Safety Recall
Code: 15F7

Subject	**Cylinder Head**
Release Date	September 16, 2016
Affected Vehicles	***U.S.A.: Certain 2016 MY Golf, Jetta & Passat*** *Check Campaigns/Actions screen in Elsa on the day of repair to verify that a VIN qualifies for repair under this action. Elsa is the only valid campaign inquiry & verification source.* ✓ *Campaign status must show "open."* ✓ *If Elsa shows other open action(s), inform your customer so that the work can also be completed at the same time the vehicle is in the workshop for this campaign.*
Problem Description	The fuel rail may detach from the cylinder head and result in a fuel leak. Leaking fuel in the presence of an ignition source may result in a fire.
Corrective Action	Replace the cylinder head.
Precautions	If a fuel smell is detected in the vehicle, customers are advised to contact an authorized Volkswagen dealer without delay to have the vehicle inspected. The vehicle may also go into engine "limp home" mode if the fuel smell is related to this recall issue.
Parts Information	Parts will be allocated prior to owner notification. If allocated parts have been used and your dealership is at the weekly Upper Order Limit, submit requests for additional parts via email to Upperorderlimits@vw.com.
Code Visibility	On or about September 16, 2016, affected vehicles will be listed on the Inventory Vehicle Open Campaign Action report under My Dealership Reports (found on www.vwhub.com & OMD Web). A list will not be posted for dealers who do not have any affected vehicles. On or about September 16, 2016, this campaign code will show open on affected vehicles in Elsa. On or about September 16, 2016, affected vehicles will be identified with this campaign code in the VIN Lookup tool at www.vw.com and on the NHTSA VIN lookup tool at www.safercar.gov.
Owner Notification	Owner notification will take place in September 2016. Owner letter examples are included in this bulletin for your reference.
Alternate Transportation for Affected Owners	Because this repair is lengthy, please ensure that your dealership assists in making alternate transportation arrangements for customers who visit your dealership for this repair.
Additional Information	**Please alert everyone in your dealership about this action, including Sales, Service, Parts and Accounting personnel. Contact Warranty if you have any questions.** **IMPORTANT REMINDER ON VEHICLES AFFECTED BY SAFETY & COMPLIANCE RECALLS** **New Vehicles in Dealer Inventory: It is a violation of Federal law for a dealer to deliver a new motor vehicle or any new or used item of motor vehicle equipment (including a tire) covered by this notification under a sale or lease until the defect or noncompliance is remedied. By law, dealers must correct, prior to delivery for sale or lease, any vehicle that fails to comply**

with an applicable Federal Motor Vehicle Safety Standard or that contains a defect relating to motor vehicle safety.

Pre-Owned Vehicles in Dealer Inventory: Dealers should not deliver any pre-owned vehicles in their inventory which are involved in a safety or compliance recall until the defect has been remedied.

Dealers must ensure that every affected inventory vehicle has this campaign completed before delivery to consumers.

Fill out and affix Campaign Completion Label (CAMP 010 000) after work is complete.
Labels can be ordered at no cost via the Compliance Label Ordering portal at www.vwhub.com.

Claim Entry Instructions

After campaign has been completed, enter claim as soon as possible to help prevent work from being duplicated elsewhere. Attach the Elsa screen print showing action *open on the day of repair* to the repair order.

If customer refused campaign work:

- ✓ U.S. dealers: Submit request via WISE under the *Campaigns/Update/Recall Closure* option.

Service Number	15F7
Damage Code	0099
Parts Vendor Code	WWO
Claim Type	Sold vehicle: 7 10 Unsold vehicle: 7 90
IMPORTANT! **Claiming Information** **Special Instructions**	Due to large number of parts needed for this repair, additional claim lines will be needed as parts list will exceed the claiming limit. Cylinder head part numbers provided per Criteria I.D. listed below with repair times. Reference the repair order for additional part requirements.
Causal Indicator	Mark cylinder head as causal part* For subsequent claim lines, mark “cylinder head” as causal part with a quantity of zero (0).
Vehicle Wash/Loaner	Do not claim wash/loaner under this action
Criteria I.D.	02 (Engine Codes CPRA-PZEV and CXBB-PZEV)
	Replace cylinder head. Labor operation: 1570 23 99 1360 T.U.

Quantity	Part Number	Description
1	06L103064	Cylinder Head (1.8T CPRA, CXBB)
Reference the repair order for additional part requirements.		

Criteria I.D.	03 (Engine Code CPKA)
	Replace cylinder head. Labor operation: 1570 24 99 1390 T.U.

Quantity	Part Number	Description
1	06L103064A	Cylinder Head (1.8T CPKA)
Reference the repair order for additional part requirements.		

Criteria I.D.	04 (Engine Code CPLA)
	Replace cylinder head. Labor operation: 1570 25 99 1360 T.U.

Quantity	Part Number	Description
1	06L103064J	Cylinder Head (2.0L CPLA)
Reference the repair order for additional part requirements.		

Customer Letter Example (USA)

<MONTH YEAR>

<CUSTOMER NAME>
<CUSTOMER ADDRESS>
<CUSTOMER CITY STATE ZIPCODE>

This notice applies to your vehicle: <VIN>

NHTSA: <INSERT NUMBER>

Subject: **Safety Recall 15F7 – Cylinder Head**
Certain 2016 Model Year Volkswagen Golf, Jetta and Passat

Dear Volkswagen Owner,

This notice is sent to you in accordance with the National Traffic and Motor Vehicle Safety Act. Volkswagen has decided that a defect, which relates to motor vehicle safety, exists in certain 2016 model year Volkswagen Golf, Jetta and Passat vehicles. Our records show that you are the owner of a vehicle affected by this action.

What is the issue?	The fuel rail may detach from the cylinder head and result in a fuel leak. Leaking fuel in the presence of an ignition source may result in a fire.
What will we do?	To help correct this defect, your authorized Volkswagen dealer will replace the cylinder head in your vehicle. This work will take more than one day to complete and will be performed for you free of charge. Because this repair is lengthy, your dealer will assist in making alternate transportation arrangements for you.
What should you do?	Please contact your authorized Volkswagen dealer without delay to schedule this recall repair. For your convenience, you can also visit www.vw.com and click on the "Owners" link to locate a dealer near you and schedule this service online.
Precautions you should take	If a fuel smell is detected in the vehicle, contact the nearest authorized Volkswagen dealer to have your vehicle inspected without delay. Your vehicle may also go into engine "limp home" mode if the fuel smell is related to this recall issue.
Lease vehicles and address changes	If you are the lessor and registered owner of the vehicle identified in this action, the law requires you to forward this letter immediately via first-class mail to the lessee within ten (10) days of receipt. If you have changed your address or sold the vehicle, please fill out the enclosed prepaid Owner Reply card and mail it to us so we can update our records.
Can we assist you further?	If your authorized Volkswagen dealer fails or is unable to complete this work free of charge within a reasonable time, or if you should have any questions about this communication, please reach out to us using your preferred method of communication at www.vw.com/contact or by calling 1 800-893-5298. Our phone team is available Monday through Friday from 8AM to 10PM EST and Saturday from 9AM to 5PM EST.
Checking your vehicle for open Recalls and Service Campaigns	To check your vehicle's eligibility for repair under this or any other recall/service campaign, please click on the ***Look Up Recalls*** link at www.vw.com and enter your Vehicle Identification Number (VIN) into the ***Recall/Service Campaign Lookup*** tool.

If you still cannot obtain satisfaction, you may file a complaint with: The Administrator, National Highway Traffic Safety Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590; or call the toll-free Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153); or go to http://www.safercar.gov.

We apologize for any inconvenience this matter may cause; however we are taking this action to help ensure your safety and continued satisfaction with your vehicle. Thank you for driving a Volkswagen!

Sincerely,

Volkswagen Customer Protection

NOTE

Damages resulting from improper repair or failure to follow these work instructions are the dealer's responsibility and are not eligible for reimbursement under this action.

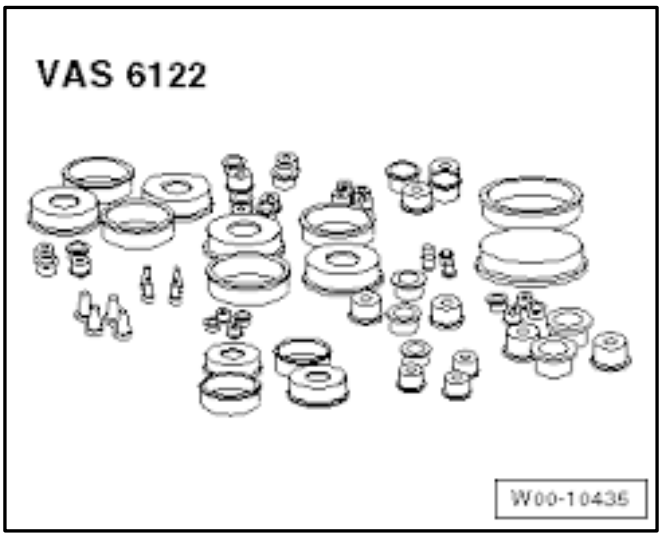
NOTE

- The following repair procedure describes a cylinder head replacement on a MY2016 Jetta 1.8L. Other models subject to this action will vary in procedure steps, tools required, and parts required.
- Please reference the Electronic Parts Catalog and the Repair Manual for further information.

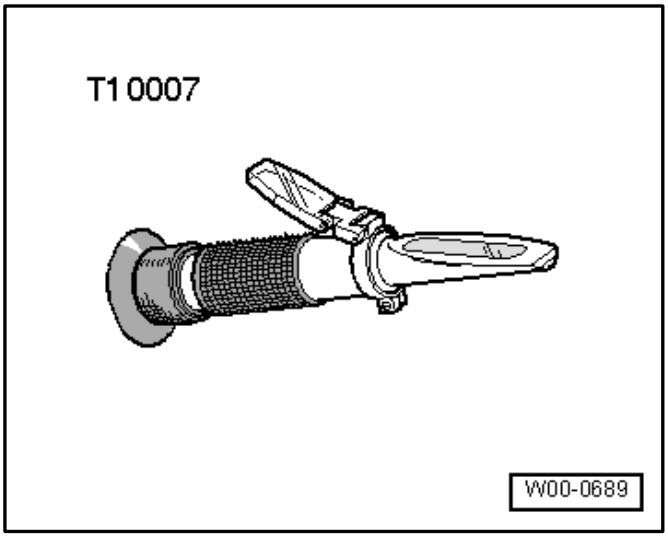
Required Parts

Criteria	Quantity	Part Number	Part Description
02	1 Per Vehicle	06L103064	Cylinder Head (1.8T CPRA, CXBB)
03	1 Per Vehicle	06L103064A	Cylinder Head (1.8T CPKA)
04	1 Per Vehicle	06L103064J	Cylinder Head (2.0T CPLA)

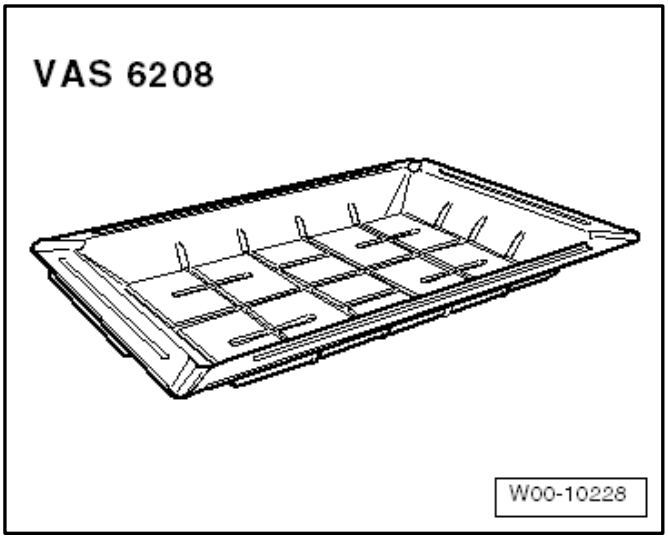
Required Tools



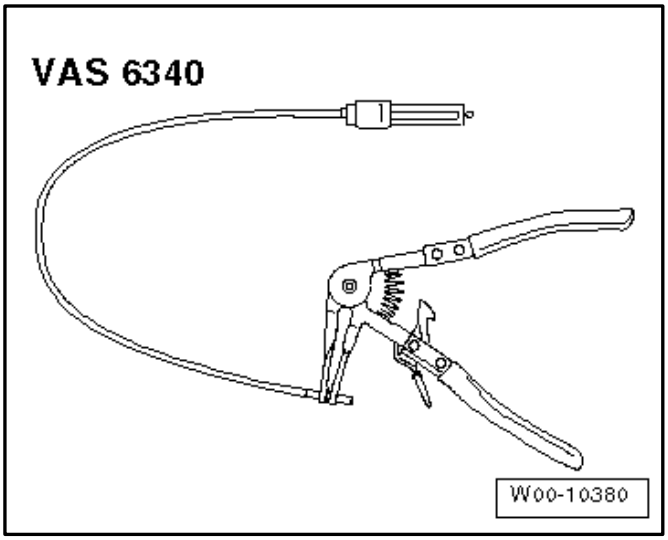
- Engine Bung Set -VAS6122



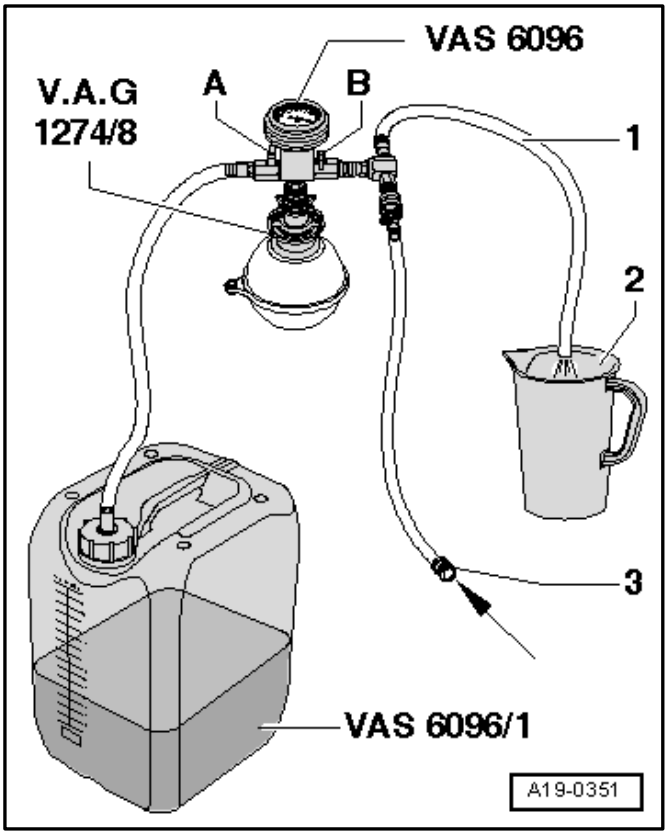
- Refractometer -T10007A-



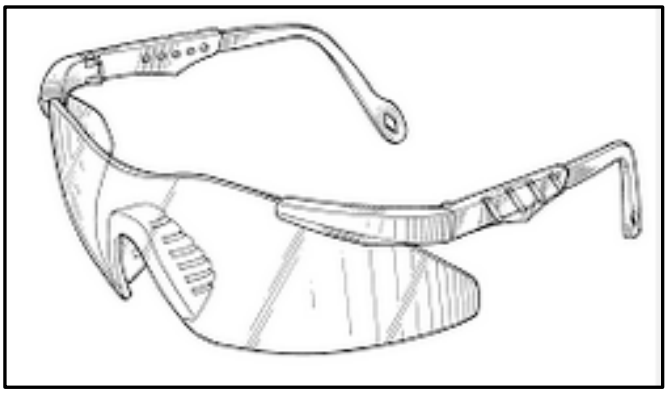
- Shop Crane - Drip Tray -VAS6208-



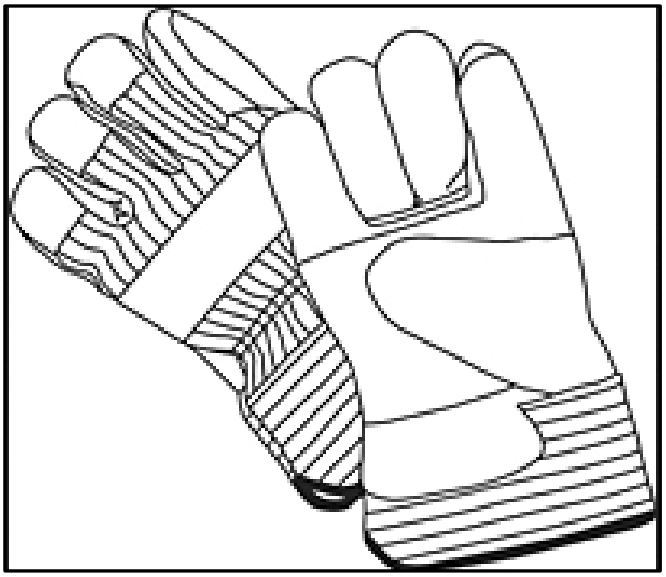
- Hose Clip Pliers -VAS6340-



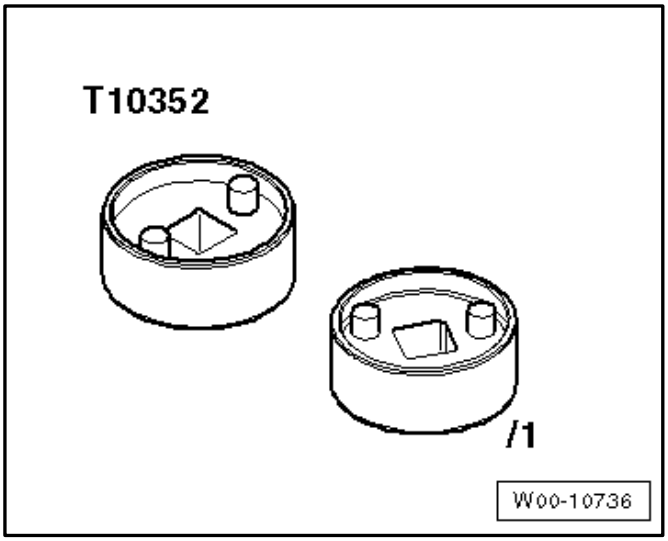
- Cooling System Charge Kit -VAS6096- VAS6096/1
- Cooling System Tester - Adapter -VAG1274/8-



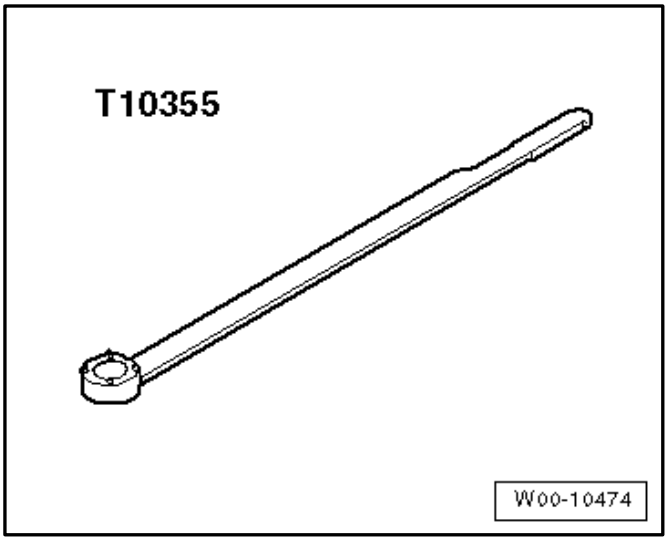
- Protective Eyewear (or equivalent)



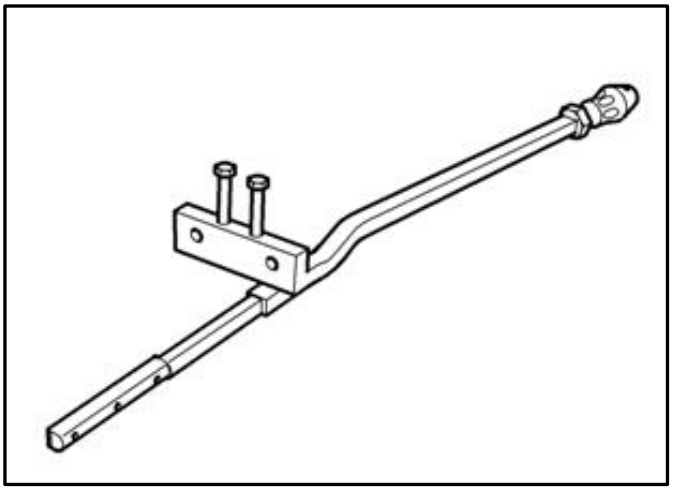
- Safety Gloves (or equivalent)



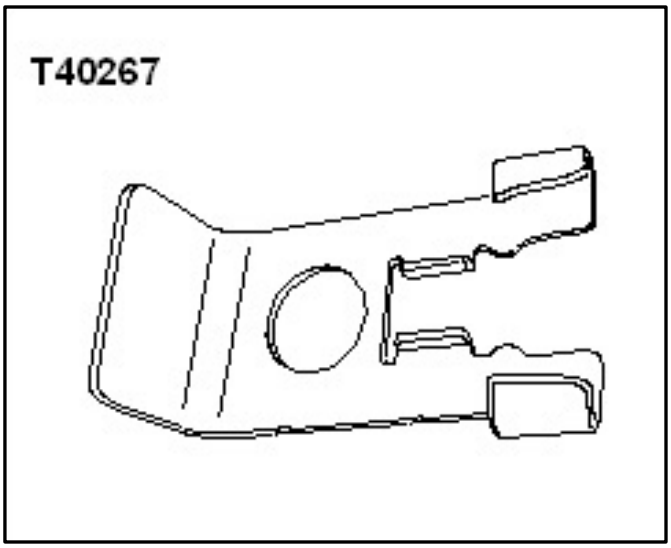
- Central Valve Assembly Tool -T10352



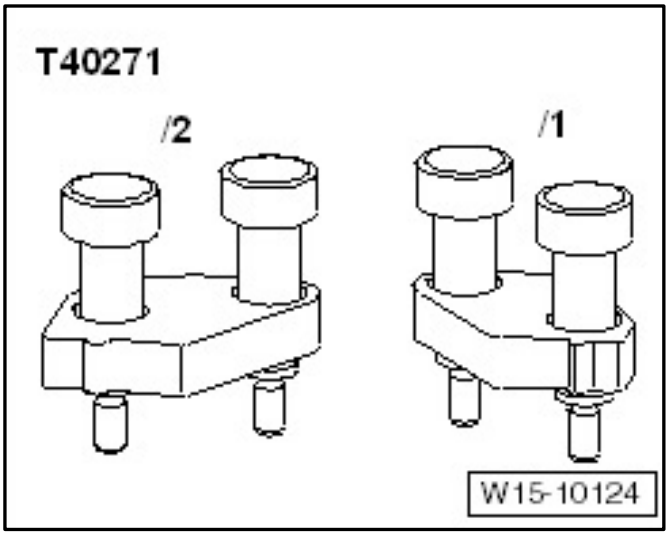
- Counterhold - Vibration Damper -T10355



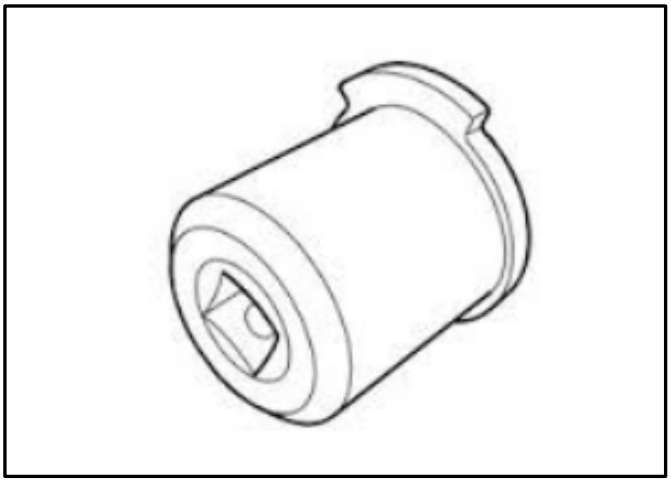
- Chain Tensioner Lever -T40243



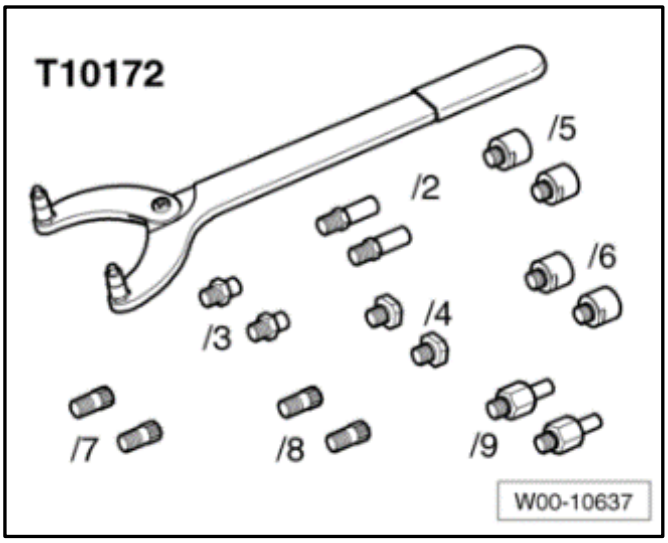
- Tensioner Locking Tool -T40267



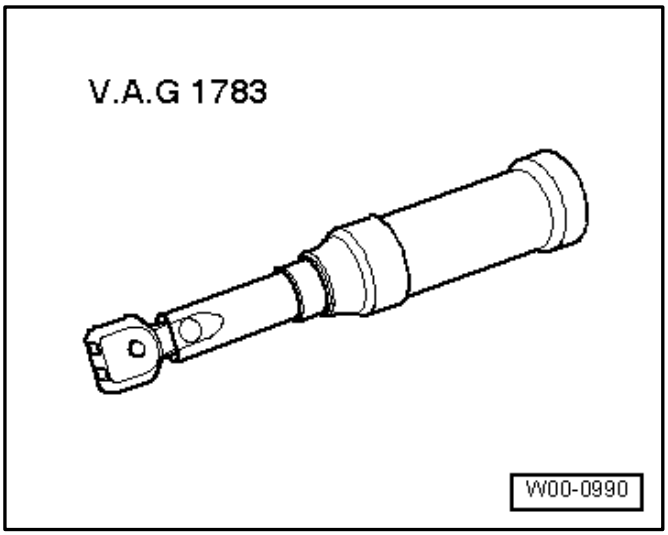
- Camshaft Locks -T40271



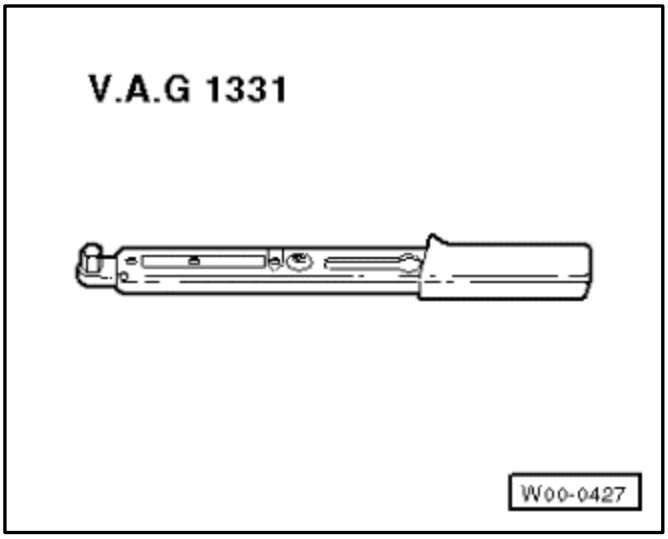
- Adapter -T40266



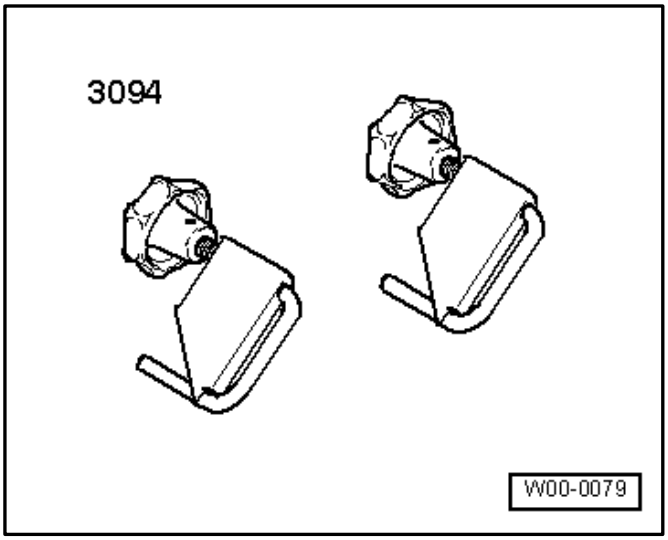
- Counterhold - Multiple Use -T10172A- with Counterhold - Kit - Adapter 2 -T10172/9



