NEWS ARTICLE

HOW TO MANAGE AND UNDERSTAND FLANGE FACE DAMAGE

Many of the aging plants we service are run beyond their expected life cycle and over time, metal piping, including flanges can corrode and become worn due to various reasons, making flange conditions a very important part of creating an effective gasket seal.

One of the main reasons that flanges become damaged is due to gasket removal techniques. A lot of time, fiber-based gaskets or even graphite from spiral wound gaskets can become stuck to the flange or embedded into the flange sealing serrations. Installers will try to remove the gaskets or debris using a chisel and hammer, scrapers, or even grinding them off. These methods are all very bad and can create more harm than good as they can lead to defects on the sealing surface in the form of pits, gouges or even deep scratches.

Now I will say that there are some good technologies out there, from anti-stick coatings to anti-adhesion release technologies. But, because all gaskets do not stick the same, adhesion testing data should be looked at as well when considering the correct material.

Gasket manufacturers will always give minimum recommended seating stress for each gasket material to ensure that when tightened to the proper load, the gasket forms into the serrations on the flange, preventing it from being blown out (trying to overcome the forces of system pressure and hydrostatic end force). What this minimum gasket load doesn't account is the appearance of any flange defects or irregularities mentioned above. This is when gasket thickness and material properties become very important. Ideally when the gasket is compressed to the recommended load, it should densify enough to prevent permeation of the media through the gasket, fill the serrations of the flange and any imperfections on the sealing surface. Failing to fill these imperfections or defects will create a leak path, resulting in an undesirable situation.

The gasket thickness chosen for your application should always be as thin as possible because gasket creep/relaxation is linear to the thickness of the material. So, the thicker the gasket material, the more potential for gasket creep/relaxation. In industry, the most common thicknesses used for soft gaskets are 1/16" (1.5mm) and 1/8" (3mm). In a perfect world, using 1/32" (0.8mm) would be ideal however due to flange serrations and any imperfections on the sealing surface, there might not be enough material to fill these defects when compressed.

So now I am going to pose the question, how much is too much damage on my flanges? Honestly the answer is: It depends! What I strongly recommend is to always reference ASME PCC-1 (a post-construction standard for bolted flange joint assemblies). It is a very useful document when trying to determine how much, is too much damage, specifically Appendix D – Guidelines for allowable gasket contact surface flatness and defect depth. This document references allowances for flange face flatness, flange face imperfection tolerances and allowable defect depth vs. width across face for both hard gaskets (semi-metallic or metallic) and soft gaskets (fiber-based and PTFE). And also provides a Flange Damage Assessment for Pits & Dents and Scratches & Gouges. So basically, a "go" and "no-go" verification of what is allowable or not. As a precaution, I do want to add, just because the damage is within acceptable ranges, proper gasket selection is critical to achieving an effective seal.

Tips for preventing premature flange damage:

- Never use a chisel, screwdriver, scraper or grinder to remove gasket debris from the flange surface. Using a soft wire brush made from a softer material than the flange itself is ideal, e.g. Copper.
- Choose a gasket material that has good anti-stick properties.
- Proper gasket thickness, hardness and material compressibility based on the conditions of the flange all need to be taken into consideration.
The standard big 3 factors; PxTxM (Pressure, temperature and media) will ensure you are filling all the defects in the flange sealing face.
- Visual inspections of both the gasket and the flange after removal will let you know if the gasket selected is doing its job. If the material or installation method is sub-par, this may cause the media to seep between the gasket and the flange (tangential leakage) and can cause premature sealing face corrosion and furthermore, defects or sealing face issues.

Remember, there is no perfect material to fix bad flanges, so taking care of them is your best defense!
Read more about our **Gasket Installation Procedures**

DURLON® SEALING SOLUTIONS