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Viewed:	5232		

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Title: Off-Chassis Charge Air Cooler Cleaning Procedure

Applies To: EPA 10 MaxxForce 11L, 13L, and N13 Engines

CHANGE LOG

2017/01/03 - Update with the new engine systems cleaning solution part number
2015/10/16 - Updated SRT Section with updated labor operation codes
2015/06/26 - Updated coding to include New Zealand, Australia, Russia
2014/11/18 - Fixed hyperlinks
2014/11/13 - Updated Formatting
2014/09/24 - Launch to field

QUICK LINKS

DESCRIPTION

The following procedure demonstrates cleaning High Pressure (HP, vehicle mounted) Charge Air Coolers (CACs) on a bench, utilizing the Cleaning Management System (CMS), CAC Pressure Test Kit, and new CAC Adapter Flushing Kit. The procedure is for all Big Bore (MaxxForce 11/13, N13) engines.

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SYMPTOMS

Diagnostic Trouble Codes & Dashboard Indicator Lights:

No directly related DTCs.

Customer Observations or Concerns:

- Low Boost
- Frequent Regens
- Poor Fuel Economy
- Oil seepage at CAC pipes

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SPECIAL TOOLS

Tool Description	Tool Number	Comments	Instructions
Cleaning Management System	12-353-01A		
Charge Air Cooler (CAC) Adapter Flushing Kit	09-925-01		
Charger Air Cooler (CAC) Pressure Test Kit	ZTSE 4341		

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SERVICE PARTS INFORMATION

Kit Description	Part Number	Quantity Required	Notes
Fluid, Engine System Cleaner	2514295C92	1	One 5 Gallon pail (Transbrite 985)

Parts Catalog
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PROCEDURE OVERVIEW

GOVERNMENT REGULATION:

Engine fluids (oil, fuel, and coolant) may be a hazard to human health and the environment. Handle all fluids and other contaminated materials (such as filters or rags) in accordance with applicable regulations. Recycle or dispose of engine fluids, filters, and other contaminated materials according to applicable regulations.

WARNING: Park vehicle on hard flat surface, turn the engine off, set the parking brake, and block the wheels to prevent the vehicle from moving in both directions. Failure to comply may result in property damage, personal injury, and / or death.

WARNING: If the vehicle must be raised, do not work under the vehicle supported only by jacks. Jacks can slip or fall over, potentially resulting in property damage, personal injury, and / or death.

WARNING: Always wear safe eye protection when performing vehicle maintenance. Failure to comply may result in personal injury and / or death.

WARNING: Keep flames or sparks away from vehicle and do not smoke while servicing the vehicle's batteries. Batteries expel explosive gases. Failure to comply may result in property damage, personal injury, and / or death.

WARNING: Remove the ground cable from the negative terminal of the battery box before disconnecting any electrical components. Always connect the ground cable last. Failure to comply may result in property damage, personal injury, and / or death.

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DIAGNOSTIC STEPS

1. Bring vehicle into shop and park on flat surface.
2. Shift transmission to Park or Neutral, set parking brake, and install wheel chocks.
3. Unlatch and open hood.

NOTE: This procedure applies to High Pressure (HP) Charge Air Coolers (CAC) only.

4. Remove CAC from vehicle. Refer to correct Service Manual on the Master Service Information Site (MSI).

OFF-CHASSIS PRESSURE TEST

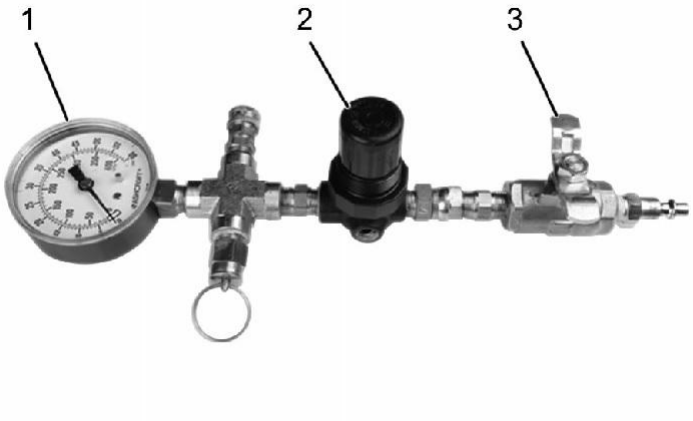

Figure 1: Gauge / Regulator Assembly

Item 1: Gauge
Item 2: Air Regulator Knob
Item 3: Air Valve

NOTE: CACs are not required to be leak proof. Do NOT test CAC for leakage by submerging it in a radiator test tank. Almost all CACs will show leakage if they are submerged.

