

## Refrigerant System Tests - Automatic Transmission

### Inspection

**NOTE:** The following refrigerant system specification information was developed for vehicles with 2.2L Puma diesel and 3.2L Puma diesel engines with automatic transmission.

1. **NOTE:** Procedure 1 — Ambient Temperature below 21°C (70°F).

**NOTE:** Variable compressors need to see a thermal load on the system in order to create normal operating pressures.

**NOTE:** To perform an accurate test make sure the vehicle ambient temperature is 21°C (70°F) or above. Perform the following steps to achieve normal operating pressures.

Drive the vehicle or run the engine until it reaches normal operating temperature.

2. Set the A/C system temperature to the highest possible temperature setting with the dual function disabled (if equipped). Manually set the blower on HI. If the vehicle has a fresh air/recirc button, set it to recirculation. If the vehicle has an A/C switch or compressor on switch, set it to A/C OFF.
3. Close all the vehicle windows and doors.
4. Allow the vehicle to idle for 5 minutes.
5. Confirm the cabin temperature is above 24°C (75°F). Set the A/C switch or compressor on switch to MAX A/C ON.
6. Allow the vehicle to idle for 5 minutes.
7. Turn engine off and proceed to procedure 2 — ambient temperature between 21°C (70°F) and 38°C (100°F).

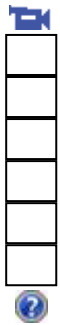
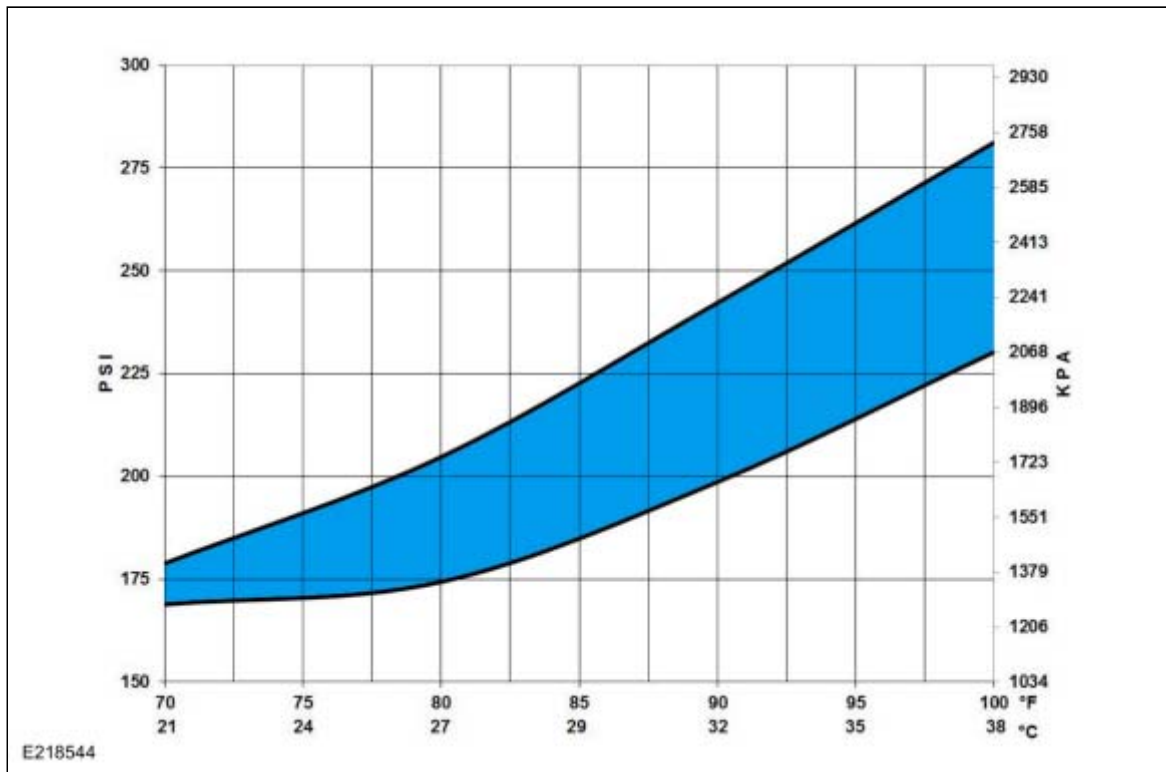
### Inspection

**NOTE:** To perform an accurate test make sure the vehicle ambient temperature is 21°C (70°F) or above. Perform the following steps to achieve normal operating pressures.

