SERVICE BULLETIN NO. SB 08-117

Issue date: 11/2008

SUBJECT: TECH TIP # 13 - STEMCO SENTINEL HUBCAP VENTING

The accompanying bulletin from Stemco, Tech Tip #13, provides valuable information which addresses the venting mechanism within the Sentinel Hubcap and Sentinel ESP.

Additional information regarding Stemco products and service may be found at Stemco's website: http://www.stemco.com/CatalogsReference/TechTips/tabid/90/Default.aspx.

Any questions regarding this service bulletin should be directed to Utility's Field Service Department at 800-423-6591.

Field Service Department

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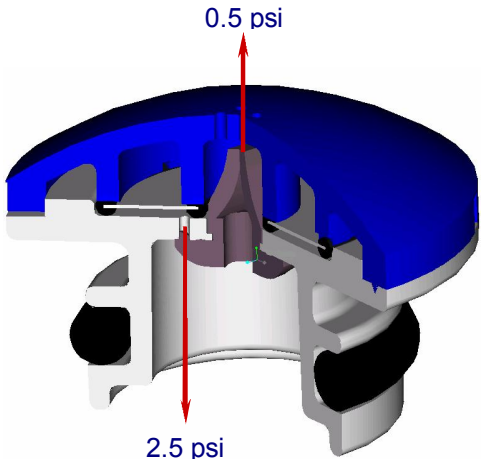
Tech Tip #13

Sentinel Products & Internal Vacuum

This Technical Tip is being issued to explain in more detail, the venting mechanism within the Sentinel Hub Cap and Sentinel ESP.



During the removal of a Sentinel ESP, the sound of air pressure being relieved may be observed. This sound has been confused as a buildup of internal pressure within the hub cavity, giving the perception that the vent is clogged. In reality, the sound of air is actually from the relief of a slight vacuum generated within the hub during vehicle cool down. This vacuum occurs because of a differential between the outbound and inbound check valve cracking pressures (shown in the Figure at right) designed into the Sentinel system as part of its contaminant exclusion function. It is present for both the Sentinel Hub Cap and the ESP. Please note that this vacuum does not affect seal performance for three primary reasons:

First, the pressure differential or maximum possible vacuum is below a typical oil seal's tolerance. The sealing lip of a typical oil seal exerts a light load or pressure on the shaft to prevent the lubricant from escaping the hub. The vacuum required to break this seal is called the Lip Opening Pressure, and is well above the maximum which the Sentinel system can produce.

Second, vacuum in the hub occurs only after the vehicle has been static long enough to cool down from its operating temperature. For example, when the vehicle initially starts its trip, the hubs begin to heat up from friction. The air inside expands and is vented out through the Sentinel outbound (duckbill) check valve at a very low pressure (typically 0.5 psi or less). The pressure inside is equalized quickly, allowing the valve to close and prevent contamination of the hub. After the vehicle is stopped, the hubs begin to cool down. At this point, the air inside contracts thus lowering the pressure. Once this air pressure drops to the inbound (umbrella) check valve's cracking pressure (typically 2.5 psi or less), the valve opens allowing air into the hub. The vacuum is relieved to prevent it from reaching levels too high for the oil seal. The incoming air must pass through the Sentinel's patented filtration design, thus preventing

contaminant entry. Once the vacuum has been relieved to an acceptable level, the inbound valve closes.

Third, the vacuum, left within the hub from the differential in cracking pressure, is quickly equalized during initial operation of the vehicle due to frictional heating within the hub. As before, this heating results in the expansion of the air inside to its operating volume. The venting cycle is then repeated, as necessary for maintenance of the appropriate pressure within the hub.

On a final note, the vacuum present within the hub is a very good indicator of how well the hub is sealed. If the hubcap or the oil seal were in poor condition, it is unlikely that either would hold the vacuum. Instead, a leak path in these two areas would allow air to slowly enter the hub, and could possibly allow lubricant to slowly escape from the hub. **Consequently, the relief of vacuum in the hub during removal of a Sentinel ESP is normal, and should be of no concern. The differential between outbound and inbound relief pressure insures proper contaminant exclusion with no effect to the oil seal.**