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#1098, Rev. F
October, 2018
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SUBJECT: Transmission Fluid and Filter Service Recommendations

MODELS AFFECTED: 5000, 6000, 8000, 9000 Series Off-Highway Transmissions

Introduction:

Off-highway transmissions require proper transmission fluid and regular fluid system maintenance for optimum performance, durability, and reliability. Fluid selection is influenced by operating environment and duty cycle. The severity of transmission service and the type of fluid determine the fluid and filter change intervals. This document summarizes the current Allison Off-Highway Transmission fluid and filter service recommendations.

Transmission Fluid Recommendations:

Allison Transmission, Inc. recommends only fluids meeting Allison Type TES 439 or TES 353 specifications for use in 5000, 6000, 8000, 9000 Series Off-Highway transmissions. The current list of TES 439 and TES 353 fluids approved by Allison is available on the Allison website at: [www.allisontransmission.com/Parts + Service/Approved Fluids](http://www.allisontransmission.com/Parts+Service/ApprovedFluids).

Acceptable oils may include some synthetic types and some engine oils as described in SAE standard J300 "Engine Oil Viscosity Classification" as follows:

- SAE 0W-30
- SAE 0W-40
- SAE 30
- SAE 5W-40
- SAE 10W-40
- SAE 15W-40
- SAE 40

Before using any fluid, check that it is listed in the TES 439 or TES 353 Approved Fluids List.

Higher viscosity fluids, such as SAE 30 or SAE 15W-40 oils are recommended for optimum transmission life in Off-Highway transmissions. When choosing the optimum viscosity grade of fluid to use, consider geographic location and preheat requirements. Proper viscosity grade selection is important when operating the transmission in conditions below a fluid's minimum operating temperature. Preheat or fluid warm-up is required when operating Allison transmissions below the fluid's minimum critical temperature, which is viscosity grade dependent. [Table 1](#) lists a number of lower viscosity fluids for consideration when operating in low ambient conditions and lists the minimum fluid temperatures below which preheat or warm-up are required. If preheating is necessary, use either auxiliary heating equipment, or warm-up the transmission by starting the engine with the transmission in **N** (Neutral), and operating at the engine low idle speed for a minimum of twenty minutes before attempting range operation.



CAUTION: Disregarding minimum fluid temperature limits can result in transmission malfunction or reduced transmission life.

Table 1. Minimum Operating Temperature (without preheat)

SAE Viscosity Grade	Degrees (C)	Degrees (F)
SAE 0W-30	-30	-22
SAE 5W-40	-25	-13
SAE 15W-40	-15	5
SAE 30	0	32
SAE 40	10	50

Transmission Fluid Change Interval:

Allison Transmission introduced Prognostics with the release of Commercial Electronic Controls 5 (CEC5) for Off-Highway products. Prognostics are designed to give the customer the following benefits:

- Maximize fluid (oil) life
- Maximize filter life
- Allow maintenance to be scheduled to prevent transmission issues

Transmission operating parameters monitored and displayed by the Prognostics feature are:

- Oil Life Monitor (OM) – The display message denotes the calculated remaining life of the transmission fluid.
- Filter Life Monitor (FM) – The display message denotes operating status of the transmission fluid filter, based on the measured pressure drop across the filter.

Prognostics is the preferred method for determining the transmission fluid change interval. For more information regarding Prognostics, refer to the CEC5 Operator's Manual (OM8106EN) or SIL 15-TR-18.

Fluid analysis is another method for determining the transmission fluid change interval. Monitor the oxidation level and check the fluid for contamination according to the measurement limits shown in [Table 2](#) and [Table 3](#). The fluid is still usable if it meets all limits in [Table 2](#) and [Table 3](#). If fluid analysis or Prognostics cannot be utilized, change the fluid every 1200 hours of operation when using TES 439 Fluids (refer to [Table 4](#)) or 4000 hours of operation when using TES 353 fluids. If the transmission is utilized in an application where low annual usage applies (less than 500 hours per year), the change interval is 48 months when using TES 439 or TES 353 when supported by Oil Analysis (refer to [Table 2](#) and [Table 3](#)). Refer to SIL 17-TR-96 for recommendations regarding oil analysis procedures.



NOTE: A Fluid Analysis Kit P/N 29537805 is available from Allison Transmission, Inc.



NOTE: If converting from TES 439 to TES 353 fluid, the initial concentration of TES 353 is not sufficient to allow the 4000 hour change interval. Initial fill of TES 353 is mixed with former TES 439 fluid and as such, retains the fluid drain interval of 1200 hours. When the second TES 353 fluid change occurs, the concentration is sufficient to allow the 4000 hour fluid drain interval.

Table 2. Fluid Oxidation Measurement Limits

Measurement	Limit
Viscosity	+/- 25% change from new fluid
Total Acid Number (TAN)	+3.0 (mgKOH) change from new fluid

When servicing any transmission, visually inspect the fluid at the sample and drain locations for dirt, metal, or coolant contamination. More frequent fluid changes may be required if the fluid is visually contaminated, if the environment produces high levels of contamination, or if fluid analysis indicates that the fluid is oxidized beyond the limits in [Table 2](#).

Table 3. Contaminant Limits

Contaminant	Limit
Water	0.2% Maximum
Glycol	No Trace Allowed
Alien Fluids*	If Detected, Change Transmission Fluid

* Any fluid not meeting Allison approval. Refer to www.allisontransmission.com/Parts + Service/Approved Fluids

The presence of contaminants in the transmission fluid is detrimental and indicates a fluid change is necessary. Contaminant limits are shown in [Table 3](#).