1. **NOTE:** Procedure 2 — Ambient Temperature between 21°C (70°F) and 38°C (100°F)

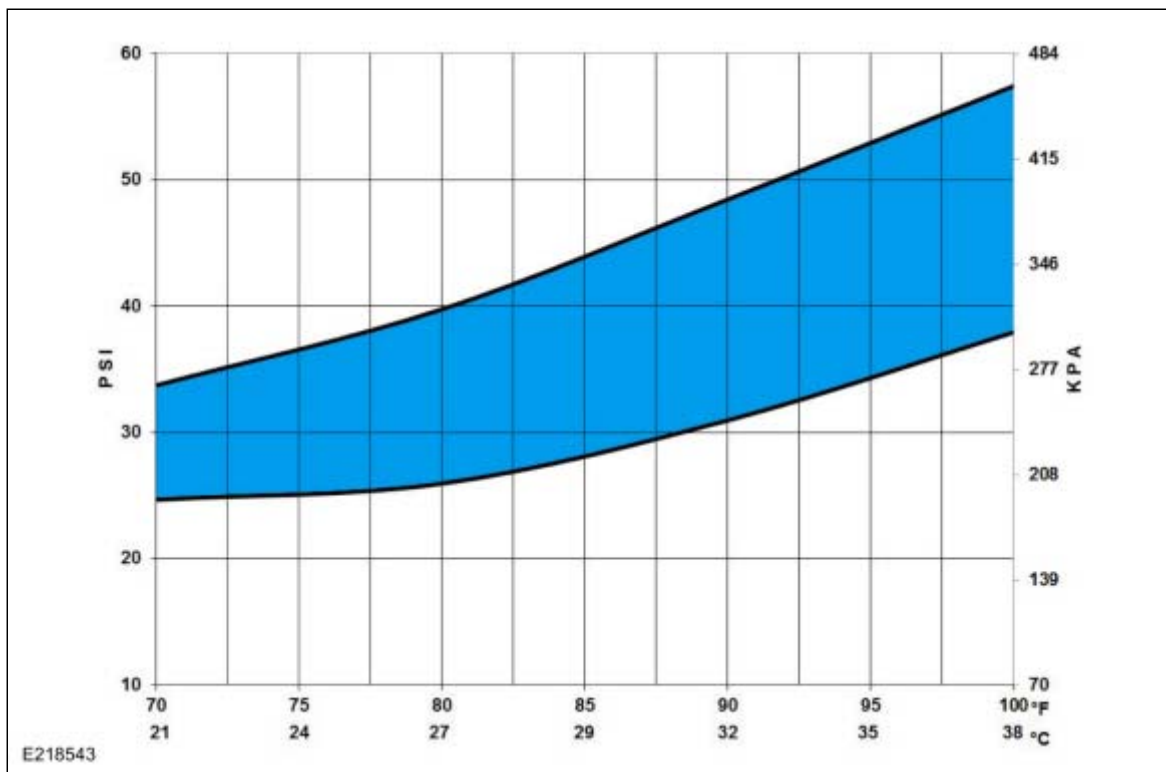
Run the engine until it reaches normal operating temperature.

2. Connect the air conditioning service unit to the refrigerant system.
3. Set the A/C system temperature to the lowest possible temperature setting with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an A/C switch or compressor on switch, set it to A/C ON.
4. Open all vehicle windows and leave the hood open for the test. Open the rear doors.
5. Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.
6. Record the ambient (shop) temperature.
7. Record the discharge pressure. If the pressure is fluctuating, record the average value.
8. A/C system, determine if the discharge pressure falls within the normal operating limits using the **Normal Refrigerant Discharge Pressures 21 - 38° C (70 - 100° F) Ambient (30 - 60% Relative Humidity)** chart below.



9. Record the suction pressure. If the pressure is fluctuating, record the average value.

10. **A/C system**, determine if the suction pressure falls within the normal operating limits using the **Normal Refrigerant Suction Pressures 21 - 38° C (70 - 100° F) Ambient (30 - 60% Relative Humidity)** chart below.



11. **NOTE:** Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

High (Discharge) Pressure	Low (Suction) Pressure	Component — Causes
High	Normal to High	<ul style="list-style-type: none"> <li>• Condenser — inadequate airflow.</li> <li>• Engine — overheating.</li> </ul>

Normal to High	Normal	<ul style="list-style-type: none"> <li>• Refrigerant overcharge — air in refrigerant.</li> </ul>
Normal to Low	High	<ul style="list-style-type: none"> <li>• A/C Compressor — low performance.</li> </ul>
Normal to Low	Normal to High	<ul style="list-style-type: none"> <li>• A/C suction line — partially restricted or plugged. <sup>a</sup></li> </ul>
Normal to Low	Low	<ul style="list-style-type: none"> <li>• Low refrigerant charge — leak in system.</li> <li>• A/C suction line — partially restricted or plugged. <sup>b</sup></li> </ul>
Erratic Operation or Compressor Not Running		<ul style="list-style-type: none"> <li>• Ambient Air Temperature (AAT) sensor — poor connection.</li> <li>• A/C pressure transducer — poor connection.</li> <li>• Evaporator temperature sensor — poor connection.</li> <li>• Low refrigerant charge — leak in system.</li> </ul>
<b>Additional Possible Components or Causes Associated With Inadequate Compressor Operation</b>		
<ul style="list-style-type: none"> <li>• Compressor drive belt — loose</li> <li>• Compressor clutch — slipping</li> <li>• Clutch coil open — shorted, or loose mounting</li> <li>• Control assembly switch — dirty contacts or sticking open</li> <li>• Clutch wiring circuit — high resistance, open or blown fuse</li> <li>• Compressor operation interrupted by engine computer</li> </ul>		
<b>Additional Possible Components or Causes Associated With a Damaged Compressor</b>		
<ul style="list-style-type: none"> <li>• Incorrect clutch air-gap</li> <li>• Suction accumulator — refrigerant oil bleed hose plugged</li> <li>• Refrigerant leaks</li> </ul>		

