Refrigerant System Capacities

Application	Specification	
	Metric	**English**
PAG Oil GM P/N 12378526 for United States PAG Oil GM P/N 88900060 for Canada		
Accumulator Replacement	-ml*	-oz*
• *Add 60 ml (2 oz) of PAG oil, plus the equal amount of oil drained from the accumulator.		
Compressor Replacement	60 ml	2 oz
• The Denso replacement compressor is precharged with 237 ml (8.0 oz) of PAG oil.		
Condenser Replacement	30 ml	1 oz
Evaporator Replacement	90 ml	3 oz
If more than the specified amount of PAG oil was drained from a component, add the equal amount drained.		
• Total System PAG Oil Capacity	210 ml	7.1 oz
R-134a		
• Refrigerant Charge	0.7 kg	1.6 lb

Fastener Tightening Specifications

Application	Specification	
	Metric	English
A/C Accumulator Nut to Evaporator	16 N·m	12 lb ft
A/C Belt Tensioner Bolts	50 N·m	37 lb ft
A/C Low Pressure Switch	6 N·m	53 lb in
A/C Refrigerant Filter Retaining Nuts	15 N·m	11 lb ft
A/C Refrigerant Pressure Sensor	6 N·m	53 lb in
Accumulator Bracket Nut	9 N·m	80 lb in
Accumulator Clamp Bolt	10 N·m	8 lb ft
Air Distribution Duct Screws	2 N·m	18 lb in
Air Distribution Housing Screws	2 N·m	18 lb in
Blower Motor Screws	2 N·m	18 lb in
Compressor Bracket Mounting Bolts	50 N·m	37 lb ft
Compressor Clutch Plate Retaining Bolt	18 N·m	13 lb ft
Compressor Discharge Hose to Condenser Nut	16 N·m	12 lb ft
Compressor Mounting Bolts	50 N·m	37 lb ft
Compressor Suction/Discharge Hose Bolt	16 N·m	12 lb ft
Compressor Suction Hose at Accumulator Nut	16 N·m	12 lb ft
Condenser Upper Insulator Retainer Bolts	9 N·m	80 lb in
Evaporator Core Cover Screws	2 N·m	18 lb in
Evaporator Tube Fitting at Orifice	25 N·m	18 lb ft
Evaporator Tube at Condenser Nut	16 N·m	12 lb ft
Evaporator Tube at Evaporator Nut	16 N·m	12 lb ft
Filter Access Door Screw	2 N·m	18 lb in
Floor Air Outlet Duct Screw	1.6 N·m	14 lb in
Heater Core Cover Screws	2 N·m	18 lb in
Hood Spring Mounting Bolt and Nut	17 N·m	13 lb ft
HVAC Module Mounting Bolts	4 N·m	35 lb in
HVAC Module Mounting Nuts	9 N·m	80 lb in
HVAC Module Screws	2 N·m	18 lb in
Mode Actuator Screws	2 N·m	18 lb in
Recirculation Actuator Screws	17 N·m	13 lb ft

Info - Contaminated R-134a A/C Systems - Air Conditioning System Flushing Procedures and Universal In-Line A/C Fileter Installation #01-01-38-006D - (Sep 14, 2004)

Contaminated R-134a A/C Systems -- Air Conditioning System Flushing Procedures and Universal In-Line A/C Filter Installation

1993-2005 Passenger Cars and Light Duty Trucks

2003-2005 HUMMER H2

with Air Conditioning

This bulletin is being revised to update the parts information. Please discard Corporate Bulletin Number 01-01-38-006C (Section 01 - HVAC).

GM Service Operations has worked with GM dealers to develop tools and procedures to properly flush A/C (air conditioning) systems. The recommended flushing procedure uses liquid R-134a refrigerant to perform the system flush and is the only GM approved method for system flushing. The use of alternate methods that utilize solvents has proven to be detrimental to A/C system performance and durability.

Every General Motors dealer has received a J 43600 ACR 2000 Air Conditioning Service Center that has built-in A/C system flushing capabilities. Every General Motors dealer has also received a J 45268 Flush Adapter Kit to utilize the flushing capability of the J 43600 ACR 2000.

