

A/C System, Retrofitting R-12 to R-134a

Group: 87

Number: 95-03

Date: September 15, 1995

Subject:

A/C System, Retrofitting R-12 to R-134a

Model(s):

All 1986 - 1993

Please read all sections of this Bulletin thoroughly before proceeding with retrofit!

At customer's request and expense, Audi models from 1986 to 1993 equipped with either a "Nippondenso" or "Zexel" compressor may be retrofitted to use refrigerant R-134a.

Different R-134a retrofit parts and procedures are necessary for each compressor type. Refer to the Table of Contents for applicable instructions.

Notes:

- ^ Retrofitting to refrigerant R-134a is not reimbursable under warranty.
- ^ Retrofit is not planned for vehicles equipped with "York" or "Delco-Air" compressors.
- ^ Always confirm compressor type prior to retrofitting.
- ^ Always check A/C system integrity and function before proceeding with retrofit.

Caution:

Part numbers are for reference only. Always check with your Parts Dept. for the latest parts information.

Cautions

Caution

Always use separate refrigerant recovery, recycling and recharging service equipment for R-12 and R-134a systems. If the same piece of equipment is used for both R-12 and R-134a systems, residual traces of refrigerant will contaminate and damage the equipment. Service equipment includes recovery, recycling, recharging station, vacuum pump, manifold gauges, etc.

Caution

Do Not blow compressed air and nitrogen through the compressor. Refrigerant circuits retrofitted to use R-134a must not be rinsed with agent R-11.

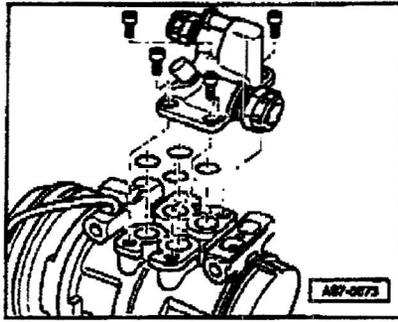
Replacement compressors are filled with nitrogen. When updating replacement compressors prior to system retrofit, relieve nitrogen charge by carefully loosening protective caps on suction and discharge ports. If gas does not escape when removing protective caps, assume leakage and do not install compressor.

Always replace accumulator if refrigerant circuit is left open.

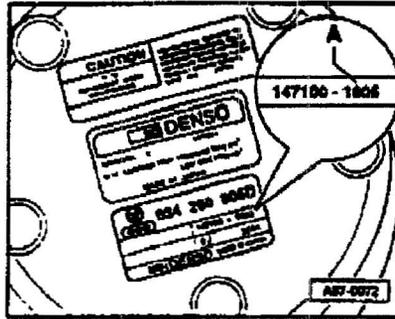
Due to residual amounts of mineral based refrigerant oil in systems retrofitted to use refrigerant R-134a, the newly installed PAG refrigerant oil will discolor immediately after use. This is normal and does not indicate a refrigerant related fault.

Compressor Identification

Nippondenso compressor:

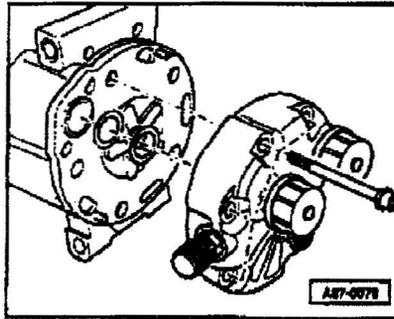


Look for suction and discharge fittings that attach to compressor manifold at side of compressor housing

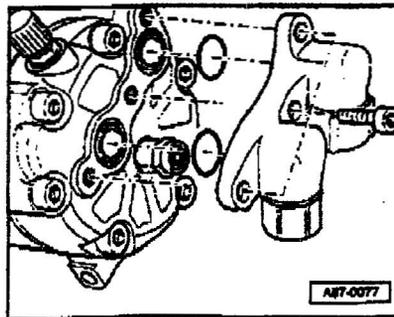


Also look for Nippondenso identification label at end of compressor

Zexel compressor:



Look for suction and discharge fittings that attach to compressor manifold at end of compressor housing.



Also look for Zexel compressors equipped with angled suction/discharge fittings mounted to the end of the compressor (for clearance)

System Preparation

^ Review all Cautions, Warnings and A/C refrigerant system safety measures stated in appropriate model repair information.

