

Company: Rosehill Polymers Ltd

Product/technology name: **Low Temperature Stable Isocyanate Prepolymer – FLEXILON i2670**

Abstract

Transport, storage and processing of PU elastomers externally has previously with PU prepolymer technology meant that the isocyanate component has had to be kept at elevated temperatures (above 15-20°C) to avoid crystallisation. Rosehill Polymers have utilised their continuous mixing PU prepolymer technology to produce a prepolymer that is stable to -20°C for in excess of 6 months.

Description

Isocyanate prepolymers are commonly used in two component manufacturing of PU elastomers for many different types of application. It is fairly common knowledge that most prepolymers manufactured by batch reaction do not withstand low temperatures as they can crystallise meaning that inferior elastomers are produced on re-heating or to prevent this, costly tanker, IBC and/or drum heating is utilised. For certain applications, for example offshore oil and gas industry product coatings, the need to transport, store and process in colder outdoor conditions is a requirement. This means that ideally the use of a low temperature stable isocyanate prepolymer is required. Rosehill Polymers have produced such a product named FLEXILON i2670 and tests have shown that it is able to withstand temperatures down to -20°C for in excess of 6 months. The ultimate mechanical properties of the elastomers produced using FLEXILON i2670 initially and after low temperature ageing are also better than those used historically. Typical data can be found below:

MDI-Type	Flexilon i2670	Competitor A	Competitor B
NCO-Content [%]	26.3	26.3	26.3
Viscosity [mPas]	120	140	125
Low Temperature Stability [°C]	-20	+15	+15

Property	Flexilon i2670	Competitor A	Competitor B
Hardness Shore-A	90	90	90
Tensile Strength [MPa]	24	18	17
Elongation at break [%]	450	300	300
Tear propagation strength [kN/mm]	72	67	65

Rosehill Polymers have pioneered the use of continuous reaction to produce polyurethane prepolymers as the process is not only quicker than batch reaction but it eliminates the formation of unwanted reaction products of MDI such as dimer and chain extended prepolymers. Flexilon i2670 therefore contains less undesirable reaction bi-products (impurities) which means that it is less likely to crystallize at low temperature. The low level of impurities is achieved by efficient mixing of the MDI and polyol components at the required reaction temperature. The temperature of each reaction component is also tailored to give the correct reaction profile, thus eliminating temperature variation. The amount of time before reactants are homogenised is also very short.

This type of isocyanate component that eliminates the need for financially and environmentally costly heating facilities has not been used previously and represents the next step forward in terms of quality assurance and reliability of PU elastomer raw materials, especially required in demanding processing environments such as in the offshore oil and gas industry.