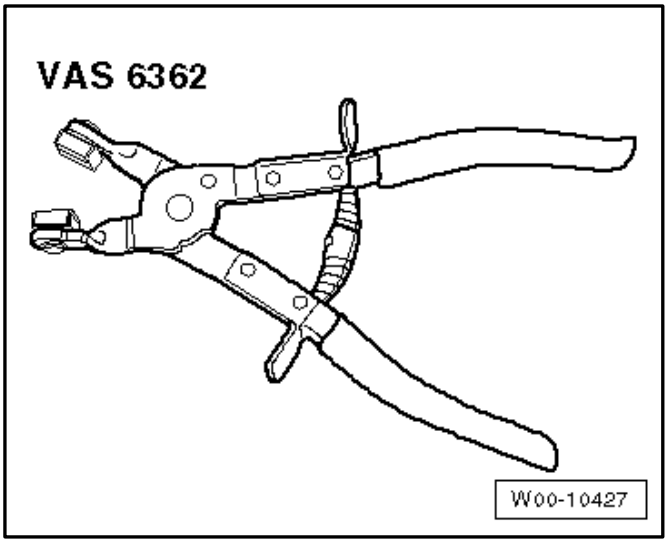
- Torque Wrench 1783 - 2-10Nm -VAG1783



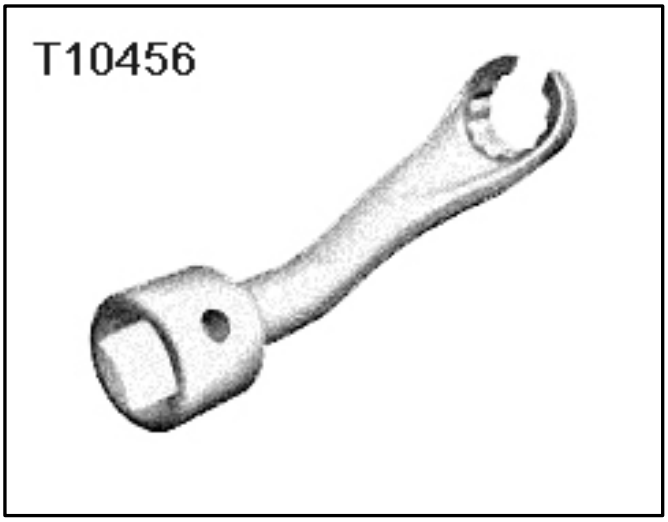
- Torque Wrench 1331 5-50Nm -VAG1331



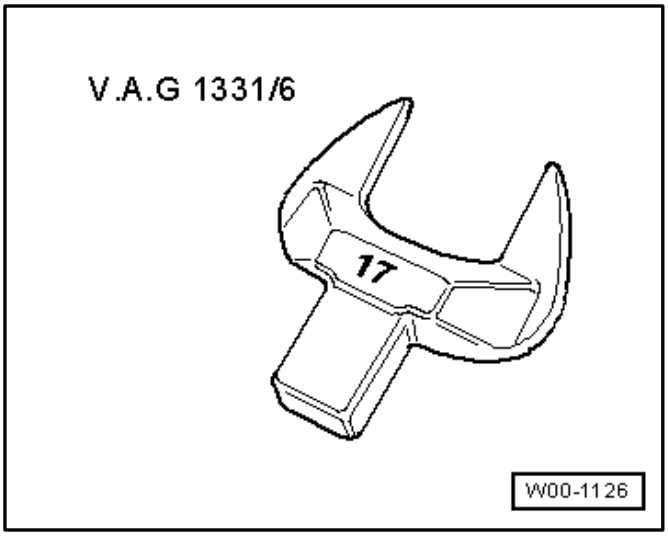
- Hose Clamps - Up To 25 mm -3094



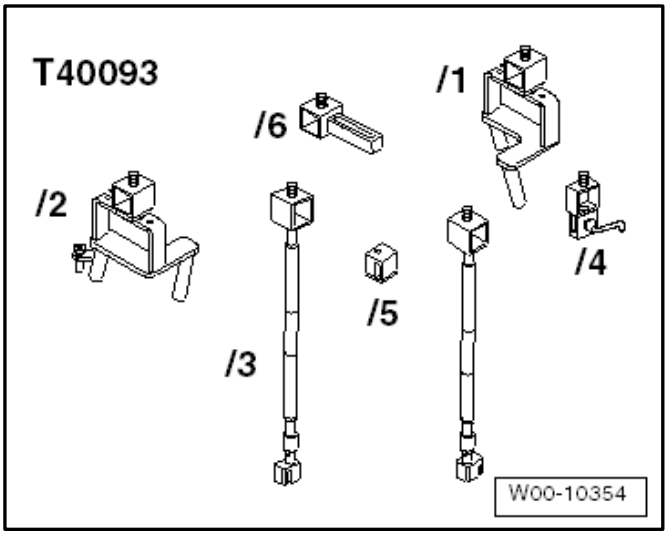
- Hose Clip Pliers -VAS6362



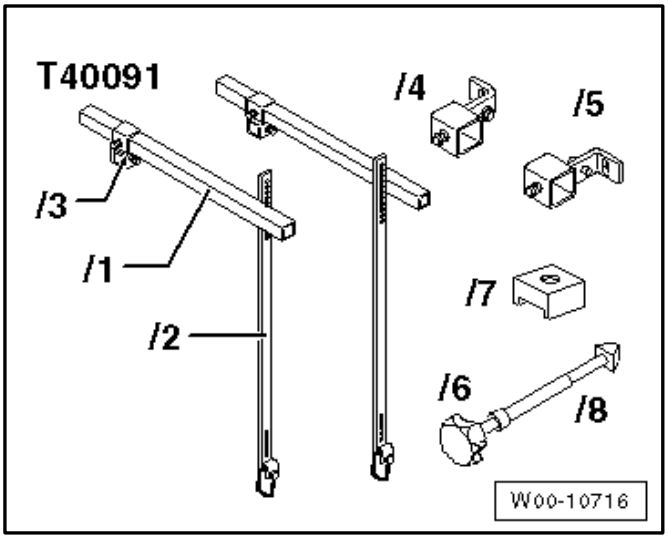
- Flare Nut Attachment - 17mm -T10456



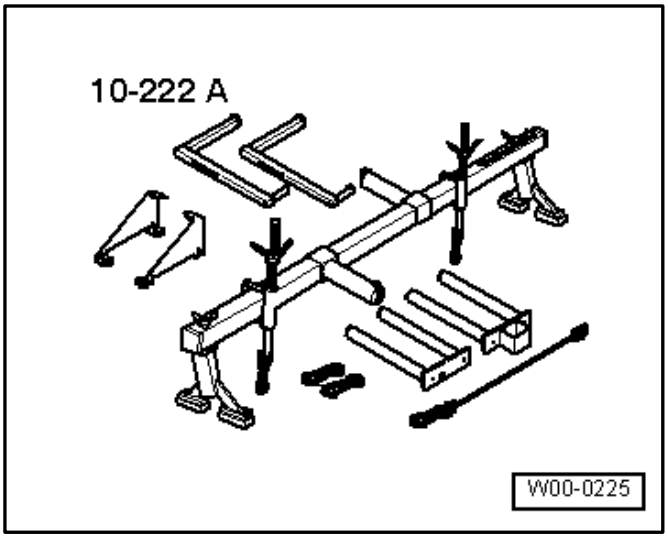
- Torque Wrench 1331 Insert - Open Jaw - 17mm - VAG1331/6



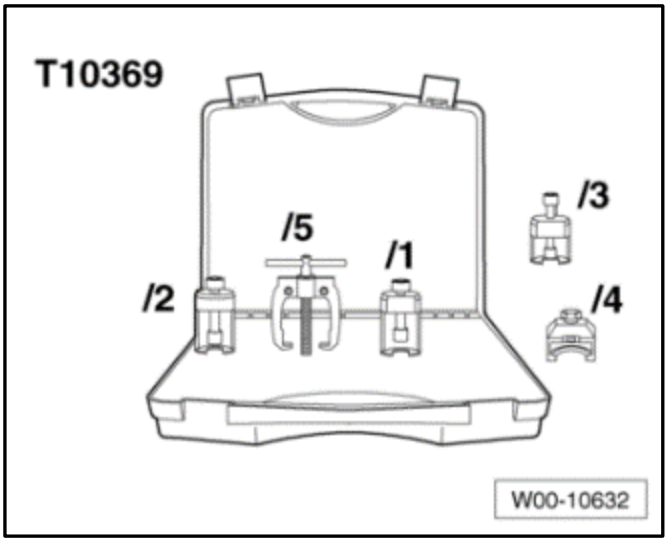
- Engine Support - Movable Joint -T40093/4- (quantity: 2) from the Engine Support - Supplement Kit -T40093A
- Engine Support - Mount -T40093/5- (quantity: 2) from the Engine Support - Supplement Kit - T40093A



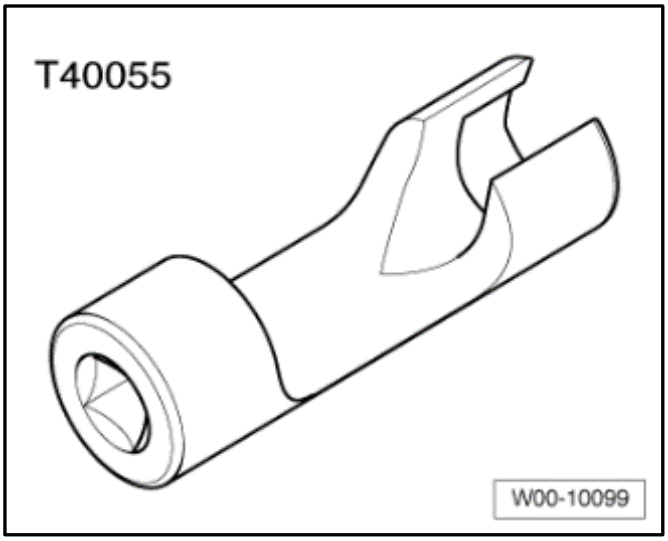
- Engine Support - Basic Set - Square Pipe - T40091/1- (quantity: 2) from the Engine Support - Basic Set -T40091
- Engine Support - Basic Set - Rail with Holes - T40091/2- (quantity: 1) from the Engine Support - Basic Set -T40091
- Engine Support - Basic Set - Movable Joint - T40091/3- (quantity: 2) from the Engine Support - Basic Set -T40091



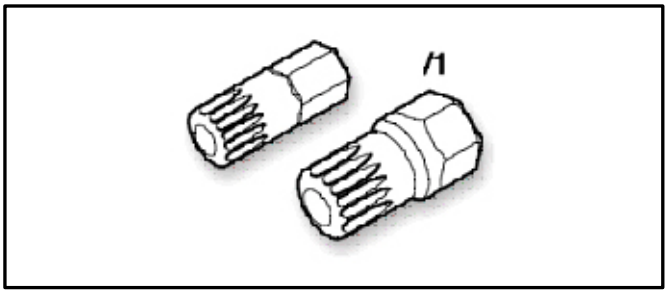
- Square Pipe with Two Bolts (quantity: 1) from the Engine Support Bridge -10-222A
- Engine Support Bridge - Spindle -10-222A/11- or Engine Support - Bracket w/Spindle and Hook - 10-222A10- from the Engine Support Bridge -10-222A- (quantity: 2)
- Engine Support - Adapter -10-222A/31A-1- (quantity: 1)
- Engine Support Bridge - Engine Support 28 -10-222A/28- (quantity: 2)
- Engine Support Bridge - Engine Support 28-1 -10-222A/28-1- (quantity: 2)
- Engine Support Bridge - Special Hook (2 pc.) -10-222A/20- (quantity: 1)



- Puller - Wiper Arm Kit -T10369
- Puller - Wiper Arm Kit - Puller 1 -T10369/1

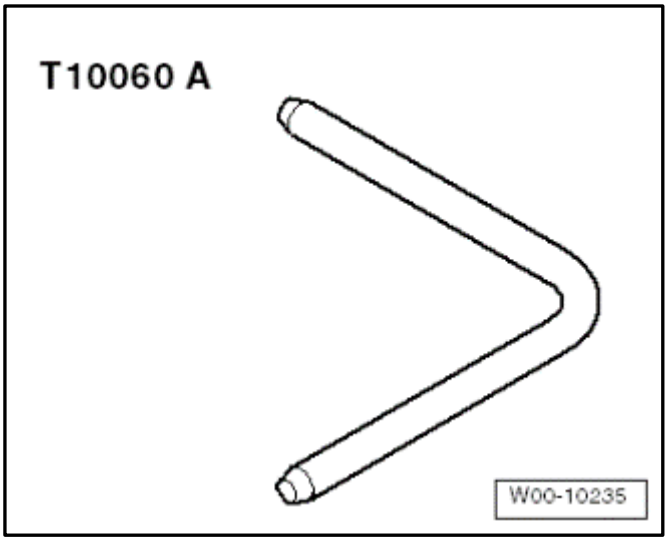


- Union Nut Socket - T40055-

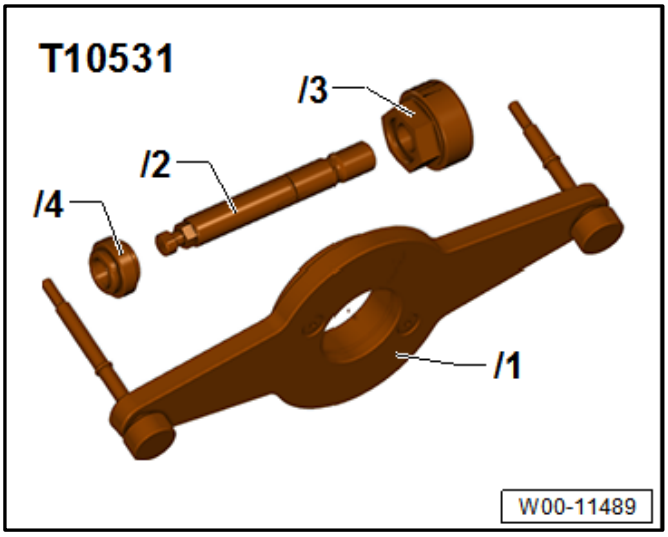


- Bits for VAG1331/13 -T10099.

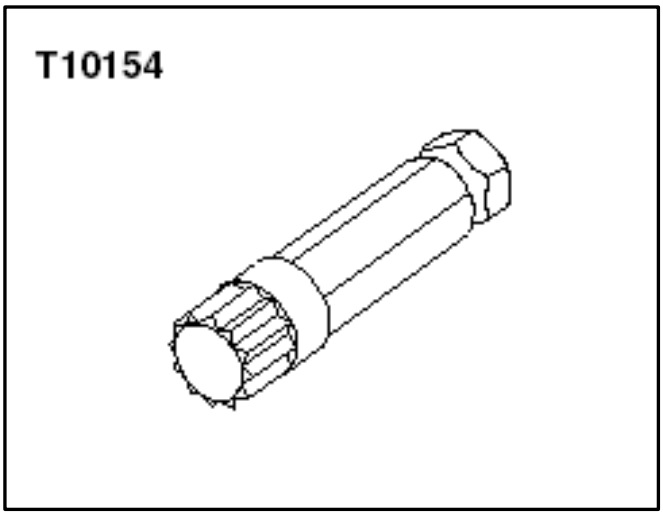
- Used Oil Collection and Extraction Unit - SMN372500 (or equivalent)



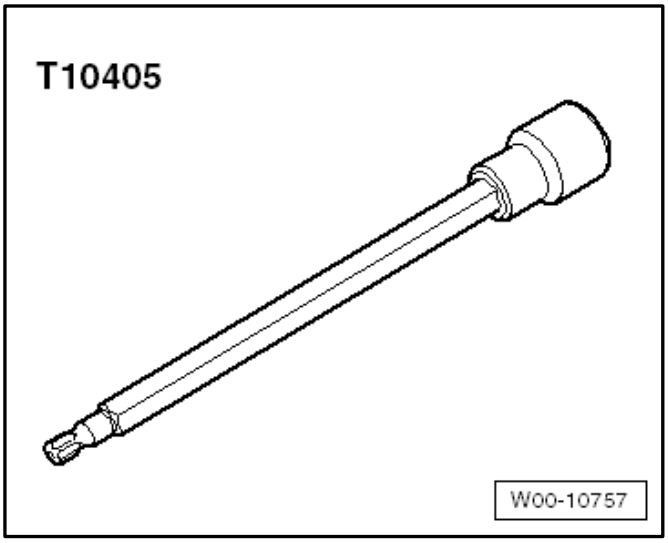
- Locking Pin -T10060A



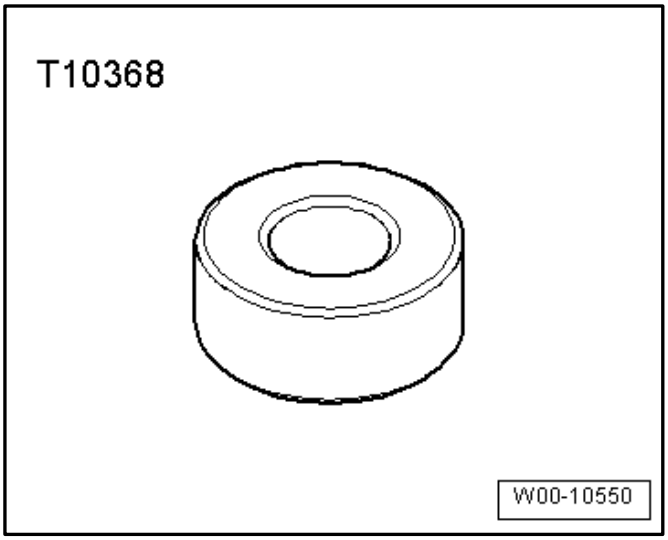
- Vibration Damper Assembly Tool -T10531



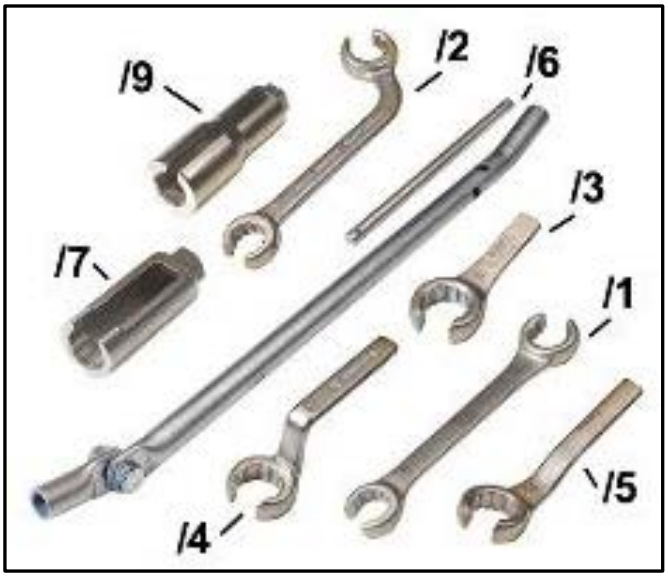
- Socket - Xzn 10 -T10154-



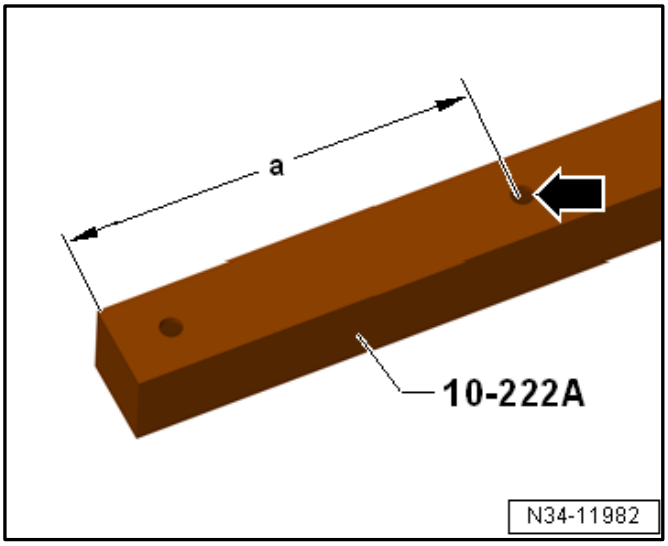
- Socket T30 -T10405-



- Press Piece - Timing Chain Cover -T10368



- Ring Wrench 7-Piece Set -3337-



- **Tools, Preparing**
  - If the adapter for Engine Support Bridge -10-222A- does not have the hole indicated by the -arrow-, it must be added.
    - Dimension -a- = 225 mm
    - Hole diameter = 12.5 mm

Repair Instruction

Section A - Check for Previous Repair

TIP

If Campaign Completion label is present, no further work is required.

- Enter the VIN in Elsa and proceed to the "Campaign/Action" screen.

TIP

On the date of repair, print this screen and keep a copy with the repair order.

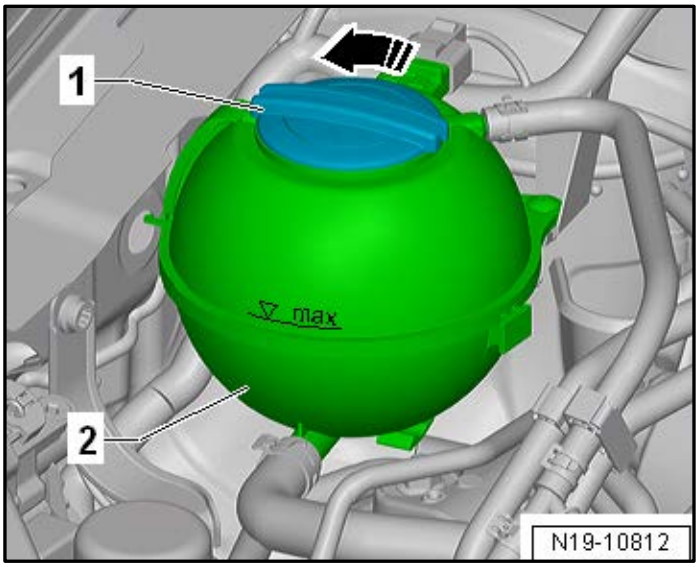
- Confirm the Campaign/Action is open <arrow 1>. If the status is closed, no further work is required.
- Note the Applicable Criteria ID <arrow 2> for use in determining the correct work to be done and corresponding parts associated.

Proceed to Section B

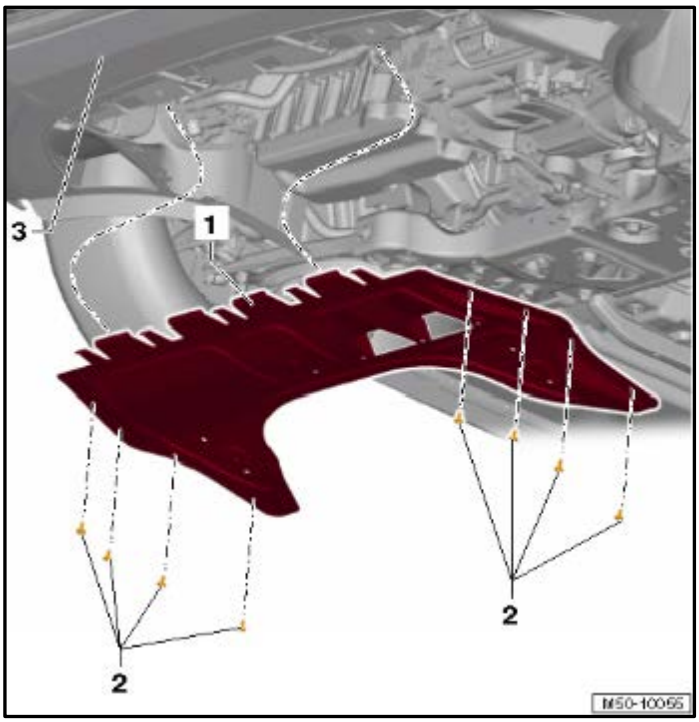
Section B – Cylinder Head Removal

⚠ WARNING

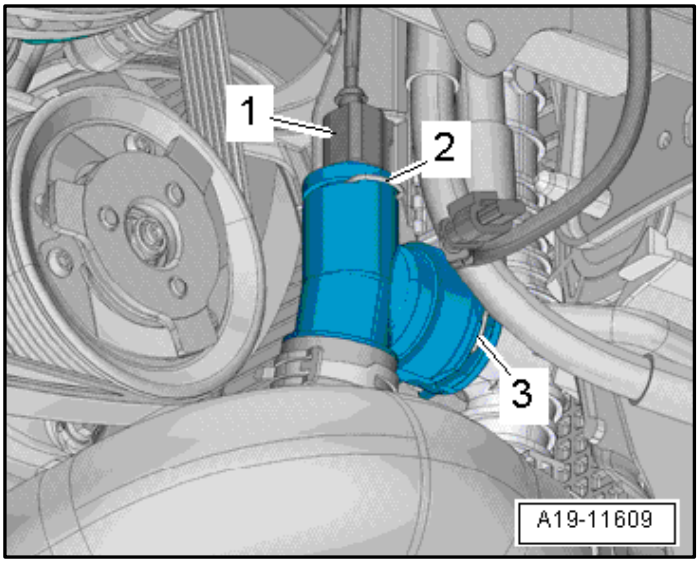
Risk of injury. Refer to “Warning and Safety Precautions”, found in **Appendix A** at the end of this document.



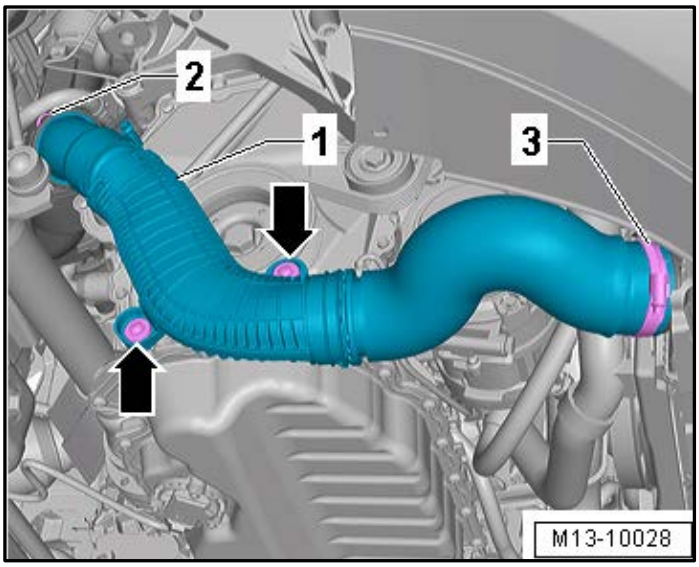
- Drain the coolant.
- Carefully open the cap -1- on the coolant expansion tank -2- in the direction of the -arrow-.



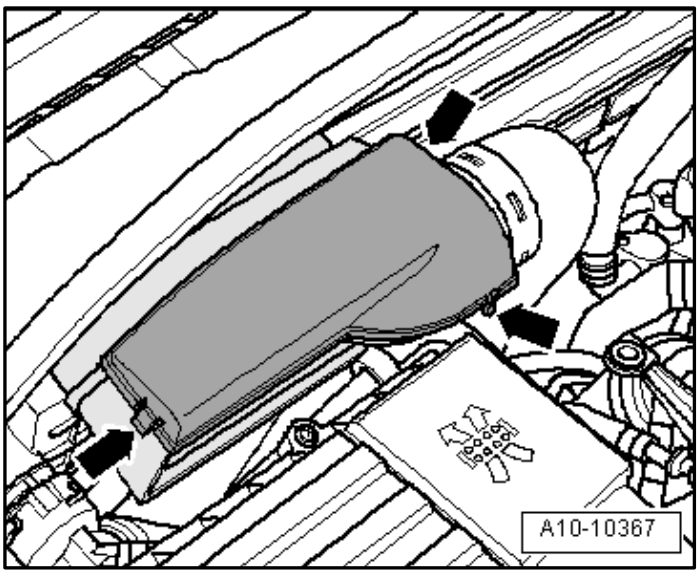
- Remove the noise insulation bolts -2-.
- Remove the noise insulation from the front bumper cover -3-.
- Place the Shop Crane - Drip Tray -VAS6208- underneath.



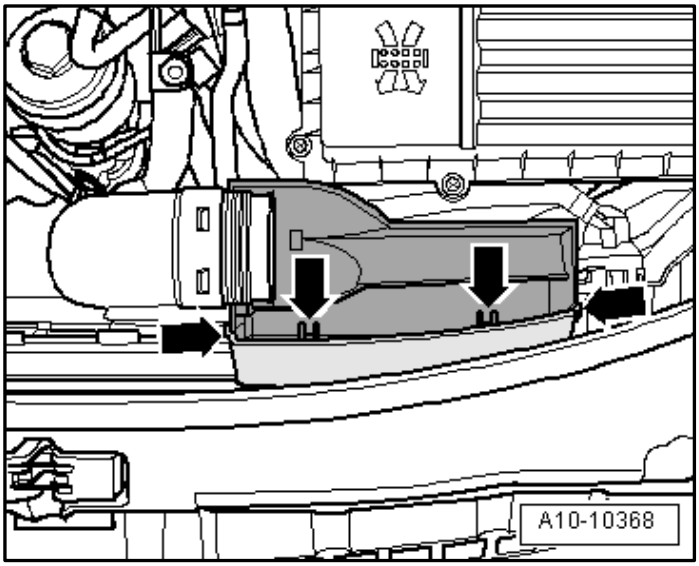
- Disconnect the Engine Coolant Temperature Sensor connector -2- on the Radiator Outlet - G83-.
- Lift the clamp -3- and remove the lower right coolant hose from the radiator. Allow the coolant to drain.



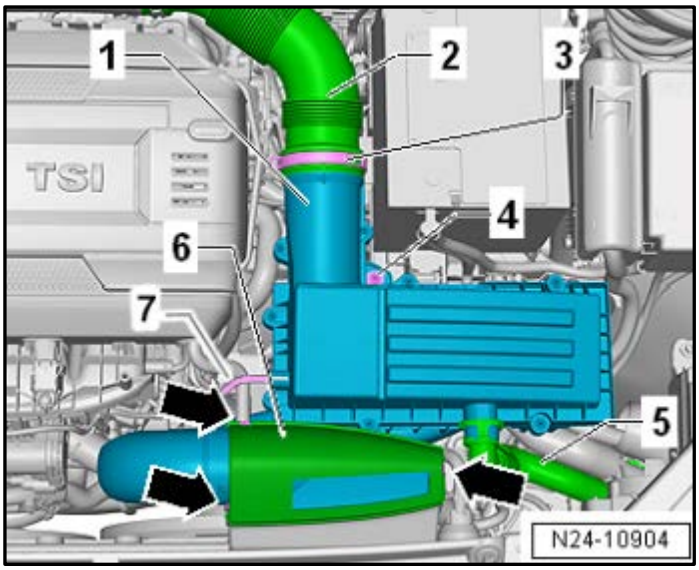
- Remove the air duct pipe bolts -arrows-.
- Remove the air duct pipe by lifting the clip -2- and opening the screw-type clamp -3-.



