

Service

**Section** 

Category Vehicle Interior

Heating/Air Conditioning

Market USA and

Mexico



#### **Applicability**

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2013 - 2023	4Runner, Avanza, Camry, Camry HV, Corolla, Hiace, Highlander, Highlander HV, Prius, RAV4, Tundra	
2017 - 2020, 2022 - 2023	86	
2013 - 2022	Avalon, Avalon HV, Sequoia	
2022 - 2023	Corolla Cross, Raize, Sienna HV, Tundra HV	
2019 - 2023	Corolla Hatchback	
2020 - 2023	Corolla, Prius Prime	
2013 - 2021	FJ Cruiser, Land Cruiser, Matrix, Prius C	
2018	Mirai (Canada)	
2016 - 2023	Mirai, RAV4 HV	
2013 - 2015	Prius PHV, Sienna	
2021 - 2024	Prius Prime	
2013 - 2018	Prius V	
2021 - 2024	RAV4 Prime	
2022 - 2023	Sienna HV MaaS Package	
2016 - 2019	Sienna	
2021 - 2023	Venza HV	
2013 - 2016	Venza	
2020	Yaris HB MEX-Prod	
2016 - 2020	Yaris R, Yaris SD MEX-Prod	
2017 - 2023	Yaris THAI-Prod	
2013 - 2019, 2022 - 2023	Yaris	
2023	bZ4X, Crown, GR Corolla, Yaris SD THAI-Prod	
2017 - 2018	iA, iM	

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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### Introduction

The air conditioning dye injection tool kit has been developed to aid in identifying the location of air conditioning refrigerant leaks. Follow the procedures outlined in this service bulletin to aid in locating, inspecting, and repairing refrigerant leaks.

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# Air Conditioning Leak Detection Dye and O-ring Joint Inspections

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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### **Warranty Information**

#### For USA Market

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	-	_	-	-

#### For Mexico Market

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	_	-	-	-

#### **Parts Information**

#### For USA and Mexico Markets

PART NUMBER	PART NAME	QTY
09874-20010*	Oil Capsule, ND-11, Fluorescence	2
09874-10010*	Oil Capsule, ND-12, Fluorescence	2

<sup>\*</sup>The dye part numbers are for Denso air conditioning systems ONLY.

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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### **Required Tools & Equipment**

The table below shows a list of the components included in the air conditioning dye injection tool kit if ANY of the components requires replacement.

Table 1.

	SPECIAL SERVICE TOOL (SST)			
TOOL KIT	DYE TYPE	REFRIGERANT TYPE / DESCRIPTION	SUB-PART NUMBERS	IMAGE
	ND-11	R-134a / Brass Coupler*	09870-10010-Y	
	(09874-20010)	R-1234yf / Brass Coupler*	09870-20010-Y	
	ND-12	R-134a / Brass Coupler*	09870-10010-B	
	(09874-10010)	R-1234yf / Brass Coupler*	09870-20010-B	
	-	Injector Handle*	09870-TP9845	
	_	Ultraviolet (UV) Flashlight*	09870-TPOPUVP	
09870- DYEKIT*	I	Flashlight Charger*	09870-0TP14	
		GLO-AWAY + Dye Cleaner*	09870-0TP19	TOTAL AND
	ı	Yellow Glasses*	09870-TP9940	
		Case*	09870-CASE	AC DYE  RUECTION TOOL KIT  RUECT

<sup>\*</sup>Essential SST.

### NOTE

Replacement components may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787 (USA) or 01-55-50103041 (Mexico).

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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### Required Tools & Equipment (continued)

REQUIRED TOOLS & MATERIAL	QTY
R1234YF A/C Machine	1
R134A A/C Machine	1

#### Air Conditioning Leak Detection Dye and Injection Tool Use

#### CAUTION

- Do NOT look directly into the UV flashlight and ALWAYS wear UV protection glasses.
- Wear safety glasses when connecting/disconnecting the dye injection tool from the air conditioning service port.
- Do NOT operate the air conditioning system while the dye injection tool is connected to air conditioning system.
- Do NOT connect the dye injection tool to a system that is evacuated.
- The air conditioning system MUST contain enough refrigerant to operate the compressor and circulate the fluorescence dye to find leaks.
- Do NOT mix ND-11 and ND-12 fluorescence dyes. ALWAYS use the fluorescence dye cartridge with the designated injector tool brass coupler.
- After use, store the injector tool and fluorescence cartridges in a cool place, away from sunlight.
- Dispose of ANY fluorescence dye in accordance with all local, state, and federal regulations.