<sup>a</sup> Low pressure reading will be normal to high if restriction is downstream of service access valve.

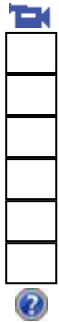
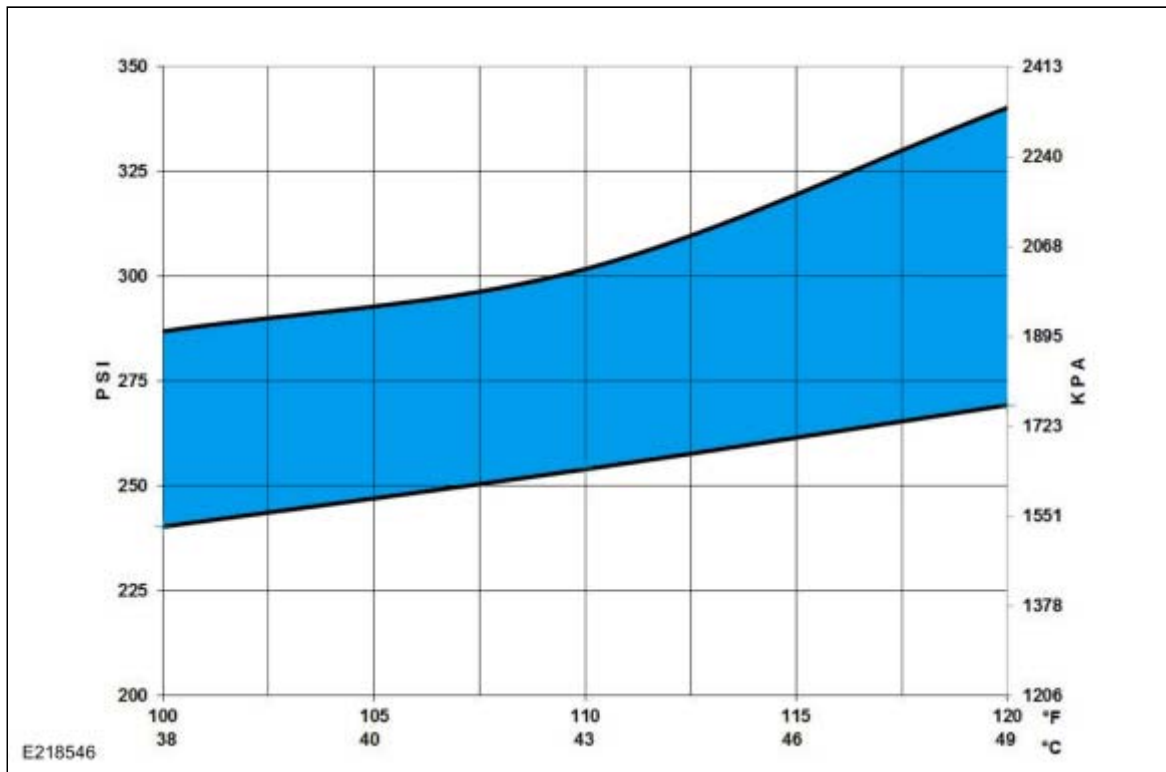
<sup>b</sup> Low pressure reading will be low if restriction is upstream of service access valve.

