

Polyurethane Specialty Products Group

VERSALINK™

Oligomeric Diamines Room-Temperature Processing

Versalink oligomeric diamines can be formulated with almost any diisocyanate or diisocyanate prepolymer. Most of our experience has been with MDI and MDI prepolymers. The melting points of the commercially available Versalink products are shown in Table 1.

Both Versalink P-250 and Versalink P-2000 oligomeric diamines can be processed as liquids at room temperature by heating them to above their melting point and then cooling them; they will remain super-cooled liquids for days or weeks. Alternatively, small amounts of Versalink P-650 can be blended to suppress the melting points of other Versalink products.

The viscosities of Versalink P-650, P-1000 and P-2000 oligomeric diamines range between 6,000 and 8,000 centipoise; the addition of low-viscosity liquid MDI reduces the initial viscosity even further. Super-cooled Versalink P-250 oligomeric diamine is a viscous liquid. It will dissolve readily in liquid MDI with a significant reduction in initial viscosity.

Determining the Versalink/Diisocyanate Mixture

The proper amount of Versalink oligomeric diamine and diisocyanate or prepolymer to blend together is determined by the TOTAL EQUIVALENT WEIGHT of the Versalink oligomeric diamine and the percent NCO of the diisocyanate. The amount of diisocyanate to add to 100 parts by weight of Versalink oligomeric diamine to achieve 95% stoichiometry based on amine (105 ISO INDEX) can be determined by the adjacent formula.

TABLE 1 - VERSALINK OLIGOMERIC DIAMINES MELTING-POINTS

	MELTING POINT °C	TYPICAL TOTAL EQUIVALENT WEIGHT GRAMS/MOL. EQ.
Versalink P-250	56	235
Versalink P-650	- 45	415
Versalink P-1000	18	600

FORMULA TO DETERMINE THE VERSALINK/DIISOCYANATE MIXTURE

$$\text{Parts by weight diisocyanate or prepolymer} = \frac{100 \text{ parts Versalink}}{0.95} \times \frac{1}{\text{Total equivalent weight Versalink}} \times \frac{4200}{\% \text{ NCO diisocyanate or prepolymer}}$$

For different stoichiometry, simply substitute the desired value for 0.95 in the equation.

Example:

Versalink P-1000, total equivalent weight - 593 grams/mol. eq.
 Stoichiometry = 95%
 Isonate® 2143L (MDI) % NCO = 29.0
 Versalink oligomeric diamine quantity = 100 grams

$$\text{Amount of MDI} = \frac{100}{0.95} \times \frac{1}{593} \times \frac{4200}{29.0}$$

$$\text{Amount of MDI} = 25.7 \text{ grams}$$

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Safety and Handling Information

For all safety and handling information, please refer to the Versalink oligomeric diamine Material Safety Data Sheets, available upon request from Air Products.

Processing Instructions

1. Under ambient conditions and in a well-ventilated area, the previously calculated ratios of Versalink oligomeric diamine and diisocyanate (or prepolymer) should be added, by weight.
2. The contents should be mixed until homogeneous, minimizing air entrainment.
3. Degassing the combined liquids is optional, depending on the application.
4. The contents are now ready for casting, spraying, painting, coating, etc.
5. The demolding or handling time is a function of the particular Versalink oligomeric diamine and diisocyanate.
6. In an adhesive, the parts can be handled within minutes of setting. In all applications, at least 75% of the ultimate properties are achieved at room temperature within the first 24 hours. The ultimate room-temperature-cured properties are realized in 7 - 14 days. Alternatively, curing can be accelerated, if desired, by heating to 100 °C for four hours.

Exception: Most Versalink oligomeric diamine blends made with Versalink P-250 can be handled as described above. However, for mixtures based on pure Versalink P-250 and diisocyanate, we do not recommend room-temperature curing. Optimum properties are reached by post-curing at ~ 100 °C.

To Order or Obtain More Information

If you would like to place an order or receive additional information, please write or call Air Products at the following location.

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