#### NOTE

Two dye cartridges are required per vehicle service. The first cartridge will be completely purged through the brass coupler to ensure there are NO contaminants such as moisture, air, etc. The second cartridge will be injected into the air conditioning system to inspect for leaks.

- The air conditioning dye injection tool kit includes four brass couplers to accommodate vehicles for the types of compressor oils and refrigerants, refer to the <u>Required Tools &</u> <u>Equipment section for details:</u>
  - ND-11 with R-134a compressor oil; electric compressors (09870-10010-Y)
  - ND-11 with R-1234yf compressor oil; electric compressors (09870-20010-Y)
  - ND-12 with R-134a compressor oil; belt driven compressors (09870-10010-B)
  - ND-12 with R-1234yf compressor oil; belt driven compressors (09870-20010-B)

#### NOTE

- ND-12 compressor oil is compatible with ND-8 oil systems.
- ND-8 compressor oil is NOT compatible with ND-12 oil systems.

#### Air Conditioning Leak Detection Dye and Injection Tool Use (continued)

 Identify the compressor oil and refrigerant system type by looking at the under-hood air conditioning label for the compressor oil and refrigerant type the vehicle is using and select the corresponding dye injector tool brass coupler.

Figure 1.



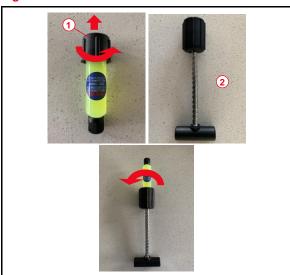
1	Compressor Oil
2	Refrigerant Type and System Charge Amount

- 3. Prepare the dye injection tool with the fluorescence dye cartridge by removing the large cap from the first cartridge.
- 4. Completely unscrew the handle on the injector and screw the dye cartridge into it.

#### NOTE

When screwing on the dye cartridge to the injector handle, make sure the piston rod remains in the fully unscrewed position.

Figure 2.



1	Large Cap
2	Dye Injection Tool

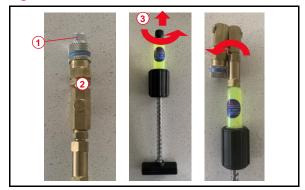
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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### Air Conditioning Leak Detection Dye and Injection Tool Use (continued)

- 5. Remove the purge fitting from the brass coupler and hold the cartridge vertically with the small cap on top.
- 6. Remove the cap and screw the cartridge firmly to the brass coupler.
- 7. Insert the purge fitting into the brass coupler.
- AFTER the purge fitting is installed, continue holding the dye injection tool in the vertical position to avoid dye form leaking out until the purge process is complete.
- 9. Turn the handle to advance the plunger until it stops, passing all the dye out of the cartridge.
- 10. Remove the purge fitting from the brass coupler.
- Completely unscrew the handle on the injector and unscrew the first empty cartridge from the brass coupler and dispose.
- 12. Install the second cartridge onto the brass coupler.

Figure 3.



1	Purge Fitting
2	Brass Coupler
3	Hold Cartridge Vertically

#### Air Conditioning Leak Detection Dye and Injection Tool Use (continued)

13. Install the purge fitting to the brass coupler and turn the handle to advance the plunger until a small amount of fluorescent dye exits the purge fitting.

Figure 4.

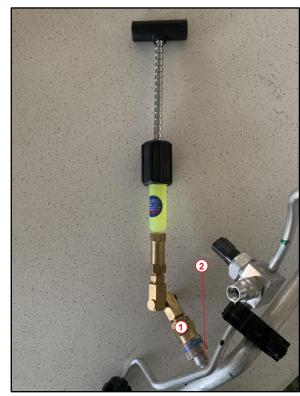


- 1 Fluorescent Dye
- 14. Remove the purge fitting. The injection tool assembly is now purged and ready for use.
- 15. Connect the brass coupler to the low side service port.