## Inspection

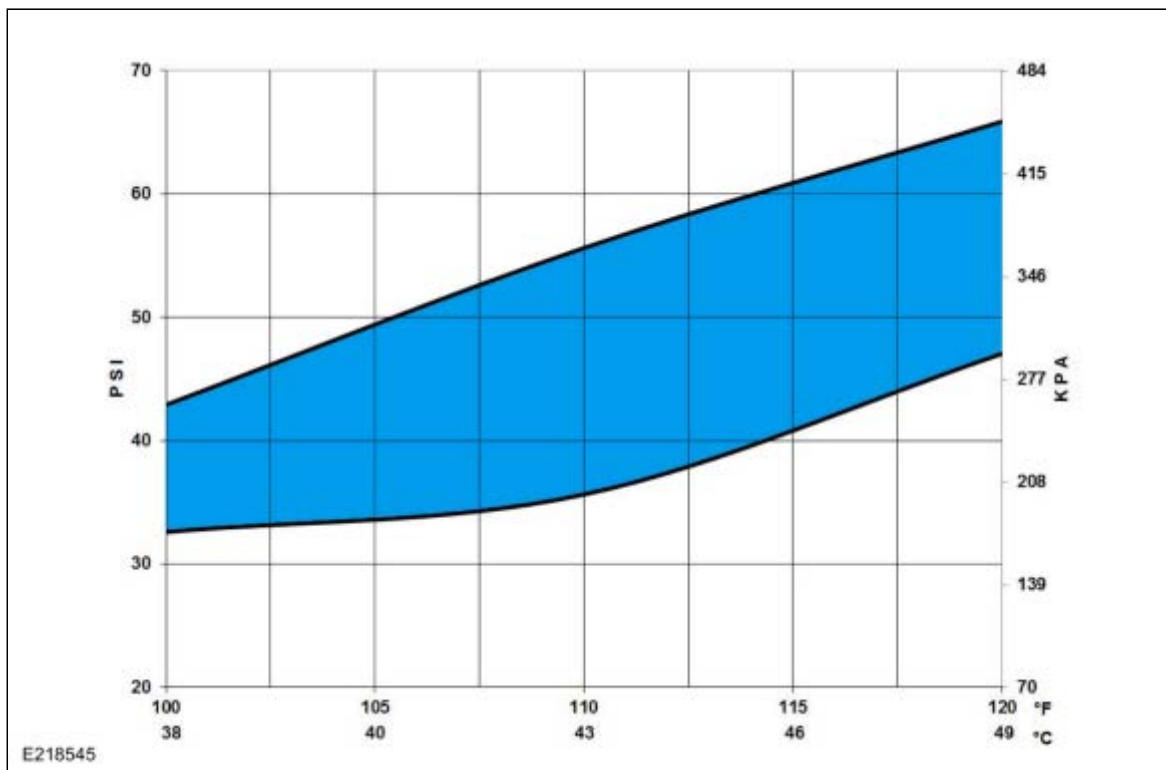
### 1. **NOTE:** Procedure 3 — Ambient Temperature Above 38°C (100°F)

Run the engine until it reaches normal operating temperature.

2. Connect the air conditioning service unit to the refrigerant system.
3. Set temperature to the lowest possible temperature setting with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an A/C switch or compressor on switch, set it to A/C ON.
4. Open all vehicle windows and leave the hood open for the test. Open the rear hatch and/or rear doors (if equipped).
5. Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.
6. Record the ambient (shop) temperature.
7. Record the discharge pressure. If the pressure is fluctuating, record the average value.
8. A/C system, determine if the discharge pressure falls within the normal operating limits using the **Normal Refrigerant Discharge Pressures 38 - 49° C (100 - 120° F) Ambient (15 - 40% Relative Humidity)** chart below.



9. A/C system, determine if the suction pressure falls within the normal operating limits using the **Normal Refrigerant Suction Pressures 38 - 49° C (100 - 120° F) Ambient (15 - 40% Relative Humidity)** chart below.



10. Record the suction pressure. If the pressure is fluctuating, record the average value.

11. **NOTE:** Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

High (Discharge) Pressure	Low (Suction) Pressure	Component — Causes
High	Normal to High	<ul style="list-style-type: none"> <li>• Condenser — inadequate airflow.</li> <li>• Engine — overheating.</li> </ul>

Normal to High	Normal	<ul style="list-style-type: none"> <li>• Refrigerant overcharge — air in refrigerant.</li> </ul>
Normal to Low	High	<ul style="list-style-type: none"> <li>• A/C Compressor — low performance.</li> </ul>
Normal to Low	Normal to High	<ul style="list-style-type: none"> <li>• A/C suction line — partially restricted or plugged. <sup>a</sup></li> </ul>
Normal to Low	Low	<ul style="list-style-type: none"> <li>• Low refrigerant charge — leak in system.</li> <li>• A/C suction line — partially restricted or plugged. <sup>b</sup></li> </ul>
Erratic Operation or Compressor Not Running		<ul style="list-style-type: none"> <li>• Ambient Air Temperature (AAT) sensor — poor connection.</li> <li>• A/C pressure transducer — poor connection.</li> <li>• Evaporator temperature sensor — poor connection.</li> <li>• Low refrigerant charge — leak in system.</li> </ul>
<b>Additional Possible Components or Causes Associated With Inadequate Compressor Operation</b>		
<ul style="list-style-type: none"> <li>• Compressor drive belt — loose</li> <li>• Compressor clutch — slipping</li> <li>• Clutch coil open — shorted, or loose mounting</li> <li>• Control assembly switch — dirty contacts or sticking open</li> <li>• Clutch wiring circuit — high resistance, open or blown fuse</li> <li>• Compressor operation interrupted by engine computer</li> </ul>		
<b>Additional Possible Components or Causes Associated With a Damaged Compressor</b>		
<ul style="list-style-type: none"> <li>• Incorrect clutch air-gap</li> <li>• Suction accumulator — refrigerant oil bleed hose plugged</li> <li>• Refrigerant leaks</li> </ul>		

<sup>a</sup> Low pressure reading will be normal to high if restriction is downstream of service access valve.