WARNING: Clean all rubber collars and other pressure test components of any oil, grease, or other lubricants. Serious injury or death can occur if metal couplers are forced out during pressure testing.

WARNING: Using appropriate fasteners, attach safety cables to CAC mounting holes or to a stationary object. Serious injury or death can occur if couplers blow out of coupling collars during pressure testing.

WARNING: Adjust air regulator valve to minimum setting before connecting air supply. Accidentally applying high pressure can damage tool components or CAC resulting in flying objects, serious injury, or death.

1. Install CAC Pressure Test Kit per instructions included with ZTSE4341, using appropriate hoses and clamps from CAC Adapter Flushing Kit 09-925-01.

2. Connect a filtered air supply to air valve (Figure 1, Item 3) on gauge / regulator assembly.

WARNING: Increase air pressure slowly to prevent adapters from blowing off during testing.
After testing, relieve pressure slowly through bleed valve before removing test equipment. Failure to do so may result in property damage, personal injury, and / or death.

WARNING: When applying air pressure, watch for movement on the hoses and / or clamps. If any movement is noticed, stop immediately and relieve any pressure, tighten the clamps, and / or reposition the hoses and clamps if necessary. Failure to comply may result in property damage, personal injury, and / or death.

3. Open air valve (Figure 1, Item 3) slightly, and slowly increase air pressure until gauge (Figure 1, Item 1) reads 30 psi (205 kPa). If required, adjust air regulator (Figure 1, Item 2) until gauge reads 30 psi (205 kPa) as follows:

A. Pull air regulator knob (Figure 1, Item 2) outward to unlock.

B. Turn air regulator knob (Figure 1, Item 2) to adjust pressure to 28 - 32 psi (193 - 221kPa).

C. Push air regulator knob (Figure 1, Item 2) back into locked position.

4. Close air valve (Figure 1, Item 3) and monitor gauge (Figure 1, Item 1) with stop watch for 15 seconds. Note any decrease in air pressure.