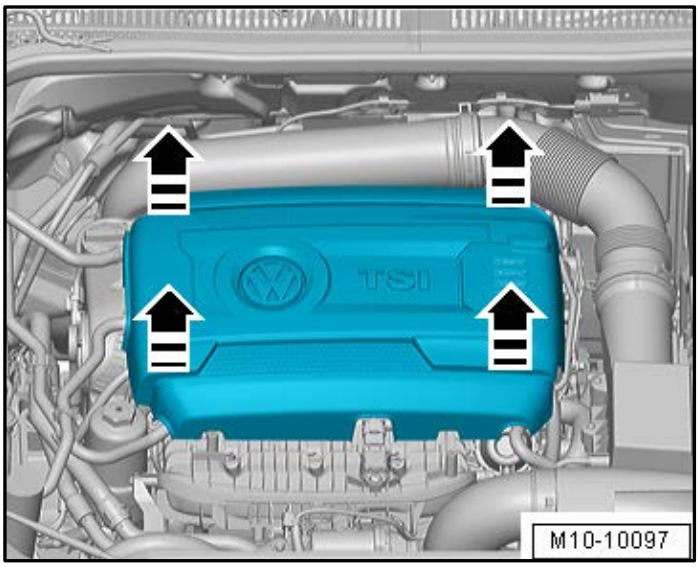
- Disengage the air filter housing side clips -arrows- and remove the cover for the air duct.



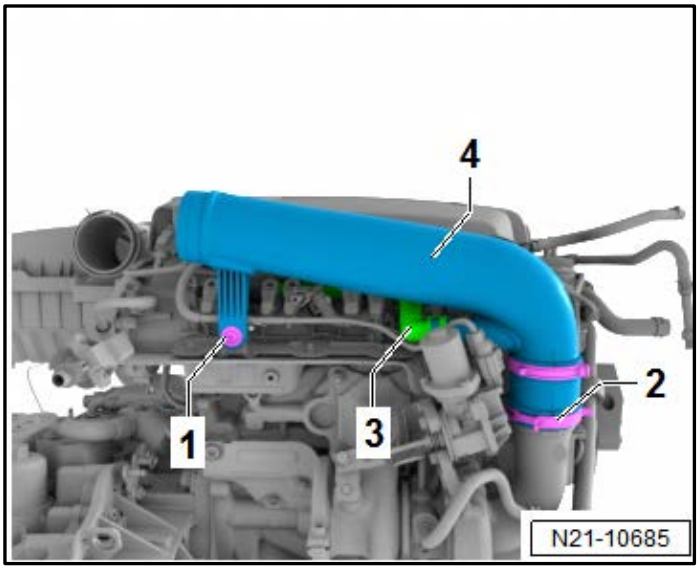
- Disengage the wire retainers -arrows- to unclip the lower air duct.



- Remove the air duct hose -2-.
- Remove vacuum line -7- from the air filter housing.
- Loosen the bolt -4- and remove the air filter housing -1- upward from the attachment bearing.
- If the vehicle is equipped with a Secondary Air System, remove the secondary air line connection -5- from the air filter housing.

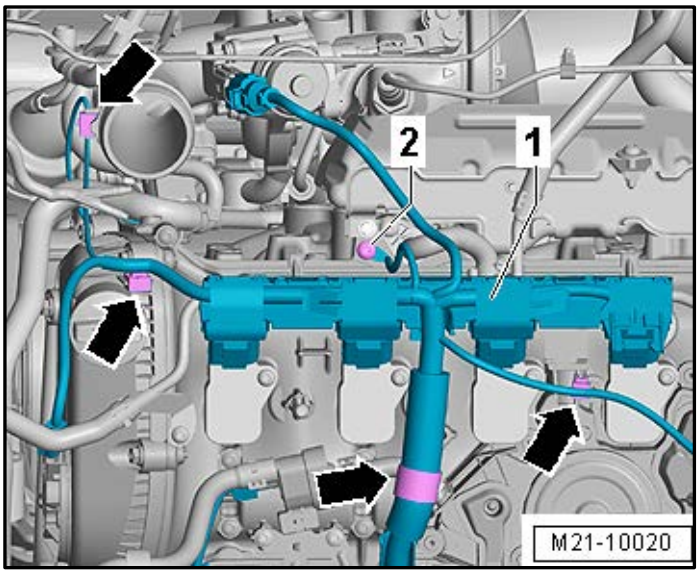


- Remove the engine cover by carefully pulling the engine cover off the retaining pins in direction of -arrows- one after the other. Do not pull sharply on the engine cover or pull it to one side.

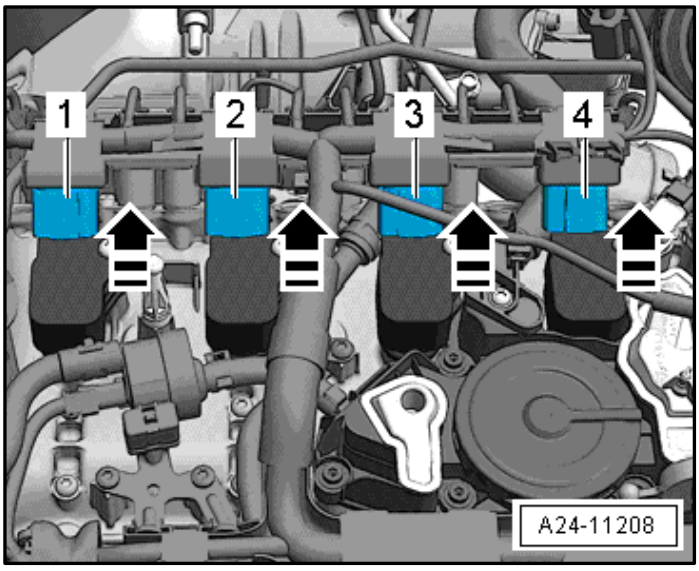


Air Duct Pipe Has Two Different Versions

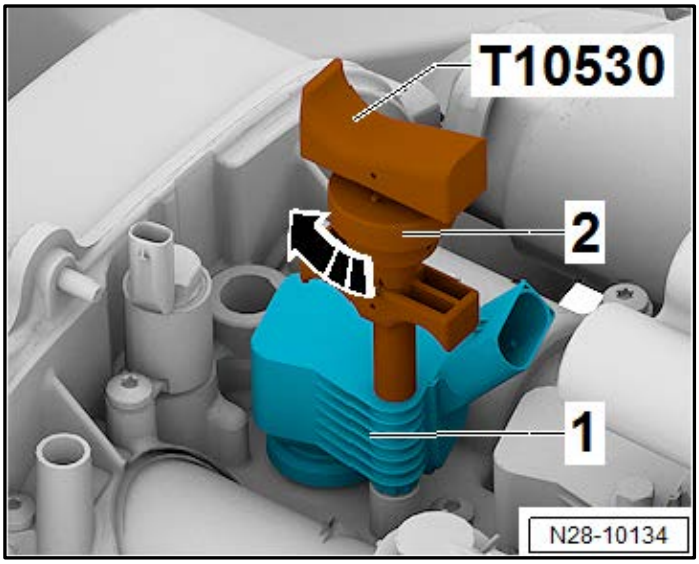
- Version 1 with Two Locking Tabs
  - Push the locking mechanism on the crankcase ventilation hose -3- together and remove the hose.
- Version 2 without Locking Tabs
  - Reposition the air guide pipe with the connected line -3- on the cylinder head.
- Remove the air duct pipe bolt -1-.
- Remove the clamp -2-
- Remove the air duct pipe -4-.



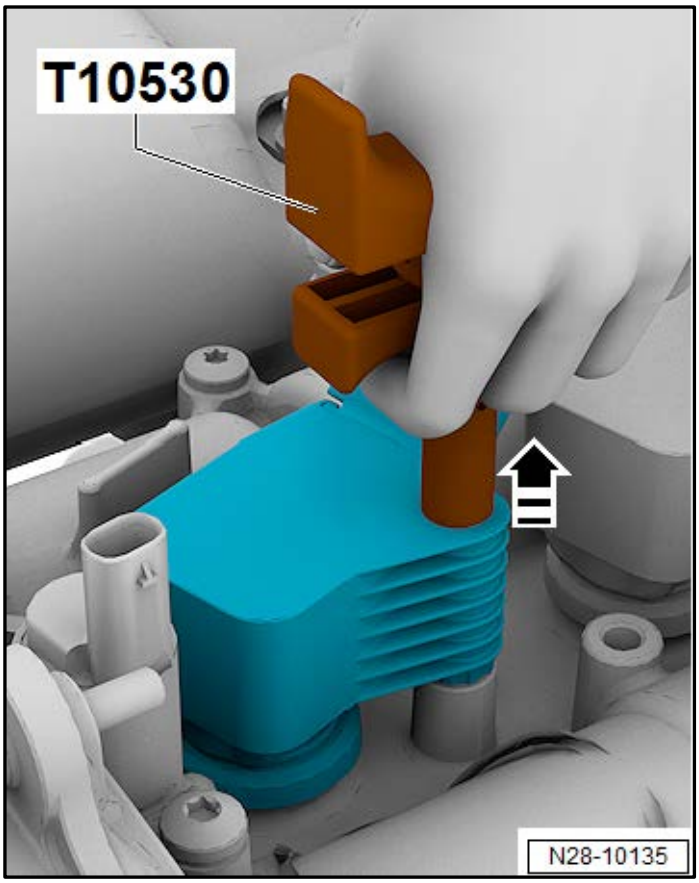
- Remove bolt -2- and unclip the ignition coil electrical wiring harness -1- from the retainers –arrows.



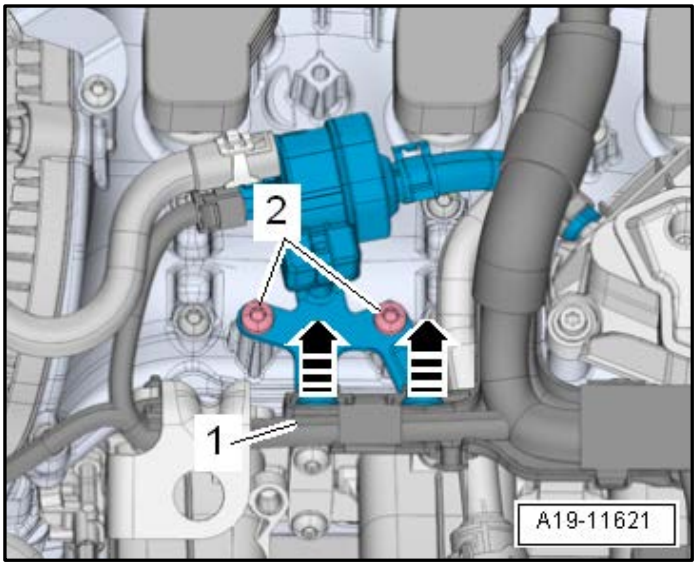
- Release the ignition coil connectors and disconnect all the connectors at the same time from the ignition coils.
- Remove the bolts for the ignition coils.



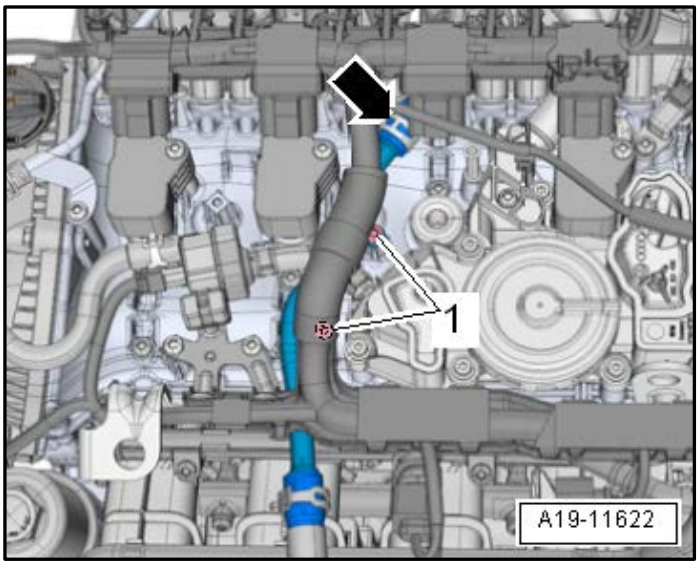
- Insert the Puller -T10530- in the ignition coil opening -1-.
- Turn the knurled nut -2- clockwise until the puller is clamped.



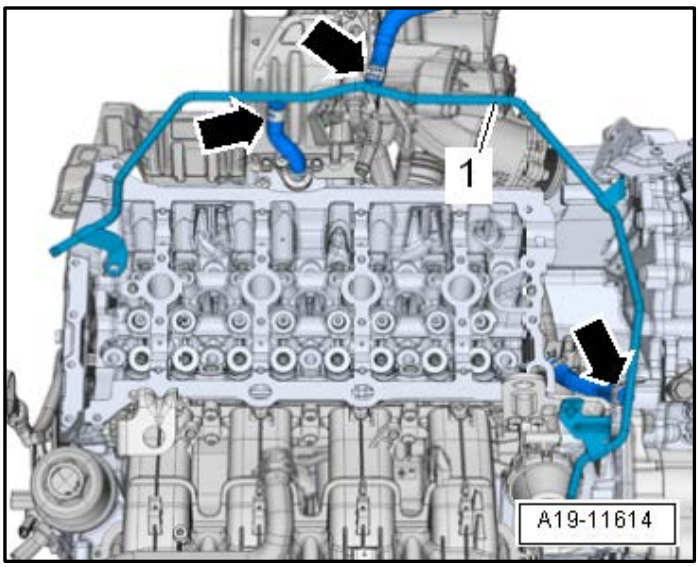
- Carefully remove the ignition coil vertically upward using the Puller -T10530.
- Repeat this process to remove all the ignition coils.



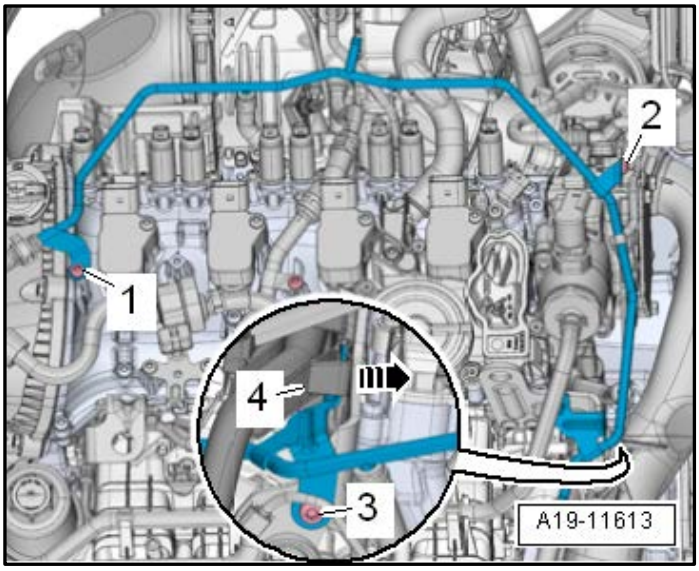
- Release retainers in direction of -arrows- and remove wiring duct -1- from bracket.



- Clamp off the upper coolant pipe coolant hoses -arrows- with the Hose Clamps - Up To 25 mm -3094.
- Loosen the clamps and remove the coolant hoses.
- Remove the bolts -1- and remove the upper coolant pipe.



- Loosen the clamps -arrows- and remove the coolant hoses.

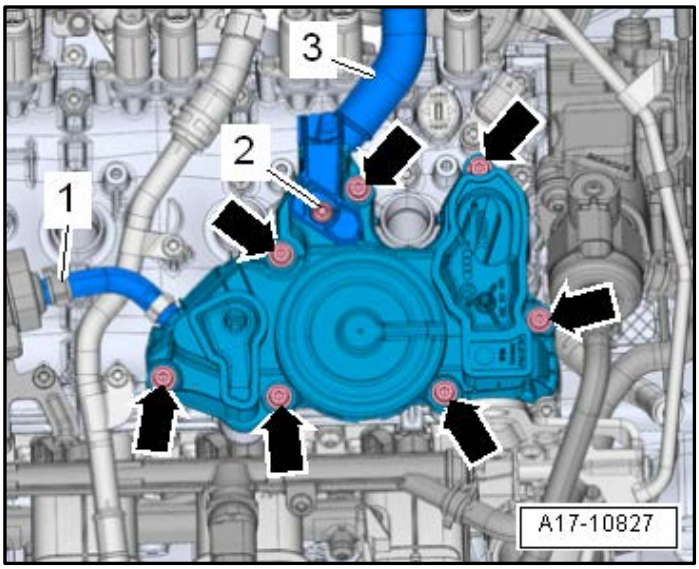


- Free up the coolant pipe connector from the clip -4- and pivot it forward.
- Remove bolts -1, 2 and 3-.

NOTE

Risk of destroying the coolant pipes through deformation. Never change the coolant pipe bent shape.

- Carefully remove the coolant line.

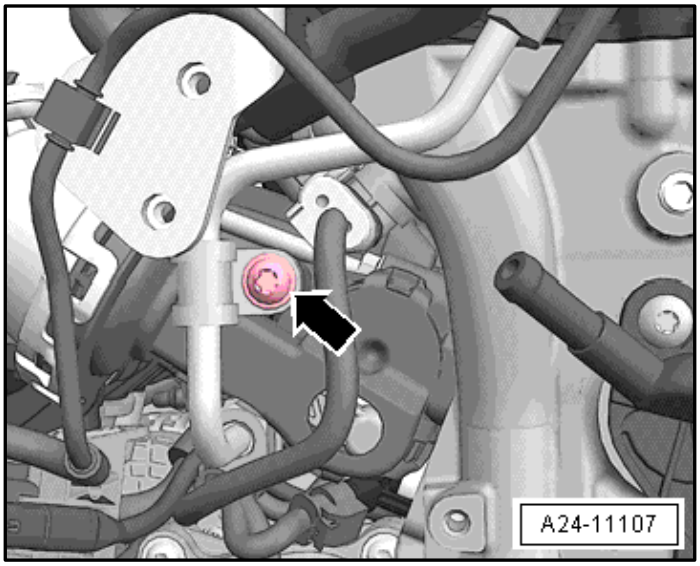


- Loosen the hose clamp -1- and remove the hose from EVAP Canister Purge Regulator Valve 1 -N80-.
- Remove bolt -2- and then remove crankcase ventilation hose -3- from oil separator.
- Remove the bolts -arrows- and the oil separator.

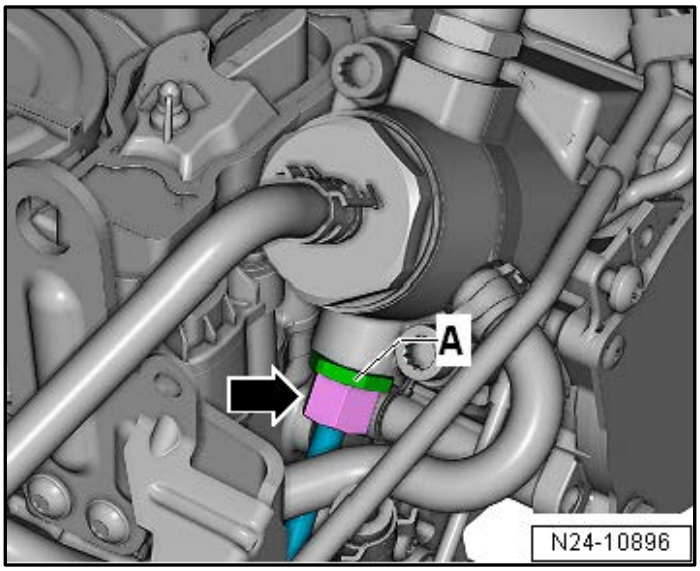
- Remove the high pressure pump by following the steps below.

NOTE

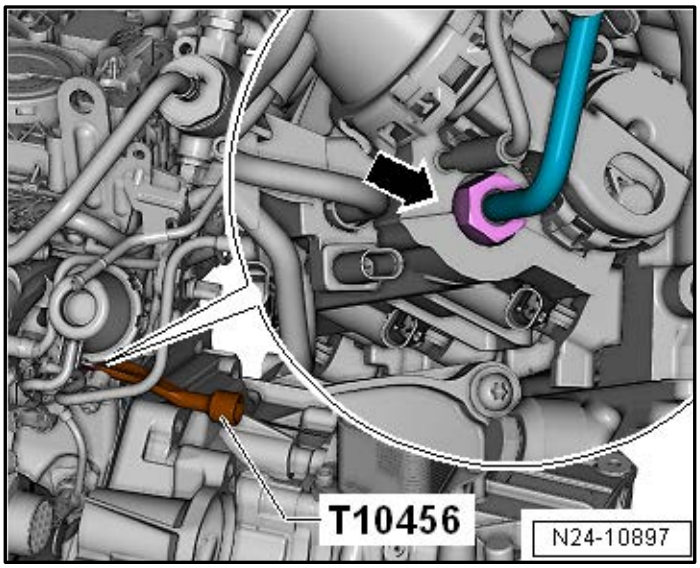
- Only remove the high pressure pump when the engine is cold.
- When installing the high pressure pump, make sure that no dirt enters the fuel system.
- Collect escaping fuel with a cleaning cloth.
- Inspect the O-ring for the high pressure pump, and replace it if damaged.
- If the connection for the high pressure line Item is loosened, it must be replaced.
- Lubricate the high pressure line with engine oil and always fasten them free of tension.
- Vehicles with the engine codes CNTA do not have an intake manifold-fuel injector.



- Remove mounting clamp -arrow- if present.



- Counterhold at the hex head -A- and loosen the union nut -arrow- from the high pressure pump. Remove the high pressure pipe.

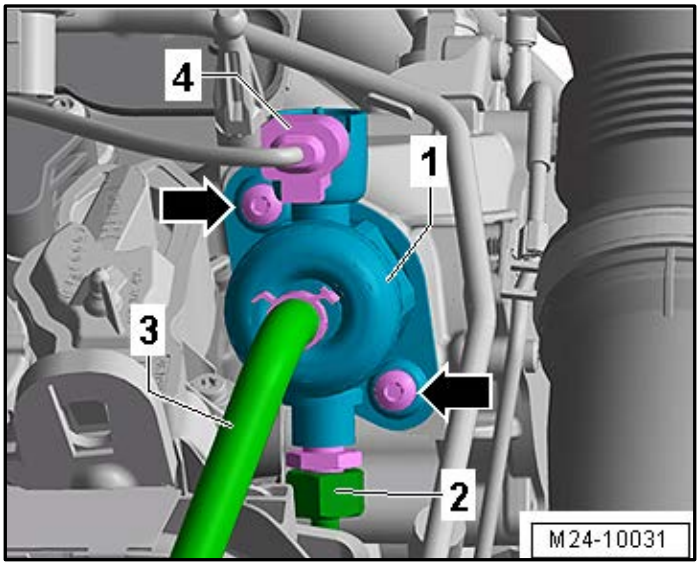


- Loosen the union nut on the fuel rail with the Flare Nut Attachment - 17mm -T10456- and remove the high pressure pipe.

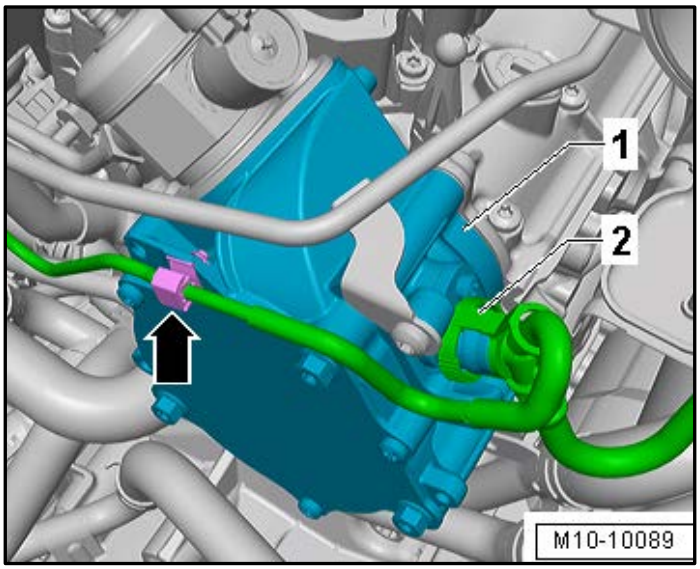
NOTE

Wipe up any leaking fuel with a cleaning cloth.

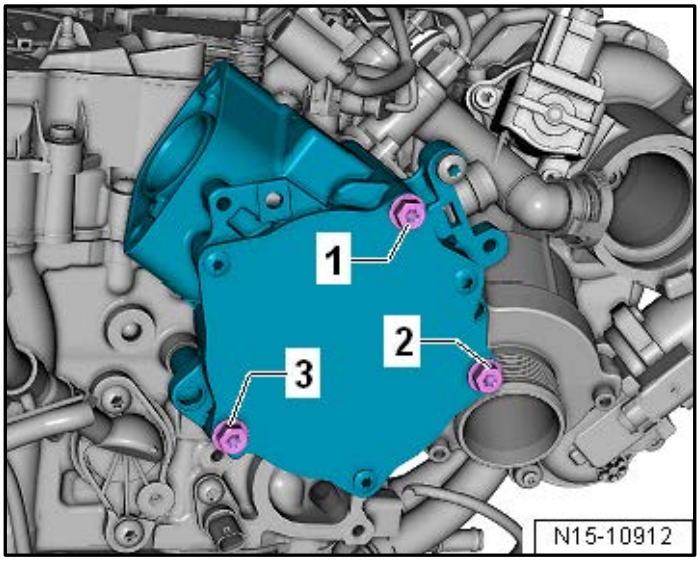
Close the open connections with clean caps. Make sure that no dirt enters the fuel system



- Disconnect the connector -4- from the Fuel Pressure Regulator Valve -N276.
- Remove the fuel line -3- from the high pressure pump.
- Remove both bolts –arrows-.
- Carefully remove the high pressure pump -1- and the roller tappet.



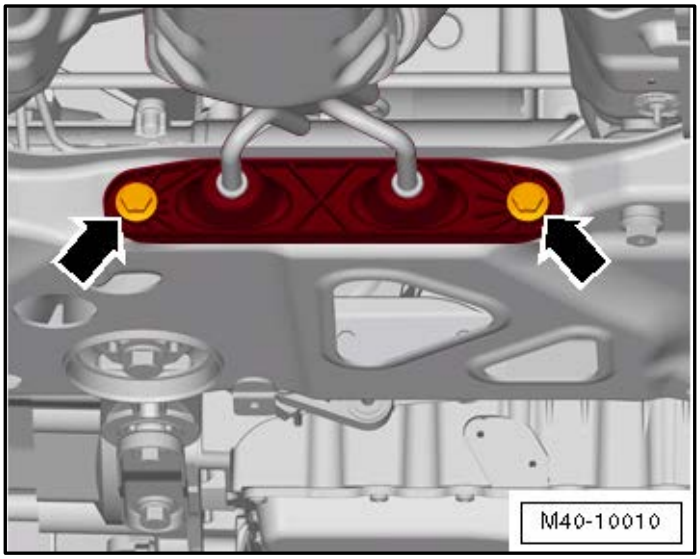
- Unclip the vacuum line -2- from the bracket –arrow-.
- Disconnect the vacuum hose -2-.



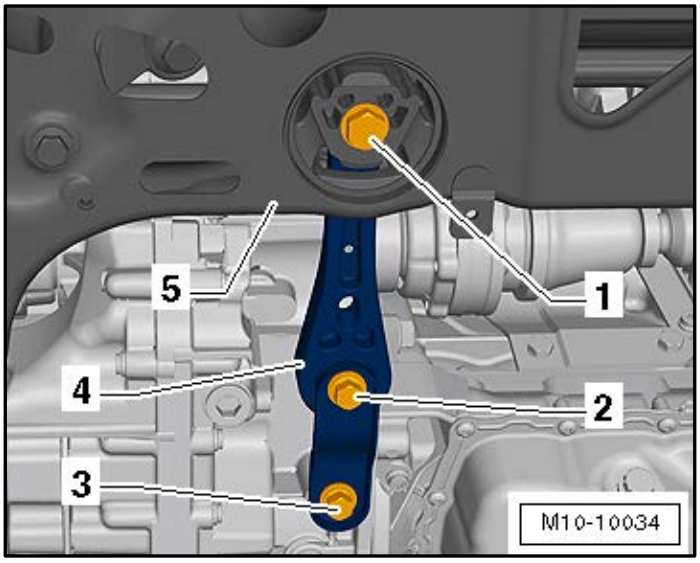
- Loosen the bolts -1 through 3- and remove the vacuum pump. The bolt -2- remains because of limited space after loosening the vacuum pump.

NOTE

Do not disassemble the vacuum pump.

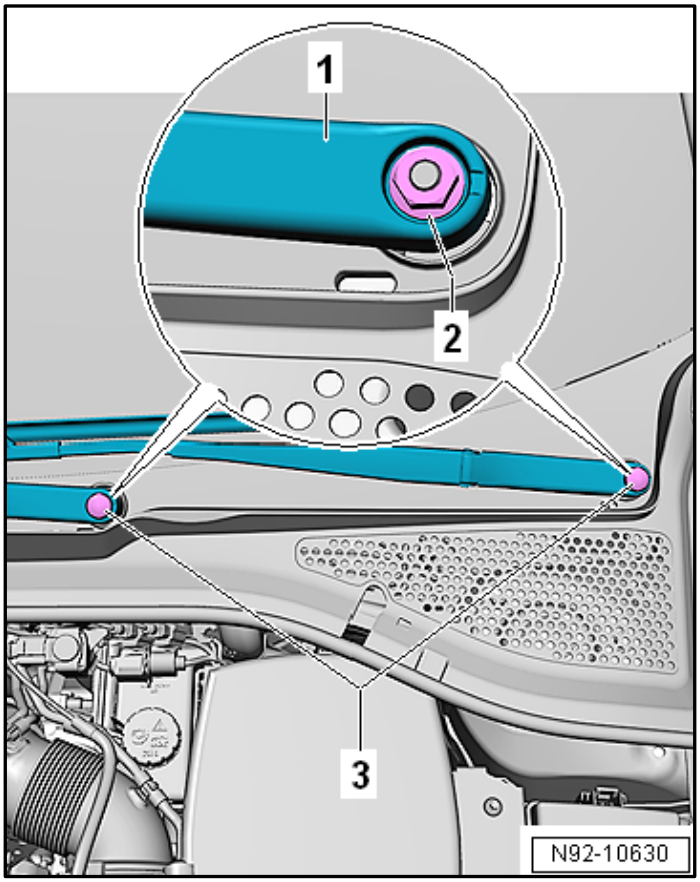


- Support the engine in the installation position by performing the following steps.
- Remove the exhaust system bracket from the subframe -arrows



- Remove the bolt -1-.
- Remove the bolts -2 and 3-.
- Remove the pendulum support -4-.