- ^ Always use Underwriter's Laboratory (UL) approved refrigerant service equipment such as Kent Moore ACR3, ACR4 or equivalent.
- ^ Before proceeding with retrofit, perform a visual inspection and functional test of complete A/C system; including instrument panel outlet temperature, air distribution, refrigerant system components, system pressure and leak test. Repair/replace parts as necessary.
- ^ Before proceeding with retrofit, ensure all replacement parts, necessary special tools and equipment are available.
- ^ Always refer to the most recent parts information for affected models when replacing damaged or leaking R-12 refrigerant system parts (including the routine replacement of O-rings).
- ^ If replacement of damaged or leaking refrigerant components is necessary, blow compressed air followed by nitrogen through the remaining (except compressor), disconnected, free flowing system components before re-assembly in order to remove moisture, impurities and remaining refrigerant oil.
- ^ Any refrigerant system component replaced prior to retrofitting the system to R-134a requires PAG refrigerant oil to be added to the circuit.
- ^ All replacement compressors must be updated prior to installation and subsequent R-134a retrofit:
- ^ Nippondenso compressors, See Nippondenso Compressor A/C System in this bulletin.
- ^ Zexel compressors, See Zexel Compressor A/C System in this bulletin.

Replacement Compressor Updating

Replacement Nippondenso compressor, updating

Note:

Replacement compressors are factory filled with R-12 compatible compressor 011 which must be drained and replaced with appropriate quantity of PAG refrigerant oil.

Only when replacement of a damaged or leaking Nippondenso compressor is necessary prior to system retrofit, update the replacement unit as follows:

- Obtain Nippondenso retrofit kit:
Part No. 4A0 298 107 A
- Relieve nitrogen charge in replacement compressor by carefully loosening protective caps on suction and discharge ports.
- Drain and measure amount of existing refrigerant oil at high and low service ports (rotating compressor via the clutch will aid draining).
- Replace shaft seals (if necessary*), See Retrofit Procedures.
- Replace manifold seals (if necessary*), See Retrofit Procedures.
- Fill with same amount of PAG refrigerant oil measured when draining.

*Notes:

- ^ Replacement compressors from the following manufacturer code have R-134a compatible shaft and manifold seals which do not need replacement:
 - 1605 and higher.
 - 2893 " "
 - 3901 " "
- ^ On these units, only change refrigerant oil to FAG type.

Required Parts

Parts required, A/C system with Nippondenso compressor

All models require the following parts:

- ^ Nippondenso retrofit kit:
Part No. 4A0 298 107 A

Consisting of:

- 2 containers (250cc) PAG refrigerant oil for Nippondenso compressors: Part No. G 052 300 A2.
- Manifold O-rings and manifold prechamber moulded gasket.
- Compressor shaft seal.
- R-134a identification labels and tag.
- ^ Service valve adapter/label kit:
Part No. 357 820 794
- ^ Restrictor*
- ^ Restrictor O-rings*
- ^ Compressor O-rings*
- ^ Accumulator O-rings*
- ^ Accumulator (see chart)

Model/production	Accumulator Part No.
90/90 quattro	443 271 161 A
Coupe quattro	8A0 820 191 B
5000/5000quattro 100/100 quattro 200/200 quattro	4A0 820 191 E
V8 quattro	441 820 191 A

Accumulator applications, System with Nippondenso compressor

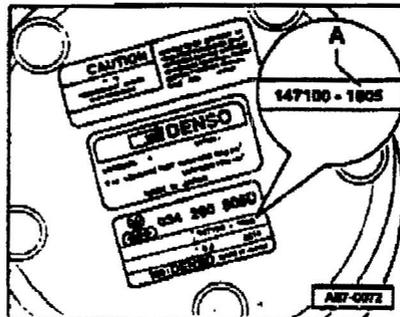
Caution

Part numbers are for reference only
Always check with your Parts Dept. for the latest parts information.

Retrofit Procedures

Retrofit procedure, A/C System with Nippondenso compressor

- Discharge and capture refrigerant R-12 using Kent Moore ACR3 or equivalent.
- Evacuate system to remove any contaminants.
- Remove compressor.
- Drain and measure amount of existing refrigerant oil from high and low service ports (rotating compressor via the clutch will aid draining).
- Replace shaft seals (if necessary*).
- Replace manifold seals (if necessary*).



* Compressors beginning with the following manufacturer code have shaft and manifold seals which are R-134a compatible. These compressors do not need updating:

- 1605 and higher
- 2893 " "
- 3901 " "

Refer to manufacturer code location -A-.