5. Repeat Steps 3 and 4 three times to verify results.

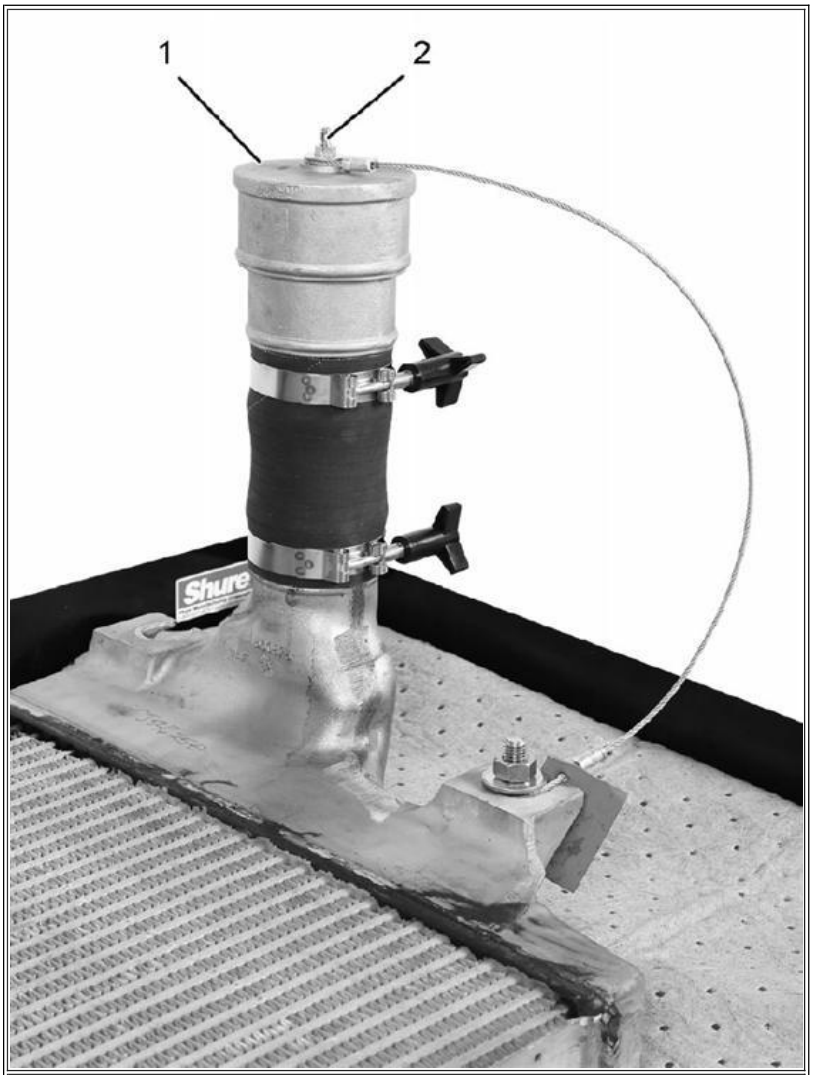

Figure 2: Bleeding Air

Item 1: Bleed off-coupler
Item 2: Bleed off-valve

6. If air pressure drop is more than 5 psi (34 kPa) in 15 seconds, replace CAC. If air pressure drop is 5 psi (34 kPa) or less in 15 seconds, perform cleaning procedure.

7. Slowly turn bleed-off valve (Figure 2, Item 2) on bleed-off coupler (Figure 2, Item 1) counterclockwise and release air from system.

8. Disconnect filtered air supply from air valve.

9. Remove CAC Pressure Test Kit per instructions included with ZTSE 4341.

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REPAIR STEPS

INSTALLATION PROCEDURE

1. Make sure reservoir of Cleaning Management System (CMS) is clean and filter has been replaced.
2. Add 5 gallons (18.93 liters) of tap water to CMS reservoir first, followed by 5 gallons (18.93 liters) of cleaning fluid.
3. Position PUMP / HEATER switch on CMS to HEATER and allow temperature to reach approximately 130°F (54.44°C) before flushing.

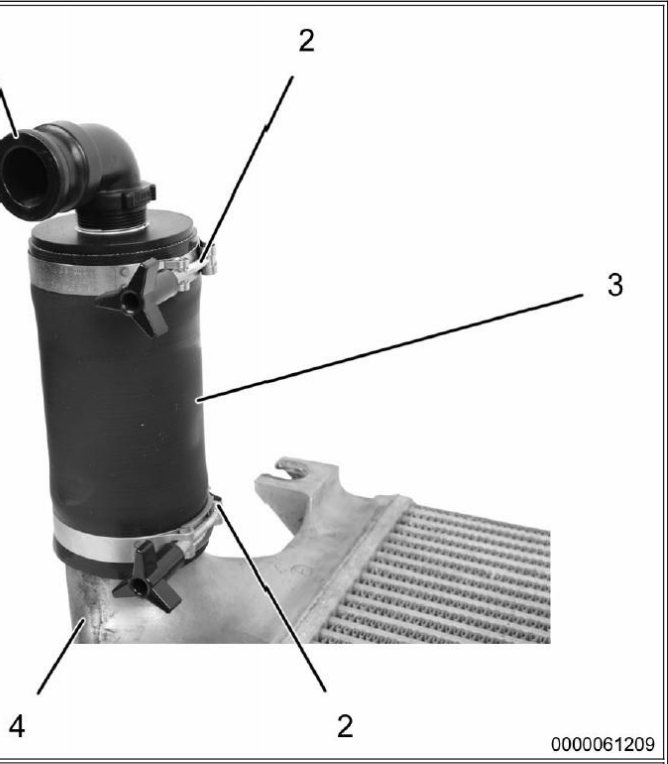

Figure 2: CAC Outlet Adapter

Item 1: CAC Adapter
Item 2: T-Clamp (2)
Item 3: Larger Hose
Item 4: CAC Outlet

4. With Charge Air Cooler (CAC) on a flat surface, install large hose (**Figure 2**, Item 3) on CAC Outlet (**Figure 2**, Item 4) with T-clamp (**Figure 2**, Item 2).

