



# Technical Service Bulletin

Date: 10/212005

Product Description: AMSOIL AW Series Hydraulic Oils

Subject: AMSOIL Hydraulic System Trouble Shooting Guide

**OBJECTIVE:**

To provide AMSOIL Dealers with hydraulic trouble shooting guidelines in order to assist hydraulic technicians and customers with hydraulic systems diagnosis.

**ISSUES:**

Hydraulic systems can be complicated and may cause diagnostic confusion and loss of many thousands of dollars when system problems occur. If the hydraulic system can be diagnosed quickly production can resume, reducing production losses to a minimum.

**TECHNICAL DISCUSSION:**

**HYDRAULIC TROUBLE SHOOTING GUIDE**

<b>PROBLEM: NOISY PUMP</b>	
<b>Cause</b>	<b>What to Do</b>
Air leaking into system	Be sure the oil reservoir is filled to the normal level and the oil intake is below the surface of the oil. Check pump packing, pipe and tubing connections, and all other points where air might leak into the system. One good way to check a point on the <i>intake</i> side suspected of leakage is to pour oil over it. If the pump noise stops, you've found the leak.
Air bubbles in intake oil	If the oil level is low or the return line to the reservoir is installed above oil level, air bubbles will form in the oil reservoir. Check oil level and return-line position.
Cavitation (the formation of vacuum in a pump when it does not get enough oil)	Check for a clogged or restricted intake line or a plugged air vent in the oil reservoir. Check all strainers in the intake line. Oil viscosity may be too high. Check the manufacturers recommendations for the correct oil viscosity and type.
Loose or worn pump parts	Check the manufacturer's maintenance instructions first. Tightening every nut in sight may <i>not</i> be the way to stop leakage. Look for worn gaskets and packings; replace if necessary. There is usually no way to compensate for wear in a part; it is <i>always</i> better to replace it. Oil may be of improper grade or quality. Check the manufacturers recommendations for the correct oil viscosity and type.
Stuck pump vanes, valves, pistons, etc.	Parts may be stuck by small particles such as; metallic chips, bits of lint, etc. If so, disassemble and clean them thoroughly. Avoid the use of files, emery cloth, steel hammers, etc., on machined surfaces. Products of oil deterioration such as gums, sludges, varnishes, and lacquers may be the cause of sticking. Use solvent to clean parts and dry thoroughly before reassembling. If parts are stuck by corrosion or rust, they will probably have to be replaced. Be sure oil has sufficient resistance to deterioration and provides adequate protection against rusting and corrosion.

Submitted By: KD

Reviewed By: DY

Approved By: Alan Amatuzio

Date: 12/09/2005

Distribution:  Internal  All

Page 1 of 4



# Technical Service Bulletin

Date: 10/21/2005

Product Description: AMSOIL AW Series Hydraulic Oils

Subject: AMSOIL Hydraulic System Trouble Shooting Guide

Filter or strainer too dirty. Filter too small	Filter and strainers must be kept clean enough to permit adequate flow. Check filter capacity. Be sure that original filter has not been replaced by one of smaller capacity. Use oil of quality high enough to prevent rapid sludge formation.
Pump running too fast	Determine recommended speed. Check pulley and gear sizes. Make sure that no one has installed a replacement motor with a faster speed than is recommended.
Pump out of line with driving motor	Check alignment. Misalignment may be caused by temperature variation.

**PROBLEM: OVERHEATING**

Cause	What to Do
Oil viscosity too high	Check oil recommendation. If you're not sure of the oil viscosity in the system, it may be worth your while to drain the system and install oil of proper viscosity. Cold temperature conditions may cause oil of proper viscosity for "working temperature" to thicken too much on the way to the pump. In this case, use of oil with higher viscosity index may cure trouble.
Internal leakage too high	Check for wear and loose packings. Oil viscosity may be too low. Check the manufacturers oil viscosity and type recommendations. Under working conditions temperatures may increase to the point that the viscosity becomes too thin. Proceed with caution if you are tempted to try a higher viscosity oil.
Excessive discharge pressure	If oil viscosity is found to be OK, trouble may be caused by high setting of relief valve. If so, reset.
Poorly fitted pump parts	Poorly fitted parts may cause undue friction. Look for signs of excessive friction; be sure all parts are in alignment.
Oil cooler clogged	On any machine equipped with an oil cooler, it is probable that high temperatures are expected. If temperatures run high normally, they'll go even higher if oil cooler passages are clogged. Clean cooler passages.
Low oil	If the oil supply is low, less oil will be available to adequately disperse heat. This will cause a rise in oil temperature, especially in machines without oil coolers. Be sure to fill to the proper oil level.

**PROBLEM: PUMP NOT PUMPING**

Cause	What to Do
Pump shaft turning in wrong direction	Shut down immediately. Some types of pumps can turn in either direction without causing damage; others are designed to turn in <i>one direction only</i> . Check belts, pulleys, gears, and motor connections. Reversed leads on 3-phase motors are the most common cause of incorrect rotation.
Intake clogged	Check line from reservoir to pump. Be sure filter and strainers are not clogged.
Low oil level	Be sure oil is up to recommended level in reservoir. Intake line must be below the oil level.
Air leak in intake	If any air at all is going through pump, it will probably be quite noisy. Pour oil over points suspected of leakage; if noise stops, you've found the leak.