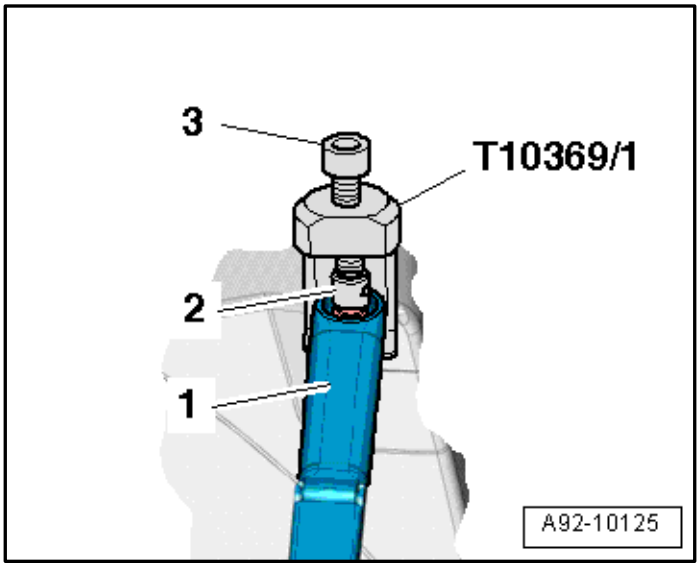
- Bring the windshield wiper into service position by operating the windshield wiper lever in the “one-touch wiping” position within 10 seconds after switching off the ignition.



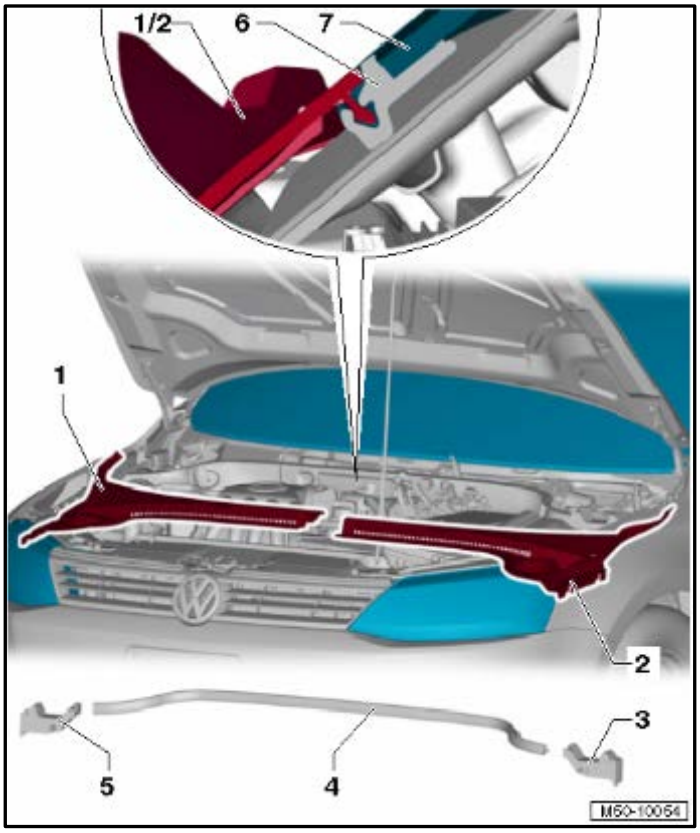
NOTE

- Risk of damaging the wiper arm shaft.
- The wiper arm shaft can get damaged when removing the windshield wiper arms without using the -T10369/1-.

- Pry the caps -3- off of the windshield wiper arms -1- using a screwdriver.
- Loosen the nuts -2- a few turns.



- Position the -T10369/1- on the wiper arm -1- as illustrated.
- Position the thrust piece -2- on the wiper arm shaft.
- Rotate the bolt -3- clockwise until the wiper arm -1- is removed from the wiper arm shaft.
- Remove the nut completely and remove the windshield wiper arm -1.

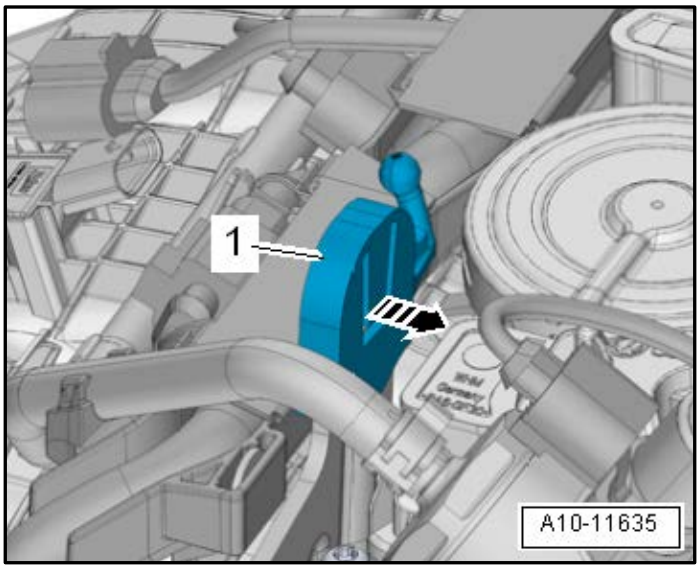


- Remove the plenum chamber cover by performing the following steps.
- Remove the seal -4- from the plenum chamber covers -1 and 2-.

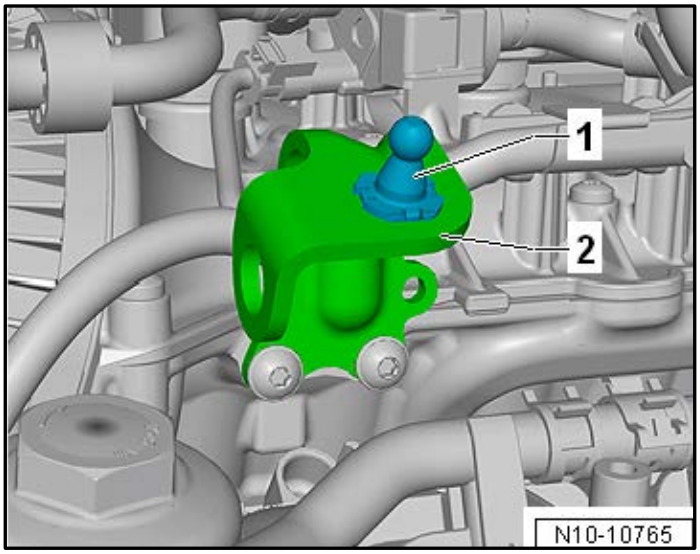
NOTE

The windshield -7- could break. Do not use a screwdriver, a wedge or any other prying tool to pry off the plenum chamber covers -1 and 2-. This could damage the windshield -7-, which could later crack.

- Lift the plenum chamber covers -1 and 2- at the edge of the windshield -7- by hand.
- Starting at the edge of the windshield -7- and working up, remove the plenum chamber covers -1 and 2- from the retainer -6-.
- Remove the left plenum chamber cover -2- forward (in the direction of travel) from the vehicle.
- Remove the bracket that holds the lines for the spray nozzles from the right plenum chamber cover -1-.
- Remove the right plenum chamber cover -1- forward from the vehicle.

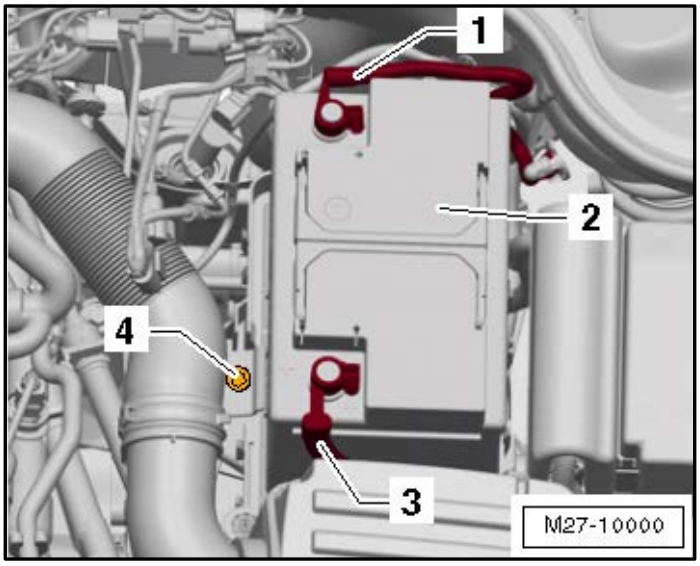


- Release the engine cover mount retainer -1- in direction of -arrow- and remove.

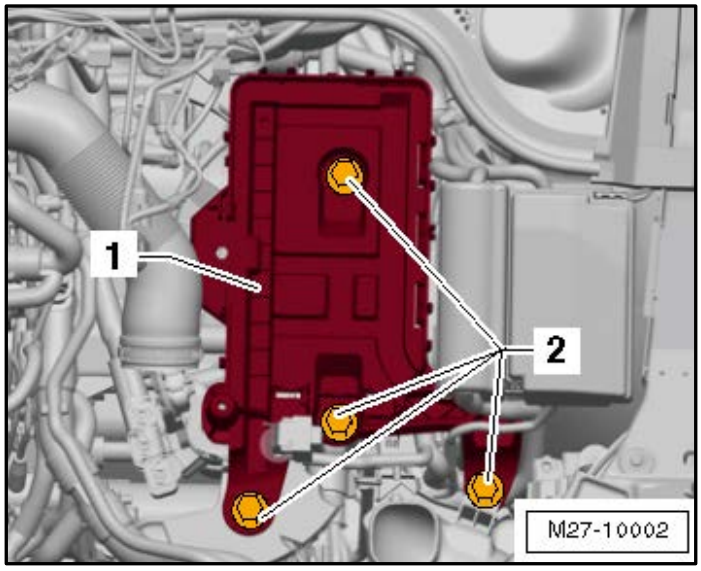


- Unclip the right engine cover mount -1- from the locating bore -2-.

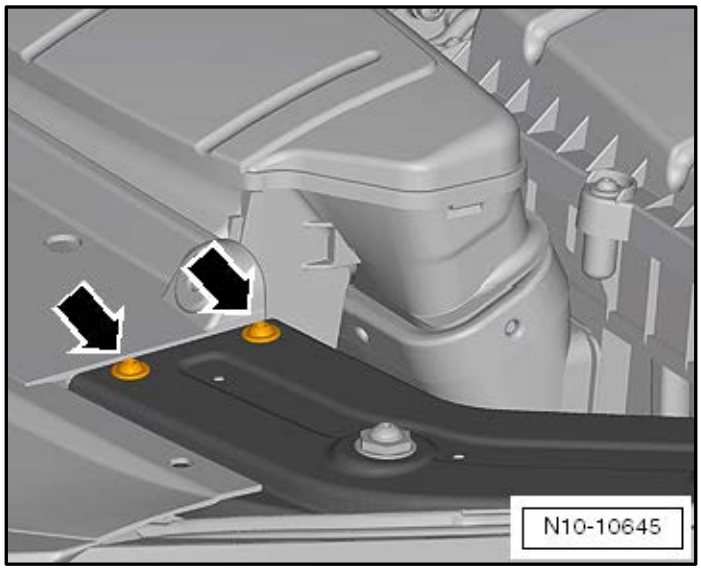
- Turn off the ignition and all electrical consumers and remove the ignition key
- Open the battery jacket -1-.



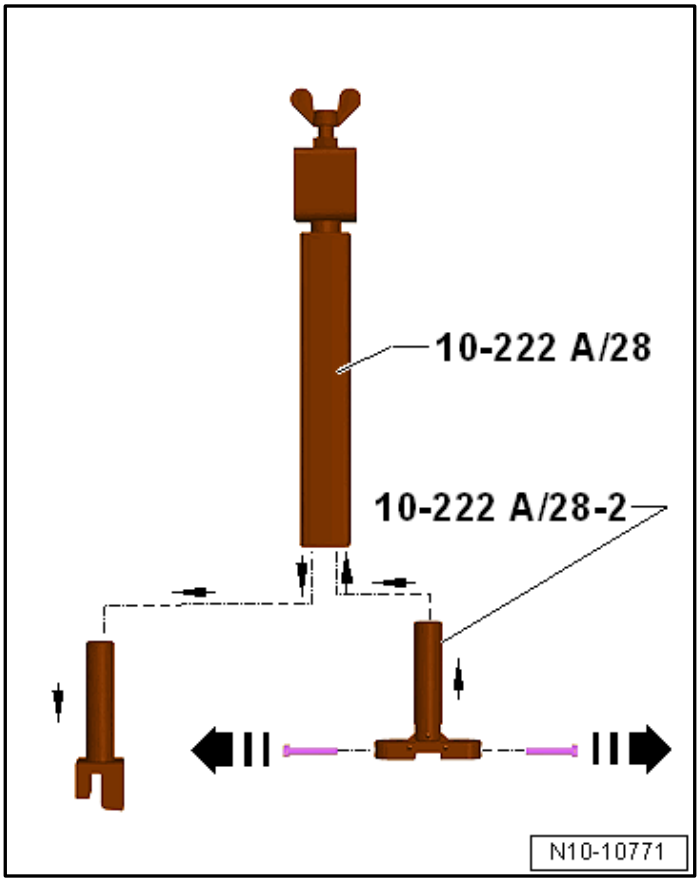
- Disconnect the battery cables -1 & 3- from the battery terminals.
- Remove the battery jacket.
- Remove the bolt -4- and then remove the clamping plate.
- Remove the battery -2-.



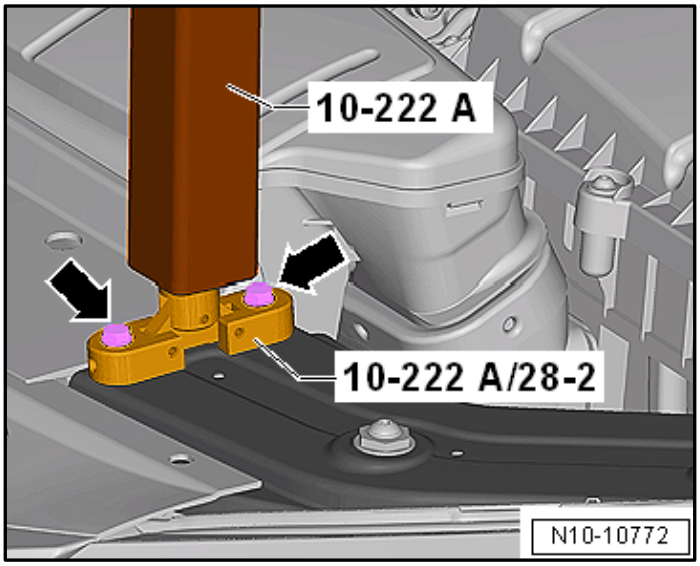
- Remove the bolts -2- from the battery tray -1- and then remove the battery tray -1-.



- Remove the bolts -arrows- for the left and right sides of the lock carrier bracket.



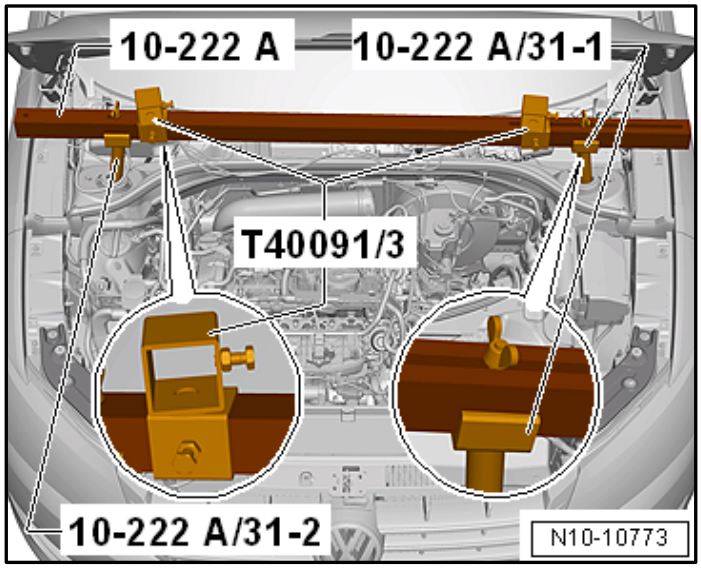
- Remove the lower mounts on the Engine Support Bridge - Engine Support 28 -10-222A/28- and replace with the Engine Support Bridge - Engine Support 28-2 -10-222A/28-2.



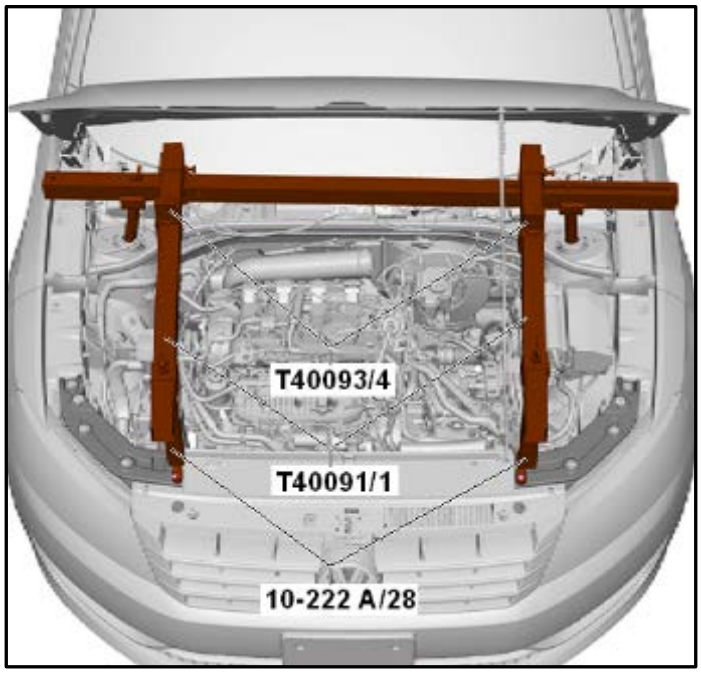
- Use the bolts from the Engine Support Bridge - Engine Support 28-2 -10-222A/28-2- for attaching the Engine Support Bridge - Engine Support 28 -10-222A/28-. Do not use the bolts for the bracket.
- Tighten the bolts to 8 Nm.

NOTE

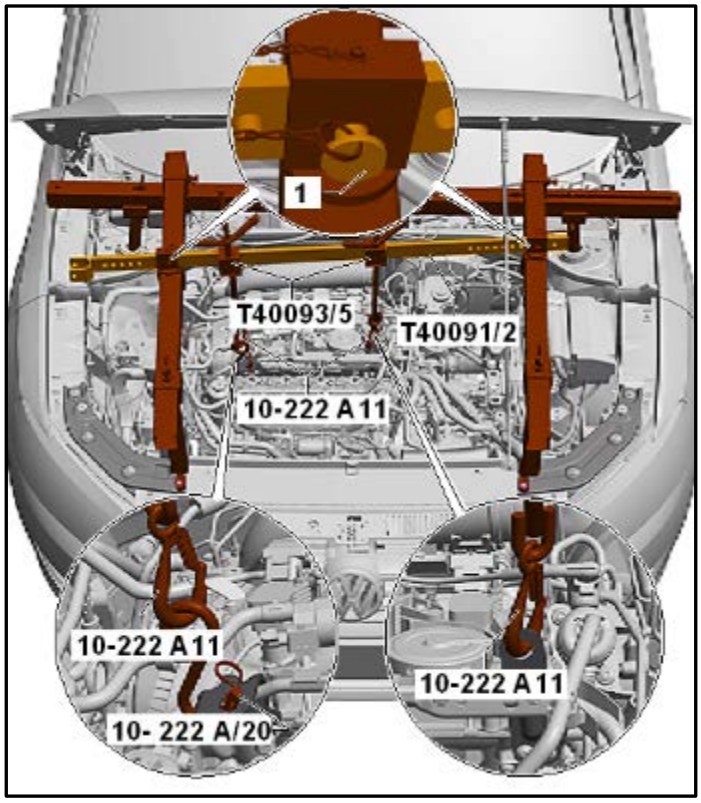
A second technician is needed when positioning the Engine Support Bridge -10-222A- on the vehicle to keep the Engine Support Bridge -10-222A- from tipping.



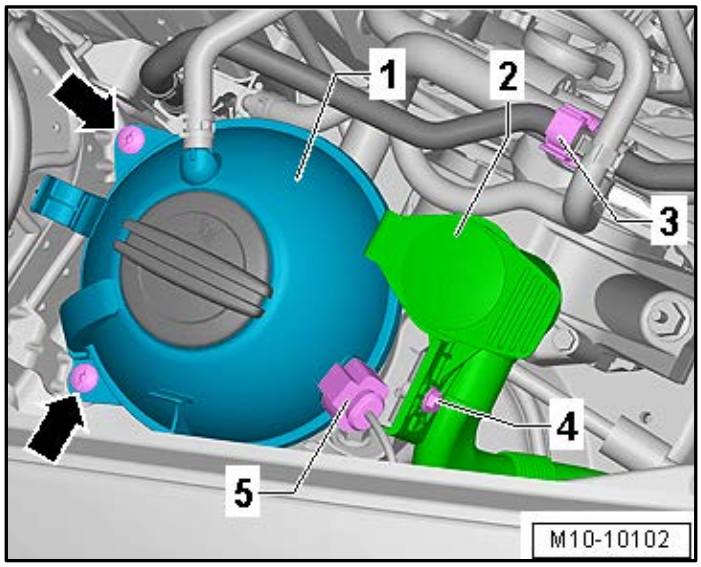
- First slide the Engine Support - Basic Set - Moveable Joints -T40091/3- onto the Square Pipe of the Engine Support Bridge -10-222A.
    - The bolts for the Engine Support - Basic Set - Moveable Joints - T40091/3- point in the direction of travel as shown in the –illustration
- Connect the Engine Support Bridge - Engine Support 31-1 -10-222A/31-1- and Engine Support Bridge - Engine Support 31-2 -10-222A/31-2- with the Engine Support Bridge - 10-222A- as shown in the -illustration-, but do not tighten them yet.
- Mount the Engine Support Bridge -10-222A- on the suspension strut towers and have a second technician hold it to prevent it from tipping.



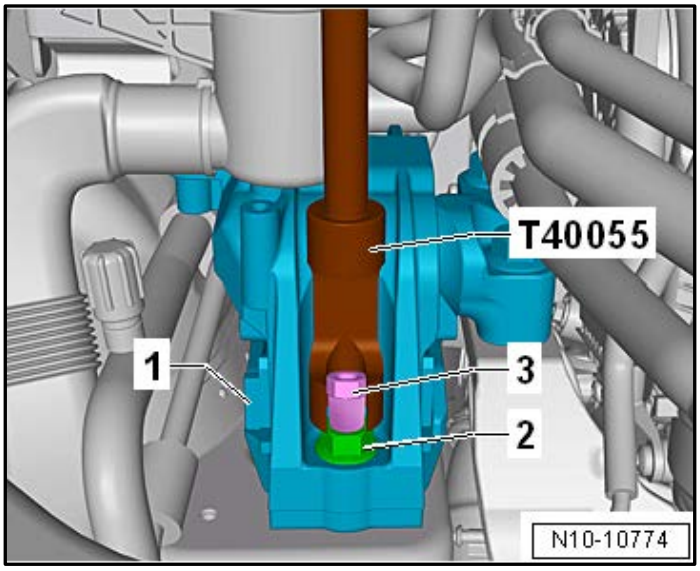
- Slide the Engine Support - Basic Set - Square Pipe -T40091/1- on the left and right through the Engine Support Bridge - Engine Support 28 -10-222A/28- from the front.
- Before connecting to the rear of the Engine Support Bridge -10-222A-, slide an Engine Support - Supplement Kit - Moveable Joint - T40093/4- onto each and attach to the Engine Support Bridge -10-222A-.



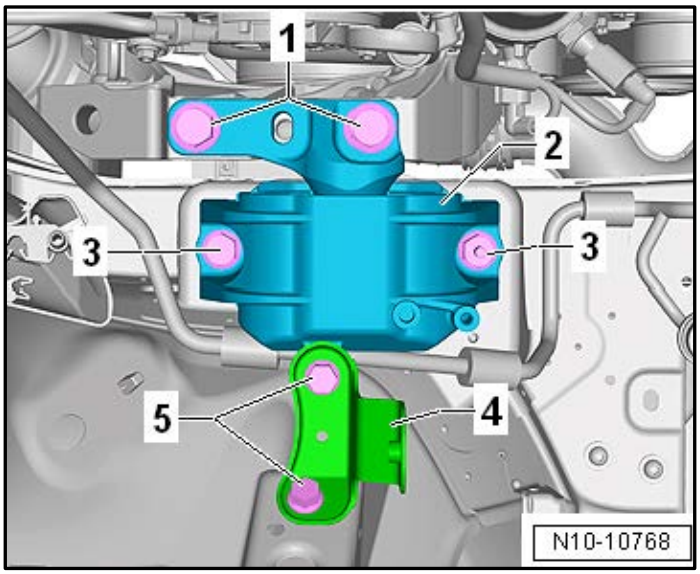
- Slide the Engine Support - Basic Set - Rail with Holes -T40091/2- through an Engine Support - Supplement Kit - Moveable Joint -T40093/4- and position both Engine Support - Supplement Kit - Mounts -T40093/5-.
- Guide the Engine Support - Basic Set - Rail with Holes -T40091/2- through the second Engine Support - Supplement Kit - Moveable Joint -T40093/4-.
- Insert the locking pin -1- into the Engine Support - Basic Set - Rail with Holes -T40091/2- as shown in the -illustration- and secure with cotter pins.
- Tighten all threaded connections on the Engine Support Bridge -10–222A- hand-tight. Adjust the height of the Engine Support Bridge -10–222A- parallel over the Engine Support Bridge - Engine Support 28 -10-222A/28- while doing so.
- Insert the Engine Support Bridge - Spindles - 10-222A/11- as shown in the -illustration-, connect them to the engine/transmission assembly and lightly pretension it, but do not lift.



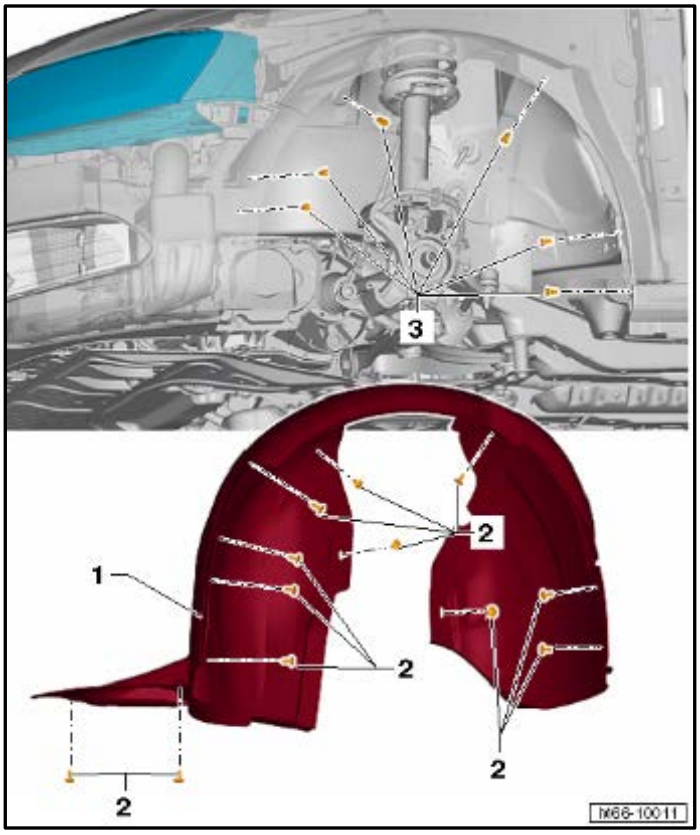
- Remove the bolt -4- and rotate the washer fluid reservoir filler tube -2- forward.
- Open the clip -3- and remove the connector -5- from the coolant expansion tank -1-.
- Remove the bolts -arrows- and place the coolant expansion tank -1- on the engine with the coolant lines connected.



- If equipped, remove the jump start terminal -3- on the front engine mount bolt -2- using the Union Nut Socket -T40055-.



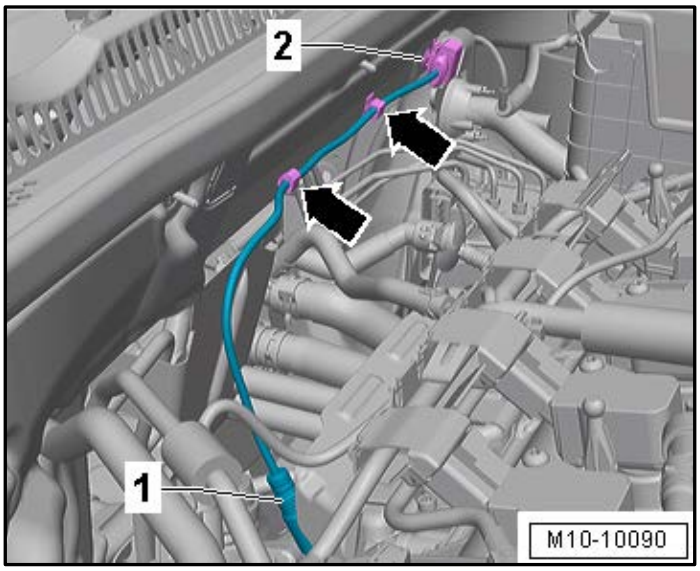
- Remove the bolts -5- and the bracket -4-.
- Remove the bolts -1 and 3- and then remove the engine mount upward.