5. Install adapter (**Figure 2**, Item 1) in large hose (**Figure 2**, Item 3) with T-clamp (**Figure 2**, Item 2).

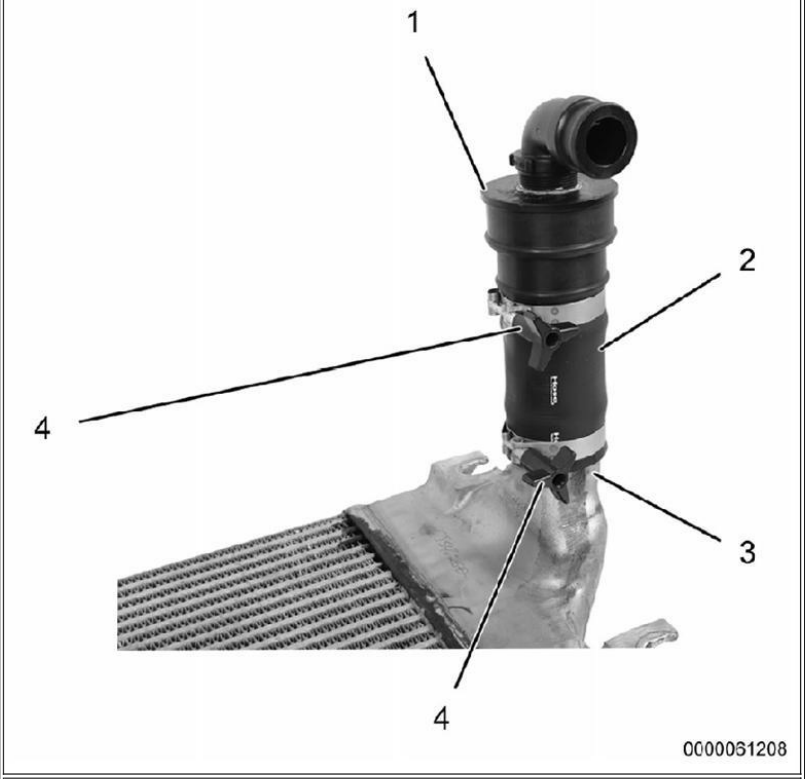

Figure 3: CAC Inlet Adapter

Item 1: CAC Adapter
Item 2: Small Hose
Item 3: CAC Inlet
Item 4: T-clamp (2)

