Freightliner LLC New Vehicle and Aftermarket Parts Limited Warranties warrant that Freightliner LLC products will be free from defects in material and workmanship that occur under normal use within the applicable warranty period, subject to certain limitations and exclusions as specified in the Warranty Manual.

It is assumed the technician or analyst reading this guide has familiarized themselves with all group 83 troubleshooting and service instructions in the vehicle Workshop Manual and has read all group 83 service bulletins pertaining to the vehicle.

Compressor damage caused during field installation or as a result of improper service is not warrantable and should not be submitted for a warranty claim.

Use quality service equipment and supplies. Accuracy of warranty checks depends upon the proper use of quality HVAC service equipment that is maintained and calibrated. This guide presumes that the technician will use high quality HVAC service equipment. If leak checks are not completed in accordance with the vehicle's workshop manual using a leak tester recommended by the workshop manual, then warranty may not be assessed correctly.

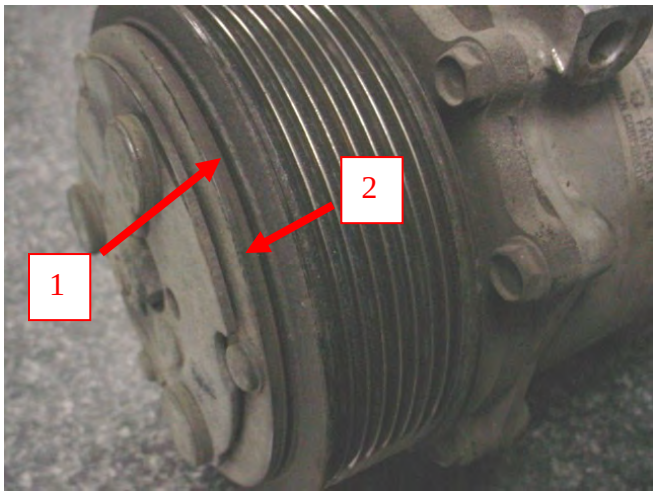
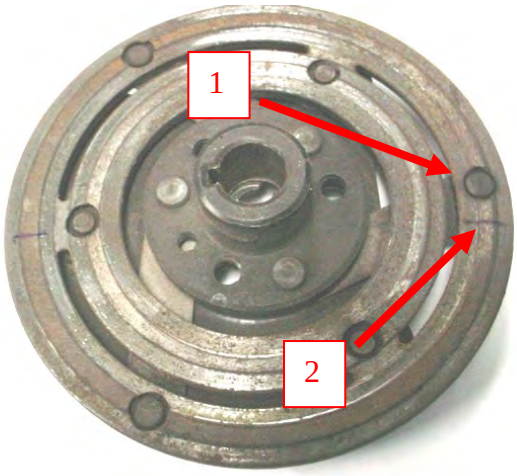
Most AC compressor problems are caused by problems elsewhere in the A/C system. Analysis indicates that more than 90% of compressors returned for warranty have failed from system issues resulting in compressor failure. **Submitting a compressor for warranty that has failed due to a system related issue will result in denial of warranty.**

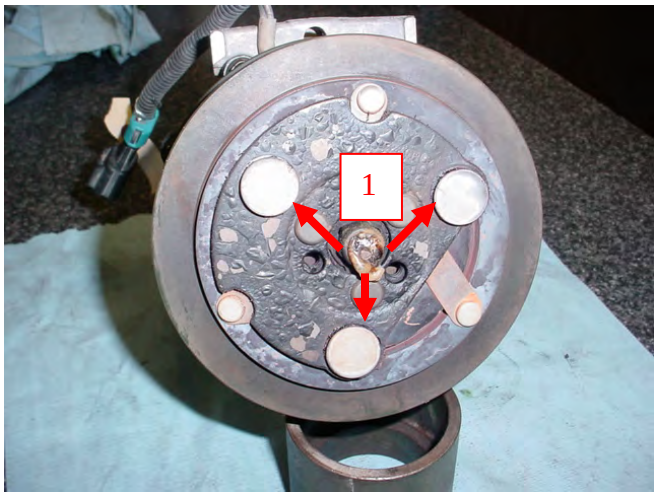
When replacing an AC compressor, verify whether the failure has been caused by **other system issues** such as:

- **System leaks.** All systems which exhibit compressor failure should be leak checked using approved methods and equipment (See section 83 of Workshop/Service Manual of the vehicle being serviced for complete details on leak testing and servicing the AC system)
- **Incorrect charge (oil or refrigerant).** The effects of incorrect charge may not be evident immediately following the service procedure. R134a and (PAG) oil, in the correct quantities, are the only fluids authorized for use in the AC system. Common causes of incorrect charge are:
    - Adding refrigerant or oil of the wrong type or amount
    - Adding oil without estimating amount remaining in system
    - Rounding up or topping up refrigerant
    - AC fill equipment that is out-of-calibration
    - Air introduced by incompletely recycled refrigerant (air not purged)
    - Contamination by non-R134a refrigerants or blends

- **System blockages (air flow and refrigerant flow).** Anything that blocks refrigerant flow inhibits the system's ability to carry heat away from the compressor and causes compressor temperatures to rise. Blockage of air flow through the condenser leads to higher system pressures which in turn lead to higher compressor temperatures.

- **Heat Transfer (condenser and evaporator).** The uninterrupted flow of air through the evaporator and condenser is necessary in order to assure refrigerant flow and heat rejection, respectively. Compressor failure may result if either is not maintained, either due to failure of the fans (condenser or evaporator), blockage of the heat exchanger, or blockage of the filter in the case of the evaporator.

Worn-Out Clutch	**Section 15.01.01** **Damage Code: 130-001A09590 (if warrantable)**
 **Figure 1**. A worn-out clutch with gap greater than .031 inch (Ref. 1) and armature plate (Ref. 2).  **Figure 2**. Back-side of armature plate of worn-out clutch with wear on edge of one rivet (Ref. 1) and ridge indicated by ink mark (Ref. 2) across ridge created by clutch wear.	**Vehicle Symptoms:** Worn-out clutch is indicated by all of the following: • Clutch armature plate does not pull-in in all areas of the clutch. • Clutch gap is greater than .039 inch in areas where it does not pull-in (Fig. 1). • Clutch may have slipped and shows signs of overheating. • If the clutch slipped and overheated, it may have caused the compressor front shaft seal to leak. **Post-removal Observations:** Worn-out clutch is indicated by the following: • Excessive armature plate wear may be used to indicate excessive gap. • Wear down to any one rivet is an indication of worn-out clutch (Fig. 2). **Warranty Coverage:** A compressor/clutch assembly with evidence of worn-out clutch is **warrantable** if the following applies: • Clutch gap is greater than .031 inch. • Compressor rotation is still smooth (no internal binding or failure). A compressor/clutch assembly with evidence of worn-out clutch is **non-warrantable** if any of the following apply: • Failure of another system component caused the worn-out clutch.* * Note: May be warrantable as secondary damage.

Loss of Refrigerant	**Section 15.01.02** **Damage Code: 130-001A09609 (if warrantable)**
 **Figures 3 and 4**. Clutch armature plate with paint bubbled and peeled and rubber isolators (Ref. 1) melted after compressor lock-up from loss of refrigerant. 	**Vehicle Symptoms:** Loss of refrigerant is indicated by any of the following: • Gradual loss of AC performance • Compressor lock-up. • Clutch slippage • Drive belt failure **Post-removal Observations:** Loss of refrigerant is indicated by all of the following: • No lubricant in compressor. • Little or no refrigerant in system. • Leak in system and/or compressor.* * Note: Due to the size of the system and number of connections, the probability of a leak somewhere other than in the compressor is high. Therefore the entire system should be leak-checked using the methods recommended in the vehicle's workshop manual.
	Warranty Coverage: A compressor/clutch assembly with evidence of loss of refrigerant is **warrantable** if only the compressor leaks. A compressor/clutch assembly with evidence of loss of refrigerant is **non-warrantable** if there is a leak elsewhere in the system. ** ** Note: May be warrantable as secondary damage.

High Pressure/Low Flow	**Section 15.01.03** **Damage Code: 130-001A09345 (if warrantable)**

Figure 5. Clutch overheated from slipping.