#### **NOTE**

Wrap the coupler connection with a shop rag as a small amount of fluorescence dye may spray out due to refrigerant pressure.

Figure 5.



1	Brass Coupler
2	Low Side Service Port

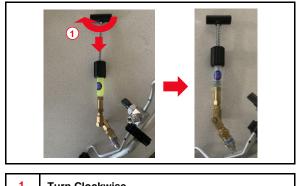
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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### Air Conditioning Leak Detection Dye and Injection Tool Use (continued)

16. Turn the plunger clockwise to inject all the dye into the vehicle.

Figure 6.



**Turn Clockwise** 

17. Disconnect the brass coupler from the service port and wipe both clean.

#### **NOTE**

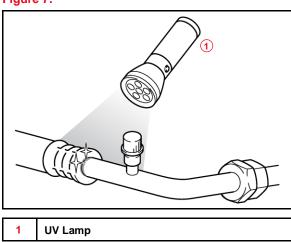
Wrap the coupler connection with a shop rag as a small amount of fluorescence dye may spray out due to refrigerant pressure.

- 18. Start the engine, turn the air conditioning switch ON, set the temperature to MAX COOL, and run the compressor for 10 minutes to circulate the fluorescence dye through the system.
- 19. Turn OFF the air conditioning and engine. Put on UV glasses and check for refrigerant leaks along the air conditioning system components while shining the UV light.

#### **HINT**

- · Areas where there are refrigerant leaks will glow in a bright yellow green.
- For smaller leaks, operate the air conditioning system over the next 24 to 48 hours and reinspect periodically.

Figure 7.



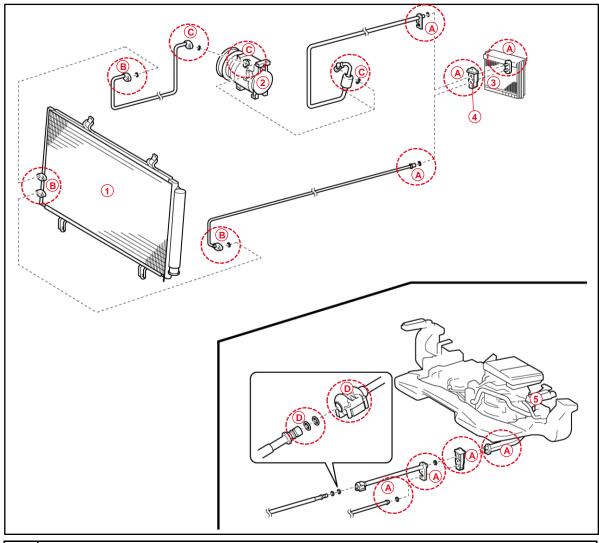
20. AFTER the leaks are repaired, use the GLO-AWAY, dye cleaner, and UV flashlight to clean the area and ensure NO dye remains.

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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

## Air Conditioning Leak Detection Dye and Injection Tool Use (continued)

Figure 8. Refrigerant Line



Α	When leaking occurs around "A" refer to the Inspect the Pipe Fitting Areas of the Expansion Valve and Evaporator subsection.
В	When leaking occurs around "B" refer to the <u>Inspect the Condenser and Pipe Fitting Area</u> subsection.
С	When leaking occurs around "C" refer to the <u>Inspect the Compressor and Pipe Fitting Area</u> subsection.
D	When leaking occurs around "D" refer to the Inspect Other Joint Areas subsection.
1	Condenser
2	Compressor
3	Evaporator
4	Expansion Valve
5	Rear Air Conditioner



#### **HVAC O-ring Joint Inspections**

Inspect the Pipe Fitting Areas of the Expansion Valve and Evaporator

#### **NOTICE**

- Do NOT reuse the O-rings once they are removed.
- . As there may be a malfunction in multiple components, make sure to complete ALL steps and replace ALL parts in which defects are found.
- If no malfunction is found in ANY related parts, a temporary leak may have occurred due to foreign matter on an O-ring, deformation, etc.
- 1. Remove the pipes from the expansion valve.