This bulletin contains a general outline of the procedure and when to perform A/C system flushing. Vehicle specific flushing information is contained in the HVAC section of SI.

A/C system flushing should NOT be routinely performed when a system failure is encountered. System flushing takes a considerable amount of time to perform and is NOT necessary on most system failures. System flushing requires prior authorization by the GM Area Service Manager (the District Service Manager in Canada) and should be performed only when one of the following conditions is found:

- A desiccant bag failure.
- A gross overcharge of A/C system lubricant.
- The A/C system lubricant is contaminated.
- A catastrophic compressor failure causing oil contamination.

A/C system flushing will remove some of the metal particles during a flush, but flushing is not completely effective in removing all metallic debris. System flushing should not be considered if removal of metallic debris is the only objective. GM Service Operations continues to strongly recommend the use of a Liquid Line Filter and a Suction Screen to control this type of system contamination and avoid repeat failures.

A/C System Flushing Procedure

Tools Required

- J 43600 ACR 2000 Air Conditioning Service Center
- J 45268 A/C Flush Adapter Kit
- J 41447 R-134a Tracer Dye or equivalent
- J 41459 A/C Tracer Dye Injector or equivalent
- J 42220 Universal 12V Leak Detection Lamp or equivalent
- J 39400 Halogen Leak Detector or equivalent
- J 44551 A/C Suction Screen Kit
- J 45037 Oil Injector Kit
- J 45037-46 GM Universal Compressor PAG Oil (packaged as 6, 8 oz tubes)

A warm engine compartment or higher ambient temperatures as well as air flow across the heat exchangers (evaporator, accumulator and condenser) speed the refrigerant recovery time during the A/C flush procedure. Whenever possible, warm the engine prior to A/C system flushing. An external fan blowing across the condenser and running the A/C blower motor while the engine is running may be used to speed up refrigerant recovery.

Front Only A/C Systems

- Recover the refrigerant from the vehicle.
- Remove the expansion device (orifice tube or TXV (Thermostatic Expansion Valve)).
- Connect the A/C lines with the orifice tube removed or install the appropriate TXV Adapter from the J 45268 A/C Flush Adapter Kit.
- Disconnect the A/C compressor manifold (never flush through a compressor).
- Inspect the end of the suction hose for a suction screen. Remove the suction screen using the screen remover in the J 44551 A/C Suction Screen Kit, if installed.
- Install the appropriate A/C compressor hose assembly flush adapter(s) from kit J 45268.
- Configure the flush adapter and hose for either a forward flush or reverse flush. Refer to the Flushing Configuration section of this bulletin.

Front/Rear (Dual Circuit) A/C Systems

Each circuit of a front/rear A/C system must be flushed separately. Flow to one circuit must be blocked with the use of a blocked orifice tube or blocked TXV. The front circuit should always be flushed first.

Front Circuit

- Recover the refrigerant from the vehicle.
- Remove the expansion device (orifice tube or TXV) from the front circuit.
- Re-connect the A/C lines with the orifice tube removed or install the appropriate non-blocked (open) TXV Adapter from kit J 45268.

Important

A blocked orifice tube is not supplied with the J 45268 Adapter kit. A blocked orifice can be made as follows: Cut the orifice tube frame and screen. Remove enough of the frame and screen to access the end of the brass orifice tube. Seal the tube by pinching off the end of the orifice tube.

- Remove the expansion device (orifice tube or TXV) from the rear circuit and install a plugged expansion device (orifice tube or TXV) into the rear circuit.
- Disconnect the A/C compressor manifold.
- Inspect the end of the suction hose for a suction screen. Remove the suction screen using the screen remover in the J 44551 A/C Suction Screen Kit, if installed.
- Install the appropriate A/C compressor hose assembly flush adapter(s) from kit J 45268.
- Configure the flush adapter and hose for either a forward flush or a reverse flush. Refer to the Flushing Configuration section of this bulletin.
- Perform the flush of the front system by following the instructions supplied with the J 43600 ACR 2000.
- Replace the plugged expansion device (orifice tube or TXV) in the rear circuit with an open expansion device (orifice tube or TXV).
- Replace the open expansion device (TXV or orifice tube) in the front circuit with a plugged expansion device (orifice tube or TXV) .
- Flush the rear system by following the instructions supplied with the J 43600 ACR 2000.