On these units, only change refrigerant oil to PAG type.

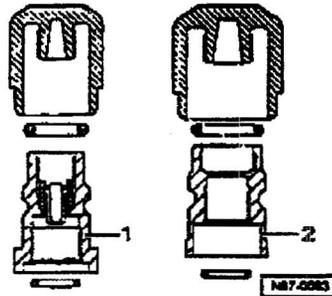
If seal replacement is not necessary, proceed as follows:

- Fill with same amount of PAG refrigerant oil measured when draining.

Note:

^ If amount of oil drained from compressor exceeds 80 cc (2.7 fl oz), fill compressor with 80 cc (2.7 fl oz) PAG oil and fill the remaining quantity via the replacement accumulator.

- Reinstall compressor.
- Install new O-rings on compressor suction and discharge hose fittings.
- Remove accumulator.
- Clean outside of accumulator if dirty.
- Weigh the removed accumulator.
- Fill new accumulator with PAG refrigerant oil until the weight of the original accumulator is achieved.
- Install accumulator (use new O-rings).
- Replace restrictor. (use new O-rings).
- Identify and install correct R-134a adapters (from Kit Part No. 357 820 794) to service valve (5).



Low pressure service valve -1- (Blue), 7/16" connection

High pressure service valve -2- (Red), 3/8" connection or 7/16" connection

- Evacuate system for a minimum of 45 minutes using Kent Moore ACR4 or equivalent.
- Charge system with refrigerant R-134a.
- Turn compressor by hand via magnetic clutch approximately 10 rotations.
- Perform quality check and leak test
- Install new R-134a warning label, Part No. 8A0 010 132, in place of existing R-12 warning label on front crossmember or radiator cover.

Note:

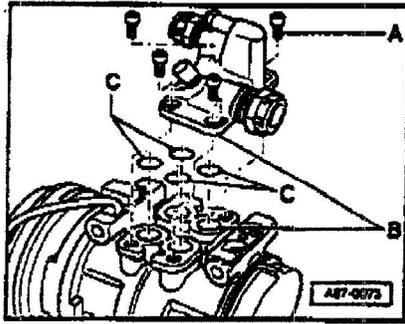
^ R-134a warning label Part No. 8A0 010 132 lists three R-134a fill capacities. Cross out fill amounts not applicable to retrofitted vehicle using a waterproof marker.

- Apply new R-134a warning label, Part No. 8A0 010 132 E, to visible location on compressor housing.
- Affix new R-134a warning label, Part No. 8A0 010 132 G, to first page of the vehicle Maintenance Booklet.

Nippondenso compressor shaft seals, replacing

Note:

^ Prepare a clean work area to ensure against seal leakage after installation.



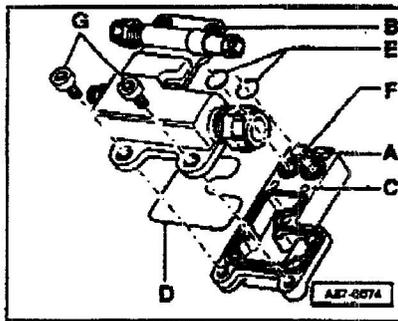
Notes:

- ^ Nippondenso compressors have two different types of suction/discharge manifold assemblies;
- ^ manifold without pre-chamber
- ^ manifold with pre-chamber
- ^ Diagram shows manifold without pre-chamber.

- Remove 4 bolts -A- Tightening torque 20 Nm (15 ft lb).
- Clean surfaces -B-, remove all traces of refrigerant oil.
- Replace O-rings -C-.

Note:

- ^ Lubricate lightly with PAG refrigerant oil before installing.



Note:

- ^ Diagram shows manifold with pre-chamber:

- Remove bolts -G-
Tightening torque 20 Nm (15 ft lb).
- Remove manifold -B- from pre-chamber -A-.
- Clean surface -C-, remove all traces of refrigerant oil.
- Replace formed seal -D- and O-rings -E-.

Note:

- ^ Alignment pin -F-, check for correct fit.

Replacement Compressor Updating

Replacement Zexel compressor, updating

Note:

- ^ Two types of replacement Zexel compressors are available; R-12 and R-134a type (labeled/identified as such). The R-134a type will be the only replacement compressor available when supplies of R-12 type run out.