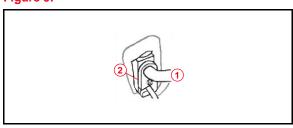
#### NOTICE

- Wipe off the joint area with a clean cloth BEFORE disassembly.
- Slowly remove the pipes straight to prevent the sealing face from being damaged and foreign materials from dropping off.
- 2. Inspect the ENTIRE O-ring surfaces making sure they are free from defects, such as damage (cuts, dents, or crushed areas), foreign material adhesion, or twists. If there are ANY defects, clean or replace the part. Refer to the O-ring Abnormalities subsection for judgement criteria.

#### **NOTICE**

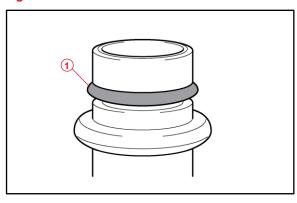
- · Inspect the O-ring surfaces in a well-lit area.
- When it is difficult to inspect the surface conditions due to oil adhesion. degrease the surface (such as by wiping it with a clean white cloth). Make sure NOT to lose any foreign material that was adhering to the surface that may indicate the source of the leak.

Figure 9.



ĺ	1	Pipe
	2	Expansion Valve

#### Figure 10.



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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### **HVAC O-ring Joint Inspections (continued)**

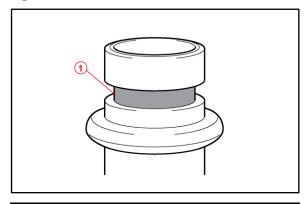
#### Inspect the Pipe Fitting Areas of the Expansion Valve and Evaporator (continued)

 Remove the O-rings and inspect the entire pipe surfaces making sure they are free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the part. Refer to the <u>Sealing Surface Abnormalities</u> (O-ring Attachment Area) subsection for judgment criteria.

#### **NOTICE**

When removing the O-rings, use soft tools (such as a toothpick) to avoid damaging the sealing face or the O-ring.

Figure 11.



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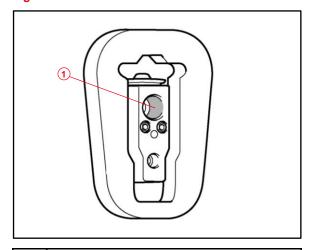
1 Sealing Surface

4. Inspect the ENTIRE sealing surfaces of the expansion valve (pipe side) making sure they are free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the part. Refer to the <u>Sealing Surface</u> <u>Abnormalities (Part Joint Area)</u> subsection for judgment criteria.

#### **NOTICE**

When it is difficult to check the surface conditions due to oil adhesion, degrease the surface (such as by wiping it with a clean white cloth). Make sure NOT to lose any foreign material that was adhering to the surface that may indicate the source of the leak.

Figure 12.



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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### **HVAC O-ring Joint Inspections (continued)**

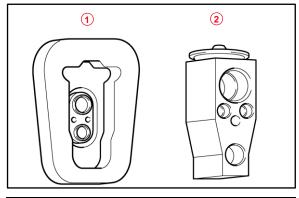
Inspect the Pipe Fitting Areas of the Expansion Valve and Evaporator (continued)

5. Remove the expansion valve from the evaporator.

#### **NOTICE**

- Slowly remove the pipes straight to prevent the sealing face from being damaged and foreign materials from dropping off.
- If the expansion valve is difficult to remove, gently move it up and down and right to left for removal.

Figure 13.

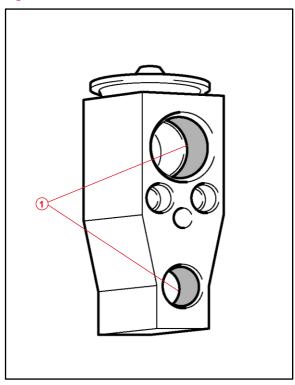


- 1 Evaporator
  2 Expansion Valve
- 6. Inspect the ENTIRE sealing surfaces of the expansion valve (evaporator side) making sure they are free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the part. Refer to the <a href="Sealing Surface Abnormalities">Sealing Surface Abnormalities</a> (Part Joint Area) subsection for judgment criteria.

