Belt Tensioner's Crucial Role

This document will provide the information needed to understand the crucial role the tensioner plays in the Accessory Belt Drive System (ABDS). It's sole job is to apply the correct amount of tension on the serpentine belt as it transfers power from the crank to the accessories in the system. The average automatic belt tensioner will adjust tension on the belt over one billion times for every 100,000 vehicle miles. Internal components in the tensioner can fail, causing stress on the belt and other accessory components, allowing the belt to slip. A slipping belt is the worst thing that can happen to the ABDS because of the noise and heat generated by the slippage, along with pulley wear. Heat transferred by the belt, thorough the accessory pulleys into the shafts and bearings, creates grease boil out and premature failure of the bearing cage. A persistent check engine light, reduced engine cooling, inconsistent power steering performance, or poor A/C system performance, are all signs of belt slip due to tension loss.

Understanding these failures, and having the ability to articulate what caused them, will lead to a more satisfied customer with reduced comebacks because of perceived warranty issues.

Key Point: It is important to find the root cause of any belt failure. If a new belt is installed without knowing the reason why the old one failed, failure begins all over again creating a future comeback and loss of profits.

For more information on what part Pulleys Alignment and Tension (PAT) play in the ABDS system, please refer to the Pulleys Alignment Tension Tech Tip.

Key Point: It's important to point out that any glazing (shine) on the underside of the belt indicates the belt has been slipping. Slippage can be caused by a variety of reasons such as not enough spring tension on the tensioner, failing component bearing, contaminated or worn pulleys, or an elongated or worn belt.

Key Point: Any side abrasion on the belt is a prime indicator that the system is misaligned. The misalignment must be found and corrected **before** installing a new belt.

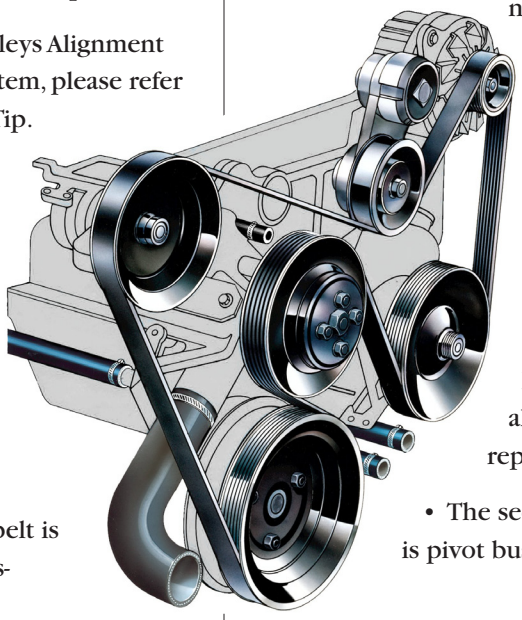
Key Point: Standard industry belt diagnostics call for replacement of a Micro-V® belt if it shows three cracks in a three inch section. A good rule of thumb for Neoprene, but not so good for EPDM. EPDM belts' inherent elasticity makes them more resistible to cracks, allowing them to run for 100,000 miles or beyond with no visual cracks. Therefore, a visual check might not be a very good indicator of true belt wear. A far better indicator of wear on EPDM belts is material loss.

Understanding the Impact of Tensioner Failure

Tensioners today are extremely important to the proper operation of the ABDS. In other words, whatever pulley or accessory the belt runs on or over is impacted by tensioner malfunction. **Tensioner replacement today is no longer an option.**

There are three distinctive signs of tensioner failure. All of these signs indicate one corrective action: **tensioner replacement.**

- The first sign of tensioner failure is belt noise or squeal. Squealing, among other things, indicates the spring inside the tensioner has lost its tensioning ability allowing the belt to slip. In addition to generating noise and creating heat for the bearings, the alternator may also lose its ability to charge or the AC to cool efficiently. The more loads applied by the accessories, the more the belt wants to slip. Hearing belt squeal and seeing glazing on the underside of the belt are good indicators that tension has been lost, and the tensioner, along with the belt, must be replaced.



- The second sign of tensioner failure is pivot bushing wear (internal) which

results in the tensioner arm moving away from its base. This separation is very difficult to see because the tensioner is firmly bolted to the engine. The pivot bushing inside the base has begun to wear and allows the tensioner arm to lean causing misalignment in the system. Look for belt "off tracking" on the pulley or any indication of side wear on the belt. Belt **side wear** can go from a slight scrubbing on one side to huge chunks lost. In any case, both belt and tensioner must be replaced to correct the problem.

- The third sign of tensioner failure is damper malfunction and should not be confused with loss of spring tension. Just like the Original Equipment (OE), Gates DriveAlign tensioners have a damper built inside the case which acts like a brake on the arm. Its sole job is to dampen the pulsation of the engine on the ABDS as the cylinders fire. Once it has lost its dampening ability, the arm begins to oscillate more resulting in increased loads on the bearings of adjacent accessories. Essentially, a failed damper creates a situation where the tensioner and belt will start to "hammer" the accessory next to it. Slight arm movement of the tensioner is normal as accessories turn on and off. However, chattering or excessive tensioner arm oscillation is a warning sign indicating possible damper failure, thus the tensioner needs immediate replacement.

Key Point: Please note there is a universal style flat spring tensioner in the aftermarket that does not have an OE style dampening system built in. It relies on spring tension to act as the dampening devise. Because it can lose its ability to dampen very quickly, it may have to be replaced more often.

Ignoring these three signs of failure and neglecting to replace the tensioner is a recipe for a future comeback or breakdown.