Flushing Configuration - Forward Flush

Forward flushing (the same flow as normal system operation) is recommended for contaminated refrigerant and/or A/C system lubricant.

Important

Install a new filter inside the J 45268-1 for every flush. Service the filter with GM P/N 5651802 (use P/N 729832 in Canada). Remove and discard the check valve from the filter.

Important

Check that the J 43600 ACR 2000 has a sufficient refrigerant charge prior to the start of the flushing procedure. The J 43600 ACR 2000 must have at least 7 pounds (3.18 kgs) of refrigerant available for charging in the machine's internal storage vessel.

Important

Always close the valve on the J 43600 ACR 2000 external refrigerant tank before starting the flushing procedure.

Follow these steps to perform the forward flush:

- Connect the J 45268-1 flush filter adapter to the suction port of the A/C compressor hose assembly flush adapter.

- Connect the blue hose from the J 43600 ACR 2000 to the J 45268-1 flush filter adapter.
- Connect the red hose from the J 43600 ACR 2000 to the discharge port of the A/C compressor hose assembly flush adapter.
- Follow the instructions supplied with the J 43600 ACR 2000 and flush the A/C system.

Flushing Configuration - Reverse Flush

Reverse flushing (the opposite flow of normal operation) is recommended for a desiccant bag failure. Always replace the accumulator after the reverse flushing procedure is complete.

Important

Install a new filter inside the J 45268-1 for every flush. Service the filter with P/N 5651802 (in Canada, P/N 729832). Remove and discard the check valve from the filter.

Important

Check that the J 43600 ACR 2000 has a sufficient charge prior to the start of the flushing procedure. The J 43600 ACR 2000 must have at least 7 pounds (3.18 kgs) of refrigerant available in the machine's internal storage vessel.

Important

Always close the valve on the J 43600 external refrigerant tank before starting the flushing procedure.

Follow these steps to perform the reverse flush:

- Connect the J 45268-1 flush filter adapter to the discharge port of the A/C compressor hose assembly flush adapter.
- Connect the blue hose from the J 45268-1 flush filter adapter.
- Connect the red hose to the suction port of the A/C compressor hose assembly flush adapter.
- Follow the instructions supplied with the J 43600 ACR 2000 and flush the A/C system.

After Flushing Is Complete

Important

Flushing will remove all the A/C system lubricant and leak detection dye from the A/C system.

After a catastrophic compressor failure, it is extremely important to eliminate and/or contain the debris that may cause repeat repairs. The debris generated from a catastrophic compressor failure will be discharged into the compressor suction line, discharge line, condenser and liquid line. The use of the J 44551 Suction Screen kit DOES NOT replace the need for liquid line filters as described in the vehicle specific Service Information. A liquid line filter should be installed whenever possible, after a catastrophic compressor failure, to protect the expansion device (orifice tube or TXV) in both the front and rear systems from debris.

The J 44551 supplies your dealership with the right tools and supplies to cover the Delphi HD6, HU6 and HT6 compressors, as well as most non-Delphi compressors, for most GM applications. Delphi V5 and V7 compressors already have this screen installed in the suction port of the compressor and do not need an additional screen installed.

The J 44551 Suction Screen Kit contains three different screen sizes. Additional screen sizes are being developed. It is important to select the correct size screen that will press fit into the suction port of the compressor hose assembly. The screen should not be installed loose inside the hose assembly.

- Insert the J 44551-6 sizing tool into the suction hose to select the correct size suction screen.
- Insert the suction screen into the compressor end of the suction hose.
- Select and install the correct mandrel to the J 44551-5.
- Install the J 44551-5 screen installation tool over the end of the suction hose and the suction screen.