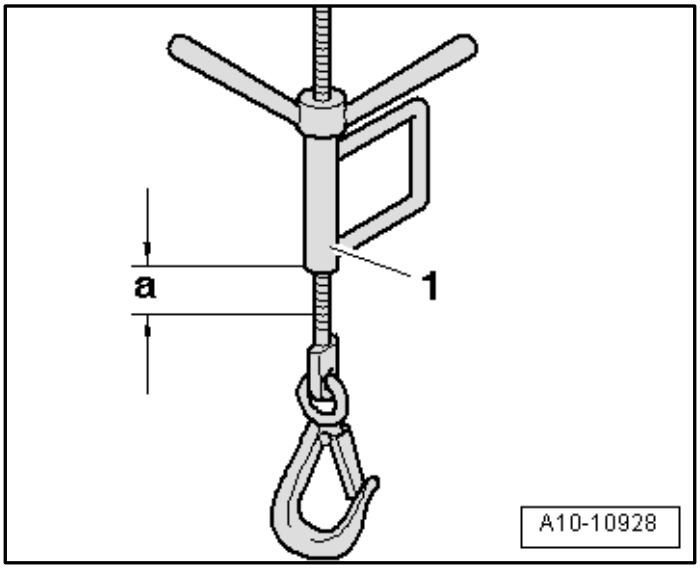
NOTE

- The following describes removing the left wheel housing liner. Removing the right wheel housing liner is identical.
- Due to equipment variations, small deviations must be considered during removal.

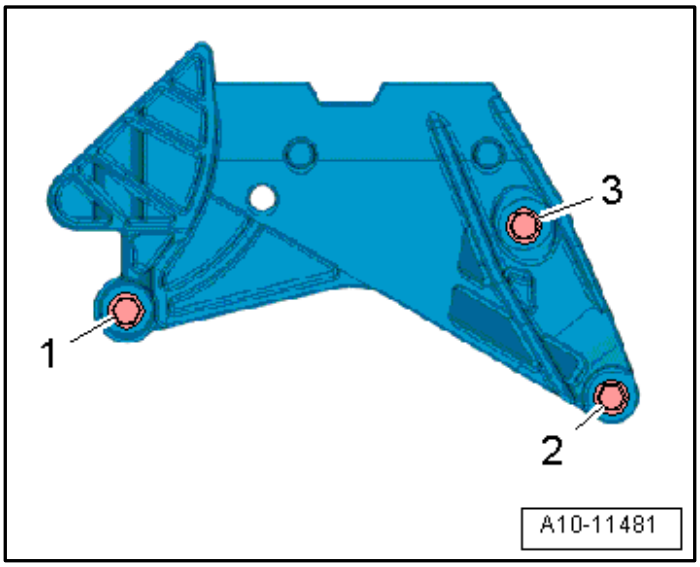
- Remove the wheel.
- Remove the bolts -2-.
- Remove the wheel housing liner -1- from the fender.



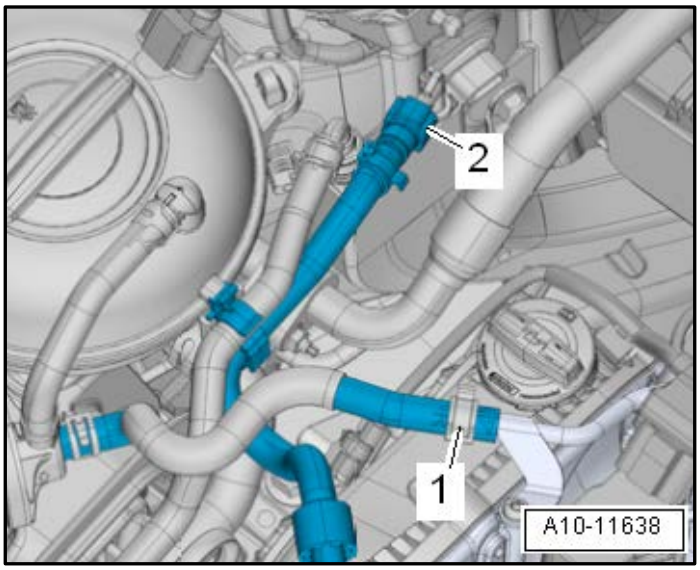
- Disconnect the connector for the Oxygen Sensor 1 before Catalytic Converter -GX10- at the separating point -2-.
- Unclip the cable from the brackets -arrows-.
- Remove the Oxygen Sensor 1 before Catalytic Converter -GX10--1- using a tool from the Ring Wrench 7-Piece Set -3337-.



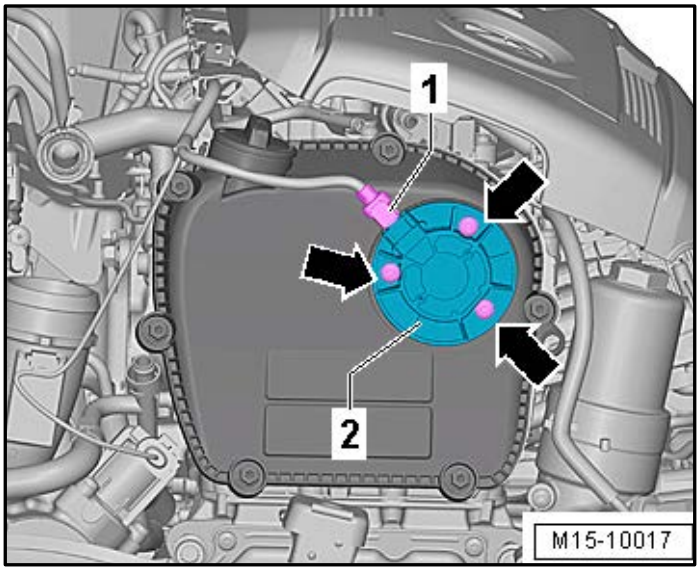
- Lift the engine until dimension –a- measures 50 mm using the Engine Support Bridge - Spindle -10-222A/11-1.



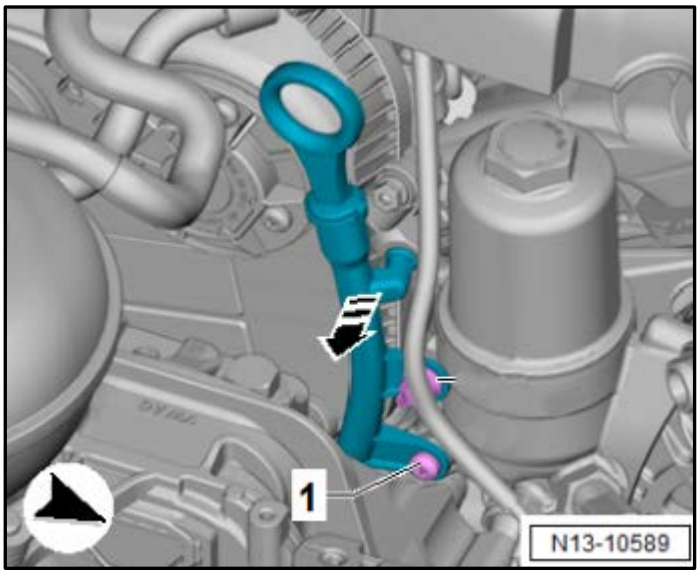
- Remove the engine support bolts -1, 2 and 3- and the engine support.



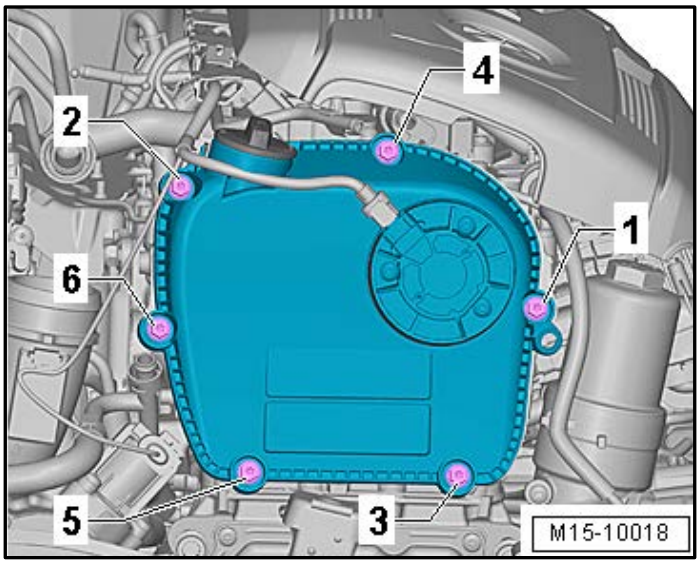
- Loosen the hose clamps -1-, remove the coolant hose and push to the right side.
- Press the release button on the EVAP canister hose -2-, remove the hose and free it up.



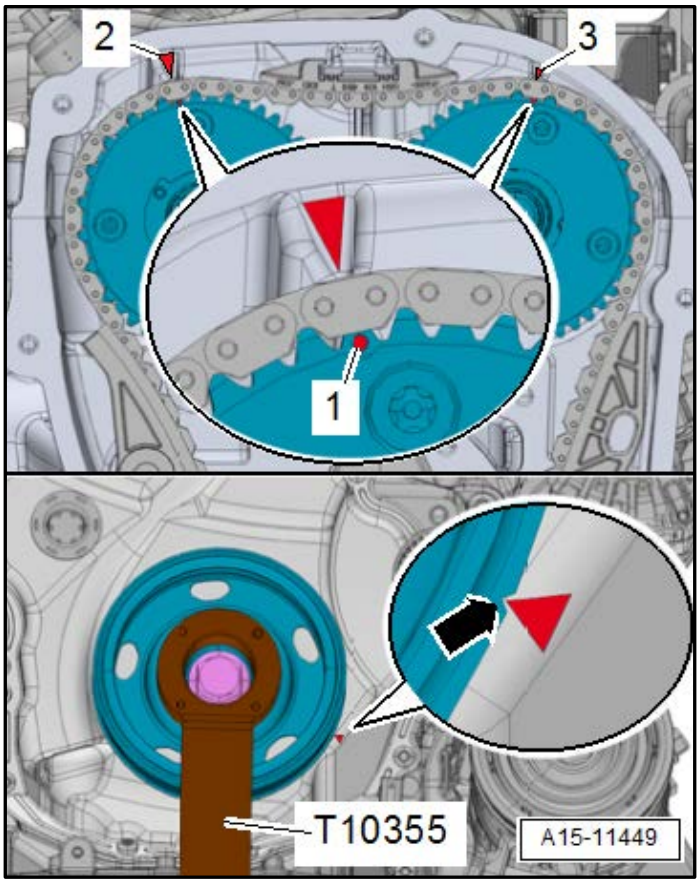
- Unclip the coolant and fuel lines and set them aside.
- Disconnect the connector -1- from the Camshaft Adjustment Valve 1 -N205-.
- Place a clean cloth under the camshaft adjustment valves.
- Remove the bolts -arrows- and then the Camshaft Adjustment Valve 1 -N205--2-.



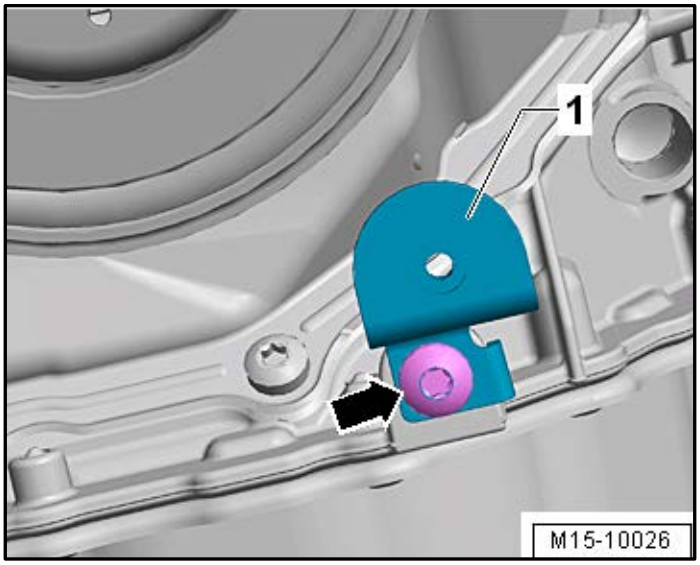
- Remove the bolt -1-.
- Unclip the oil dipstick tube from the timing chain upper cover -arrow-.



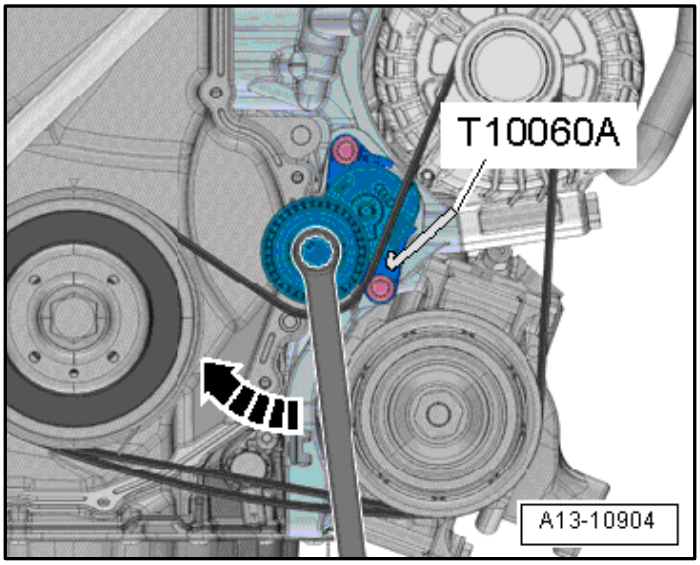
- Unclip the wiring harness for the camshaft adjustment valves and free up.
- Remove the bolts -1 through 6- and the upper cover for the timing chain.



- Rotate the vibration damper using the Counterhold - Vibration Damper -T10355- into the “TDC” position.
    - The markings -1- on the camshaft chain sprockets must be opposite the markings -2 and 3-.
    - The notch on the vibration damper and the marking on the lower cover for timing chain -arrow- must be opposite one another.



- Remove the bolt -arrows- and remove the air pipe duct bracket -1-.

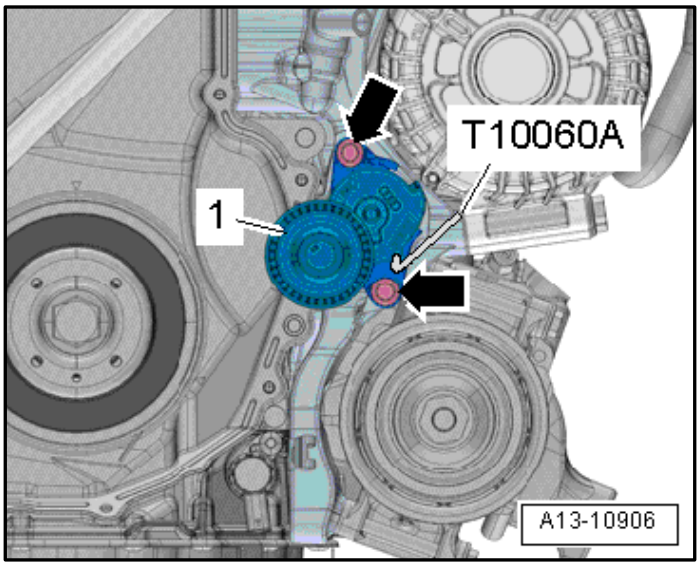


- Remove the ribbed belt by performing the following steps.

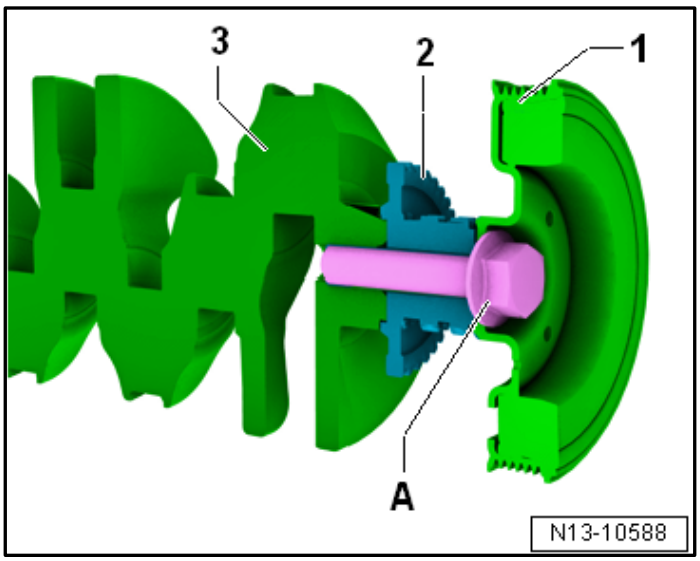
NOTE

If the ribbed belt is going to be reinstalled, the running direction must be marked with chalk or a felt-tip pen for reinstallation.

- To release the tension on the ribbed belt, turn the tensioner in the direction of -arrow-.
- Secure the tensioner using the Locking Pin -T10060A-.
- Remove the ribbed belt.

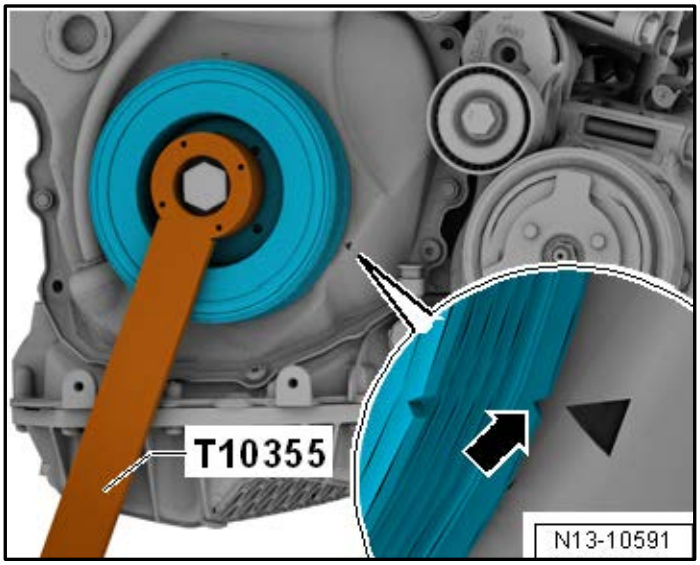


- Remove the bolts -arrows- and remove the ribbed belt tensioner -1- from the sub-assembly bracket.

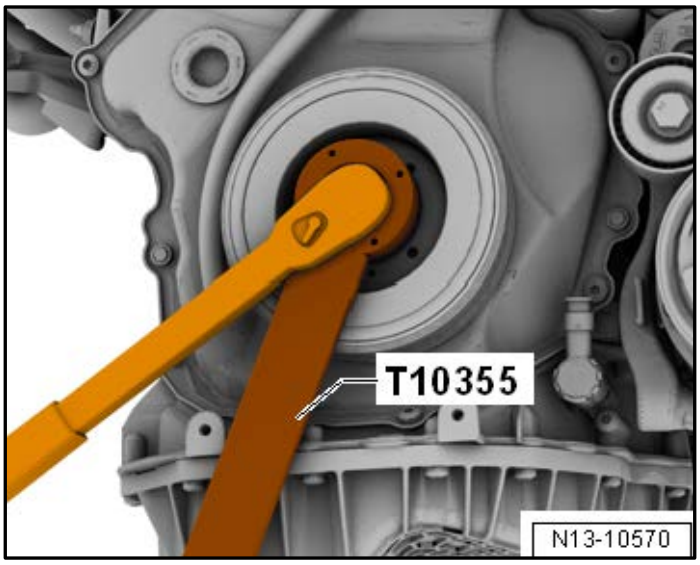


NOTE

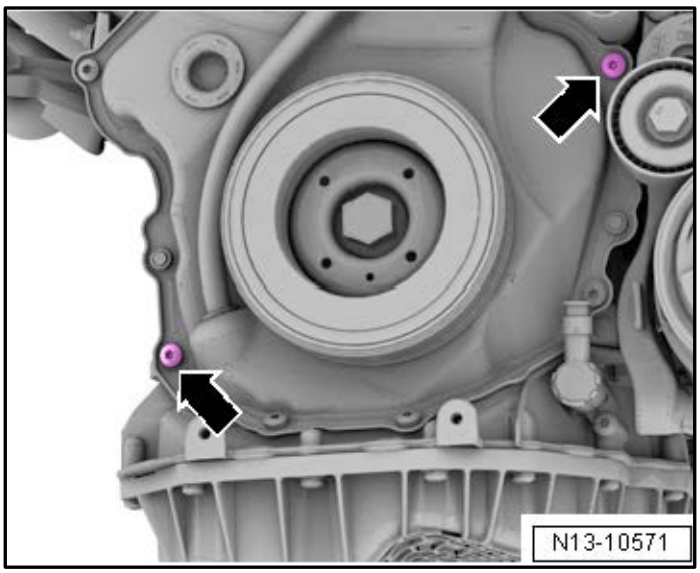
The vibration damper bolt -A- connects the vibration damper -1-, the timing chain sprocket -2- and the crankshaft -3- with each other. Before removing the bolt, the chain sprocket must be secured to the crankshaft as described in the following.



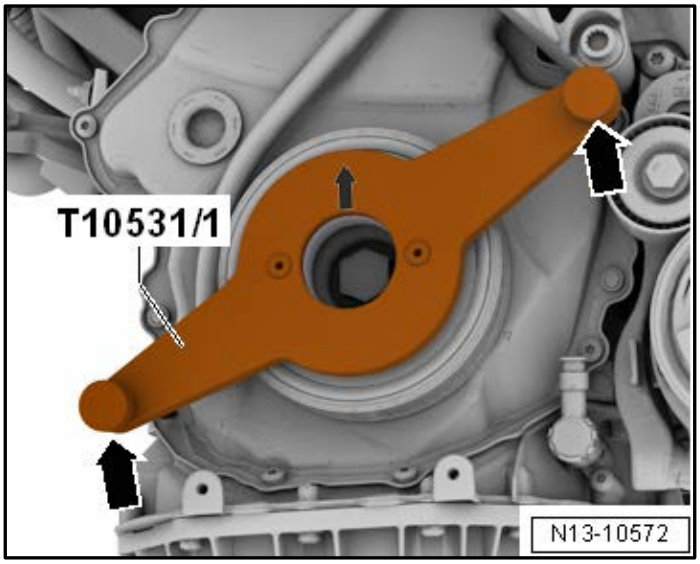
- Turn the vibration damper to TDC -arrow- using the Counterhold - Vibration Damper - T10355.
  - The notch on the vibration damper must align with the arrow marking on the lower timing chain cover
  - The marking on the cover is located in the »four-o'clock position«.



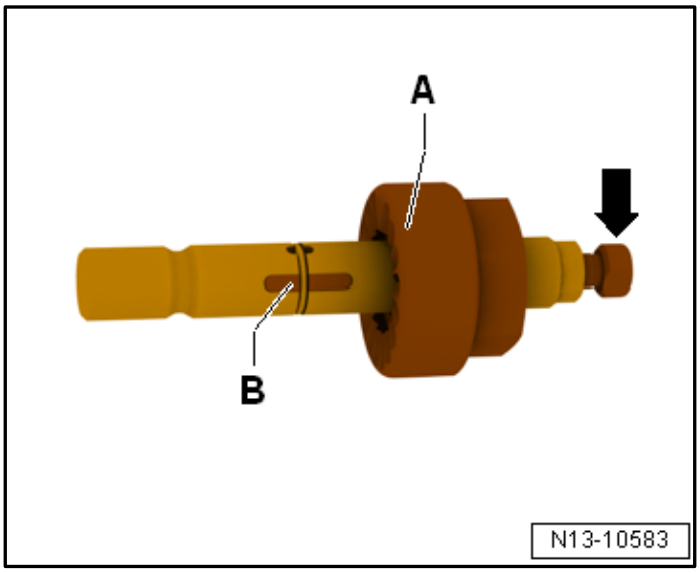
- Loosen the vibration damper bolt approximately 1/2 turn by using the Counterhold - Vibration Damper -T10355-.
- If the vibration damper was turned, correct to TDC.



- Remove and discard the two bolts -arrows- shown for the timing chain cover.



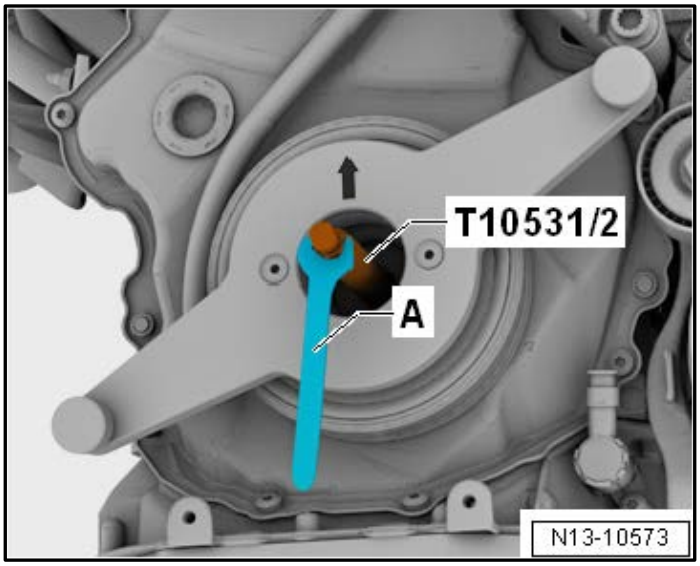
- Place the Counterhold Tool -T10531/1- as shown on the vibration damper and tighten it hand-tight using the knurled bolts -arrows-.
- Remove the vibration damper bolt completely.



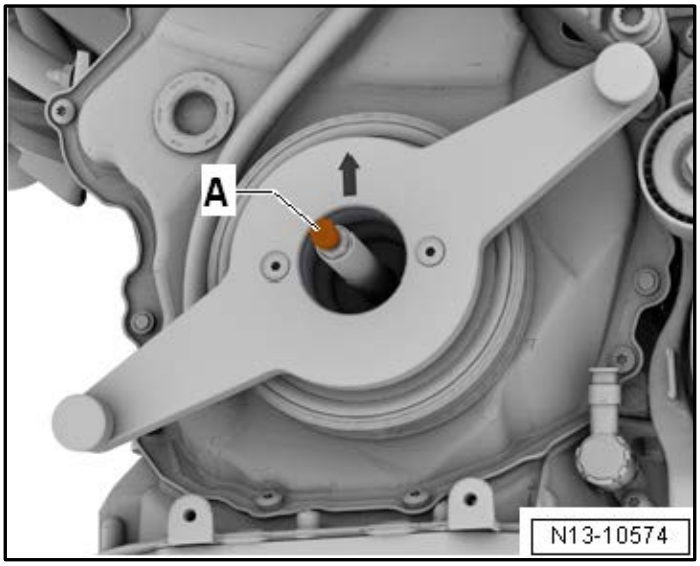
- Check if the Turning Over Tool -T10531/3--A- can be easily pushed over the clamping piece -B-. Turn the adjusting bolt -arrow-.

NOTE

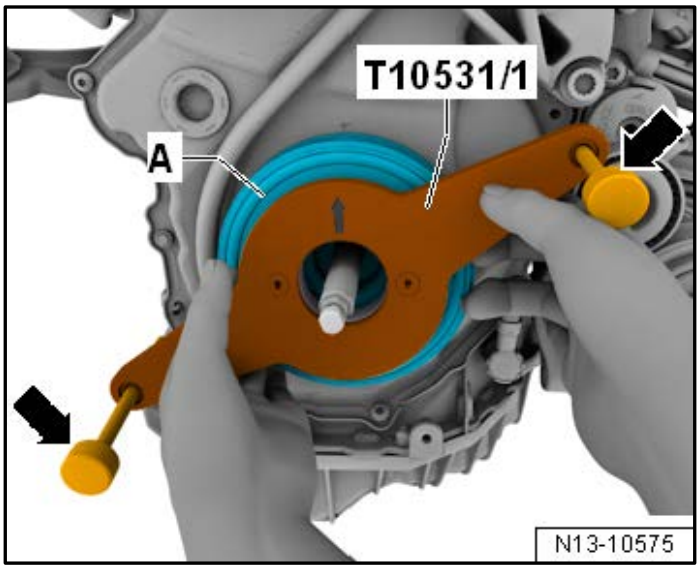
Do not turn the adjusting bolt further, otherwise the Vibration Damper Assembly Tool - Tensioning Pin -T10531/2- becomes jammed in the crankshaft when installing.



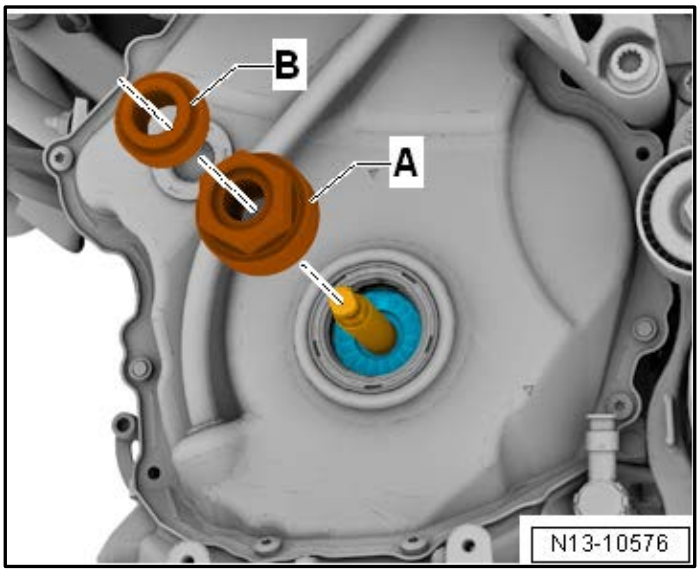
- Install the Vibration Damper Assembly Tool - Tensioning Pin -T10531/2- in the crankshaft and tighten it hand-tight using a 12 mm open end wrench -A-.