Table 4. Standard Fluid Change Intervals (by Fluid Type)

Transmission Model	Fluid Specification	Drain Interval
5000, 6000, 8000, 9000 Series	TES 439 Fluids	Up to 1200 hours or 48 months
	TES 353 Fluids	Up to 4000 hours or 48 months

Filter Element Change Intervals and Service:

Filter element change intervals are determined by the filter element efficiency. Current Allison filter elements use a filter media rated nominally at 6 microns. Filter change intervals discussed in this letter only apply to genuine Allison Transmission filter elements.



NOTE: The charging pump screen located in the transmission sump is an oil strainer and should only be serviced at overhaul.

If the filter change interval cannot be monitored with the Prognostics function or the delta-P switch as described below, change the filter elements whenever the fluid is changed and at 600 hour intervals between fluid changes.

Allison filter assemblies are equipped with a differential pressure (delta-P) switch to indicate when the filter element requires service. This serves two important functions; it allows the actual change interval to be determined for each customer's application, and is the service requirement indicator used for the Prognostics function. The Prognostics function was made available beginning with CEC5 and is the preferred method for determining filter element change intervals. The delta-P switch senses the pressure difference between the unfiltered fluid entering the filtration media and the filtered fluid exiting the filtration media. Once the filter is near its capacity or "full", the pressure differential

between filtered and unfiltered fluid becomes high enough to activate the switch. Sustained operation after the indication point will cause the filter bypass valve to open, allowing unfiltered fluid to circulate into the transmission.



CAUTION: Both former and current Allison direct- and remote-mount transmission main circuit filters feature an integral bypass valve located in the filter head. Former filter assemblies have bypass valves that can be inspected whenever the filter elements are changed. A visual check must show the bypass valve squarely seated in the filter housing. If the valve is cocked, loose, or missing, replace the filter head assembly. For current Allison filter assemblies, the bypass valve must be removed for inspection. If a problem is found with the bypass valve on a current Allison filter assembly, replace the filter head.

Use the following procedure to remove and inspect the bypass valve in a current Allison filter head assembly:

1. Remove the SAE-12 straight thread plug on the side of the filter head opposite the delta P switch (refer to [Figure 1](#)). Exercise caution during removal; the plug is under spring tension.



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Figure 1. Current Allison Filter Assembly

2. Remove the spring and valve from the valve bore of the filter head.
3. Inspect the valve for cracks, scoring, and any other damage.
4. Inspect the valve bore and valve seat for scoring, debris, and any other damage.
5. Inspect the spring for cracks, bent coils, and any other damage.
6. Check to be sure the plug is free of damage and the O-ring is in good condition.
7. Re-install the valve and spring into the filter head while ensuring the valve is seated properly. If the valve will not seat properly, replace the filter head.

8. Re-install the SAE-12 straight thread plug. Use caution, pressure must be applied to the plug during installation due to spring tension. Torque the plug to 28-42 lb-ft (37-57 N·m).

Filter elements capture debris suspended in the fluid generally from three sources. These three sources are contaminants from the transmission/cooler circuit, from the fluid itself, and through the transmission breather. The debris amounts are highest when a new or newly rebuilt transmission is installed or an oil change has just occurred. Shorter than normal filter service life may be experienced in these conditions due to the collection of normal break-in material. However, each successive element should provide longer service life. When replacing the filter element, do not change the transmission fluid unless the fluid is visibly contaminated. New transmission fluid is generally contaminated above the 6-micron level and changing the fluid unnecessarily may actually add contaminants resulting in reduced filter element life. One way to maximize filter service life would be to pre-filter the replacement fluid before or while adding it to the transmission. If problems persist, check with the fluid supplier or perform a fluid analysis of the new fluid. By changing the element(s) before indication by the delta-P switch, significant usage of the filter can be wasted and is not cost effective. Additionally, by changing the element prematurely, a vital source of wear contamination information is lost, or at least distorted.



NOTE: Monitoring the actual filter element service life to the indicated change point as determined by the delta-P switch indication allows the general condition of the transmission internal wearing components to be determined.

After system cleanup, the filter elements provide long-service life in a normally functioning transmission. A normally functioning transmission does not generate debris that needs to be removed by the filter element. As the internal wearing components inside the transmission begin to deteriorate, the service life of the filter element is measurably shorter due to the filtering out of the debris from the deteriorating component. When this occurs, the transmission does start to generate debris.



NOTE: Measurable premature filter element delta-P indications may be utilized as an early warning signal that a preventive maintenance repair is advisable to prevent excessive consequential damage.

Technical Information:

For detailed information on transmission fluid characteristics, analysis, and selection, refer to Automatic Transmission, Inc. Fluid Technician's Guide (GN2055EN), available from any Allison Transmission Distributor or Dealer.

Service Information:

For more information about current Allison filter assemblies, refer to SIL 25-TR-17.

For complete fluid and filter change procedures, refer to the appropriate service manual:

SM7463EN 5000/6000 Series Transmission Service Manual

SM1228EN 8000 Series Transmission Service Manual

SM7335EN 9600 Series Transmission Service Manual

SM7336EN 9800 Series Transmission Service Manual

SM7449EN 9800 Oil Field Series 8-Speed Vocational Model Manual