<sup>b</sup> Low pressure reading will be low if restriction is upstream of service access valve.

## Refrigerant System Tests - Manual Transmission

### Inspection

**NOTE:** The following refrigerant system specification information was developed for vehicles with 2.2L Puma diesel and 3.2L Puma diesel engines with manual transmission.

1. **NOTE:** Procedure 1 — Ambient Temperature below 21°C (70°F).

**NOTE:** Variable compressors need to see a thermal load on the system in order to create normal operating pressures.

**NOTE:** To perform an accurate test make sure the vehicle ambient temperature is 21°C (70°F) or above. Perform the following steps to achieve normal operating pressures.

Drive the vehicle or run the engine until it reaches normal operating temperature.

2. Set the A/C system temperature to the highest possible temperature setting with the dual function disabled (if equipped). Manually set the blower on HI. If the vehicle has a fresh air/recirc button, set it to recirculation. If the vehicle has an A/C switch or compressor on switch, set it to A/C OFF.
3. Close all the vehicle windows and doors.
4. Allow the vehicle to idle for 5 minutes.
5. Confirm the cabin temperature is above 24°C (75°F). Set the A/C switch or compressor on switch to MAX A/C ON.
6. Allow the vehicle to idle for 5 minutes.
7. Turn engine off and proceed to procedure 2 — ambient temperature between 21°C (70°F) and 38°C (100°F).

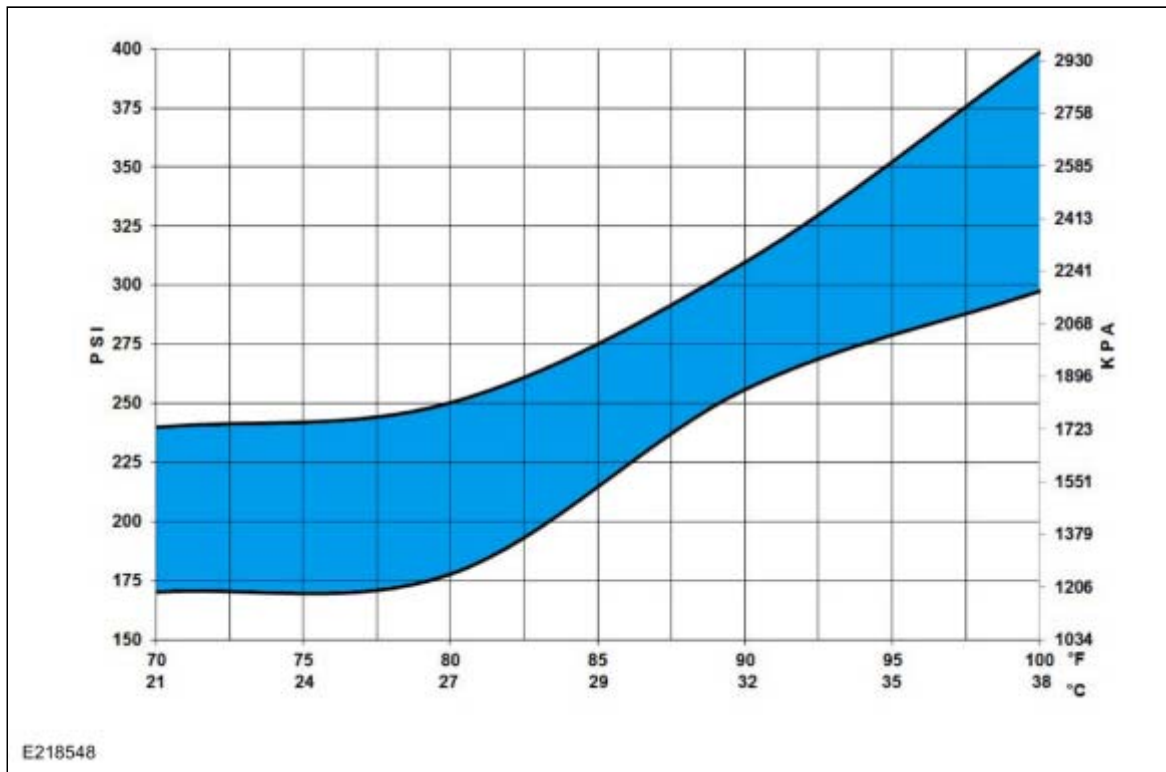
### Inspection

**NOTE:** To perform an accurate test make sure the vehicle ambient temperature is 21°C (70°F) or above. Perform the following steps to achieve normal operating pressures.

