum solid, along with intermediate types of viscous fluid and paste. Upon curing, the Sifel family offers a variety of elastomeric products such as moulded rubber parts, low modulus adhesives, soft coating layers, and very soft and sticky gels. This wide variety of products is a result of combined technical achievements of chemical composition, filler loading and rubber formulation.

Thanks to the excellent characteristics of perfluoroether polymer, Sifel products have outstanding properties of low temperature flexibility, heat resistance, and improved resistance to fuels, solvents, acids, and alkalis compared with standard fluororubber.

The introduction of Sifel provides oilfield engineers with a wide range of opportunities to improve the performance of sealing, coating and bonding operations in various applications exposed to severe conditions.