

Influence of Additives

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Adhesives play a key role in the gasket industry. Any product assembly consisting of multiple components attached together require either a mechanical or chemical adhesive method of attachment.

COMPOSITE EXAMPLE:

LAYERED GASKET MATERIAL (Mechanical bonding):

Mechanical attachment or bonding provides for the secure attachment of the facing to the perforated metal core. It is resistant from any chemical attack and provides for a good bond and shear resistance.



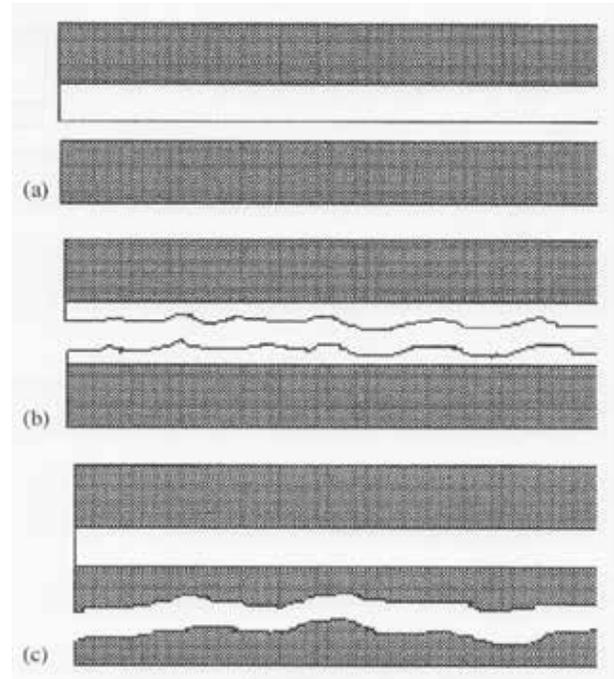
LAYERED GASKET MATERIAL (Adhesive bonding)

In the case of an adhesively bonded facing to an unbroken metal core, the adhesive must hold the layers together when subjected to both chemical contact and mechanical motion.



ADHESIVE vs. COHESIVE FAILURE:

Illustrated are three modes of failure in an adhesive joint. Adhesive failure is whenever the failure occurs at the interface between layers as in figure (a). Cohesive failures occur with any layer as illustrated in (b) and (c). The adhesive should not be the weakest link so I would prefer failure mode (c). If this type occurs and can be an issue, alternate treatments can be implemented such as surface coatings.



FACTORS INFLUENCING SUCCESS:

- The surfaces of both the facing and the steel must be free of any oils or anti-stick which could impede good initial adhesion. Surface preparation is key especially with various metals. For instance, tinplate steel and stainless are more difficult to get a good adhesive bond. Oils that aid in the rolling of metals must be removed and certain surface preparations might be in order.
- The adhesive must resist any degradation from any chemicals it may contact. In an engine application this may be lubricating oil and anti-freeze, among others.
- The temperature environment must not degrade the adhesive causing it to get brittle and crack. The bond is what holds this composite together.
- Improper curing of the adhesive can lead to rapid failure of the bond.
- The ultimate bond should have sufficient flexibility to remain intact during handling and any post forming required.
- Insufficient pressure during the gluing process may reduce the intimacy and the percentage of bond.
- The adhesive may have dried too much before the parts were laminated.

The illustrations used in this article are particular in a gasket laminate material however, the principles apply to the bonding of any materials.

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