1. **NOTE:** Procedure 2 — Ambient Temperature between 21°C (70°F) and 38°C (100°F)

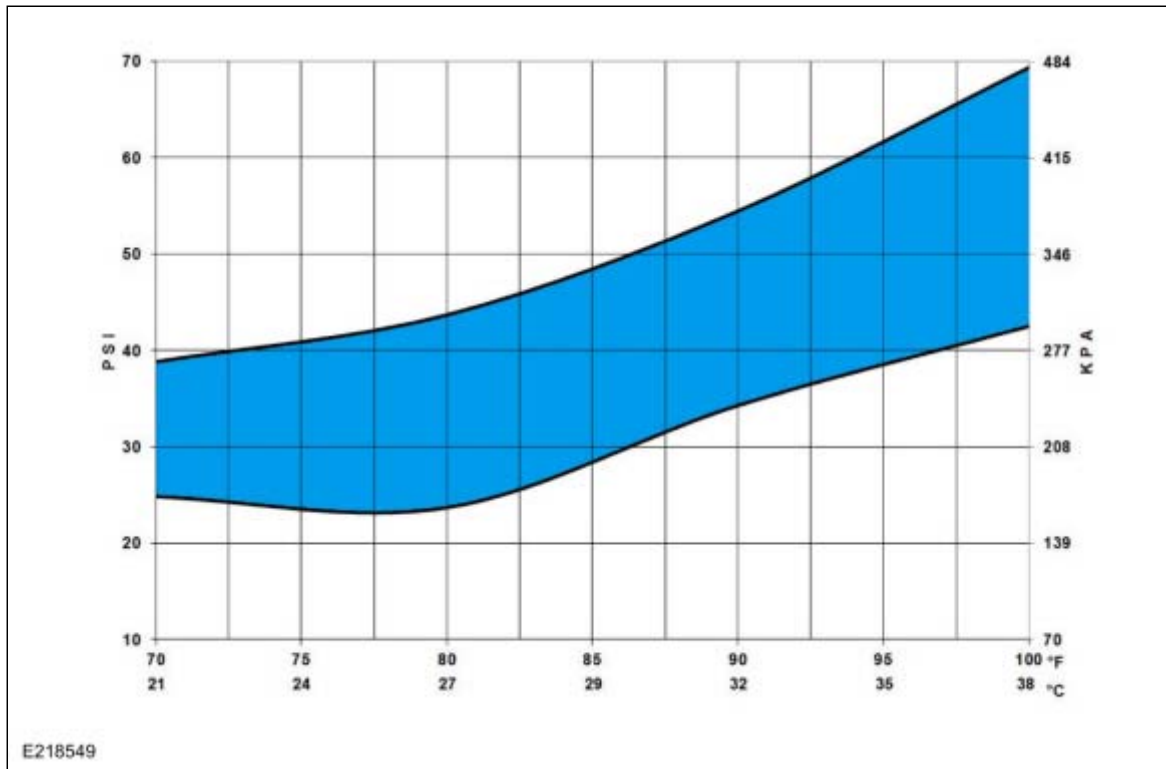
Run the engine until it reaches normal operating temperature.

2. Connect the air conditioning service unit to the refrigerant system.
3. Set the A/C system temperature to the lowest possible temperature setting with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an A/C switch or compressor on switch, set it to A/C ON.
4. Open all vehicle windows and leave the hood open for the test. Open the rear doors.
5. Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.
6. Record the ambient (shop) temperature.
7. Record the discharge pressure. If the pressure is fluctuating, record the average value.
8. A/C system, determine if the discharge pressure falls within the normal operating limits using the **Normal Refrigerant Discharge Pressures 21 - 38° C (70 - 100° F) Ambient (30 - 60% Relative Humidity)** chart below.



9. Record the suction pressure. If the pressure is fluctuating, record the average value.

10. **A/C system**, determine if the suction pressure falls within the normal operating limits using the **Normal Refrigerant Suction Pressures 21 - 38° C (70 - 100° F) Ambient (30 - 60% Relative Humidity)** chart below.



11. **NOTE:** Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

High (Discharge) Pressure	Low (Suction) Pressure	Component — Causes
High	Normal to High	<ul style="list-style-type: none"> <li>• Condenser — inadequate airflow.</li> <li>• Engine — overheating.</li> </ul>

