



Significant Fire Retardancy Test Results

PureGRAPH® improves polyurethane safety

HIGHLIGHTS

- Limiting Oxygen Index (LOI) tests show a step change improvement in fire retardancy when PureGRAPH® is added.
- PureGRAPH® enhanced polyurethanes do not burn continuously in normal atmospheric oxygen.
- Additional fire testing is in progress.

Background

Research work undertaken recently by a number of institutions has identified that the addition of graphene to polyurethane elastomers provides very useful fire retardancy qualities. This is in addition to other well-known benefits that come with the addition of graphene. Most of this work is understood to be at bench scale in laboratories. First Graphene has been conducting bulk sample test work in association with the University of Adelaide, on performance of the PureGRAPH® range of graphene products for fire retardancy in polymer compounds. The initial results have been impressive.

Test Results

The base polyurethane elastomer burnt with an LOI value of 22.85%. The addition of ca. 1% PureGRAPH® to the polyurethane elastomer raises the LOI to 31.6%, meaning that under normal atmospheric conditions it will not propagate or support flame and will only burn in the presence of significantly higher oxygen levels. This also promotes graphene enhanced polyurethane elastomers up the LOI index, increasing the potential market share of these materials.

Previous tests have demonstrated that the PureGRAPH® range of products provide significantly increased tensile, tear and abrasion wear characteristics to the base polyurethane product. The addition of fire retardancy characteristics has been identified as a key market need in the mining industry.

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While further testing is required to confirm the initial test results, FGR is optimistic that the observed fire retardancy qualities will enable the delivery of a new generation of safer polyurethane elastomer materials to industry, without compromising strength and wear characteristics.

Craig McGuckin, Managing Director said *"We have demonstrated the mechanical improvements PureGRAPH® provides to polyurethane elastomer materials. Fire in rubbers and polyurethane elastomers costs the mining industry considerable amounts, both in terms of replacement and foregone productivity. Using PureGRAPH® to both increase the time between replacement and limit fire provides a considerable benefit to the users of polyurethane elastomers. Further tests will be conducted, but certainly these initial results are very encouraging."*

About the Limiting Oxygen Index (LOI) test:

ASTM D2863 standard test - Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index) is a method to determine the minimum concentration of oxygen in an oxygen/nitrogen mixture that will support a flaming burn in a plastic specimen. The result is known as the **Limiting Oxygen Index** (LOI) and reported as percentage oxygen. Ambient air has an oxygen content of 21.5%.

The higher the LOI, the better is the intrinsic flame retardancy. LOI values for common polymers are 17.4 for polyethylene, 23-26 for Nylon 6 and >38 for PVC. The test is a well-established, quantitative indicator of material flammability. Additional industry relevant tests are typically required prior to material adoption in specific applications.

About First Graphene Ltd (ASX: FGR)

First Graphene Ltd. is the leading supplier of high-performing, graphene products. The company has a robust manufacturing platform based upon captive supply of high-purity raw materials and an established 100 tonne/year graphene production capacity. Commercial applications are now being progressed in composites, elastomers, fire retardancy, construction and energy storage.

First Graphene Ltd. is publicly listed in Australia (ASX:FGR) and has a primary manufacturing base in Henderson, near Perth, WA. The company was recently incorporated in the UK as First Graphene (UK) Ltd. and is a Tier 1 partner at the Graphene Engineering and Innovation Centre (GEIC), Manchester, UK.

PureGRAPH™ Range of Products

PureGRAPH™ graphene powders are available in tonnage volumes with lateral platelet sizes of 20µm, 10µm and 5µm. The products are high performing additives, characterised by their high quality and ease of use.

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