#### **NOTICE**

When it is difficult to inspect the surface conditions due to oil adhesion, degrease the surface (such as by wiping it with a clean white cloth). Make sure NOT to lose any foreign material that was adhering to the surface that may indicate the source of the leak.

Figure 14.





#### **HVAC O-ring Joint Inspections (continued)**

#### Inspect the Pipe Fitting Areas of the Expansion Valve and Evaporator (continued)

7. Inspect the ENTIRE O-ring surfaces of the evaporator making sure they are free from defects, such as damage (cuts, dents, or crushed areas), foreign material adhesion, or twists. If there are ANY defects, clean or replace the part. Refer to the O-ring Abnormalities subsection for judgement criteria.

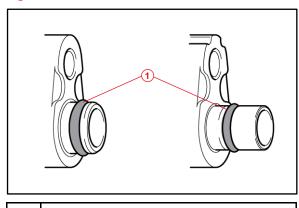
#### **NOTICE**

- Inspect the O-ring surfaces in a well-lit area.
- · When it is difficult to inspect the surface conditions due to oil adhesion, degrease the surface (such as by wiping it with a clean white cloth). Make sure NOT to lose any foreign material that was adhering to the surface that may indicate the source of the leak.
- 8. Inspect the ENTIRE evaporator surface by remove the O-rings making sure they are free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the part. Refer to the Sealing Surface Abnormalities (O-ring Attachment Area) subsection for judgment criteria.

#### **NOTICE**

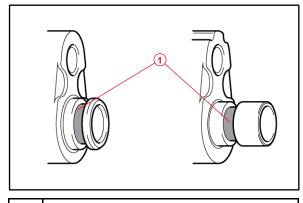
When removing the O-rings, use soft tools (such as a toothpick) to avoid damaging the sealing face or the O-ring.

Figure 15.



**O-rings** 

#### Figure 16.





**HVAC O-ring Joint Inspections (continued)** 

Inspect the Condenser and Pipe Fitting Area

- Do NOT reuse the O-rings once they are removed.
- . As there may be a malfunction in multiple components, make sure to complete ALL steps and replace ALL the parts in which defects are found.
- If no malfunction is found in ANY related parts, a temporary leak may have occurred due to foreign matter on an O-ring, deformation, etc.
- 1. Remove the discharge and liquid pipes from the condenser.

#### NOTICE

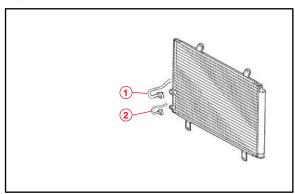
- Wipe off the joint area with a clean cloth before disassembly.
- Slowly remove the pipes straight to prevent the sealing face from being damaged and foreign materials from dropping off.

2. Inspect the ENTIRE O-ring surfaces making sure they are free from defects, such as damage (cuts, dents, or crushed areas), foreign material adhesion, or twists. If there are ANY defects, clean or replace the part. Refer to the O-ring Abnormalities subsection for judgement criteria.

#### **NOTICE**

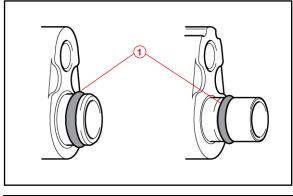
- Inspect the O-ring surfaces in a well-lit area.
- · When it is difficult to inspect the surface conditions due to oil adhesion, degrease the surface (such as by wiping it with a clean white cloth). Make sure NOT to lose any foreign material that was adhering to the surface that may indicate the source of the leak.

Figure 17.



1	Discharge Side
2	Liquid Side

Figure 18.





#### **HVAC O-ring Joint Inspections (continued)**

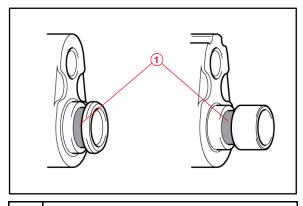
#### Inspect the Condenser and Pipe Fitting Area (continued)

3. Inspect the ENTIRE pipe surfaces by removing the O-rings making sure they are free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the part. Refer to the **Sealing Surface Abnormalities** (O-ring Attachment Area) subsection for judgment criteria.