Alternator bearings and water pump seals are very susceptible to any form of excessive vibration or heat generated that travels right into the bearings. If the belt is unable to transfer needed power from the crankshaft because of incorrect tension or worn pulleys, accessories will have the potential to run at diminished output levels. For this reason, when installing a replacement accessory component, it's important to check/observe the tensioner in operation to ensure it is operating properly. If it is not, replace it.

Remember, if you have seen signs of premature failure in an alternator, water pump or any accessory up stream from the tensioner, it may be the failed tensioner causing this component to fail as well.

Tensioner Inspection Procedures

It's a good rule to observe the system in operation before replacing any belt. Several areas of concern should be observed when the engine is running and when is off.

With the Engine Running:

1. Observe the tracking of the belt as it revolves around the pulleys. Pay attention to the flat idler pulleys, especially on the tensioner arm. The belt, for the most part, should run true to the center of the pulley. As noted above, if the belt is "off tracking" on the tensioner arm pulley, pivot bushing wear is most likely causing the arm to pull away from the base. Though you might not be able to see this separation, **side scuffing or chirping** of the belt will probably confirm this at some point.

   Key Point: Any abrasion or rubbing on **one side** of the belt indicates there is misalignment in the ABDS and can point directly to the tensioner. Not correcting this misalignment quickly will result in numerous comebacks because it will be perceived as belt failure.

2. Observe the tensioner arm movement as the belt runs over it. There should be a gentle arm motion as accessories turn on and off (i.e. A/C compressor clutch engaging and disengaging). If it doesn't move at all, it is possible the tensioner is stuck. You can test this later with the engine off.

3. Look for excessive chattering or tensioner arm oscillation. This is not the result of poor spring tension, but it is caused by a worn component inside the tensioner called a damper. Excessive arm oscillation is a sign that the damper failed or is failing, and the tensioner needs immediate replacement. Failure to replace it can lead to additional problems with other system accessories in the future as noted above.

   Key Point: Excessive arm oscillation creates a hammering effect on the accessory next to it that can cause premature failure of that component as well.

4. Lastly, listen for any hissing or growling noise that could indicate a potential pulley bearing failure. Con-

tinue to listen for chirping or squealing of the belt as it runs around the pulleys. This can be an indication of a poorly tensioned or misaligned system. To help identify whether it is an alignment or tension issue, perform the spray bottle test which is noted below.

Key Point: Squealing indicates a loss of tension resulting in an inefficient system, unneeded heat for the bearings, and wear for the pulleys.

With the Engine Off:

1. Remove belt and visually inspect each pulley. Running surfaces must be in good working order, free of wear, dirt, grease and grime. Clean all pulleys to provide an excellent gripping surface, and to minimize slippage of the new belt. Any residue oil on a pulley will coat the new belt and, as soon as the engine is started, the failure process starts all over again. Remember, a belt can only perform as well as the system will allow. Poor pulley quality means poor belt service life and system inefficiency, resulting in future comebacks.

2. Inspect the outside of the tensioner for rust bleed seeping from inside the tensioner. This is normally an indication that there is inside metal on metal wear, and a clue that the tensioner is failing from the inside out. Replace it immediately.

3. **Spin** the pulleys. Pulleys should spin freely without bearing noise. Check for any grease seepage or smudging around the pulley bearing. Seepage indicates that the bearing seal has been compromised and grease has leaked from the bearing. The pulley bearing will begin to make noise and eventually seize if not replaced soon.

   The most sensible repair when identifying pulley problems on the tensioner is not to just replace the pulley but to replace the complete tensioner as a unit. The tensioner was built as such, and the internal parts of the tensioner have received just as much wear as the pulley. Doing so will eliminate a potential future comeback.

4. Place your wrench on the tensioner and cycle the tensioner arm through its complete motion path. Do this a minimum of three times. Feel for spring tension along with a fluid motion throughout its arm path. Any sticking or notchy movement may indicate a problem with the spring or pivot bearing. Replace bearing with bushing. While cycling the tensioner, feel for base arm separation which is the result of pivot bushing wear. The tensioner arm should not rock from side to side at all, and if it does, it will cause misalignment and potential comebacks.

The **"Spin Cycle"** test as noted above is a recommended starting point for checking potential tensioner problems. If at any point during the test one of the above noted concerns are found, it is highly recommended that the tensioner and belt be replaced immediately. Failure to do so will create repeated comebacks, lost profits and unsatisfied customers.

Spray Bottle Test Disclaimer: This test is a simple process that determines if the chirping/squealing coming from the ABDS is an alignment or tension related problem. It is highly recommended that this test be performed by a professional technician. Since this test is performed with the engine running, make sure your clothing and bodily parts stay clear of the engine. Failure to do so can result in severe injury or even death.

With the engine running, take a spray bottle filled with water and spray the underside of the belt. If possible, spray the affected pulley. The water acts as a lubricant (only use water). If squealing becomes more pronounced when sprayed, it indicates there is not enough tension on the belt. Replace both, belt and tensioner.

If spraying the underside of the belt causes the chirping to dissipate momentarily, the system is misaligned. Find and repair the misalignment.

The purpose of this document is to clear the misconception by most counter persons/service writers/technicians or consumers who believe there is no **urgency** in replacing a failing tensioner until it begins to fall apart.

The bottom line is, "If" the belt and tensioner are not working together to transfer the power from the crankshaft, it will only result in repeated comebacks from perceived belt failures, or complaints of premature bearing failure, along with diminished outputs by the accessories in the system. Tensioner replacement is not an option and must be discussed not only when a belt is sold, but also when accessories are sold, if the OE tensioner has never been replaced.

For more information, please contact your local Gates representative or email us at aftermarkettraining@gates.com