Important

Correct placement of the J 44551 is critical.

- Tighten the forcing screw of the J 44551-5. The suction screen is fully installed when the screen is flush with the end of the suction hose fitting.
- Remove the J 44551-5 suction screen tool from the suction hose.
- Install the J 44551-1 Suction Screen Notification Label.
- Remove the A/C compressor.
- Remove the A/C compressor drain plug, if equipped. Drain the A/C system lubricant from the compressor into a clean, graduated cylinder. Rotate the compressor input shaft to assist in draining the A/C system lubricant from the compressor. Measure and record the amount of A/C system lubricant removed.
- Install the A/C compressor drain plug, if equipped.
- Install the A/C compressor.
- Remove the blocked orifice tube or TXV adapter (front/rear systems only).
- Install a new orifice tube or remove the TXV adapter.
    - Inspect the original TXV for debris.
    - Clean or replace the original TXV as needed.
    - For front/rear systems, be sure both expansion devices (orifice tubes or TXVs) are installed.

Important

Even after a system flush, control devices are subject to contamination and malfunction. To insure long term reliability the installation of the newly redesigned in-line A/C filter before an orifice tube or rear TXV is recommended.

- Install the in-line filter on front A/C systems before the orifice tube.
- Install the in-line filter on front/rear A/C systems before the "Y" in the evaporator tube.
- Do not allow metal burrs to enter the evaporator tube during cutting or when removing the burrs.
- Because of limited space in the engine compartment, it may be necessary to remove the system's existing orifice tube and install the orifice in the in-line filter.

- Install a Universal In-line A/C Filter, *P/N 89016656* (AC Delco P/N 15-10413). Refer to the instruction sheet included with the filter for detailed installation instructions. Re-install the suction screen if it was previously removed.
- Look up the required amount of A/C system lubricant for the vehicle being worked on. Refer to the System Capacities table in the appropriate section of SI. Remember that after a system flush there is no lubricant in the A/C system.
- Install the proper amount of Synthetic Lubricant (Universal Refrigerant Oil), P/N 12378526 (in Canada, P/N 88900060), into the A/C system using the J 45037 Oil Injector.
- Add one bottle of J 41447 R-134a Tracer Dye, GM P/N 12346303 (in Canada, P/N 10953458), or the equivalent, using the J 41459 dye injector (or the equivalent).
- Evacuate the A/C system.
- Recharge the A/C system to the proper charge level specified for that vehicle's A/C system.
- Verify proper A/C system operation.
- Leak test all connections using the J 44220 Universal 12V Leak Detection Lamp, the J 39400-A Leak Detector or equivalents. Remember that the A/C system must operate for several minutes before leak dye will show a leak if one is present.

Parts Information

Part Number	Description	Qty
5651802 (US) 729832 (Canada)	Filter/Carburetor Fuel Inlet	1 Required Per Flush (packaged individually)
89016656 (*AC Delco Part# 15-10413)	Universal In-Line A/C Filter	1 (packaged individually)
12378526 (US) 88900060 (Canada)	Lubricant, Synthetic (Universal Refrigerant Oil)	As Required (packaged 6, 8 oz tubes per case)
12346303 (US) 10953458 (Canada)	R-134a Tracer Dye	1 Per Vehicle (packaged 12 bottles per case)
12356150 (US) 10953485 (Canada)	R-134a Refrigerant	As Required (packaged as a 30 lb. cylinder)

Parts are currently available from GMSPO.

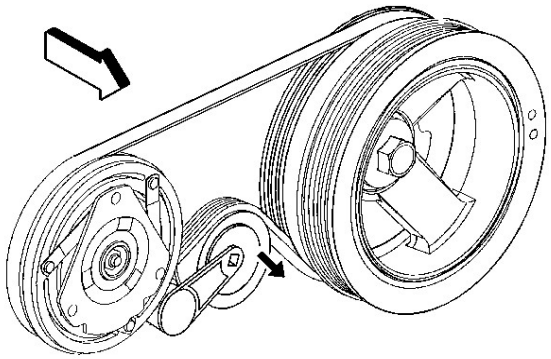
*This filter is *also available* through your local A/C Delco distributor.