#### **NOTICE**

When removing the O-rings, use soft tools (such as a toothpick) to avoid damaging the sealing face or the O-ring.

Figure 19.



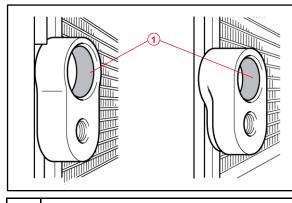
**Sealing Surfaces** 

4. Inspect the ENTIRE sealing surface of the condenser making sure it is free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the part. Refer to the Sealing Surface Abnormalities (Part Joint Area) subsection for judgment criteria.

#### **NOTICE**

When removing the O-rings, use soft tools (such as a toothpick) to avoid damaging the sealing face or the O-ring.

Figure 20.





**HVAC O-ring Joint Inspections (continued)** 

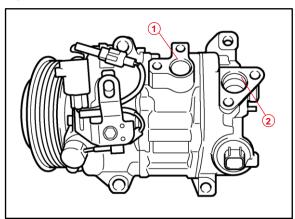
Inspect the Compressor and Pipe Fitting Area

- Do NOT reuse the O-rings once they are removed.
- . As there may be a malfunction in multiple components, make sure to complete ALL and replace ALL the parts in which defects are found.
- If no malfunction is found in ANY related parts, a temporary leak may have occurred due to foreign matter on an O-ring, deformation, etc.
- 1. Remove the discharge and suction pipes from the compressor.

#### **NOTICE**

- Wipe off the joint area with a clean cloth before disassembly.
- · Slowly remove the pipes straight to prevent the sealing face from being damaged and foreign materials from dropping off.

Figure 21.



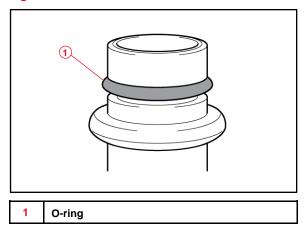
1	Discharge Side
2	Suction Side

2. Inspect the ENTIRE O-ring surfaces making sure they are free from defects, such as damage (cuts, dents, or crushed areas), foreign material adhesion or twists. If there are ANY defects, clean or replace the part. Refer to the O-ring Abnormalities subsection for judgement criteria.

#### **NOTICE**

- · Inspect the O-ring surfaces in a well-lit area.
- When it is difficult to inspect the surface conditions due to oil adhesion. degrease the surface (such as by wiping it with a clean white cloth). Make sure not to lose any foreign material that was adhering to the surface that may indicate the source of the leak.

Figure 22.





#### **HVAC O-ring Joint Inspections (continued)**

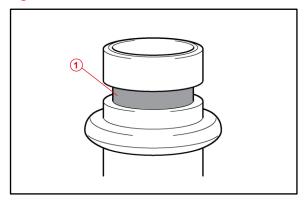
#### Inspect the Compressor and Pipe Fitting Area (continued)

3. Inspect the entire pipe surfaces by removing the O-rings making sure they are free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the part. Refer to the **Sealing Surface Abnormalities** (O-ring Attachment Area) subsection for judgement criteria.

#### **NOTICE**

When removing the O-rings, use soft tools (such as a toothpick) to avoid damaging the sealing face or the O-ring.

Figure 23.



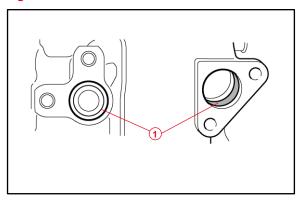
**Sealing Surface** 

4. Inspect the ENTIRE sealing surface of the compressor making sure it is free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the part. Refer to the Sealing Surface Abnormalities (Part Joint Area) subsection for judgment criteria.

#### **NOTICE**

When it is difficult to inspect the surface conditions due to oil adhesion, degrease the surface (such as by wiping it with a clean white cloth). Make sure NOT to lose any foreign material that was adhering to the surface that may indicate the source of the leak.

Figure 24.