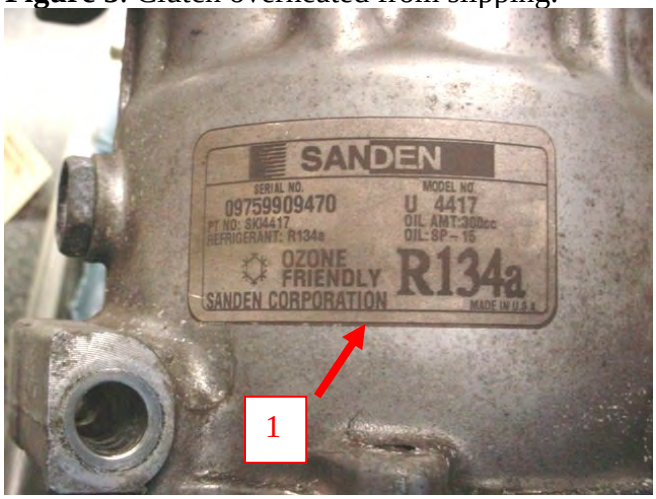


Figure 6. Label darkened and shrunken. Note glue visible around edge (Ref. 1)

Figure 7. Black oil in compressor.*

Vehicle Symptoms:

High pressure/low flow is indicated by any of the following:

- Poor AC performance.
- Compressor cycles off while vent temperatures remain high.
- Engine fan remains engaged more than normal.
- Clutch or belt slips during compressor engagement.
- Discharge from the pressure relief valve (PRV).

Post-removal Observations:

High pressure/low flow is indicated by all of the following:

- Clutch damaged due to slipping (see fig. 5).
- Compressor label darkened and shrunken from heat (see fig. 6).
- Oil remaining in compressor is black (see fig. 7).
- System blockage, over-charge, or contaminated system.

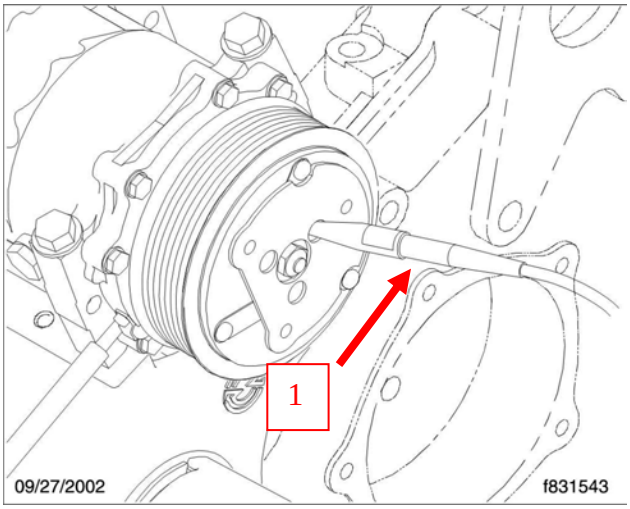
Warranty Coverage:

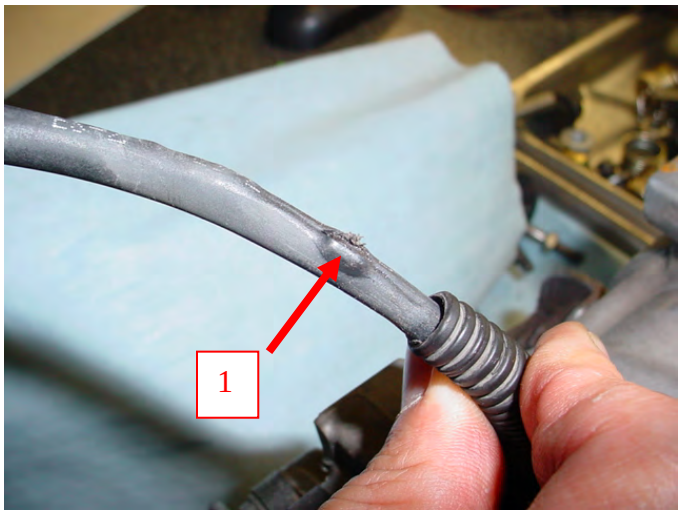
A compressor assembly with evidence of high pressure/low flow is **warrantable** only if all of the following apply**:

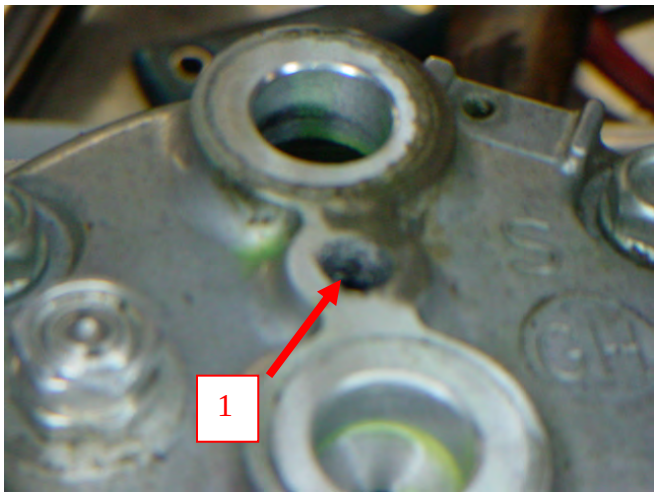
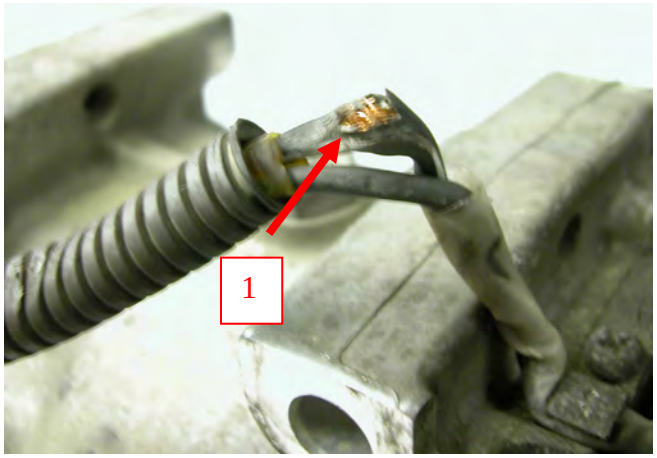
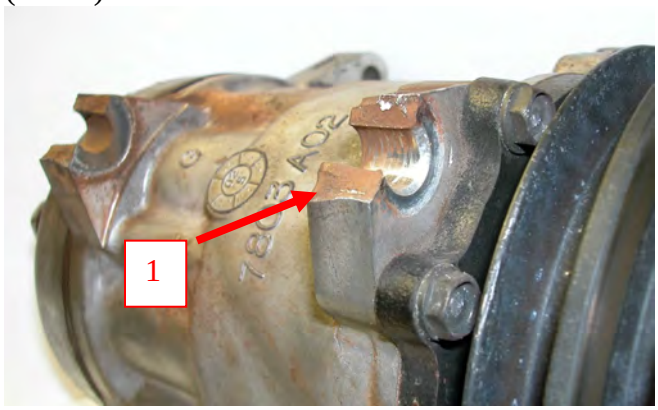
- The source of blockage is at the compressor connections.
- The compressor was factory installed.
- The condition occurs within the initial operating period. (Refer to the Initial Operating Period in section 1.5 of the Warranty Manual for details.)
- The correct amount of refrigerant was recovered from the system.

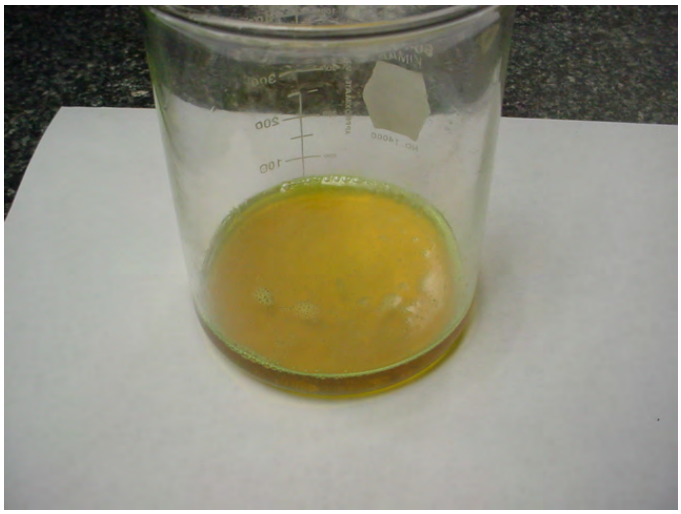
*Note: Do not disassemble compressors that are to be returned for warranty.