6. Install small hose (**Figure 3**, Item 2) on CAC inlet (**Figure 3**, Item 3) with T-clamp (**Figure 3**, Item 4).

7. Install CAC adapter (**Figure 3**, Item 1) in small hose (**Figure 3**, Item 2) with T-clamp (**Figure 3**, Item 4).

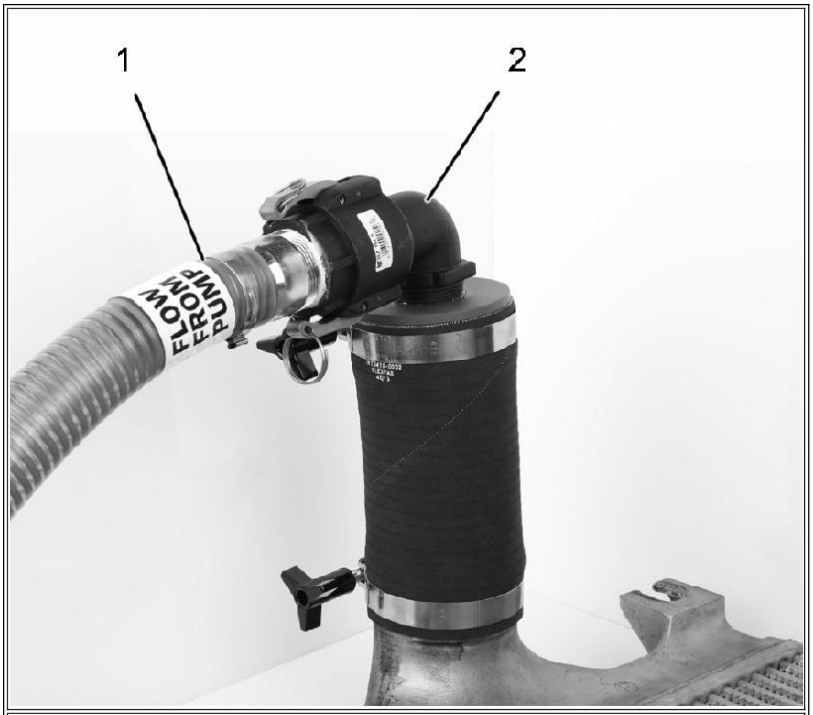

Figure 4: Outlet Adapter

Item 1: CMS FLOW FROM PUMP hose
Item 2: Outlet Adapter

8. Connect CMS FLOW FROM PUMP hose (**Figure 4**, Item 1) to outlet adapter (**Figure 4**, Item 2).

9. Install FLOW FROM PUMP hose to CMS.

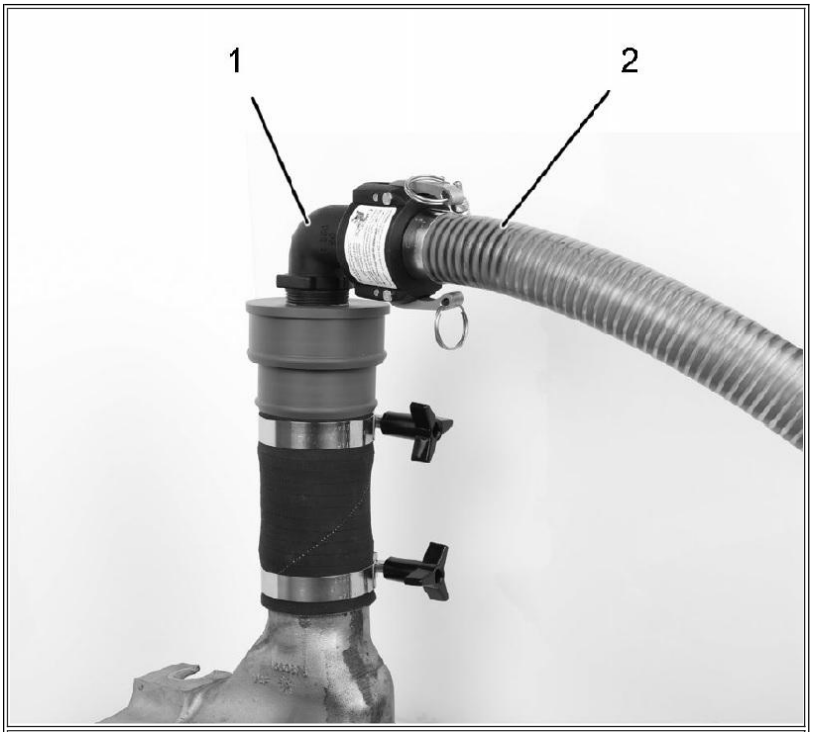

Figure 5: Inlet Adapter

Item 1: Inlet Adapter
Item 2: CMS FLOW RETURN hose

10. Connect CMS FLOW RETURN hose (**Figure 5**, Item 2) to inlet adapter (**Figure 5**, Item 1).

11. Connect FLOW RETURN hose to CMS.

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CLEANING PROCEDURE

Figure 6: Timer

1. Set and start timer (**Figure 6**) on CMS for 20 minutes, position PUMP / HEATER switch on CMS to PUMP, and perform 20-minute back-flush.

2. Position PUMP / HEATER switch on CMS to OFF.

3. Disconnect CMS FLOW RETURN hose (**Figure 5**, Item 2) from inlet adapter (**Figure 5**, Item 1).

4. Disconnect CMS FLOW FROM PUMP hose (**Figure 4**, Item 1) from outlet adapter (**Figure 4**, Item 2).

5. Connect CMS FLOW RETURN hose (**Figure 5**, Item 2) to outlet adapter (**Figure 4**, Item 2).

6. Connect CMS FLOW FROM PUMP hose (**Figure 4**, Item 1) to inlet adapter(**Figure 5**, Item 1).

7. Set and start timer (**Figure 6**) on CMS for 20 minutes, position PUMP / HEATER switch on CMS to PUMP, and perform 20-minute forward -flush.

8. Position PUMP / HEATER switch on CMS to OFF.

9. Disconnect CMS FLOW FROM PUMP hose from inlet adapter.

10. Disconnect CMS FLOW RETURN hose from outlet adapter.

11. Drain and clean CMS.

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FLUSHING PROCEDURE

1. Fill CMS with 10 gallons of hot tap water.

2. Connect CMS FLOW FROM PUMP hose (**Figure 4**, Item 1) to outlet adapter (**Figure 4**, Item 2).

3. Connect CMS FLOW RETURN hose (**Figure 5**, Item 2) to inlet adapter (**Figure 5**, Item 1).

4. Set and start timer (**Figure 6**) on CMS for 10 minutes, position PUMP / HEATER switch on CMS to PUMP, and perform 10-minute rinse with hot tap water.

