Memo

To: General Distribution  Date: January 11, 2017
From: Applications Engineering  cc:
Subject: Temperature & Pressure Ratings of Gasketing Materials

**Temperature Ratings**

We are asked from time to time about the maximum and continuous operating temperatures and maximum pressures for our gasketing materials. The ratings we publish are chosen after consideration of lab tests as well as field experience. This usually leads to the question, "Are these numbers set in stone?" The answer is no. A gasket with a continuous operating temperature (COT) of 400°F (205°C) will probably operate about as well at 410°F (210°C) as it will at 400°F (205°C) or even 390°F (199°C). Often, there are no well-defined material property transition temperatures for gasket materials, with the exception of those materials with a melt or gel temperature. Conversely, a gasket installed in a light weight flange or a gasket not properly compressed can leak at ambient temperature.

**Pressure Ratings**

Pressure ratings are also selected in a similar manner. Most gaskets, when properly installed in appropriate flanges, will hold pressures many times greater than the published pressure rating. However, keep in mind that the application of heat will also impact those safety factors. In addition, flanges with extremely high pressure ratings are typically heavily bolted to overcome the forces generated by the internal pressure. In many cases, the gasket assembly stresses these higher pressure flanges can develop can easily exceed the crush strength of the gasket, which is one of the reasons why metal gaskets, such spiral wound or kammprofile gaskets are better options. Garlock pressure ratings assume standard ASME pipe flanges with properly serrated surfaces, and bolts torqued to the published preferred torque values.

**Pressure x Temperature (PxT)**

Garlock uses a third factor that must be considered when selecting a gasket for a specific application. The PxT or Pressure x Temperature rating is a number that considers these two conditions together. As previously stated, the pressure a gasket can hold at ambient (room) temperature is very different than what it can hold at elevated temperature. That's where PxT ratings come into play. These ratings are derived from results of many high temperature tests where the materials are installed at the minimum recommended stress, then heated to the maximum published temperature, and finally pressurized until the gaskets fail/leak/blowout.

**How high is too high?**

Any easy way to think about the ratings of a gasket is like the speedometer in your car. When a car is driven the normal speed range it was designed for it can run for many years without any issues. However, if a car was driven at the maximum speed displayed on the speedometer, the life of the vehicle and components will be drastically reduced. If the intended use of the car was high speed driving, the logical choice would be to use a car designed for those conditions.
Gaskets are similar in that using the products at the upper ratings will likely result in shorter service life. Applications Engineering will typically recommend an upgrade when approaching the continuous operating temperature, 50% of the maximum pressure rating and/or 50% of the PxT rating. This only makes good sense when there are products readily available that can meet the higher performance requirements. When asked for a recommendation, it is appropriate to give the best recommendation for the conditions. We do know of situations where customers have successfully evaluated and used products slightly beyond the published ratings. However, we cannot endorse the use of gaskets above the published ratings.

**Are there other variable that impact performance?**

Absolutely! The single largest factor to gasket performance is INSTALLATION. Several years ago Applications Engineering did a study of “failed gasket” and found that nearly 90% of all failures are due to improper installation, misaligned flanges, incorrect torque levels and/or flanges that were not appropriate for the gasket used. In fact, the customers that are successfully using gaskets near or over the published ratings can typically attribute the success to proper installation.

Media (what’s being sealed) is also a huge factor. As an example, a fiber gasket may have a temperature rating of 400ºF (205ºC), but that does NOT mean the product is suitable for sulfuric acid at 400ºF (205ºC).

Gasket thickness also can directly impact overall performance. There is a bulletin on Garlock.com that delves deep into this subject.

As a general rule of thumb, the best approach to selecting a gasket is to:

1. **Collect the TAMPS information**
   - Temperature
   - Application
   - Media
   - Pressure
   - Size

2. **Contact the Garlock Applications Engineering department at 315-597-7350 if you are not absolutely confident that you have selected the correct product.**

3. **Make sure anyone installing the gaskets has access to and follows correct installation practices, in order to achieve the optimum performance out of the gasket.**