Submitted By: KD

Reviewed By: DY

Approved By: Alan Amatuzio

Date: 12/09/2005

Distribution: \_\_\_ Internal X All

Page 2 OF 4



# Technical Service Bulletin

Date: 10/212005

Product Description: AMSOIL AW Series Hydraulic Oils

Subject: AMSOIL Hydraulic System Trouble Shooting Guide

Pump shaft speed too low	Some pumps will deliver oil over a wide range of speeds; others must turn at recommended speed to give appreciable flow. Find out first the speed recommended by the manufacturer; then, with a speed counter if possible, check the speed of the pump. If speed is too low, look for trouble in driving motor.
Oil too heavy	If oil is too heavy, some types of pumps cannot pick up prime. You can make a very rough check of viscosity by first getting some oil that is known to have the right viscosity. Then, with both oils at the same temperature, pour a quart of each oil through a small funnel. The heavier oil will take a noticeably longer time to run through. Oil that is too heavy can do great harm to hydraulic systems. Drain and refill with oil of the right viscosity.
Mechanical trouble (broken shaft, loose coupling, etc.)	Mechanical trouble is often accompanied by a noise that you can locate very easily. If disassembly is necessary, follow the manufacturer's recommendations to the letter.

**PROBLEM: LOW PRESSURE IN SYSTEM**

Cause	What to Do
Relief valve setting too low	If the relief valve setting is too low, oil may flow from the pump through the relief valve and back to the oil reservoir without reaching the point of use. To check the relief setting, block the discharge line <i>beyond the</i> relief valve and the check line pressure with pressure gauge.
Relief valve stuck open	Look for dirt or sludge in the relief valve. If the valve is dirty, disassemble and clean. A stuck valve may be an indication the system contains dirty or deteriorated oil. Be sure that the oil has high enough resistance to deterioration and varnishes.
Leak in system	Check the whole system for leaks. Serious leaks in the open are easy to detect, but leaks often occur in concealed piping. One routine in leak testing is to install a pressure gage in the discharge line near the pump and then block off the circuits progressively. When the gage pressure drops with the gage installed at a given point, the leak is between this point and the checkpoint just before it.
Broken, worn, or stuck pump parts	Install a pressure gage and block system just beyond the relief valve. If no significant pressure is developed and the relief valve is OK, look for mechanical trouble in the pump. Replace worn and broken parts.
Incorrect control valve setting; oil "short-circuited" to reservoir	If open-center directional control valves are unintentionally set in the neutral position, oil will return to the reservoir without meeting much resistance and very little pressure will be developed. Scored control-valve pistons and cylinders can cause this trouble. Replace worn parts.

**PROBLEM: ERRATIC ACTION**

Cause	What to Do
Valves, pistons, etc., sticking or binding	First, check suspected parts for mechanical deficiencies such as misalignment of a shaft, worn bearings, etc. Then look for signs of dirt, oil sludge, varnishes and lacquers caused by oil deterioration. You can make up for mechanical deficiencies by replacing worn parts, but don't forget that these deficiencies are often caused by the use of wrong oil.

Submitted By: KD

Reviewed By: DY

Approved By: Alan Amatzio

Date: 12/09/2005

Distribution: \_\_\_ Internal X All

Page 3 OF 4



# Technical Service Bulletin

Date: 10/21/2005

Product Description: **AMSOIL AW Series Hydraulic Oils**

Subject: **AMSOIL Hydraulic System Trouble Shooting Guide**

Sluggishness when a machine is first started	Sluggishness is often caused by oil that is too thick at starting temperatures. If you can put up with this for a few minutes, oil may thin out enough to give satisfactory operation. But if oil does not thin out or if surrounding temperature remains relatively low, you may have to switch to oil with lower pour point, lighter viscosity, or, perhaps, higher Viscosity Index. Under severe conditions, immersion heaters are sometimes used.
----------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**PROBLEM: LEAKAGE AROUND THE PUMP**

Cause	What to Do
Worn packing	Tighten packing gland or replace packing. Trouble may be caused by abrasives in the oil. If you suspect this sort of trouble, make a thorough check of the points where abrasives may enter the system.

**RECOMMENDATION:**

AMSOIL Synthetic Hydraulic Oils should be recommended for hydraulic systems according to the manufacturer's viscosity specifications at given ambient temperatures.

AMSOIL Synthetic Hydraulic Oils have very high viscosity indices (VI), providing a more stable viscosity during a wider temperature range. They are free of paraffin's (wax), have low pour points, and provide superb low temperature performance. AMSOIL Synthetic Hydraulic Oils are formulated for shear stability and oxidation resistance for high temperature protection.

AMSOIL Synthetic Hydraulic Oils are compatible with mineral oils and most synthetic oils.

AMSOIL manufacturers four products that can be used in hydraulic systems.

1. Synthetic AW Series Anti-Wear Hydraulic Oils
  - AWF ISO 15 (best cold temperature)
  - AWG ISO 22 (best cold temperature)

- AWH ISO 32 (most popular, multi-purpose)
  - AWI ISO 46
  - AWJ ISO 68
2. Synthetic TBI Biodegradable Hydraulic Oil with zinc free anti-wear technology, ISO 32/46
  3. Synthetic Tractor Hydraulic/Transmission oil ATH multi viscosity anti-wear SAE 5W-30 (ISO 46)
  4. Synthetic RC Series R & O/AW Gear and Bearing Oils with zinc free anti-wear technology.
    - RCG ISO 22
    - RCH ISO 32
    - RCI ISO 46
    - RCJ ISO 68
    - RCK ISO 100

**NOTICE:**

AMSOIL AW Series Hydraulic Oils are not recommended for applications requiring fire resistant hydraulic fluids, or for aircraft applications.

Submitted By: KD

Reviewed By: DY

Approved By: Alan Amatzio

Date: 12/09/2005

Distribution: \_\_\_ Internal X All

Page 4 OF 4