**Note: The compressor assembly may be warrantable as progressive damage.

Compressor Leak	**Section 15.01.04** **Damage Code: 130-001A09609 (if warrantable)**
 **Figure 8**. Using detector probe to check for leaks at the compressor front shaft seal. Leak detector probe (Ref. 1).* *Note: See vehicle workshop manual for proper leak detection methods. Use of incorrect leak detection methods will lead to incorrect diagnosis and a possible rejected claim. **Note: The compressor assembly may be warrantable as subsequent damage of a warrantable repair.	**Vehicle Symptoms:** Compressor leak is indicated by any of the following: • Gradual loss of AC performance. • Increased compressor cycling. **Warranty Coverage:** A compressor/clutch assembly with a compressor leak is **warrantable** if one of the following apply: • The compressor exhibits a leak*, and the compressor clutch shows no sign of excessive heat. (OR) • The compressor exhibits a leak*, and the clutch shows signs of excessive heat, and there are no leaks elsewhere in the system. A compressor/clutch assembly that leaks is **non-warrantable** if all of the following apply: • The clutch shows signs of excessive heat. • There is a leak elsewhere in the system. **

Diode Failure	**Section 15.01.05** **Damage Code: 130-001A09317 (if warrantable)**
 **Figure 9**. Diode in power lead has failed open (Ref. 1). Swell in heat shrink is from over-heated diode.	**Vehicle Symptoms:** Diode failure is indicated by any of the following: • Unexplained grounding codes. • Failure of clutch relays. • Blown fuse on clutch circuit. **Observations:** Diode failure is indicated by any/all of the following: • Heat damaged diode. • Reverse voltage spike when clutch power is disengaged (use of an oscilloscope would be required to observe this reverse voltage). • Spark on positive lead when power is taken away from clutch by breaking the circuit (this spark may not be visible in a well lit area, though it may be audible). Use of a 12V power supply and a connector with visible contacts may be required to observe this spark. **Warning: DO NOT reverse the supply voltage to the clutch; this will damage the diode.** • Flexing the cable in the area of the diode may cause an intermittent short.
	Warranty Coverage: A compressor/clutch assembly with evidence of diode failure is **warrantable** unless an unwarrantable condition exists as stated below. A compressor/clutch assembly with evidence of diode failure is **non-warrantable** if any of the following apply: • The compressor clutch lead was damaged by handling during field installation or in service. • Power to the clutch was reversed.

Incorrect Installation	**Section 15.01.06** **Damage Code: 130-001A09940 (if warrantable)**
 **Figure 10**. Threads stripped at hose connector bolt (Ref. 1).  **Figure 11**. Severed or worn through power lead (Ref. 1).  **Figure 12**. Broken or worn mounts (Ref. 1).	**Vehicle Symptoms:** Incorrect Installation is indicated by any of the following observations: • Stripped threads in hose connections. • Broken bolts in mounts or hose connections. • Broken or worn mounts. • Severed or worn-through power lead. • Too-long of bolt used in hose connection. **Warranty Coverage:** A compressor/clutch assembly with evidence of incorrect installation is **warrantable** only if the condition occurs within the initial operating period. (Refer to the Initial Operating Period in section 1.5 of the Warranty Manual for details.) A compressor/clutch assembly with evidence of incorrect installation is **non-warrantable** under any conditions other than that stated above.

Excessive Torque Required to Turn Compressor	**Section 15.01.07** **Damage Code: 130-001A09345**
 **Figure 13**. Heat damage from clutch slippage.  **Figure 14**. Clean oil with dye in it.	**Vehicle Symptoms:** Excessive torque required to turn compressor is indicated by any of the following: • Clutch slippage. • Belt noise. **Post-removal Observations:** Excessive torque required to turn compressor is indicated by all of the following: • Presence of clean oil in compressor.* • Difficulty turning compressor shaft.** **Warranty Coverage:** A compressor/clutch assembly which requires excessive torque to turn is **warrantable** <u>only</u> if all of the following apply: • Compressor in service for less than 5000 miles. • Compressor oil clean. • Full refrigerant charge recovered. • Shaft does not turn smoothly** *Always remember to return the oil sample to the compressor after inspection. **If shaft is encumbered by a failed clutch bearing it may be necessary to remove the armature plate before attempting to rotate the compressor shaft.