5. Position PUMP / HEATER switch on CMS to OFF.

6. Disconnect CMS FLOW FROM PUMP hose (**Figure 4**, Item 1) from outlet adapter (**Figure 4**, Item 2).

7. Disconnect CMS FLOW RETURN hose (**Figure 5**, Item 2) from inlet adapter (**Figure 5**, Item 1).

8. Tip CAC on its side and allow water to drain.

9. Drain and clean CMS.

10. Fill CMS with 10 gallons of tap water.

11. Connect CMS FLOW RETURN hose (**Figure 5**, Item 2) to outlet adapter (**Figure 4**, Item 2).

12. Connect CMS FLOW FROM PUMP hose (**Figure 4**, Item 1) to inlet adapter(**Figure 5**, Item 1).

13. Set and start timer (**Figure 6**) on CMS for 10 minutes, position PUMP / HEATER switch on CMS to PUMP, and perform 10-minute rinse with hot tap water (cold water is sufficient if hot tap water is not available).

14. Position PUMP / HEATER switch on CMS to OFF.

15. Disconnect CMS FLOW FROM PUMP hose from inlet adapter.

16. Disconnect CMS FLOW RETURN hose from outlet adapter.

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REMOVAL PROCEDURE

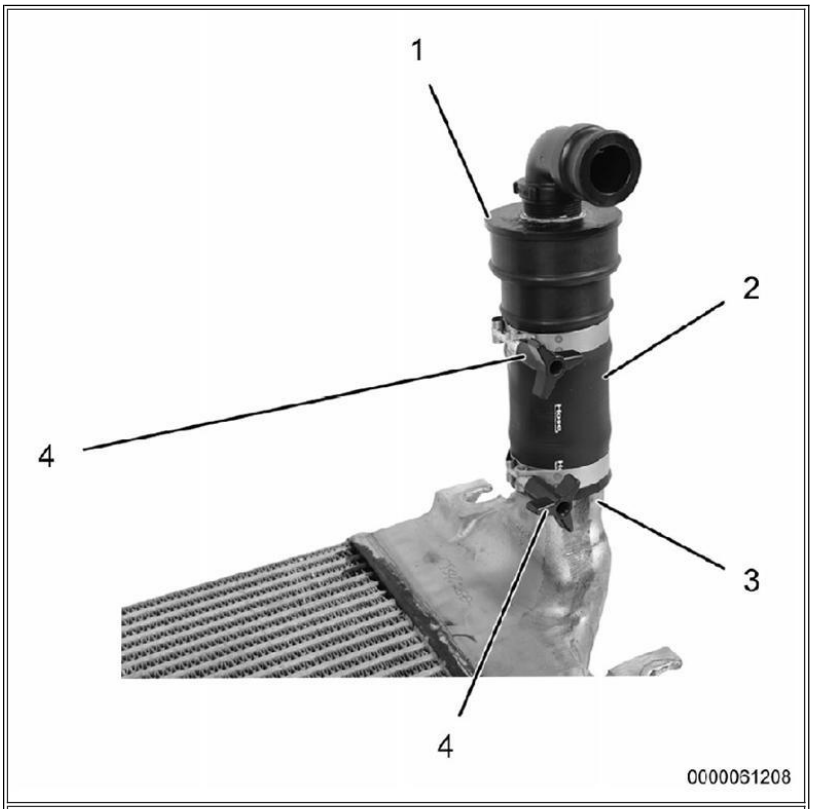

Figure 7: CAC Inlet Adapter Removal

Item 1: CAC Adapter
Item 2: Small Hose
Item 3: CAC Inlet
Item 4: T-clamp (2)

1. Remove T-clamp (**Figure 7**, Item 4) and CAC adapter (**Figure 7**, Item 1) from small hose (**Figure 7**, Item 2).
2. Remove T-clamp (**Figure 7**, Item 4) and small hose (**Figure 7**, Item 2) from CAC inlet (**Figure 7**, Item 3)