Only when replacement of a damaged or leaking Zexel compressor is necessary prior to system retrofit, update the replacement unit as follows:

- Obtain Zexel retrofit kit:

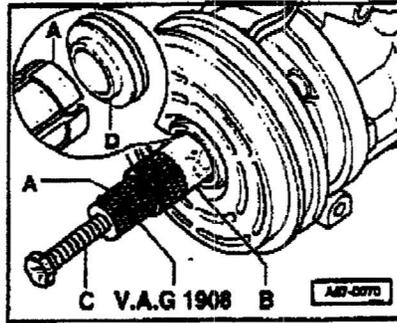


Fig.1 Flange Seal (with collector ring-counter support),
removing and installing

- Remove clutch assembly,
Repair Manual, Air Conditioning, Repair Group 87.
- Insert puller -A- in groove -D- of flange seal.
- Tighten sleeve by pushing in the tension ring -B-.
- Remove shaft seal by turning screw -C-.

Note:

- ^ Lubricate lightly with PAG refrigerant oil before installing.

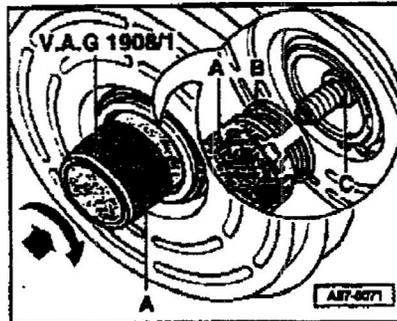


Fig. 2 Shaft seal (with collector ring)
removing and installing

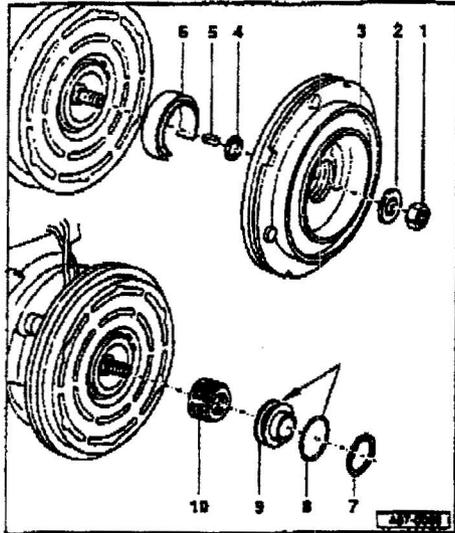
- Insert puller -A- in shaft seal -B-, remove shaft seal.
- Check shaft for dirt and clean if necessary.
- Check shaft of compressor and groove -C-, if sharp edges or burrs are present, remove and clean shaft.

Note:

- ^ Lubricate lightly with PAG refrigerant oil before installing.

- Install clutch assembly and adjust gap.

Nippondenso compressor manifold seals, replacing



1 – Hex nut M8

- ◆ Tightening torque:
20 Nm (15 ft lb)

2 – Spring washer

3 – Clutch disc

4 – Spacers to adjust gap dimension

5 – Fitted spring

6 – Felt ring

7 – Lock ring

- ◆ Install lock ring with smooth side to compressor
- ◆ Compress spring on shaft seal to ensure lock ring fits in groove

8 – O-ring seal

- ◆ Replace
- ◆ Installed in flange seal

9 – Flange seal (with collector ring-counter support)

- ◆ Replace
- ◆ Removing and installing, ⇒ Fig. 1

10 – Shaft seal (with collector ring)

- ◆ Replace
- ◆ Removing and installing ⇒ Fig. 2

Note:

Coat lightly with PAG refrigerant oil before installing.

Part No. 4AO 298 107

Relieve nitrogen charge in replacement compressor by carefully loosening protective caps on suction and discharge ports.

- In both cases (R-12 or P-134a type), replace pressure relief valve.

Note:

R-12 type replacement compressors are factory filled with R-12 compatible compressor oil which must be drained.

- Drain and measure amount of existing refrigerant oil via oil drain plug (rotating compressor via the clutch will speed draining).
- Fill with same amount of FAG refrigerant oil.
- If amount of oil drained exceeds 80 cc (2.7 fl oz), fill compressor with 80 cc (2.7 fl oz) FAG oil and the remaining quantity via the replacement accumulator.
- Proceed with system retrofit.

Notes:

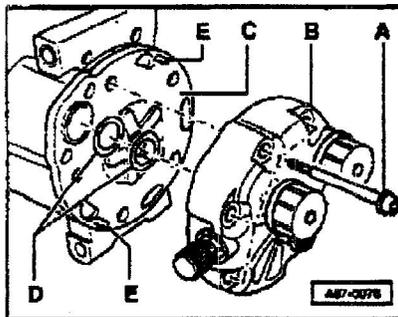
- ^ R-134a type replacement compressors are factory filled with R-134a compatible compressor oil. This oil does not require changing.
- ^ R134a type replacement compressors require the suction/discharge manifold from the original (R-12) compressor to be removed and installed on the replacement unit.