Normal to High	Normal	<ul style="list-style-type: none"> <li>• Refrigerant overcharge — air in refrigerant.</li> </ul>
Normal to Low	High	<ul style="list-style-type: none"> <li>• A/C Compressor — low performance.</li> </ul>
Normal to Low	Normal to High	<ul style="list-style-type: none"> <li>• A/C suction line — partially restricted or plugged. <sup>a</sup></li> </ul>
Normal to Low	Low	<ul style="list-style-type: none"> <li>• Low refrigerant charge — leak in system.</li> <li>• A/C suction line — partially restricted or plugged. <sup>b</sup></li> </ul>
Erratic Operation or Compressor Not Running		<ul style="list-style-type: none"> <li>• Ambient Air Temperature (AAT) sensor — poor connection.</li> <li>• A/C pressure transducer — poor connection.</li> <li>• Evaporator temperature sensor — poor connection.</li> <li>• Low refrigerant charge — leak in system.</li> </ul>
<b>Additional Possible Components or Causes Associated With Inadequate Compressor Operation</b>		
<ul style="list-style-type: none"> <li>• Compressor drive belt — loose</li> <li>• Compressor clutch — slipping</li> <li>• Clutch coil open — shorted, or loose mounting</li> <li>• Control assembly switch — dirty contacts or sticking open</li> <li>• Clutch wiring circuit — high resistance, open or blown fuse</li> <li>• Compressor operation interrupted by engine computer</li> </ul>		
<b>Additional Possible Components or Causes Associated With a Damaged Compressor</b>		
<ul style="list-style-type: none"> <li>• Incorrect clutch air-gap</li> <li>• Suction accumulator — refrigerant oil bleed hose plugged</li> <li>• Refrigerant leaks</li> </ul>		

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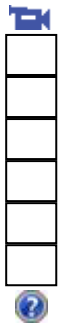
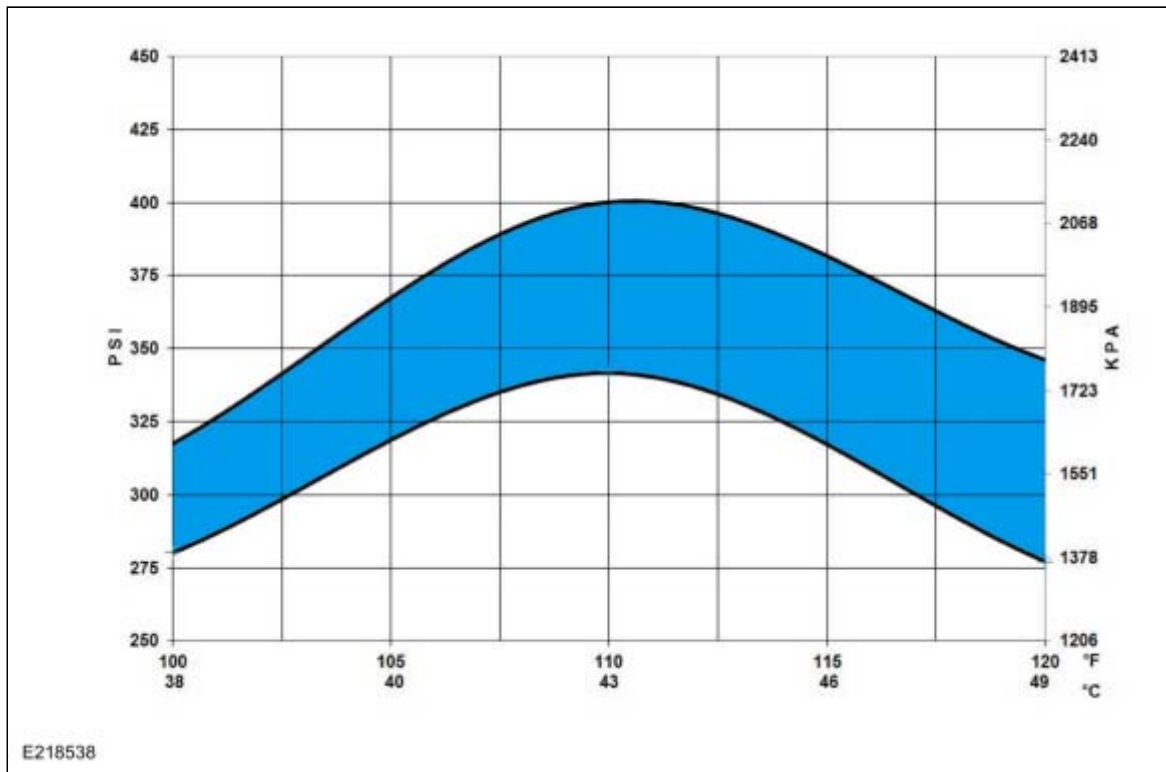
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## Inspection