Compressor Replacement

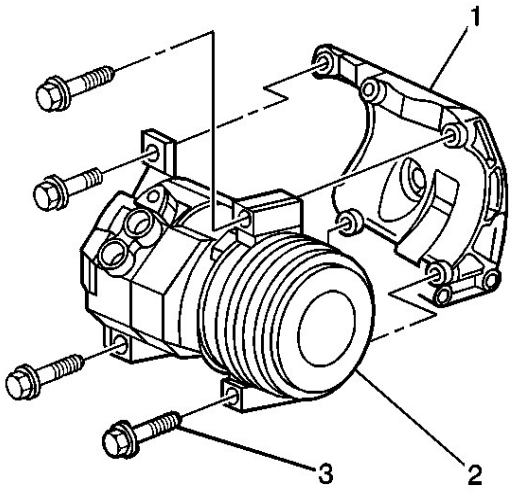
Tools Required

J 39400-A Halogen Leak Detector

Removal Procedure



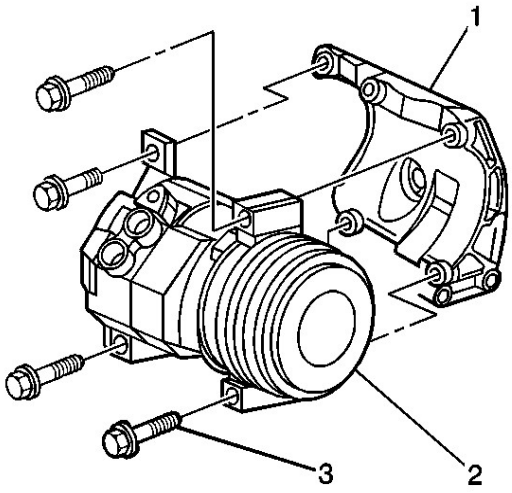
- Recover the refrigerant. Refer to Refrigerant Recovery and Recharging .
- Remove the fan shroud. Refer to Fan Shroud Replacement in Engine Cooling.
- Install a ratchet into the air conditioning (A/C) belt tensioner adapter opening.
- Rotate the A/C belt tensioner clockwise in order to relieve the tension on the belt.
- Remove the A/C belt from the A/C compressor.
- Slowly release the tension on the A/C belt tensioner.
- Remove the A/C discharge hose bolt from the A/C compressor.
- Remove the A/C discharge hose from the A/C compressor.
- Remove the A/C suction hose bolt from the A/C compressor.
- Remove the A/C suction hose from the A/C compressor.
- Discard the sealing washers.
- Cap or tape all of the hose and line ends.
- Disconnect the electrical connector from the A/C compressor coil.



- Remove the A/C compressor mounting bolts.
- Remove the A/C compressor (2) from the bracket (1).
- If replacing the A/C compressor. Refer to Compressor Oil Balancing .

Installation Procedure

- Add the proper amount of PAG oil to the compressor crankcase. Refer to Refrigerant System Capacities .



- Install the A/C compressor (2) to the bracket (1).

Notice

Refer to Fastener Notice in Cautions and Notices.

- Install the A/C compressor mounting bolts.
  Tighten

  Tighten the bolts to 50 N·m (37 lb ft).

- Connect the electrical connector to the A/C compressor coil.
- Remove the caps or tape from the hose and line ends.
- Install the new sealing washers. Refer to Sealing Washer Replacement .
- Install the A/C suction hose to the compressor.
- Install the A/C suction hose bolt to the A/C compressor.
  Tighten

  Tighten the bolt to 16 N·m (12 lb ft).

- Install the A/C discharge hose to the A/C compressor.
- Install the A/C discharge hose bolt to the A/C compressor.
  Tighten

  Tighten the bolt to 16 N·m (12 lb ft).