- Tighten the adjusting bolt -A- hand-tight. The chain sprocket is secured to the crankshaft as a result.

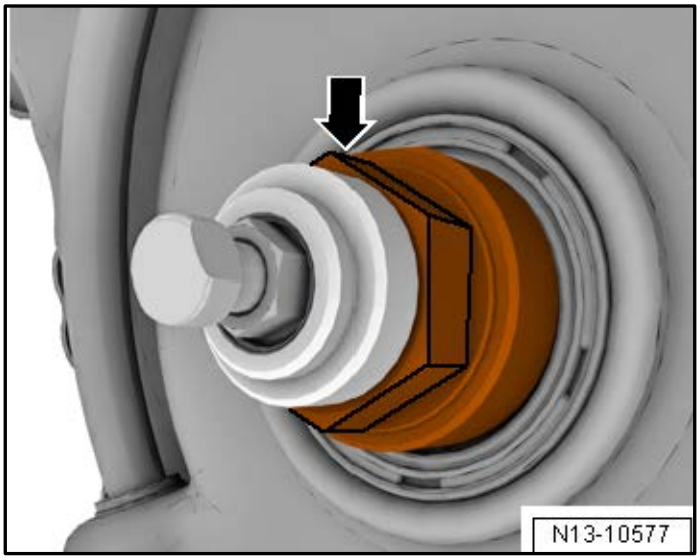


- Remove the knurled bolts -arrows-.
- Remove the Vibration Damper Assembly Tool - Counterhold Tool -T10531/1- and vibration damper -A-.

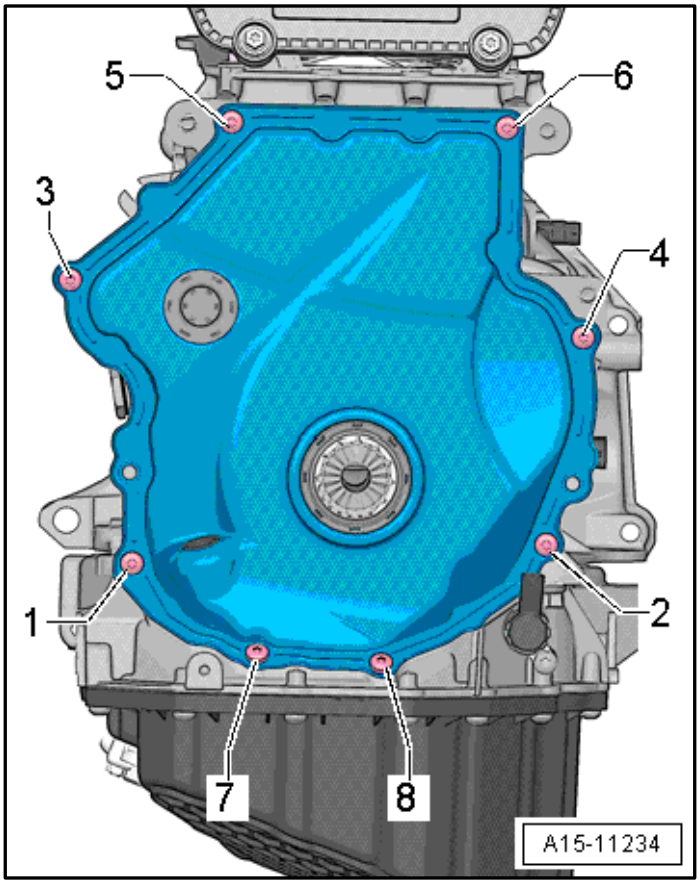


If the Crankshaft Is Turned without the Vibration Damper:

- Place the Vibration Damper Assembly Tool - Turning Over Tool -T10531/3--A- on the tensioning pin. While doing so, pay attention to the chain sprocket tooth contour. The flat side of the tool is at the top in TDC. Tighten the Vibration Damper Assembly Tool - Turning Over Tool -T10531/3- with the Knurled Nut - T10531/4--B-.

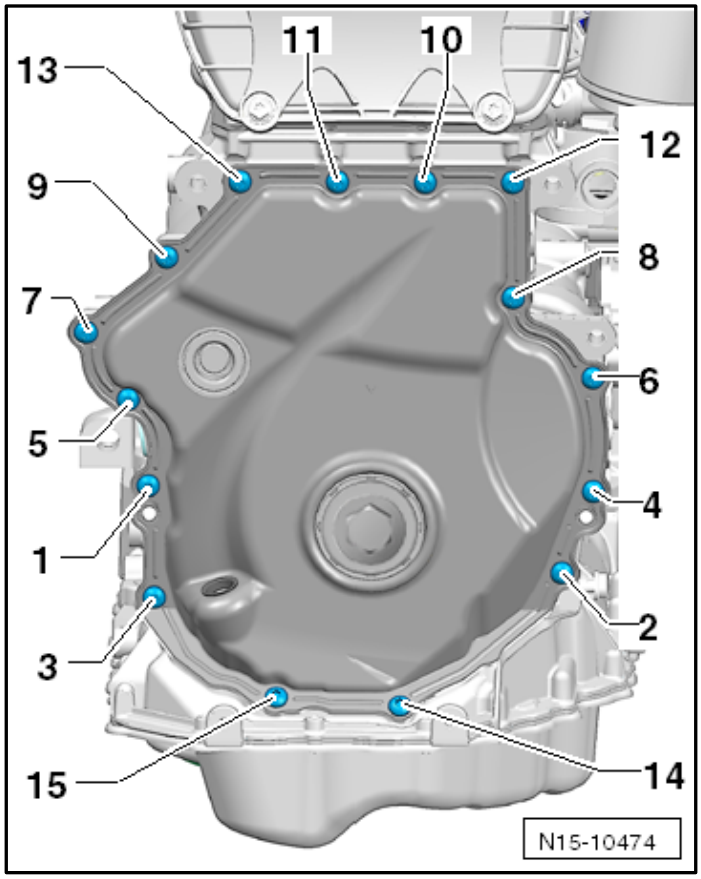


- The crankshaft can now be turned at the hex fitting -arrow-.



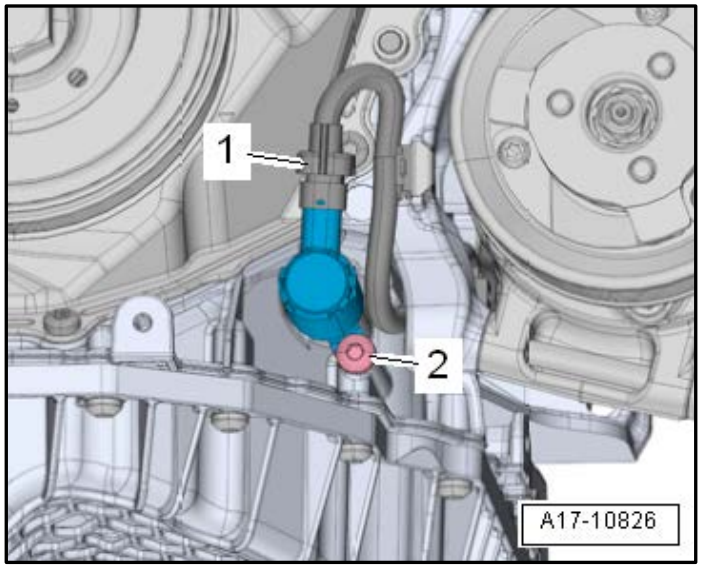
If equipped with an 8-Bolt Lower Timing Chain Cover:

- Remove the bolt -3- using the Socket - T30 - T10405.
- Remove the remaining bolts -1 through 8-.



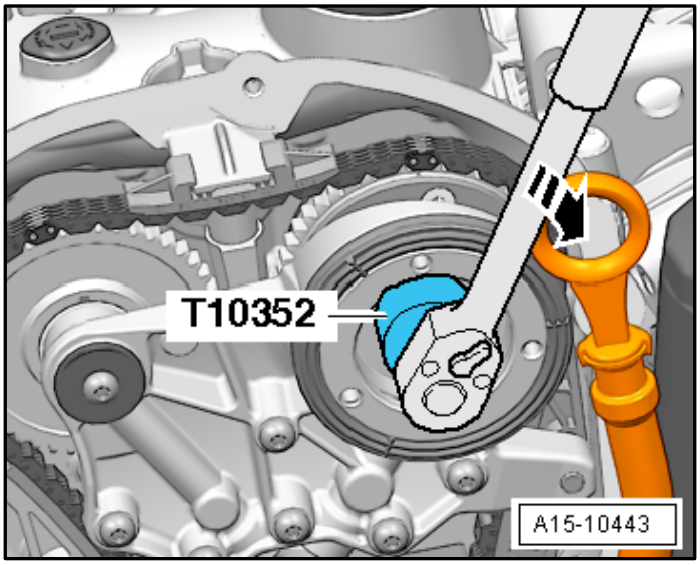
If equipped with an 15-Bolt Lower Timing Chain Cover:

- Remove the bolts -5 and 7- with the Socket -T30 -T10405-.
- Remove the remaining bolts -1 through 15-.



Continuation for All Vehicles

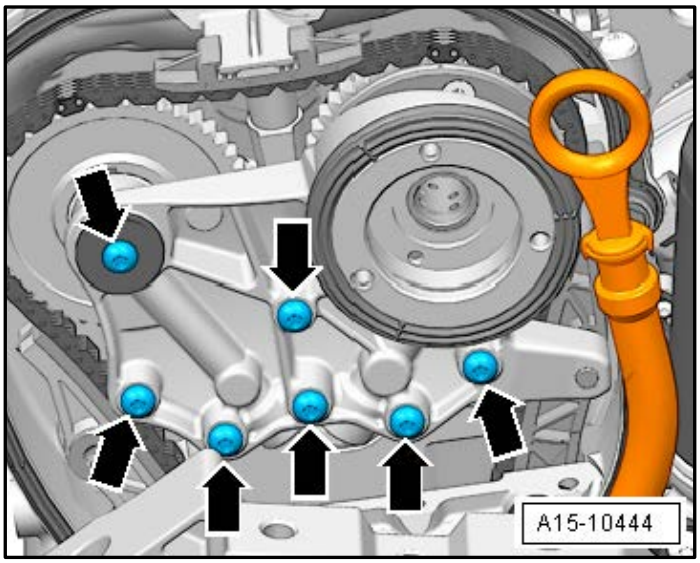
- Place the Used Oil Collection and Extraction Unit -SMN372500- under the engine.
- Disconnect the Oil Pressure Regulation Valve connector -1-.
- Remove the bolt -2- and the Oil Pressure Regulation Valve -N428--3-.
- Pry off the lower timing chain cover.



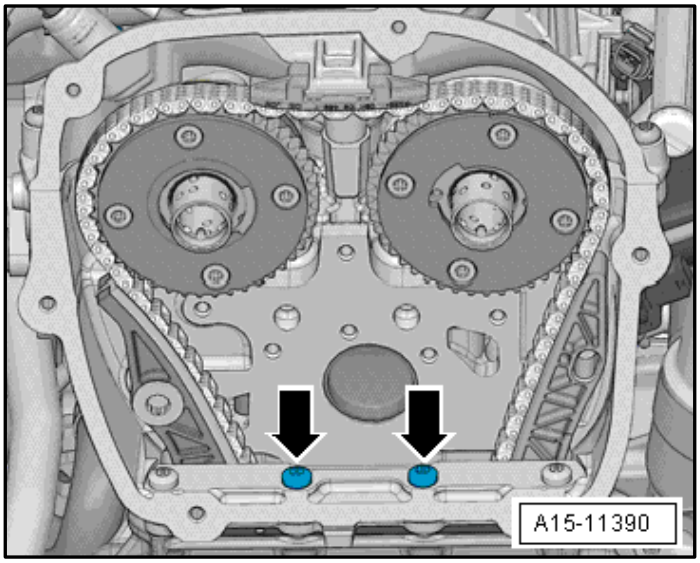
- Remove the control valve in the direction of the arrow using the Assembly Tool -T10352/2-.

NOTE

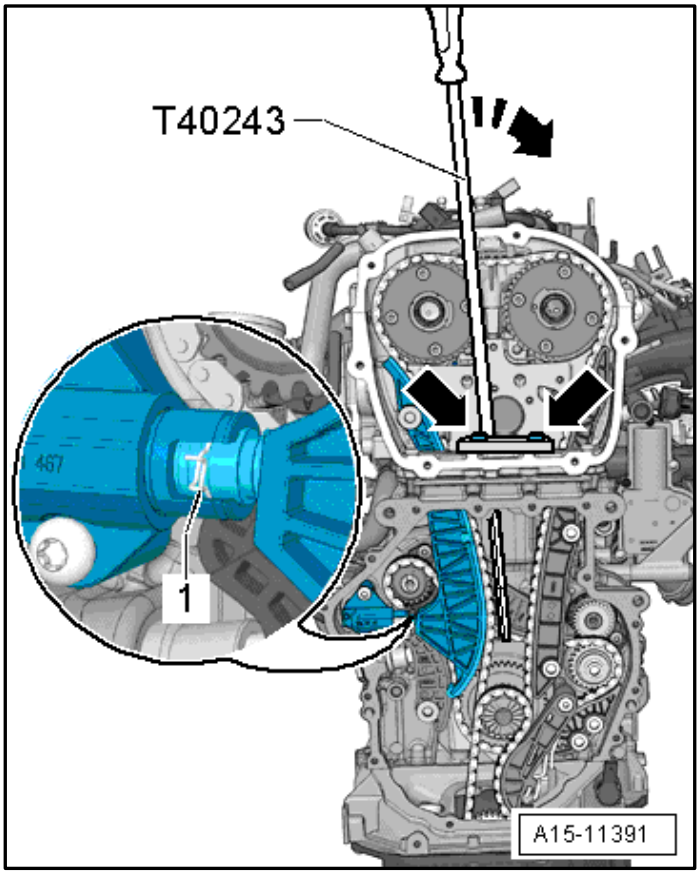
The control valve has left-hand thread.



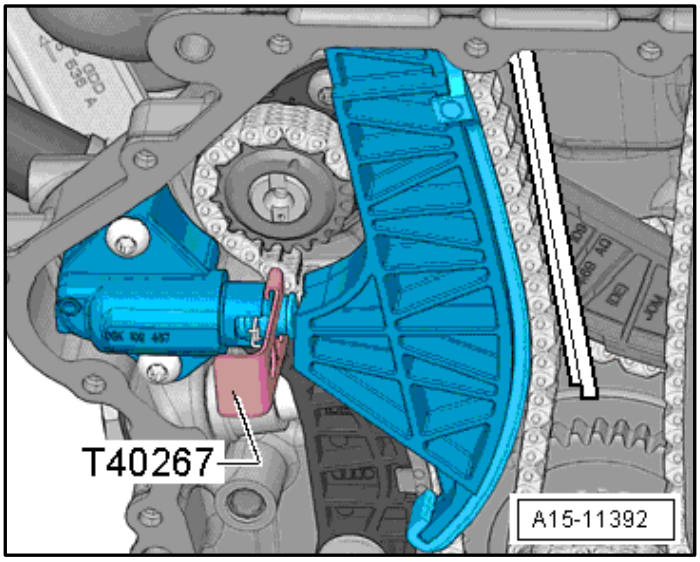
- Remove the bolts -arrows- and remove the bearing bracket.



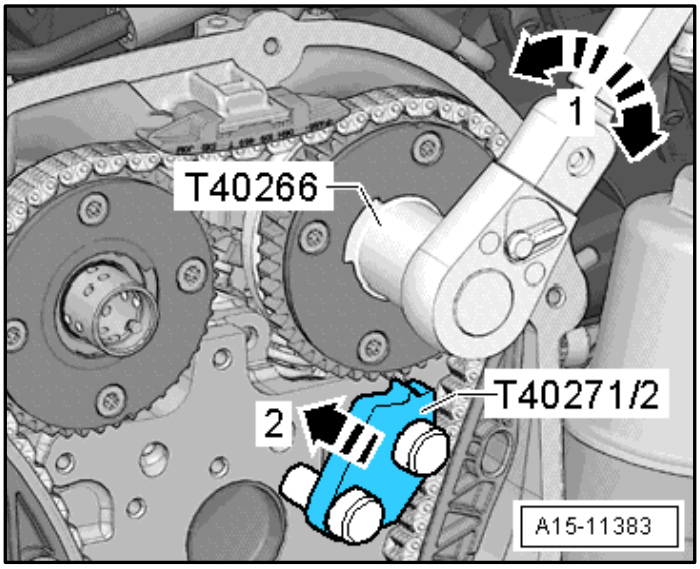
- Remove the bolts -arrows-.



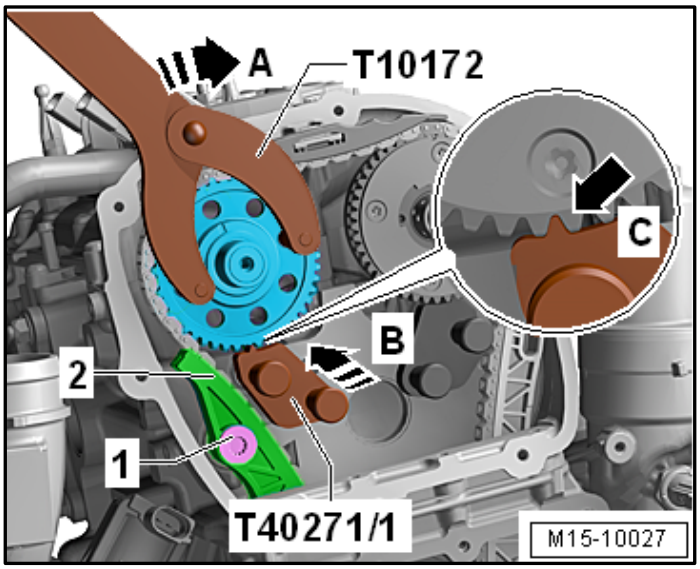
- Install the Chain Tensioner Lever -T40243-- arrows-.
- Press the chain tensioner circlip -1- together and hold it.
- Slowly press and hold the Chain Tensioner Lever -T40243- in the direction of -arrow-.



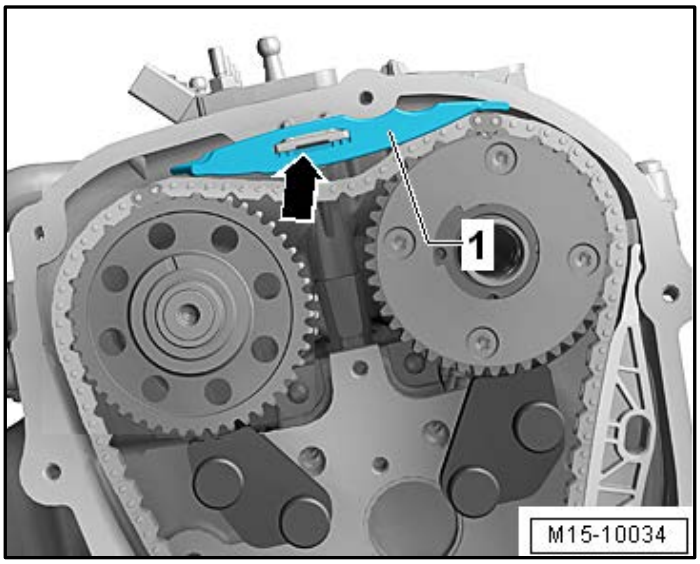
- Secure the chain tensioner with the Tensioner Locking Tool -T40267-.
- Remove the Chain Tensioner Lever -T40243-.



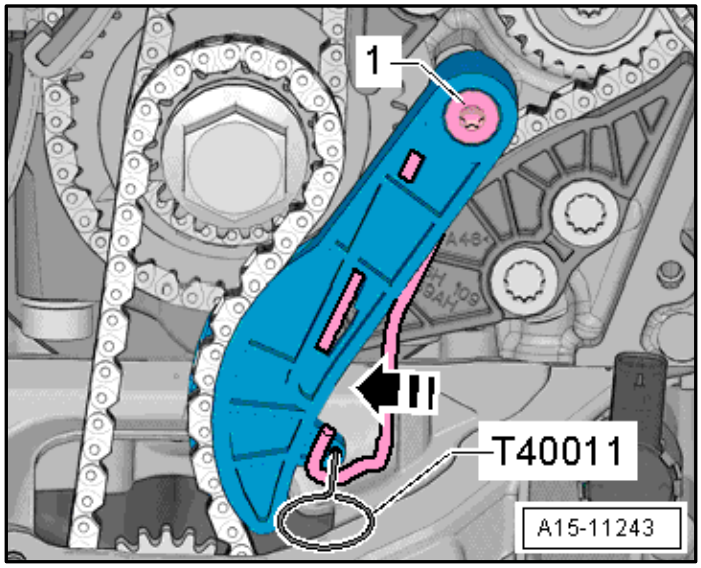
- Bolt the Camshaft Lock - Component 2 - T40271/2- to the cylinder head and slide into the splines on the chain sprocket in the direction of the -arrow 2-. Rotate the intake camshaft with the Adapter -T40266--1- if necessary.
- Install the Camshaft Lock - Component 1 - T40271/1- on the cylinder head.



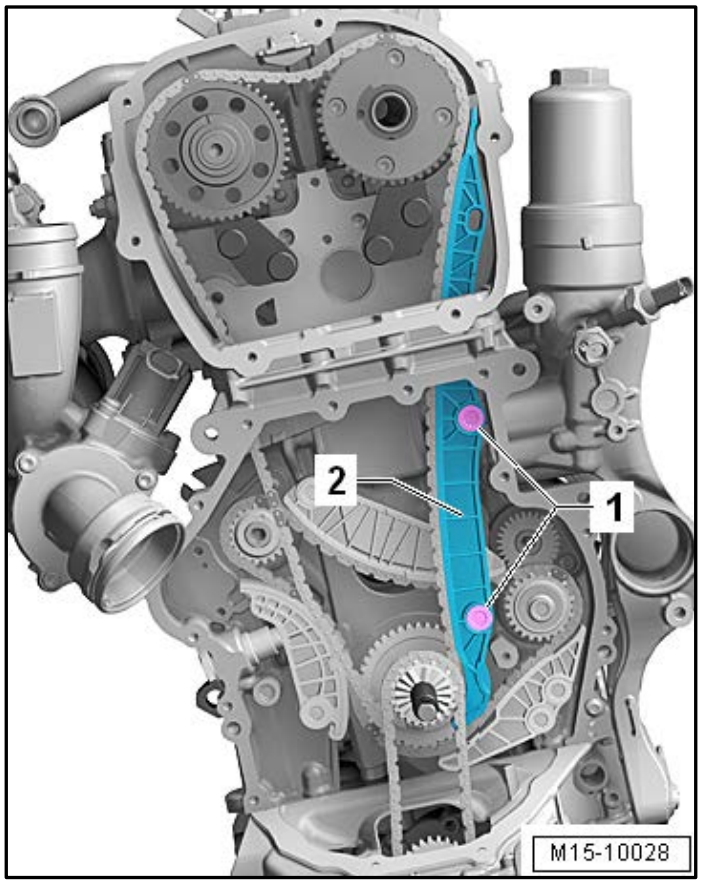
- With help from a second technician, hold the exhaust camshaft securely with the Counterhold - Multiple Use -T10172A- in direction of the -arrow A-. Remove the bolt -1- and guide the tensioning rail -2- downward. Turn the camshaft clockwise -A- until the Camshaft Locks -T40271/1- can be slid, in the direction of the -arrow B-, into the chain sprocket splines -C-
- Check the installation position -C- of the Camshaft Locks -T40271/1-.



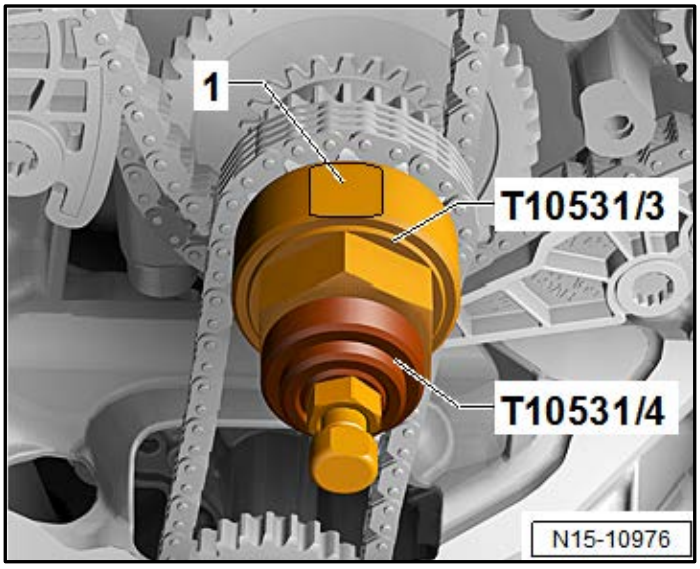
- Remove the guide rail -1-. To do so, release the retainer -arrow- with a screwdriver and push the guide rail off toward the front.



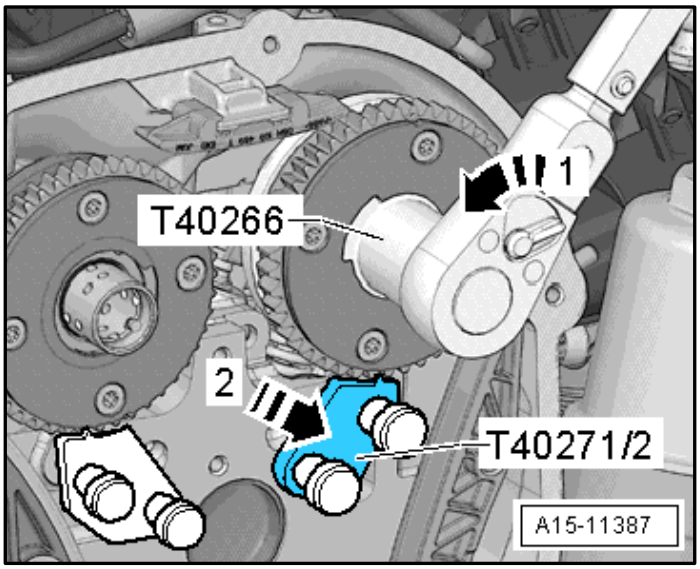
- Press the oil pump chain tensioner bracket in direction of -arrow- and lock with Locking Pin (3 pc.) -T40011-.
- Remove the bolt -1- and remove the chain tensioner.



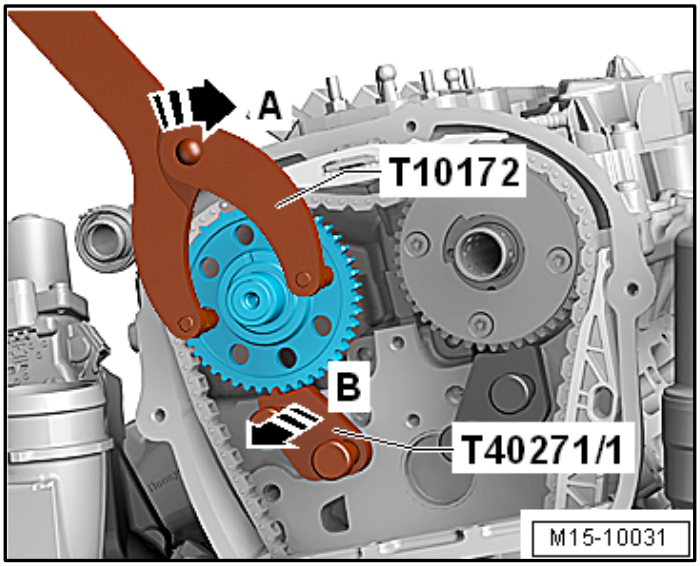
- Remove the bolts -1- and remove the glide rail -2-.
- Remove the camshaft timing chain from the camshaft bearing and guide downward.



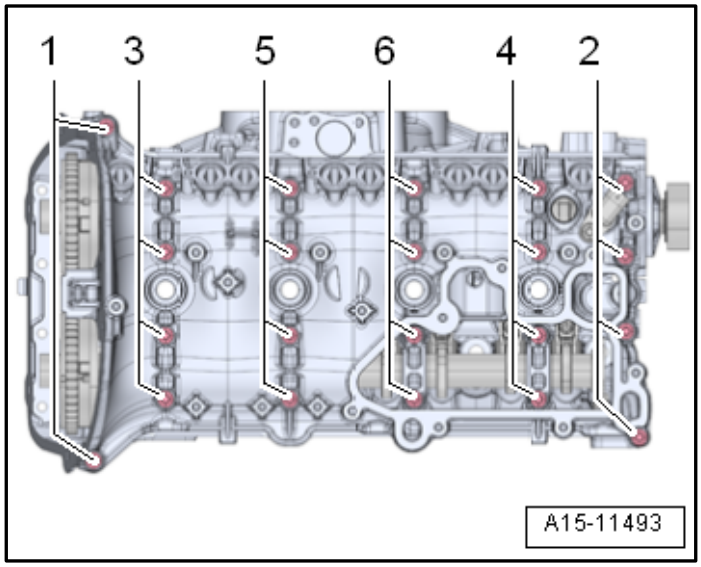
- Install the Assembly Tool - Turning Over Tool -T10531/3-. In the “TDC point” the flat area -1- points upward. Install the Knurled Nut -T10531/4-. Turn the crankshaft with a 32 mm open end wrench counter-clockwise out of “TDC”.