R134a Zexel replacement compressor, modification

- ^ (applies only when replacing damaged or leaking R-12 Zexel compressor with R-134a Zexel compressor)

Notes:

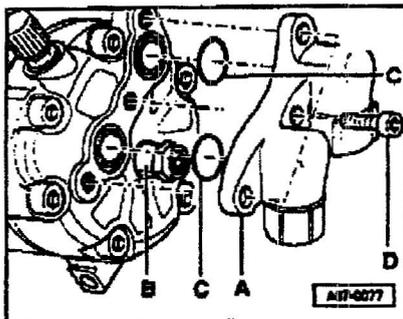
- ^ Prior to system retrofit, R-134a type replacement compressors require interchanging the manifold plates from the existing compressor to the new compressor:
- ^ If equipped, angled suction/discharge manifold adaptors must be interchanged
- Prepare a clean work area to ensure against seal leakage after installation.
- Relieve nitrogen charge in replacement compressor by carefully loosening protective caps on suction and discharge ports.
- Remove pressure relief valve from manifold plate -B- of existing R-12 compressor and replacement R-134a compressor.



- Remove bolts -A- from both the existing compressor and new compressor. Tightening torque 20 Nm (15 ft lbs).
- Remove manifold plate -B- from both compressors.
- Clean surface -C- on R-134a replacement compressor; remove all traces of refrigerant oil.
- Install manifold plate from existing R-12 compressor on new R134a replacement compressor.
- Install new pressure relief valve from retrofit kit.

Notes:

- ^ Check for correct alignment of pins -E- and spring washer -D- (for suction pressure control).
- ^ R-134a type replacement compressors are factory filled with R-134a compatible compressor oil. This oil does not need to be changed



Note:

- ^ Existing R-12 compressors equipped with an angled suction/discharge adaptor only require interchanging of the angled adaptor to the replacement R-134a compressor and the installation of the pressure relief valve. Manifold interchange is not necessary with this configuration.
- Remove bolts -D- from existing compressor
Tightening torque 20 Nm (15 ft lbs).
- Remove manifold adaptor -A- and transfer to new R-134a replacement compressor
- Replace pressure relief valve -B-.
- O-rings -C- from R-134a replacement compressor may be used (available in kit, Part No. 4A0 298 013 AA if required).
- Proceed with system retrofit.

Required Parts

Parts required,
A/C system with Zexel compressor

All models require the following parts:

- ^ Zexel retrofit kit:
Part No. 4A0 298 107

Consisting of:

- 1 container (300cc) PAG refrigerant oil for Nippondenso compressors: Part No. G 052 200 A2.
- Pressure relief valve (with O-ring).
- R-134a identification labels and tag.
- ^ Service valve adapter/label kit:
Part No. 357 820 794
- ^ Restrictor*
- ^ Restrictor O-rings*
- ^ Compressor O-rings*
- ^ Accumulator O-rings*
- ^ Accumulator

Accumulator applications, systems with Zexel compressor:

Model/production	Accumulator Part No.
90/90 Quattro, 80/80 Quattro	8A0 820 191 B
100/100 Quattro, 200/200 Quattro	4A0 820 191 E

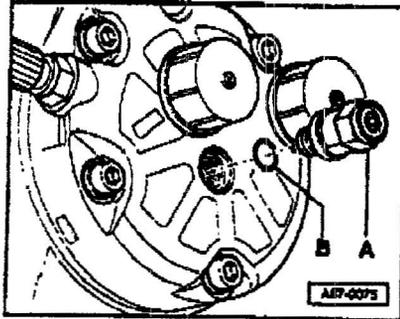
Caution

Part numbers are for reference only. Always check with your Parts Department for the latest parts information.

Retrofit Procedures

Retrofit procedure,
A/C System with Zexel compressor

- Discharge and capture refrigerant R-12 using Kent Moore ACR3 or equivalent.
- Evacuate system to remove any contaminants.
- Replace pressure relief valve.

**Note:**

^ Compressor removal may be necessary if pressure relief valve is not accessible as installed.

- Remove pressure relief valve -A- and replace with valve and O-ring supplied in retrofit kit. Tightening torque: 10 Nm (7 ft lbs).