### 1. **NOTE:** Procedure 3 — Ambient Temperature Above 38°C (100°F)

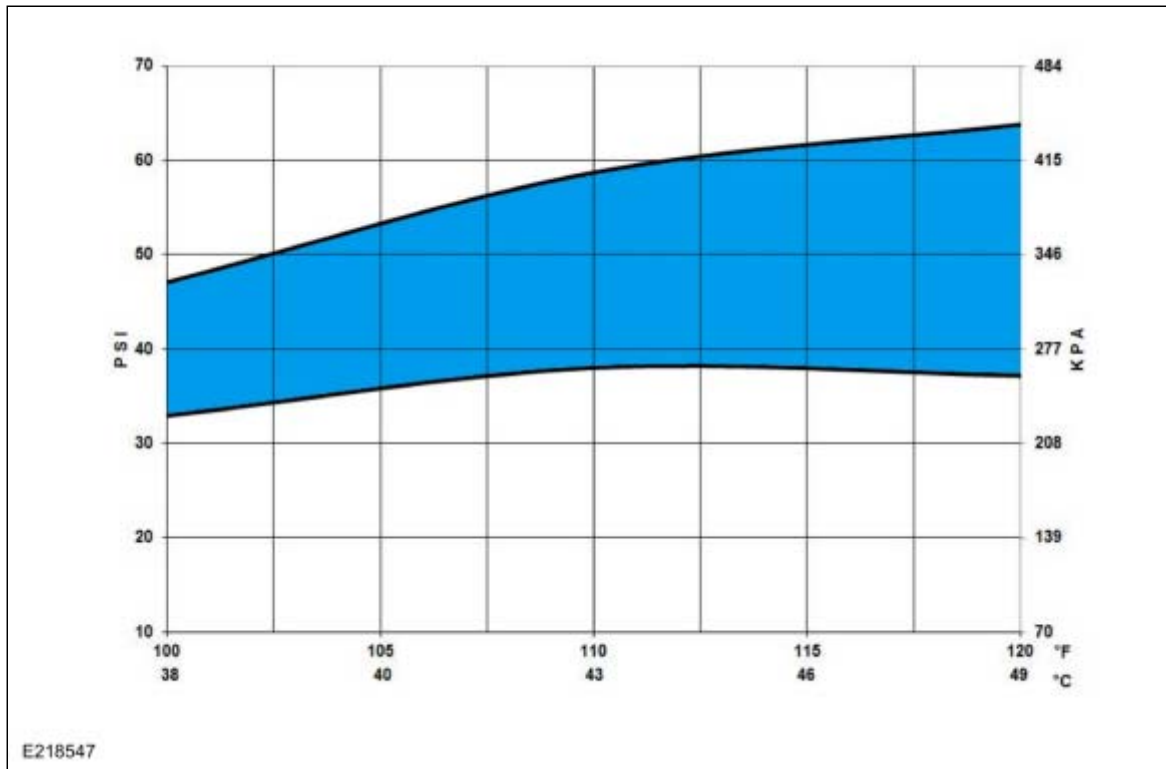
Run the engine until it reaches normal operating temperature.

2. Connect the air conditioning service unit to the refrigerant system.
3. Set temperature to the lowest possible temperature setting with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an A/C switch or compressor on switch, set it to A/C ON.
4. Open all vehicle windows and leave the hood open for the test. Open the rear hatch and/or rear doors (if equipped).
5. Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.
6. Record the ambient (shop) temperature.
7. Record the discharge pressure. If the pressure is fluctuating, record the average value.
8. A/C system, determine if the discharge pressure falls within the normal operating limits using the **Normal Refrigerant Discharge Pressures 38 - 49° C (100 - 120° F) Ambient (15 - 40% Relative Humidity)** chart below.



9. Record the suction pressure. If the pressure is fluctuating, record the average value.

10. A/C system, determine if the suction pressure falls within the normal operating limits using the **Normal Refrigerant Suction Pressures 38 - 49° C (100 - 120° F) Ambient (15 - 40% Relative Humidity)** chart below.



11. **NOTE:** Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

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Normal to High	Normal	<ul style="list-style-type: none"> <li>• Refrigerant overcharge — air in refrigerant.</li> </ul>
Normal to Low	High	<ul style="list-style-type: none"> <li>• A/C Compressor — low performance.</li> </ul>
Normal to Low	Normal to High	<ul style="list-style-type: none"> <li>• A/C suction line — partially restricted or plugged. <sup>a</sup></li> </ul>
Normal to Low	Low	<ul style="list-style-type: none"> <li>• Low refrigerant charge — leak in system.</li> <li>• A/C suction line — partially restricted or plugged. <sup>b</sup></li> </ul>
Erratic Operation or Compressor Not Running		<ul style="list-style-type: none"> <li>• Ambient Air Temperature (AAT) sensor — poor connection.</li> <li>• A/C pressure transducer — poor connection.</li> <li>• Evaporator temperature sensor — poor connection.</li> <li>• Low refrigerant charge — leak in system.</li> </ul>
<b>Additional Possible Components or Causes Associated With Inadequate Compressor Operation</b>		
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<b>Additional Possible Components or Causes Associated With a Damaged Compressor</b>		
<ul style="list-style-type: none"> <li>• Incorrect clutch air-gap</li> <li>• Suction accumulator — refrigerant oil bleed hose plugged</li> <li>• Refrigerant leaks</li> </ul>		

<sup>a</sup> Low pressure reading will be normal to high if restriction is downstream of service access valve.

<sup>b</sup> Low pressure reading will be low if restriction is upstream of service access valve.