DUCTMATE®

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Selecting The Right Flange Gasket For Your Applications

The Engineer's Corner: Duct System With An Engineering Perspective

From time to time our Engineering Staff addresses customer questions that have a common theme. Ductmate feels that these issues need to be addressed and shared with our customers for the sake of clarity and knowledge, especially on the part of someone who specifies duct products.

An electronics manufacturer in the Northeast recently reported to Ductmate that their flange gaskets were "dripping" onto manufactured electronic components and computer keyboards. Upon further inspection, the gaskets had also been dripping onto the top of the ceiling panels. The operating temperature and pressure conditions were both within specifications and the gasket failure still occurred.

In a similar, but separate incident a large semiconductor manufacturer discovered their flange gasket material "drooping" between the duct flanges. The result was gasket material seemingly falling from between the flanges onto various stages of their production area. Due to these and several other recent cases of field failure reports, we have decided to address the issue of proper flange gasket selection criteria and explain many of the terms associated with gaskets and sealing compounds.

Neither of the gaskets used on the previously described jobs were supplied by Ductmate Industries. However, other Ductmate products were on the job and the customer chose to call us when the problem was discovered. Being a team of problem solvers, we investigated the issue and uncovered the problem of selecting poor quality gasketing material. We then elected to publish this update to make you aware of potential problems that could arise in an area that could easily be overlooked. Specifying the right flange gasket to suit your requirements is more important than you might think! The key is knowledge of what makes a quality gasket and writing a tight specification that allows no deviations. Let's take a look at what makes up a quality flange gasket.

Understanding the physical properties...

To better understand what makes up a quality gasket, it is important to first understand several key items.

Adhesion is the characteristic that occurs when one material sticks to another. One characteristic of good adhesion is the length of time that the bond lasts.

Tack is used to describe the gaskets quick binding capability. Tack is only applicable for a short amount of time and is only necessary until permanent bonding occurs. Tack is achieved through a careful formulation of elastomers, polymers and resins which must be carefully selected to enable the sealant to permanently bond later. If quality elastomers, polymers or resins are not chosen, the tack may be fine but other problems may occur such as plasticizer migration, cold flow, loss of tensile strength, long term aging or instability. All of the above can cause relatively quick gasket deterioration. To achieve good tack, some gasket manufacturers resort to using a lot of oils, plasticizers, by-products and low-cost hydrocarbon resins. When their products are used to the extreme, the result can be any of the above listed problems however, when used in moderation the imbalance will only affect reliability slightly. The end user will not be able to detect the extent to which the gasket has been compromised unless a problem arises.

Specific adhesion means that a gasket has been formulated to adhere to a specific surface. Specific adhesion creates the real bond between particular substrates, allowing them to work compatibly over a long period of time.

Cold flow can occur at all temperatures and is the process of the material trying to seek the lowest possible level with respect to gravity. Increased plasticizer or oil content can lead to lower cold flowpoints.

Polymer is an ambiguous term used to describe the primary structural member of the gasket. The term polymer can be widely misused by gasket manufacturers to disguise a lot of undesirable proprietary materials. Polymers can easily be affected by heat, cold and ultraviolet light. There are several "plastic-acrylic polymers" available that are not always cured to an elastomeric level. Such products are vulnerable to a reversion of cure, not only back to the level of the original polymer, but also back to original level of the individual components in the original polymer. Should this occur, it can easily be identified by a strong odor that is usually apparent after a prolonged exposure. These same problems frequently occur in other so-called polymers made of non-cured butyls or butyls cured with resins.

Plasticizer migration occurs when the materials that make a compound flexible leave the compound through bleeding, evaporation, thermal decomposition or oxidation. The remaining material is less elastic than originally intended. The main concern with plasticizer migration is that the migrating material ends up as the material that interferes with the surface to which the gasket is bonded therefore becoming its weakest link. The gasket now has little or no tensile strength, and will lead to an eventual breakdown of the bond. An easy way to visually identify plasticizer migration is to inspect the gasket for what will appear as a "wet" look on the surface of the gasket.

The two failures that were presented in this update are classic examples of a polymer break down that caused a reversion of the butyl Always remember the old saying, "You get what you pay for."

DUCT SYSTEM INSIGHTS WITH AN ENGINEERING PERSPECTIVE

How can you assure that a quality gasket is installed in your ductwork system?

Begin by researching the manufacturers who provide flange gaskets and make certain that they know and understand the requirements of the HVAC Industry. These manufacturers should understand system requirements and limits while being capable of providing quality and acrylic "polymers". The gasket manufacturer provided a low-end product for the application and the product broke down and began "dripping" or "drooping" from the flanges. This scenario occurs ever too often when a perceived "Bargain" arises on a flange gasket. products on a consistent basis. Second, study the specification sheets that are readily available which detail the physical attributes that are important to a quality gasket. Third, develop a written specification for the appropriate gasket and/or manufacturer. Finally, always insist that the specified gasket is installed on each project and NEVER, NEVER compromise your specification for a perceived "Bargain". The end result could cost you time, money, lost production and your reputation!

Begin your research...

Ductmate offers several types of flange gaskets, all of which are consistent in formulation and produced specifically for the HVAC Industry. Each of our gaskets is developed for a specific purpose and will provide years of "no drooping/no dripping" application. Now that you have a general understanding of what to look for in a quality flange gasket take a moment to examine the following chart.

We are confident that the Ductmate flange gaskets are the yardsticks to which all others should be measured!

DUCTMATE FLANGE GASKETS				
	Sticky Tape	"440" Gasket	Neoprene Gasket	Chemical Resistant Gasket
Uses	SMACNA T-25 A, B[1]	SMACNA T-25 A,B[1] SMACNA T-22[2] DM 25, 35, 45 Ovalmate	SMACNA T-25 A,B[1] SMACNA T-22[2] DM 25, 35, 45 Ovalmate	SMACNA T-25 A,B[1] SMACNA T-22[2] DM 25, 35, 45 Ovalmate
Service Life	20 years	20 years	Varies	Varies
Service Temperature	-40° to 190° F	-65° to 220° F	-40° to 150° F[3]	-100° F to 200° F[4]
Polymer	Butyl, EPDM, Proprietary	Butyl, Proprietary	Neoprene	Cross-Linked Polyethelyne
Plasticizer	Polyisobutylene	Polyisobutylene	N/A	N/A
Fungicides	Yes	Yes	N/A	N/A
Spec Compliance	UL 723 ASTM E-84	MIL-C-18969B, Type II, Class B TT-C-1796A, Type II, Class B USDA Acceptable UL 723	UL 94 HF-1	UL 94 HF-1

1. T-25A, B refers to TDC and TDF type connections, respectively.
2. T-22 refers to companion angle flange type connections.
3. T 200°F for intermittent service.
4. To 220°F for intermittent service.