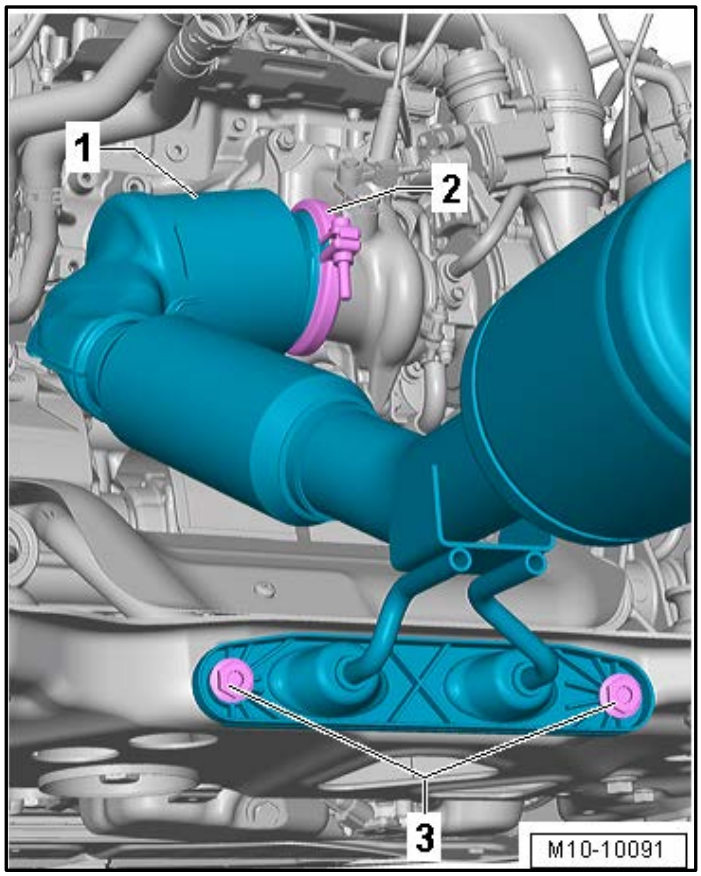
- Turn the intake camshaft in the direction of the -arrow 1- using the Adapter -T40266-. Slide the Camshaft Lock -T40271/2- out of the chain sprocket splines in direction of -arrow 2- and bring the camshaft into the rest position.



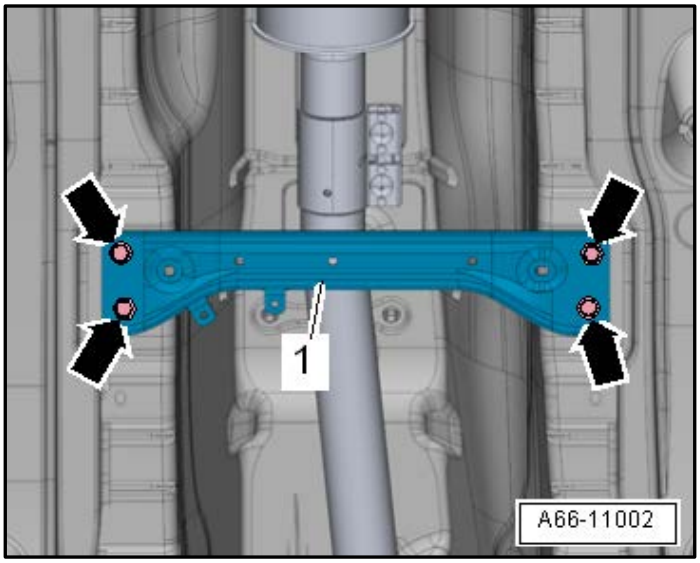
- Turn the exhaust camshaft using the Counterhold - Multiple Use -T10172A- in direction of the -arrow A-. Slide the Camshaft Lock -T40271/1- out of the chain sprocket splines in the direction of the -arrow B- and bring the camshaft into the rest position.



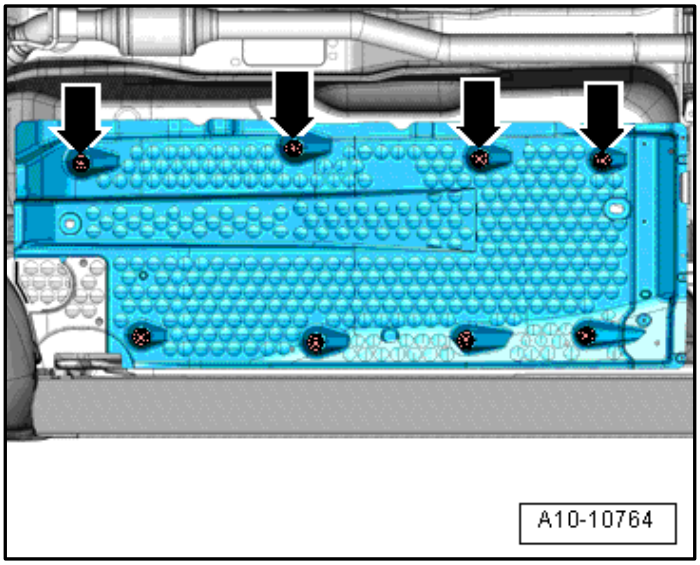
- Remove the cylinder head cover bolts in -1 to 6- sequence.
- Remove the cylinder head cover.
- Remove the camshaft and cover the open engine components.



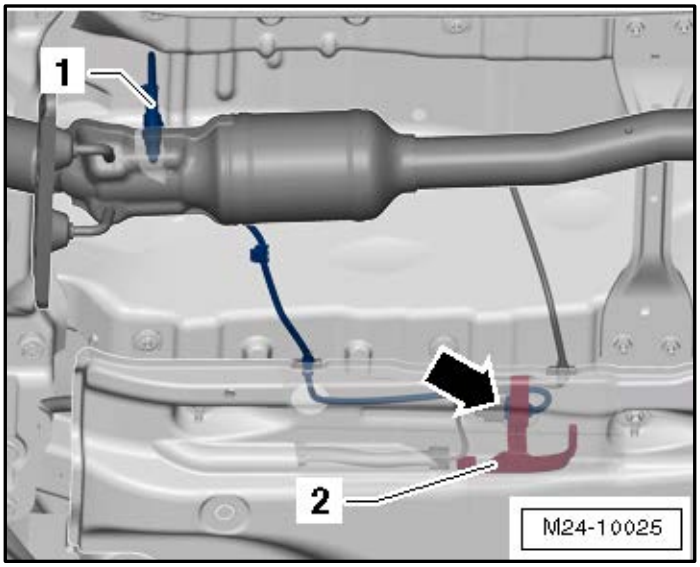
- Remove the catalytic converter bolt -2- and the clamp.
- Remove the nuts -3-.



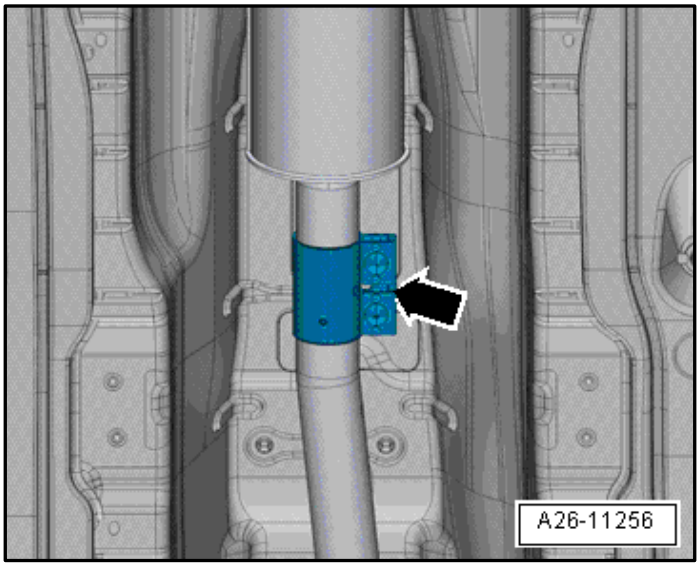
- Remove the front tunnel brace -1-.



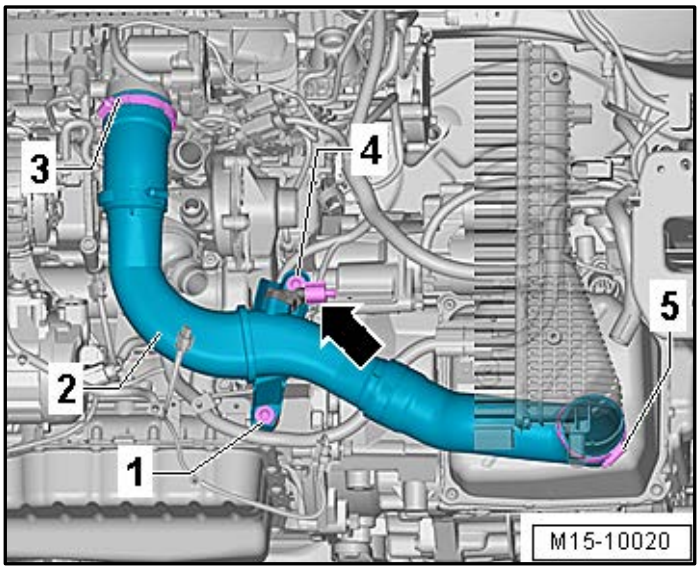
- Remove the nuts -arrows- from the right underbody panel and pull the underbody panel slightly downward.



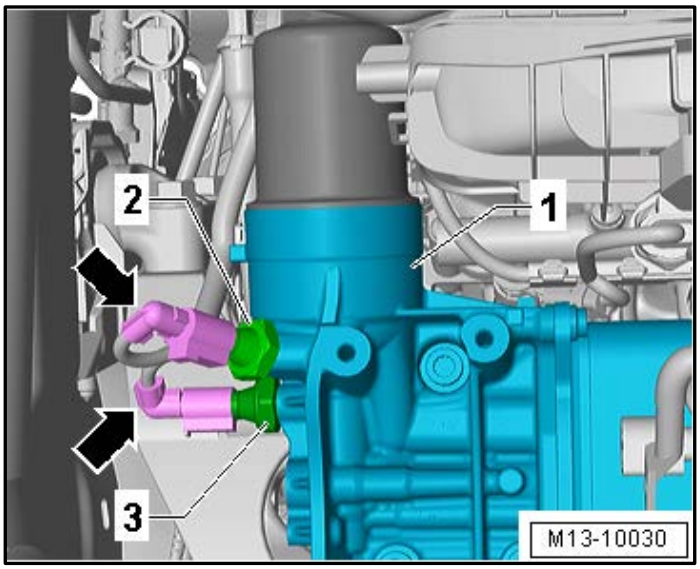
- Unclip the connector -arrow- from the bracket -2- and disconnect it.



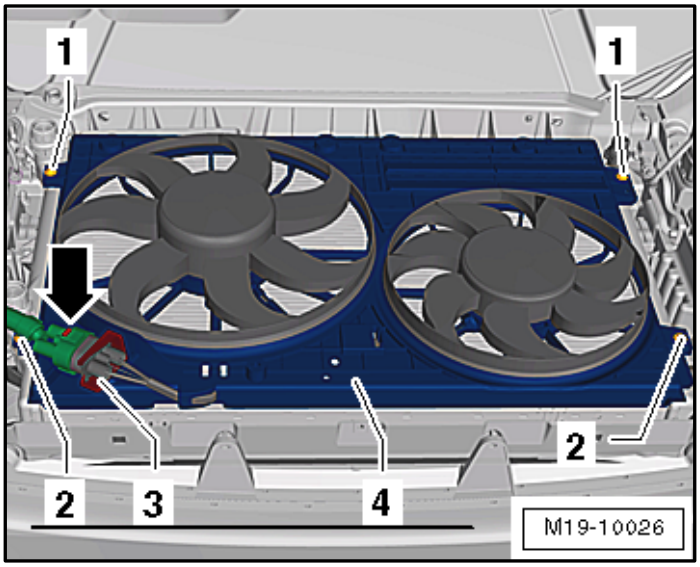
- Loosen the clamping sleeve -arrow- and push it toward the rear.
- Remove the catalytic converter with the front exhaust pipe.



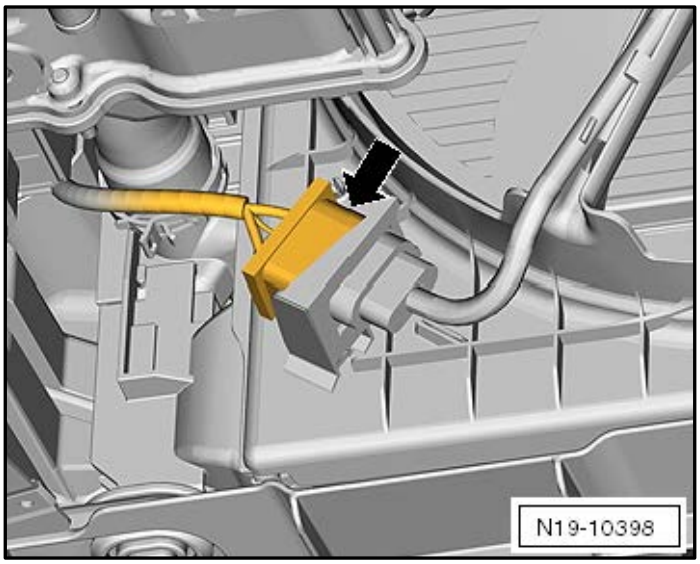
- Loosen the hose clamp -3 and 5-.
- Disconnect the connector from the Charge Air Pressure Sensor -G31--arrow-.
- Remove the bolts -1 and 4- and then remove the air duct pipe downward.
- Seal the open lines and connections with clean plugs from the Engine Bung Set -VAS6122-.



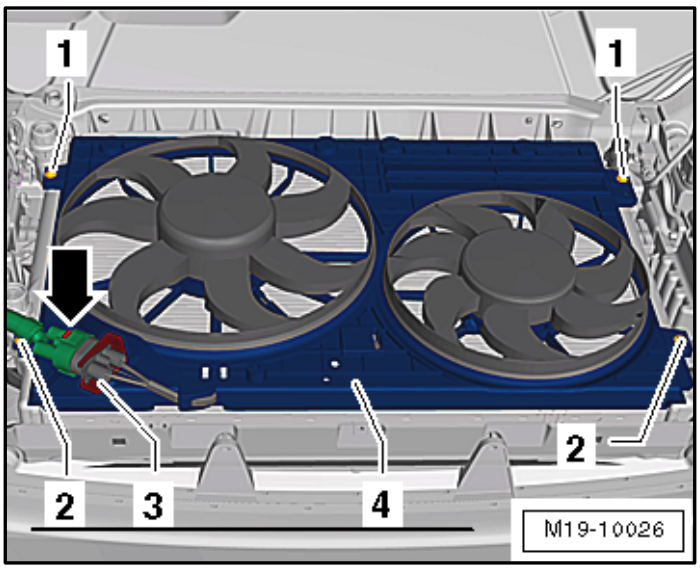
- Disconnect the connectors -top arrow- for the Oil Pressure Switch - F1--3-.
- Disconnect the connectors -bottom arrow- for the Reduced Oil Pressure Switch -F378—2-.



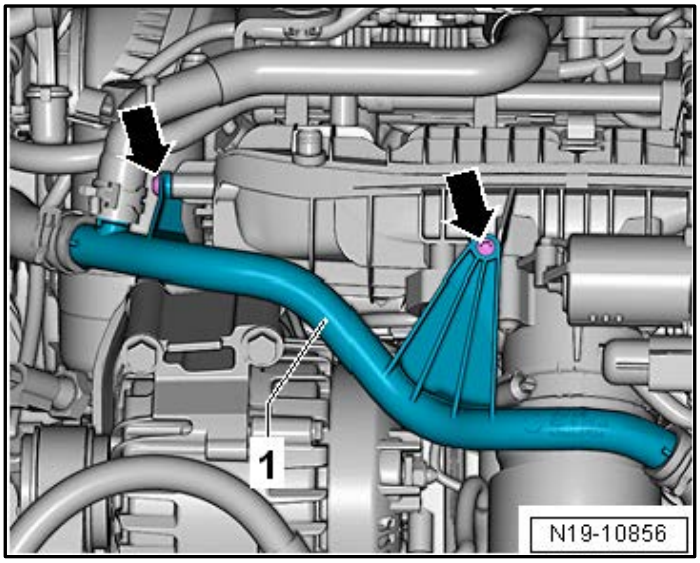
- Remove the bolts at the top of the fan shroud -1-.



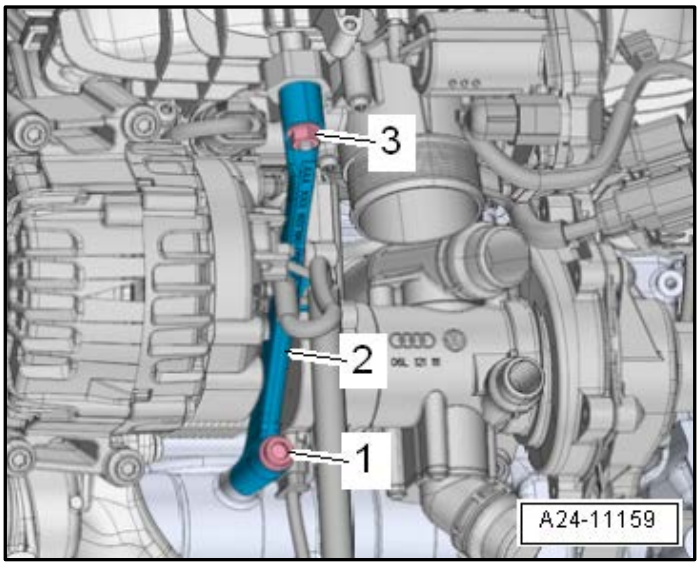
- Release and disconnect the connector -arrow-.



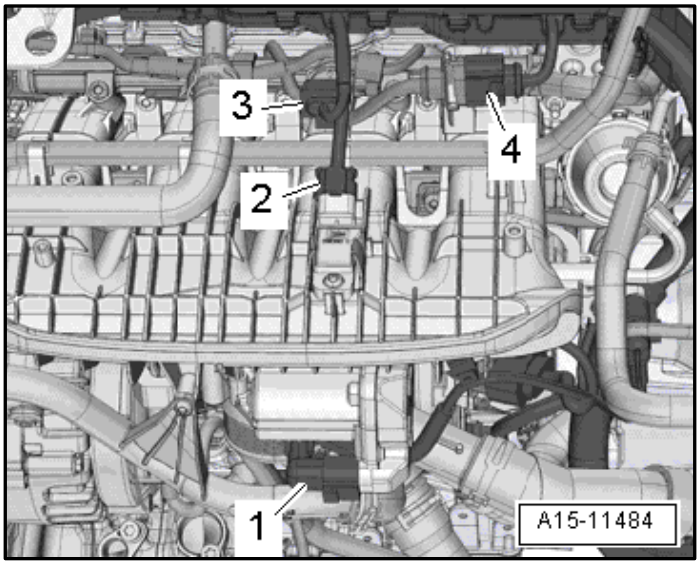
- Remove the bolts at the bottom of the fan shroud -2-.
- Remove the air shroud downward.



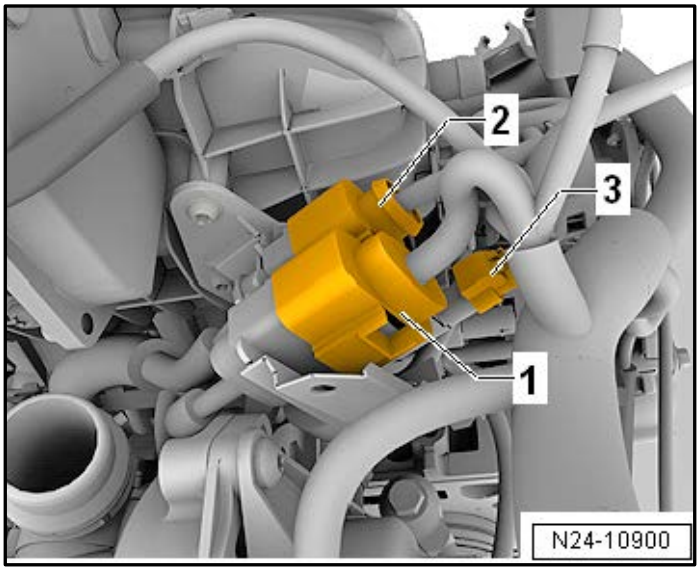
- Remove the bolts -arrows-.



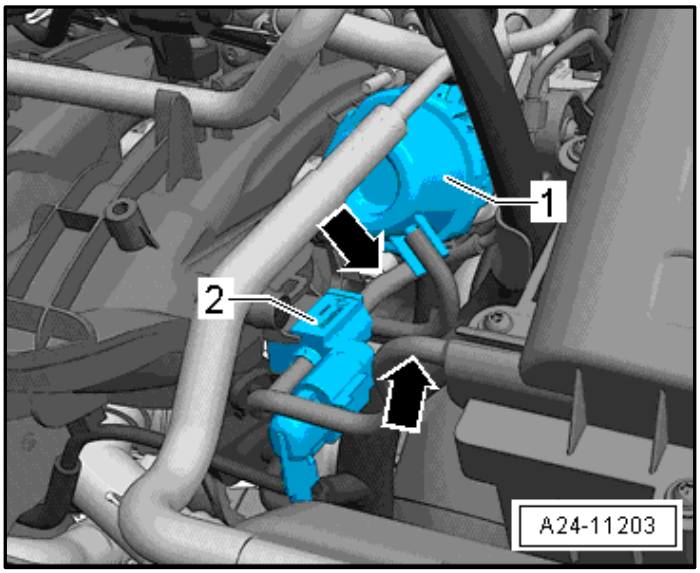
- Remove the bolt -1- and the nut -3- and then remove the bracket -2- for the intake manifold.



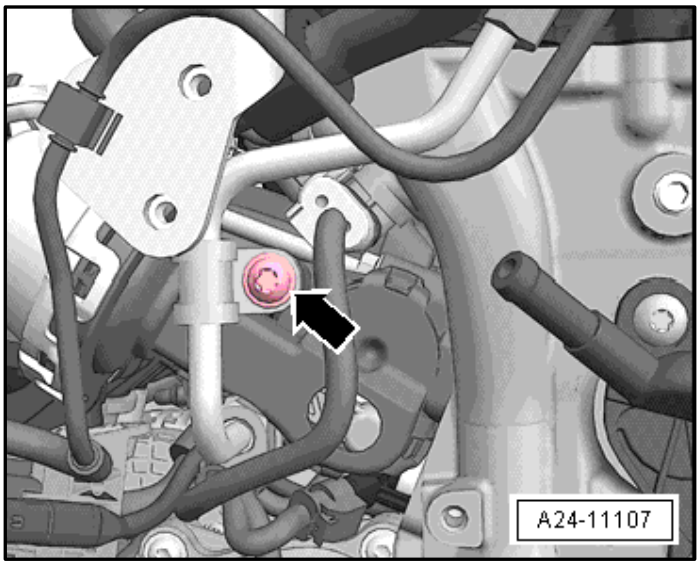
- Disconnect the Throttle Valve Control Module -GX3- connector -1-.
- Disconnect the Intake Air Temperature Sensor -G42-/Manifold Absolute Pressure Sensor -G71- <2>.
- Remove the connector -4- from the bracket.
- Free up the wiring harness and push it to the side.



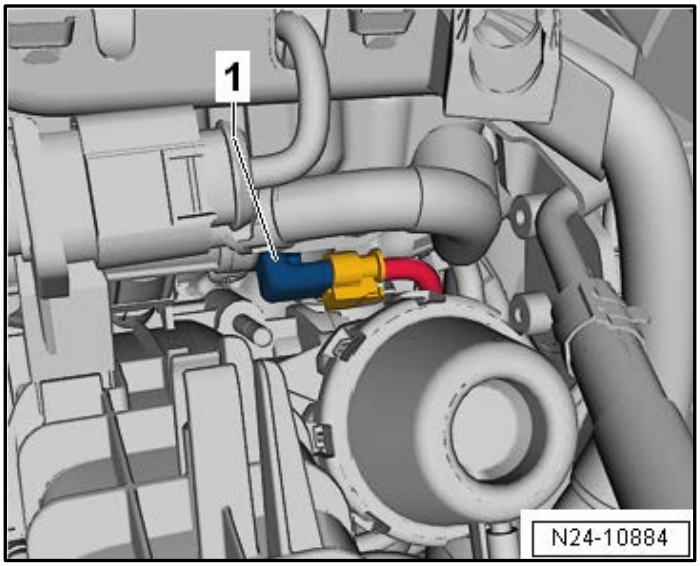
- Disconnect the connectors -1, 2 and 3- underneath the intake manifold.



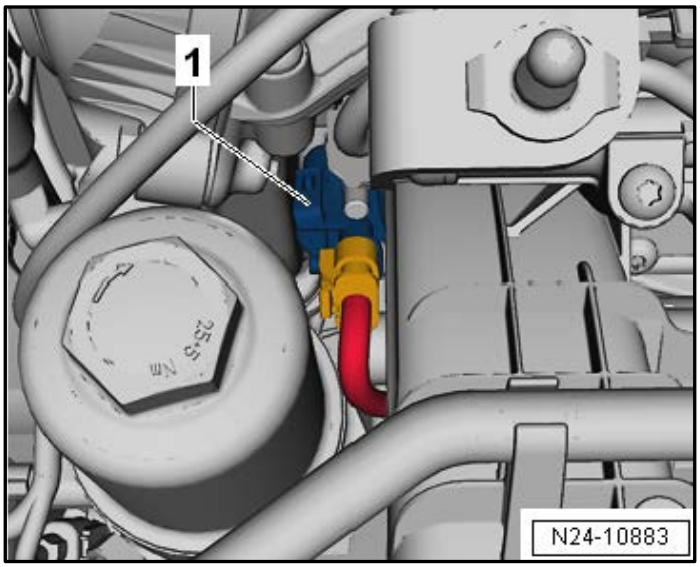
- Disconnect the connector from the Intake Manifold Runner Control Valve -N316--2-.
- Disconnect the vacuum line -back arrow- from the Intake Manifold Runner Control Valve -N316--2-.



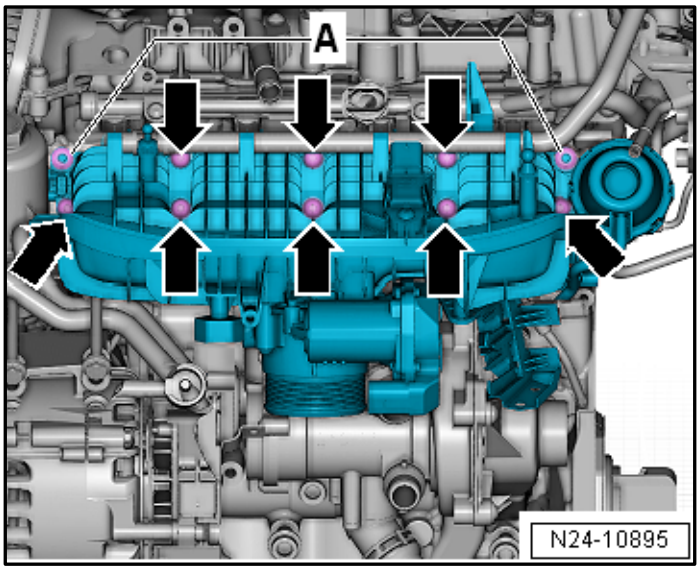
- Remove the mount clamps -arrow- for the high pressure line.



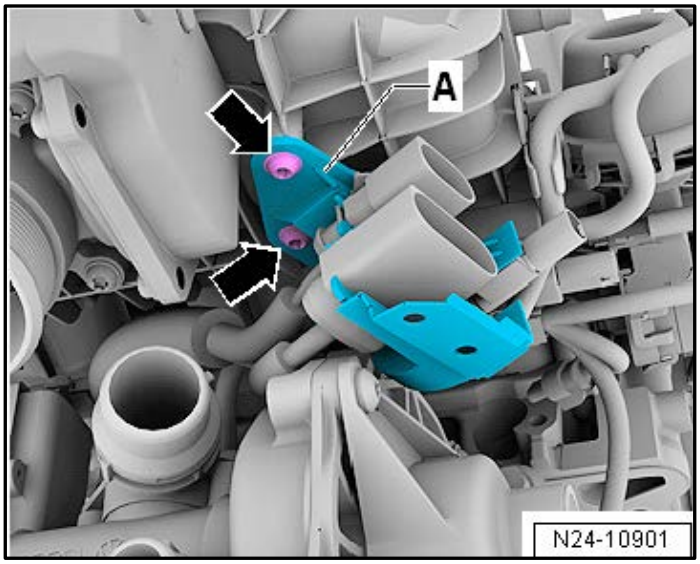
- Disconnect the connector -1- from the Camshaft Position Sensor -G40-.



- Disconnect the connector -1- from the Intake Manifold Runner Position Sensor -G336-.



- Remove the nuts -A- and bolts -arrows- from the intake manifold.

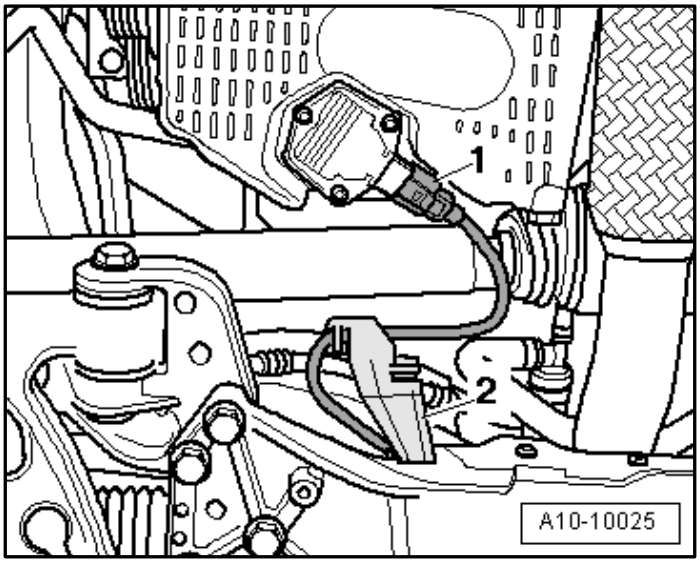


- Pull the intake manifold slightly away from the cylinder head and remove the bolts -arrows- for the bracket -A-.
- Unclip the vacuum line from the intake manifold and remove the intake manifold.

