Finding Solutions To High Temperature Challenges

RTP Company has a long history of success in providing the precise solution to fit the performance needs of even the most challenging applications. High temperature applications are unique in that they must perform well under extreme conditions. Historically, molders and manufacturers have used Polyetherimide (PEI) for high temperature applications; however, there is only one producer of PEI, and this material can be in short supply for extended periods. Even though there are no exact equivalents to PEI on the market, there is a solution for High Temperature applications: RTP Company!

RTP Company can compound a variety of amorphous or semi-crystalline polymers with reinforcements to match specific properties that meet or exceed the performance of PEI. Whether you select an off-the-shelf material or a custom compound, RTP Company provides a wide range of options with greater design flexibility and far fewer interruptions in material supply, making it an ideal choice for High Temperature solutions.

Material Selection
Sulfone-based polymers such as PPSU, PES, PPS, and PSU are all excellent candidates for PEI replacement. The first step in replacing PEI with a suitable High Temperature solution from RTP Company is to identify the critical properties for your application, such as:

- Temperature performance and operating temperatures
- Physical properties
- Chemical resistance
- Low flame, smoke, toxicity, and heat generation

It is also important to consider the resin selection and potential additives that will enhance the performance of the thermoplastic in a particular way. For example, in general, PPSU and PES can operate at higher temperatures and provide better chemical resistance. However, in terms of flammability, PPSU, PES, and PPS are fairly comparable, while PSU is not as effective.

Engineers from RTP Company can assist with identifying key requirements and provide material recommendations. In general, when additional performance is required, our engineers will recommend or develop a custom formulation to fit the exact requirements of your application.

Or, if an unfilled resin will suffice, RTP Company offers PEI alternatives such as PPSU, PES, and PSU through its relationship with ResMart*, an independent distributor of neat resins.

*RTP Company is the official sales representative of ResMart, an independent distributor of neat resins.
How Do Thermoplastic Compounds Stack Up?

In cases where an application must perform in elevated or extreme temperature environments, RTP Company can formulate custom compounds to improve performance. Figure 1 illustrates how our specifically-formulated compounds perform in comparison to PEI under elevated temperatures.

**Figure 1: Elevated Temperature Performance**

When comparing the physical properties of neat resin to thermoplastic compounds used for High Temperature applications, properties such as stiffness, strength, and shrinkage can vary depending on the level of glass content and the base resin used, as shown in Figures 2 – 4.

**Figures 2 - 3: Property Comparisons between PEI, PES, PPSU, and PPS**

Questions? Contact your local RTP Company Sales Engineer for more details, or visit [www.rtpcompany.com](http://www.rtpcompany.com)
Resistance to Chemicals, Flame, Smoke, and Heat

When chemical resistance is a key requirement, there are a number of considerations, including:

- Chemical type and concentration
- Frequency of contact
- Duration of contact
- Temperature during contact

After reviewing these factors with regard to your application, RTP Company can assist in the selection of a polymer that fits the necessary chemical resistance requirements. Figure 5 shows a chemical resistance comparison between various filled compounds vs. a PEI glass filled compound.

In addition, resistance to flame, smoke, and heat are important factors in selecting a High Temperature solution, particularly since PEI is inherently capable of meeting UL94 V-0 performance. Fortunately, there are other materials that are comparable in this regard, including PES, PPA, PPS, PSU, and PSU alloys, as shown in Figure 5. When selecting a high temperature solution, it is important to consider other UL ratings, as well, such as CTI and RTI.

Figure 5: Comparison of Filled Compound Properties
Case Study: Aerospace Interior Application

A major aircraft manufacturer was in need of a thermoplastic material for cosmetic parts in the airplane interior. The material needed to meet all FAR requirements for flame, smoke, toxicity, and heat release (FAR 25.853 (a) & (d), OSU Heat Release). RTP Company met this challenge with Radel® R-7159, an economical, unfilled, proprietary PPSU blend that we produce under license from Solvay.

For More Information

Although there are no direct equivalents to PEI on the market, sulfone-based products can perform as well or even better than PEI in many applications. Details regarding the application and its service environment are critical to finding the correct replacement polymer. To learn more about High Temperature solutions, please contact your local RTP Company Sales Engineer, or visit www.rtpcompany.com and click the “People Finder” button to find your local Sales Engineer.

*Radel is a registered trademark of Solvay S.A.