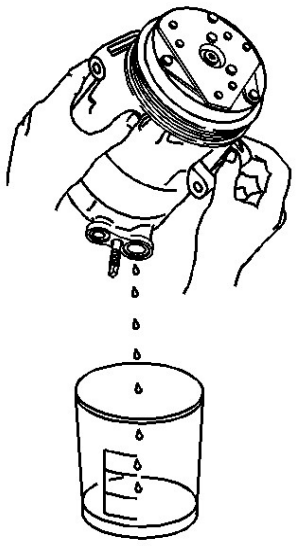
- Install the A/C drive belt. Refer to Drive Belt Replacement - Air Conditioning in Engine Mechanical - 6.0L.
- Install the fan shroud. Refer to Fan Shroud Replacement in Engine Cooling.
- Evacuate and recharge the A/C system. Refer to Refrigerant Recovery and Recharging .
- Leak test the fittings of the component using the J 39400-A .

Compressor Oil Balancing

Draining Procedure

Important: Drain and measure as much of the refrigerant oil as possible from the removed compressor.

- Drain the oil from both the suction and discharge ports of the removed compressor into a clean, graduated container. Rotate the compressor shaft to assist in draining the compressor.



- Measure and record the amount of oil drained from the removed compressor. This measurement will be used during installation of the replacement compressor.
- Properly discard the used refrigerant oil.

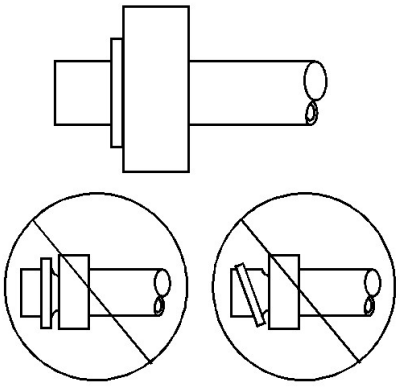
Balancing Procedure

Important: The refrigerant oil in the A/C system must be balanced during compressor replacement.

- The Denso replacement compressor is shipped with 74 ml (2.5 oz) of refrigerant.
- Before installing the compressor, the refrigerant oil will have to be fully drained.
- Add back the same quantity of PAG oil as drained from the removed compressor. Refer to the amount of refrigerant oil recorded during the compressor removal.

Sealing Washer Replacement

Removal Procedure



- Remove the seal washer from the A/C refrigerant component.

Important

Cap or tape the open A/C refrigerant components immediately to prevent system contamination.

- Inspect the seal washer for signs of damage to help determine the root cause of the failure.
- Inspect the A/C refrigerant components for damage or burrs. Repair if necessary.

Important

DO NOT reuse sealing washer.

- Discard the sealing washer.

Installation Procedure

Important

Flat washer type seals do not require lubrication.

- Inspect the new seal washer for any signs of cracks, cuts, or damage.
  Do not use a damaged seal washer.
- Remove the cap or tape from the A/C refrigerant components.
- Using a lint-free clean, dry cloth, clean the sealing surfaces of the A/C refrigerant components.
- Carefully install the new seal washer onto the A/C refrigerant component.
  The washer must completely bottom against the surface of the fitting.

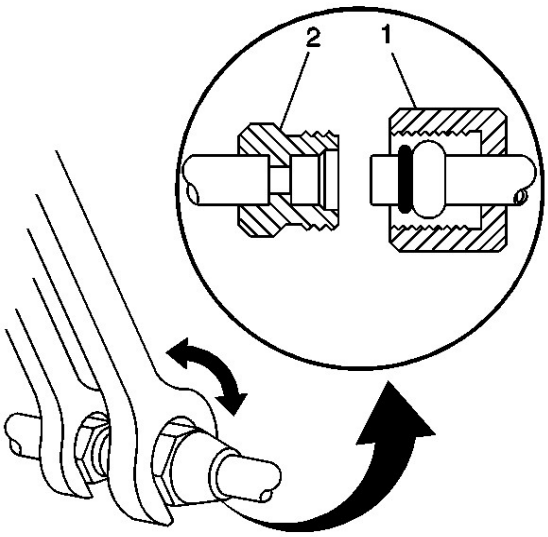
Important

After tightening the A/C components, there should be a slight sealing washer gap of approximately 1.2 mm (3/64 in) between the A/C line and the A/C component.