**HVAC O-ring Joint Inspections (continued)** 

**Inspect Other Joint Areas** 

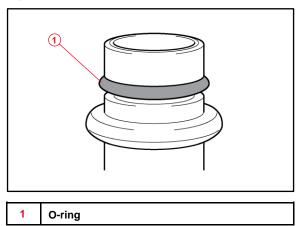
#### NOTICE

- · Do NOT reuse the O-rings once they are removed.
- Make sure to inspect all the related parts and replace all the parts where defects are found.
- If no malfunction is found in ANY related parts, a temporary leak may have occurred due to foreign matter on an O-ring, deformation, etc.
- Inspect the ENTIRE O-ring surface of the pipe or part making sure they are free from defects, such as damage (cuts, dents, or crushed areas), foreign material adhesion or twists. If there are ANY defects, clean or replace the part. Refer to the O-ring Abnormalities subsection for judgement criteria.

#### **NOTICE**

- Wipe off the joint area with a clean cloth before disassembly.
- Slowly remove the pipes straight to prevent the sealing face from being damaged and foreign materials from dropping off.

Figure 25.



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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### **HVAC O-ring Joint Inspections (continued)**

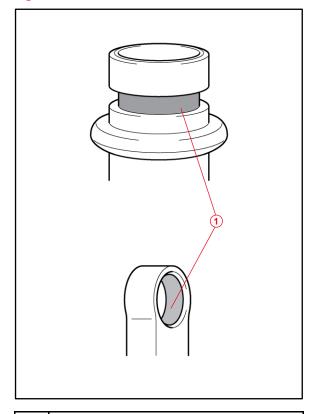
#### **Inspect Other Joint Areas (continued)**

 Inspect the ENTIRE sealing surfaces of the pipe or part by removing the O-rings making sure they are free from defects, such as foreign material adhesion, damage, or corrosion. If there are ANY defects, clean or replace the pipe or part. Refer to the <u>Sealing Surface Abnormalities</u> (O-ring Attachment Area) subsection for judgement criteria.

#### **NOTICE**

When removing the O-rings, use soft tools (such as a toothpick) to avoid damaging the sealing face or the O-ring.

Figure 26.



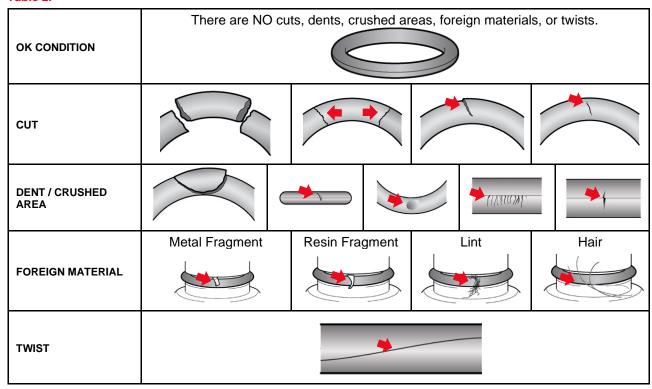
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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### **Judgement Criteria**

## **O-ring Abnormalities**

Table 2.



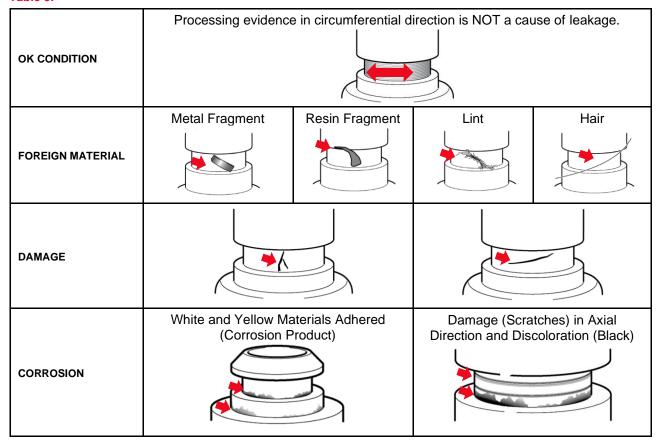
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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### **Judgement Criteria (continued)**

#### **Sealing Surface Abnormalities (O-ring Attachment Area)**

Table 3.



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## Air Conditioning Leak Detection Dye and O-ring Joint Inspections

#### **Judgement Criteria (continued)**

#### **Sealing Surface Abnormalities (Part Joint Area)**

Table 4.