Note:

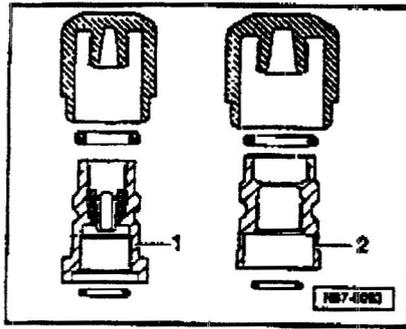
^ Lubricate lightly with PAG refrigerant oil before installing.

- If compressor is removed to replace valve, also drain and measure amount of existing refrigerant oil via oil drain plug (rotating compressor via the clutch will speed draining). Fill with same amount of PAG refrigerant oil.

Note:

^ Only small amounts of refrigerant oil are present in installed, operational Zexel compressors. Unless access to pressure relief valves is necessary, it is not necessary to remove compressors to drain the oil.

- Reinstall compressor (if removed).
- Remove accumulator.
- Clean outside of accumulator if dirty.
- Weigh the removed accumulator.
- Fill new accumulator with PAG refrigerant oil until the weight of the original accumulator is achieved.
- Install accumulator (use new O-rings).
- Replace restrictor. (use new O-rings).
- Identify and install correct R-134a adapters (from Kit Part No. 357 820 794) to service valve (5).



- ^ Low pressure service valve -1- (Blue), 7/16" connection
- ^ High pressure service valve -2- (Red), 3/8" connection or 7/16" connection
- Evacuate system for a minimum of 45 minutes using Kent Moore ACR4 or equivalent.
- Charge system with refrigerant R-134a, see refrigerant capacity table.
- Turn compressor by hand via magnetic clutch approximately. 10 rotations.
- Perform quality check and leak test.
- Install new R-134a warning label, Part No. 8A0 010 132, in place of existing R-12 warning label on front crossmember or radiator cover.

Note:

- ^ R-134a warning label Part No. 8A0 010 132 lists three R-134a fill capacities. Cross out the fill amounts not applicable to retrofitted vehicle using a waterproof marker.
- Apply new R-134a warning label, Part No. 8A0 010 132 E, to visible location on compressor housing.
- Affix new R-134a warning label, Part No. 8A0 010 132 G, to first page of the vehicle Maintenance Booklet.

Refrigerant/Oil Capacity Table

Model	Compressor	Capacity
90/90 quattro Coupe quattro	Nippondenso	750g + 50g (26.5oz + 1.8oz)
90/90 quattro	Zexel	650g + 50g (23oz + 1.8oz)
80/80 quattro	Zexel	750g + 50g (26.5oz + 1.8oz)
5000/5000 quattro 100/100 quattro 200/200 quattro V8 quattro	Nippondenso	900g + 50g (31.7oz + 1.8oz)
100/100 quattro 200/200 quattro V8 quattro	Zexel	900g + 50g (31.7oz + 1.8oz)

Refrigerant R-134a, Capacity Table

Note:

- ^ R-134a warning label Part No. 8A0 010 132 lists three R-134a fill capacities. When applying new R-134a label to vehicle, cross out the fill amounts not applicable to retrofitted vehicle using a waterproof marker.

Compressor	Refrigerant system, total refrigerant oil capacity	Replacement compressor, refrigerant oil quantity
Nippondenso	300 cc +/- 20 cc (10.2 fl oz +/- 0.7 fl oz)	80 cc +/- 20 cc (2.7 fl oz +/- 0.7 fl oz)
Zexel	300 +/- 20 cc (10.2 fl oz +/- 0.7 fl oz)	300 +/- 20 cc (10.2 fl oz +/- 0.7 fl oz)

PAG Refrigerant Oil, Capacity Table

- ^ Refrigerant oil for Nippondenso compressor Part No. G 052 200 A2
- ^ Refrigerant oil for Zexel compressor Part No. G 052 300 A2

Note:

- ^ Factory filled PAG oil (Part No. G052 154 A2) in Zexel R-134a replacement compressors does not require changing.

Caution

The total system oil capacities shown are the maximum allowed for each compressor and refrigerant circuit combination. Do not exceed the total system oil capacity. Compressor damage and a decrease in cooling performance will result. PAG-oil (Poly-Alkaline-Glycol) is hygroscopic (absorbs water) After use, opened containers should be sealed immediately. PAG-oil from containers that have remained open for longer periods of time must not be used.