- Assemble the remaining A/C refrigerant components. Refer to the appropriate repair procedure.

O-Ring Replacement

Removal Procedure



- Disassemble the A/C refrigerant components. Refer to the appropriate repair procedure
  - For compression style fittings use a back up wrench on the fitting (2) and loosen the fitting nut (1).
  - For banjo style fittings remove the bolt retaining the banjo type fitting.
- Remove the O-ring seal from the A/C refrigerant component.
- Inspect the O-ring seal for signs of damage to help determine the root cause of the failure.
- Inspect the A/C refrigerant components for damage or burrs. Repair if necessary.

Important

Cap or tape the open A/C refrigerant components immediately to prevent system contamination.

- Cap or tape the A/C refrigerant components.
- Discard the O-ring seal.

Installation Procedure

- Inspect the new O-ring seal for any sign or cracks, cuts, or damage. Replace if necessary.
- Remove the cap or tape from the A/C refrigerant components.
- Using a lint-free clean, dry cloth, carefully clean the sealing surfaces of the A/C refrigerant components.

Important

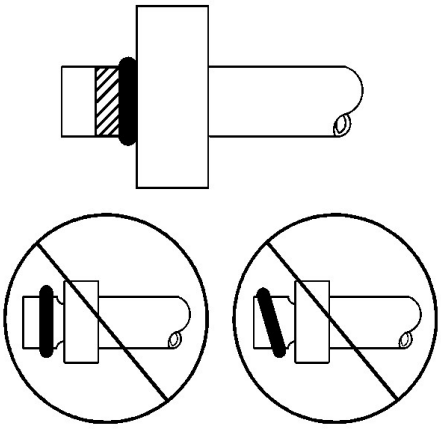
DO NOT allow any of the mineral base 525 viscosity refrigerant oil on the new O-ring seal to enter the refrigerant system.

- Lightly coat the new O-ring seal with mineral base 525 viscosity refrigerant oil.

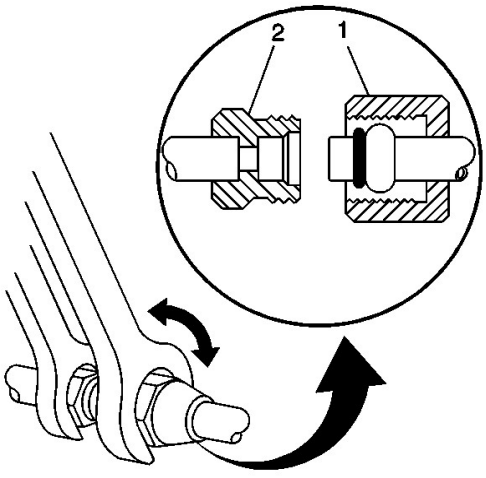
Important

DO NOT reuse O-ring seals.

- Carefully slide the new O-ring seal onto the A/C refrigerant component.



- The O-ring seal must be fully seated.



- Assemble the A/C components.
  Refer to the appropriate repair procedure.
  - For compression style fittings use a back up wrench on the fitting (2) and tighten the fitting nut (1) to specification.
  - For banjo style fittings install the bolt retaining the banjo type fitting and tighten to specification.

