Vortox Air Technology, Inc.'s Explanation of Acceptable Perceived Defects in Paper Filter Elements

1. **Adhesive Overfill** – Material in question is called "Plastisol" which is a common compound used in the adhesion of filter elements. It is specifically used as a bonding agent for the inner/outer screen and the filter paper to the metal end cap. It is poured into the cavity of the end cap and then the filter pack is set in the metal end cap. It is then cured with heat and sometimes if the Plastisol is filled too close to the edge of the end cap it will rise slightly and the excess Plastisol will appear to over bake but in reality it is venting to atmosphere.

Plastisol is used for filter production because it is a cost-effective method to fill the end cap cavity and when cured and hardened is void free of cavities. Plastisol is a soft enough and rubbery material that it is designed to pass through an engine without causing harm to pistons/cylinder walls, etc.

This is a slight overfill that does happed from time to time and is an accepted practice, and in no way harms anything downstream of the filter element. When cured, the Plastisol would need to be cut off which would pose the possibility of cutting the pleated paper, so it is left alone and when cured will not separate from the body of the filter.

2. **Spot Welds** – Resistance welding is the preferred method of welding sheet metal joints. The inner and outer screen material fall into the same category. The visual appearance of a circular mark is evidence of such a weld.

Resistance welding is a process that joins together two pieces of thin metal by passing a current through an electrode on each side of the welded materials. The current passed creates resistance and thus heat. The electrodes are under pressure so when fusion occurs the "squeeze" of the material is forced into the area making contact with the electrodes. The two materials are then joined to form a weld without the use of filler metals and heat is controlled to the area between electrodes.

Since the process passes current and creates resistance at the point of contact, the metal surfaces are not always perfect to each other and the welds will vary slightly from spot to spot. Sometimes due to this variation, the welds will be hotter than others and will discolored. Welding expanded wire is very inconsistent in terms of surface texture so more or less current will pass between the materials. This is a very normal occurrence and is a compounded by the galvanized coating on the expanded wire.

It would be impossible to control every weld on galvanized coated expanded wire due to the inconsistency of the surface of the material. This is a very acceptable occurrence within the industry.

3. **Markings on Metal End Caps** – Due to the way in which filter elements are packaged, the end caps may appear to be scuffed or discolored. This is simply a result of the bare metal of the end cap rubbing against the cardboard carton that it is packaged in.

Movement will occur during transit, which may cause the end caps to rub against the cardboard resulting in slight scuffs or scratches of the end caps. This is perfectly normal and does not impede the use of the filter element in any way of fit, form, or function. This is an acceptable industry occurrence.

In conclusion, filter elements with these perceived defects are perfectly fine for use and is nothing that would prevent them from being used as directed. These are industry standard acceptable perceived defects. Vortox Air Technology will not accept returns or rejections due to these perceived defects.