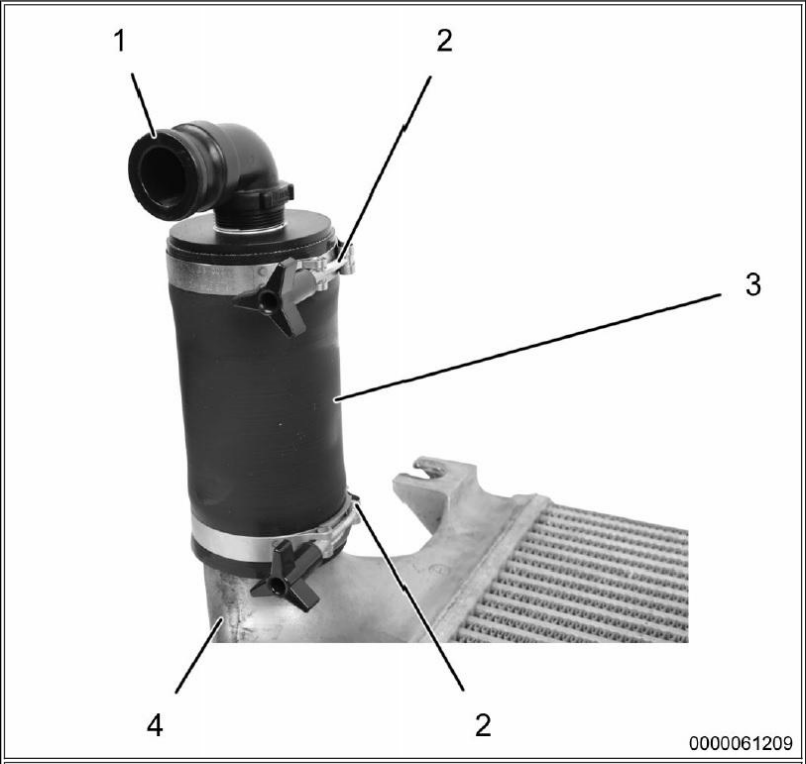

Figure 8: CAC Outlet Adapter

Item 1: CAC Adapter
Item 2: T-Clamp (2)
Item 3: Larger Hose
Item 4: CAC Outlet

3. Remove T-clamp (**Figure 8**, Item 2) and CAC adapter (**Figure 8**, Item 1) from large hose (**Figure 8**, Item 3).
4. Remove T-clamp (**Figure 8**, Item 2) and large hose (**Figure 8**, Item 3) from CAC Outlet (**Figure 8**, Item 4).
5. Drain and clean CMS.
6. Blow dry CAC with compressed air.
7. Install CAC Refer to correct Service Manuals on Master Service Information Site (MSI).
8. Run engine to verify proper operation, no leaks, and no fault codes.
9. Close and Latch Hood.
10. Remove wheel chocks.

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WARRANTY INFORMATION

Warranty Claim Coding:

Group:	09046 - Charge Air Cooler
Noun:	925 - Charge Air Cooler, Chassis Mounted

SRTs are subject to change without notice, the time posted on the SRT homepage are correct and should be used.

Section	Step	Description	Chassis	Engine	SRT	Multiple CACs	Hours
Diagnostics	4	CAC R&R	CAT CT660	EPA 10 11L, 13L, & N13	TC09-3925U-20	Cold Side	High-Pressure CAC Removal & Installation (SRTs)
Diagnostics	4	CAC R&R	CAT CT660	EPA 10 11L, 13L, & N13	TC09-3925U	Hot Side	
Diagnostics	4	CAC R&R	CAT CT660	EPA 10 11L, 13L, & N13	TC09-3925U-15	Both	
Diagnostics	4	CAC R&R	WorkStar	EPA 10 11L, 13L, & N13	N09-3925U-20	Cold Side	
Diagnostics	4	CAC R&R	WorkStar	EPA 10 11L, 13L, & N13	N09-3925U-22	Hot Side	
Diagnostics	4	CAC R&R	WorkStar	EPA 10 11L, 13L, & N13	N09-3925U-21	Both	
Diagnostics	4	CAC R&R	TranStar	EPA 10 11L, 13L, & N13	Q09-3925U-21	N/A	
Diagnostics	4	CAC R&R	Prostar	EPA 10 11L, 13L, & N13	R09-3925U-21	N/A	
Off-Chassis Pressure Test	1 - 9	CAC Pressure Test	ALL Chassis	EPA 10 11L, 13L, & N13	Q09-3925U-1	N/A	
Installation - Removal	1 - 10	CAC Cleaning, Perform	ALL Chassis	EPA 10 11L, 13L, & N13	A09-3925A	N/A	

Alternatively, the SRT code can be searched for, here.

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OTHER RESOURCES

Master Service Information Site

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