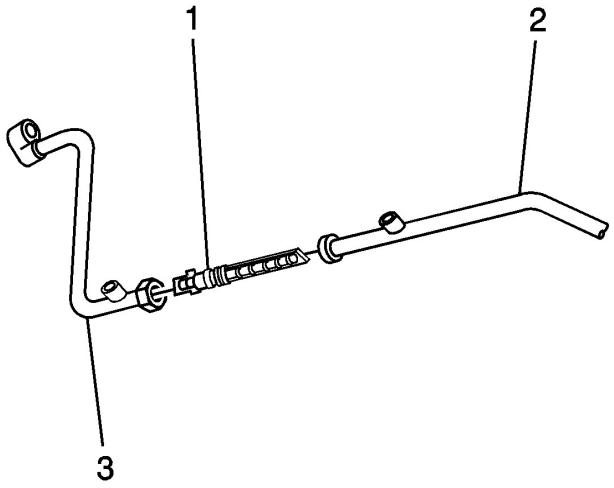
Expansion (Orifice) Tube Replacement

Tools Required

- J 26549-E Orifice Tube Remover
- J 39400-A Halogen Leak Detector

Removal Procedure

- Recover the refrigerant. Refer to Refrigerant Recovery and Recharging .



- Loosen the nut from the evaporator tube fitting.
- Use the J 26549-E in order to remove the orifice tube (1) from the evaporator tube (2).
- Cap or plug the open line.

Installation Procedure

- Uncap or unplug the evaporator tube.
- Lubricate the new O-ring using new 525 viscosity refrigerant oil.
- Install the new O-ring seal.
- Install the orifice tube (1) to the evaporator tube (2).
  - Coat the O-ring seal with 525 viscosity refrigerant oil.
  - Insert the short screen end of the new orifice (1) into the evaporator tube.
- Connect the evaporator tube at the fitting.
  Tighten

  Tighten the fitting to 25 N·m (18 lb ft).

- Evacuate and recharge the system. Refer to Refrigerant Recovery and Recharging .
- Leak test the fittings of the repaired component using J 39400-A .

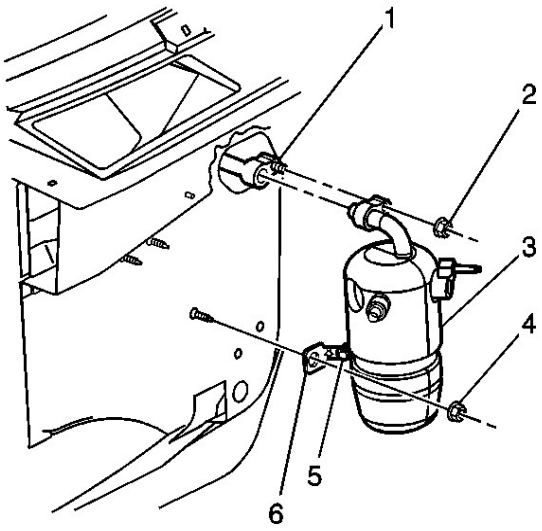
Accumulator Replacement

Tools Required

J 39400-A Halogen Leak Detector

Removal Procedure

- Recover the refrigerant. Refer to Refrigerant Recovery and Recharging .
- Disconnect the electrical connector from the A/C low pressure switch.
- Remove the compressor hose nut from the accumulator.
- Remove the compressor hose from the accumulator.



- Remove the nut (2) from the evaporator fitting.
- Remove the accumulator bracket nut (4) from the retaining stud.
- Remove the accumulator (3).
- Remove the retaining bracket bolt (5).
- Remove the retaining bracket (6) from the accumulator (3).
- Remove and discard the O-ring seals.

Installation Procedure

- Add the proper amount of PAG oil to the accumulator. Refer to Refrigerant System Capacities .
- Install new O-ring seals. Refer to O-Ring Replacement .
- Install the retaining bracket (6) to the accumulator.
- Install the retaining bracket bolt (5).
  Tighten
  Tighten the bolt to 10 N·m (89 lb in).

- Install the accumulator (3).
- Install the accumulator bracket nut (4).
  Tighten
  Tighten the nut to 9 N·m (80 lb in).
- Install the nut (2) to the evaporator fitting.
  Tighten
  Tighten the nut to 16 N·m (12 lb ft).
- Install the compressor hose to the accumulator.
- Install the compressor hose nut to the accumulator.
  Tighten
  Tighten the nut to 16 N·m (12 lb ft).
- Connect the electrical connector to the A/C low pressure switch.
- Evacuate and recharge the system. Refer to Refrigerant Recovery and Recharging .
- Leak test the fittings of the component using the J 39400-A .