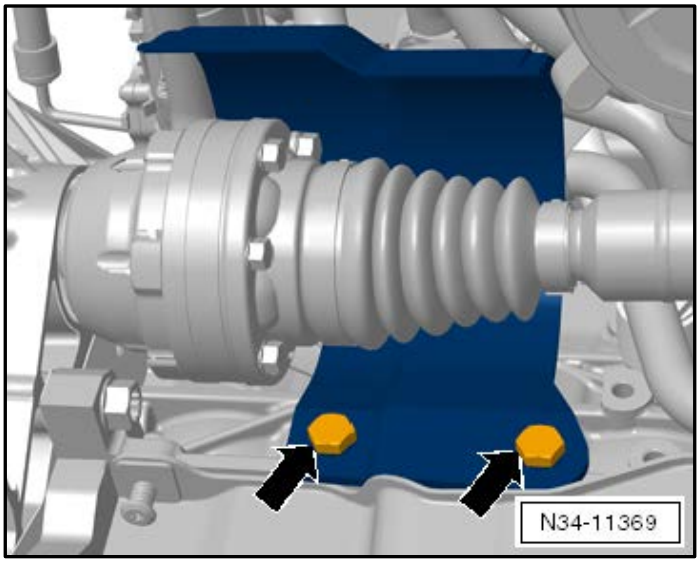
NOTE

The control valve has left-hand thread.

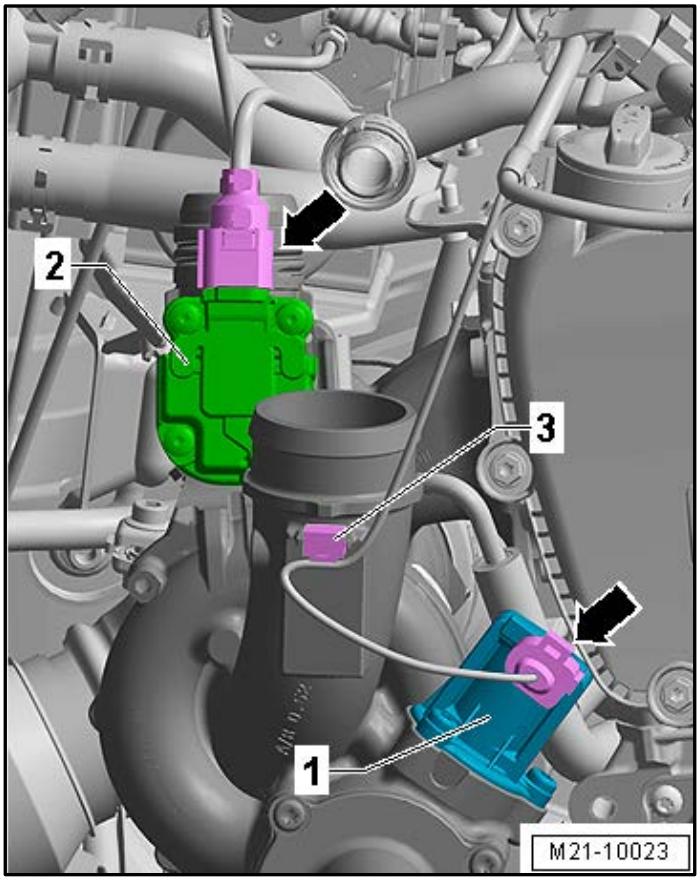
- Remove the turbocharger by following the steps below.



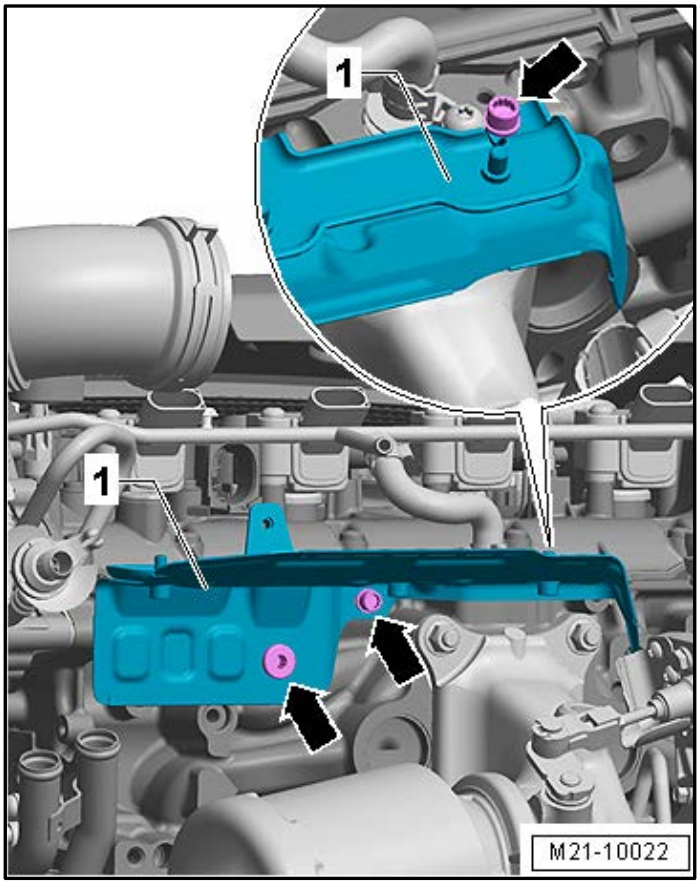
- Disconnect the connector -1- for the Oil Level Thermal Sensor -G266-. Unclip the bracket -2- from the subframe.



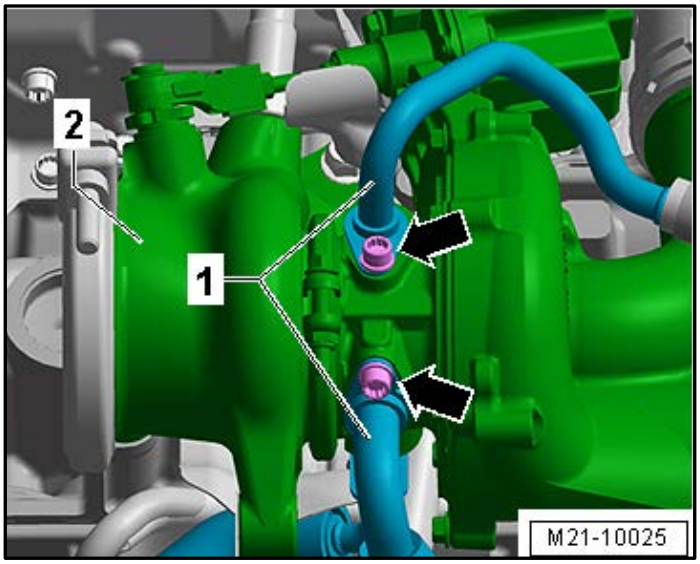
- Remove the bolts -arrows-.
- Remove the right drive axle heat shield.



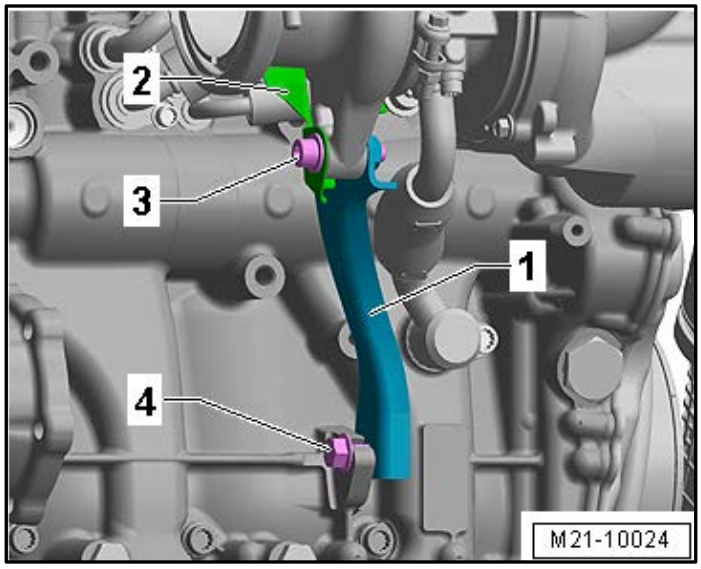
- Disconnect the connectors -arrows- from the Turbocharger Recirculation Valve -N249--1- and Charge Air Pressure Actuator -V465--2-.
- Loosen clip -3- and free up wire.



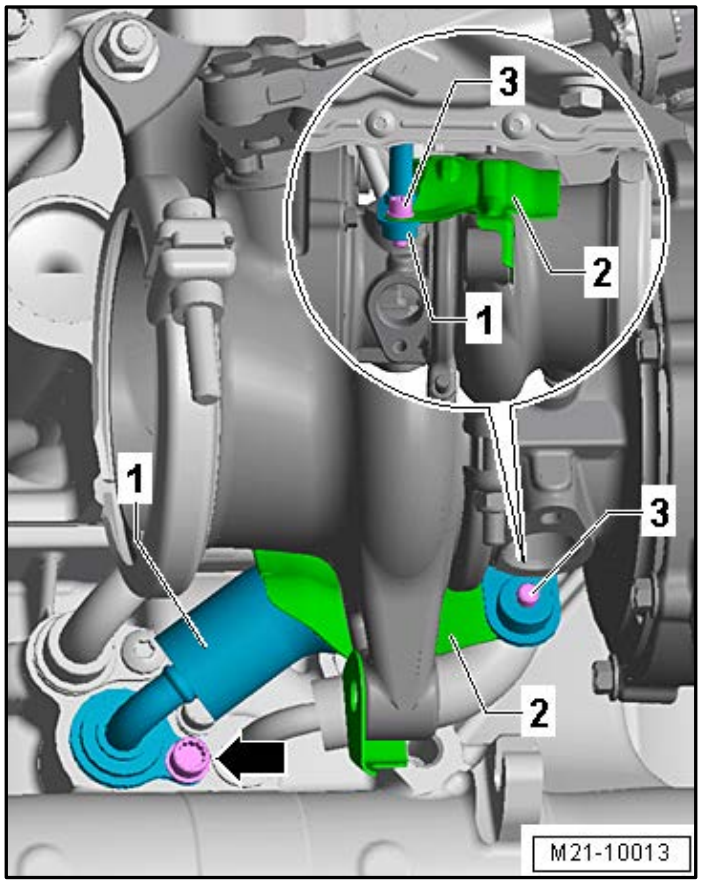
- Remove the bolts -arrows- and the heat shield -1-.



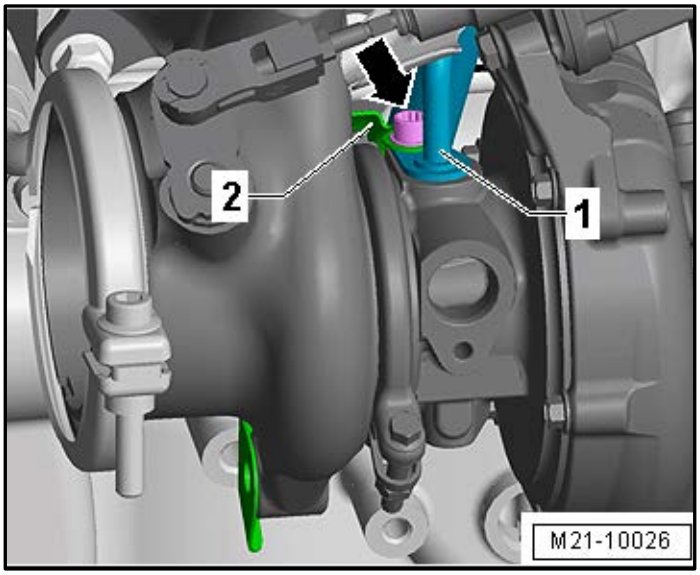
- Remove the bolts -arrows- and the lines -1- from turbocharger -2-.



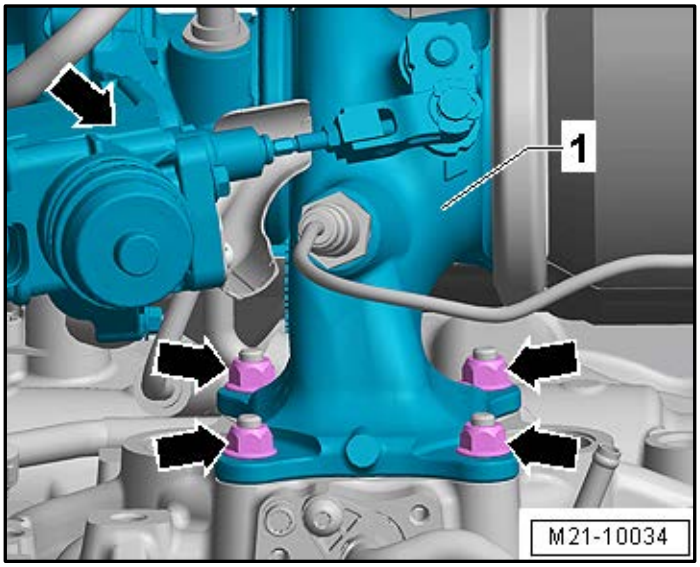
- Remove bolts -3 and 4- and remove support brace -1-.



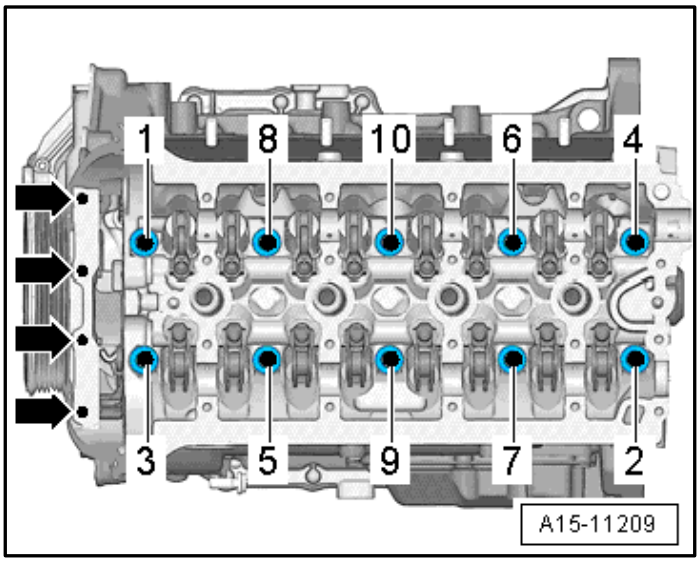
- Remove the bolt -arrow- using the Socket -Xzn 10 -T10154-. Remove the line -1- straight off the engine.
- Remove the bolt -3-.
- Remove the bolt -arrow-.



- Remove oil supply line -1- and heat shield -2- from turbocharger.



- Remove the nuts -arrows-.
- Remove the turbocharger/exhaust manifold.
- Seal the turbocharger with the Engine Bung Set -VAS6122-.



- Remove the bolts -arrows-.
- Remove the cylinder head bolts in the sequence -1 to 10-.

NOTE

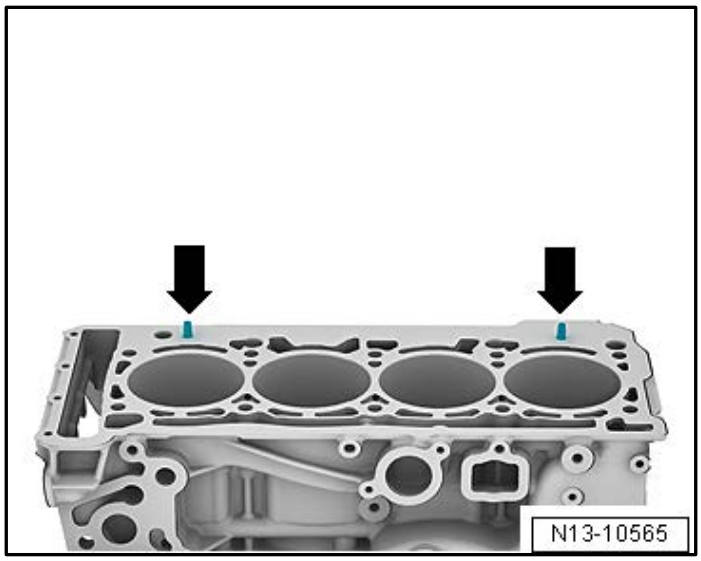
- Make sure all wires and cables are disconnected.
- Pay attention to the tension and guide tracks when lifting the cylinder head.

- Remove the cylinder head.
- Transfer necessary components from the removed cylinder head to the new cylinder head.

Section C – Cylinder Head Installation

NOTE

- Replace the bolts that are tightened with an additional turn.
- Replace the gaskets, seals and self-locking nuts.
- The hose supports, air duct pipes and hoses must be free of oil and grease before installing.
- Secure all hose connections with standard production hose clamps. Refer to the Parts Catalog.
- Spray the bolts on the used clamps with rust remover before installing.
- Only unpack the new cylinder head gasket immediately prior to installation. The silicon layer and the cylinder head gasket recessed area must not be damaged.
- Carefully remove the sealant residue from cylinder head and cylinder block. Make sure that no long grooves or scratches result. Carefully remove all lapping and sanding residue.
- Clean the cylinder head bolt blind holes. If necessary blow out with compressed air.

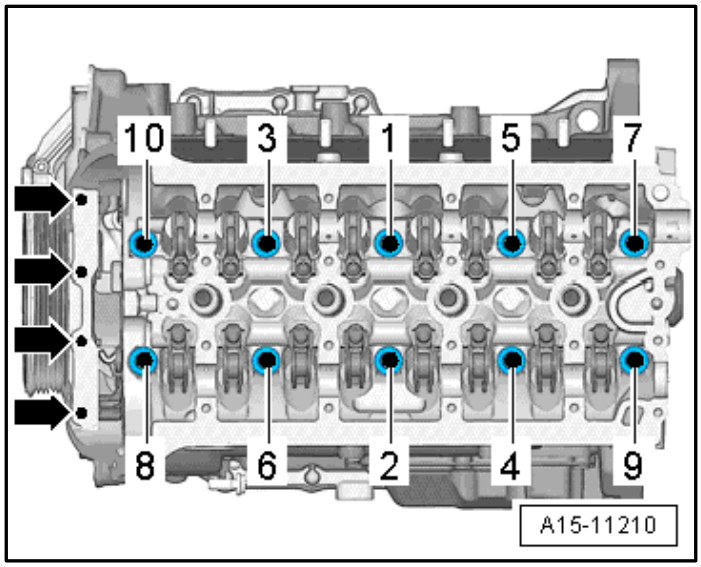


- Position the cylinder head gasket.

NOTE

- Pay attention to centering pins in cylinder block -arrows-.
- Pay attention to the cylinder head gasket installation position: the part number must be readable from the intake side.

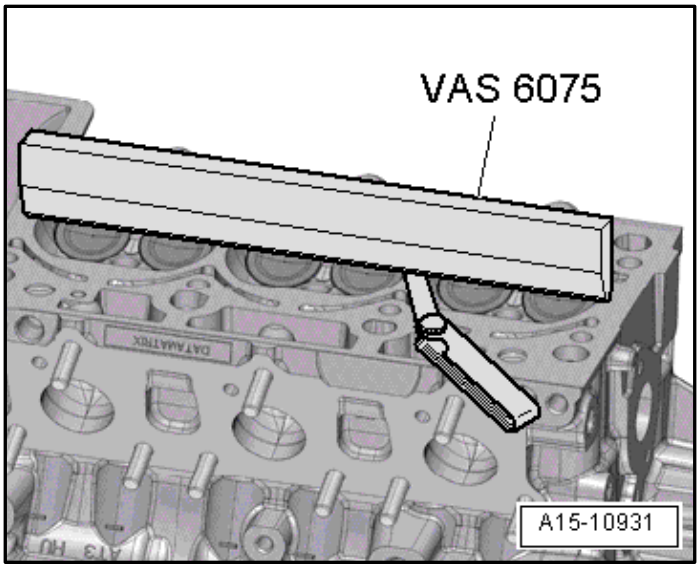
- If the crankshaft was turned in the meantime, bring the piston for cylinder 1 to TDC and then turn the crankshaft back again slightly.



- Position the cylinder head.
- Install and tighten new cylinder head bolts using the specification table below.

Step	Bolts	Tightening Specification /Additional Turn
1	-1- through -10-	40 Nm
2	-1- through -10-	Turn an additional 90°.
3	-1- through -10-	Turn an additional 90°.
4	Bolts -arrows-	4 Nm
5	Bolts -arrows-	Turn an additional 90°.

Cylinder Head, Checking for Distortion

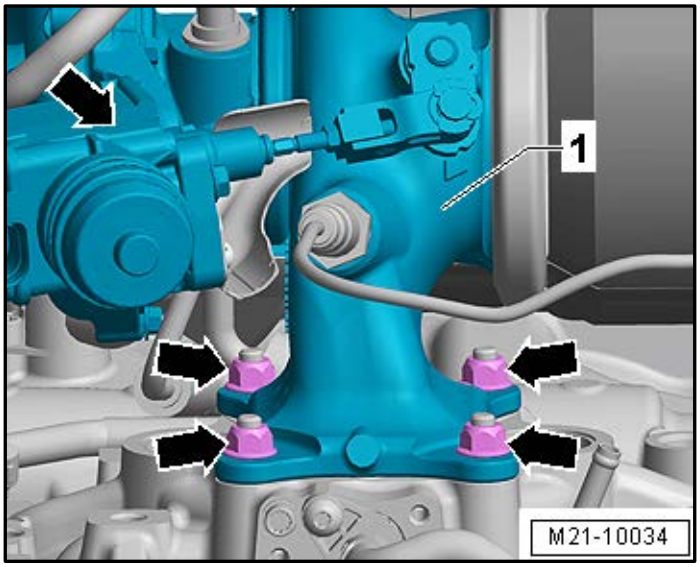


- Check the cylinder head at several locations for distortion using a Straight Edge - 500mm - VAS6075- and a feeler gauge.
- Maximum permissible distortion: 0.05 mm.

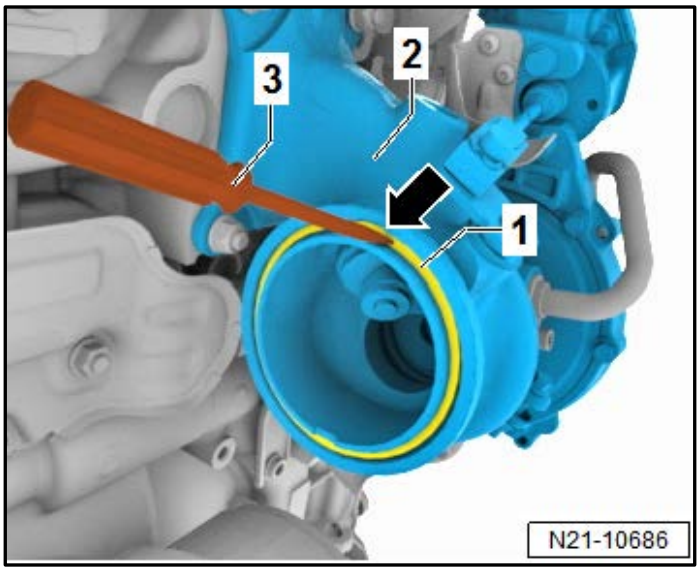
- Reinstall the turbocharger by performing the following steps.

NOTE

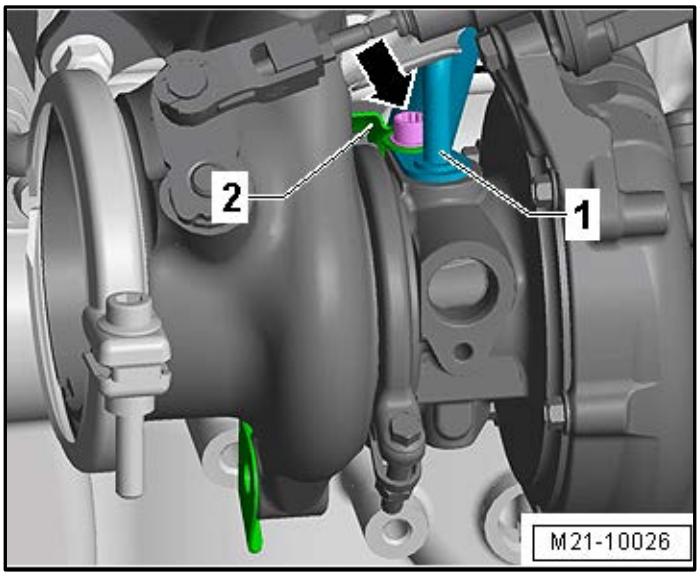
- If mechanical damage (such as a destroyed compression wheel) is found on the turbocharger, just replacing the turbocharger is not enough. To avoid subsequent damage later, perform the following steps:
- Check the air filter housing, air filter element and air duct hoses for contamination.
- Check the entire charge air circuit and charge air cooler for foreign objects
- If there are foreign objects in the charge air system, clean the charge air circuit and replace the charge air cooler if necessary.
- Hose connections and charge air system hoses must be free of oil and grease before installing. On connector couplings, the seal and sealing surfaces must only be lightly oiled.
- Install only approved clamps for securing hose connections. Refer to Parts Catalog.
- Replace gaskets, seals and self-locking nuts.
- Replace the turbocharger clamp and catalytic converter after removing.
- Fill the turbocharger with engine oil at the connection for oil supply line.
- After installing the turbocharger, let the engine run at idle for approximately one minute and without increasing the engine speed. This ensures the turbocharger is supplied with oil.



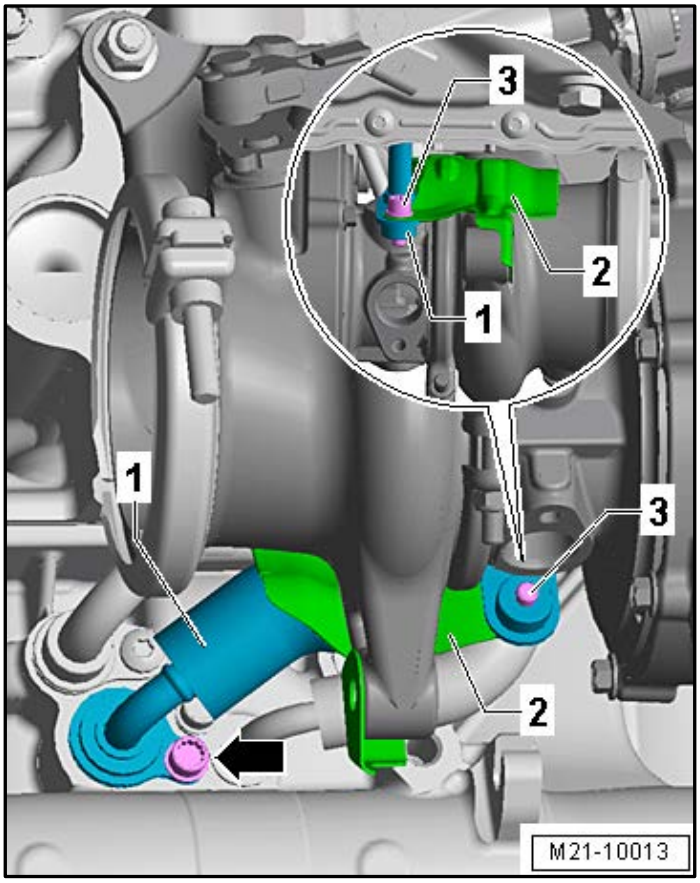
- Remove any seals used from the Engine Bung Set -VAS6122- from the turbocharger.
- Reinstall the turbocharger/exhaust manifold to the cylinder head.
- Install new nuts –arrows- and tighten to 25 Nm.



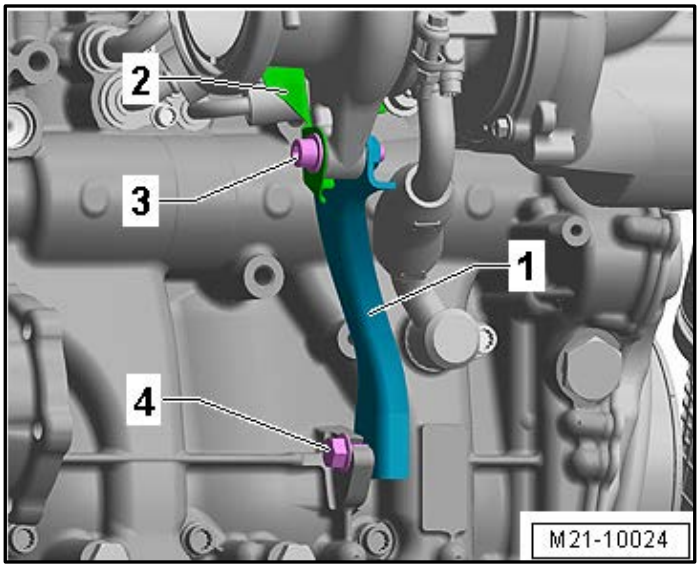
- Pry out the seal -1- from the turbocharger -2- by inserting a screwdriver -3- in the opening -arrow-.



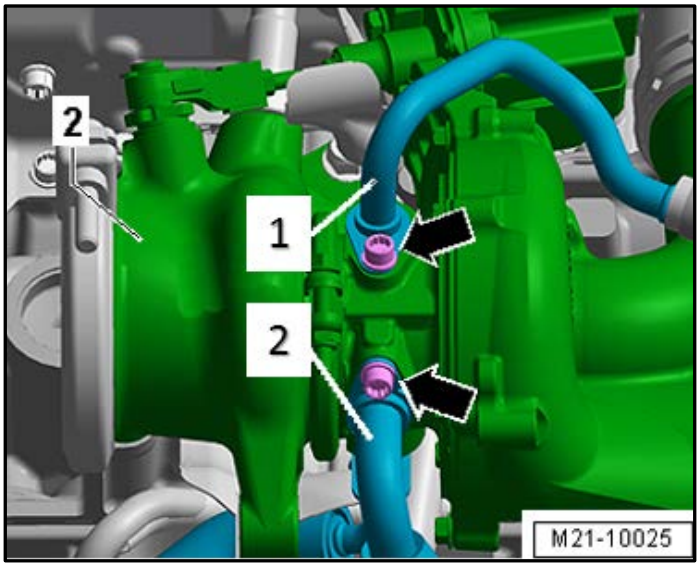
- Install a new oil supply line O-ring and reinstall the oil supply line -1- and heat shield -2-.
- Reinstall the bolt -arrow- and tighten to 9 Nm.



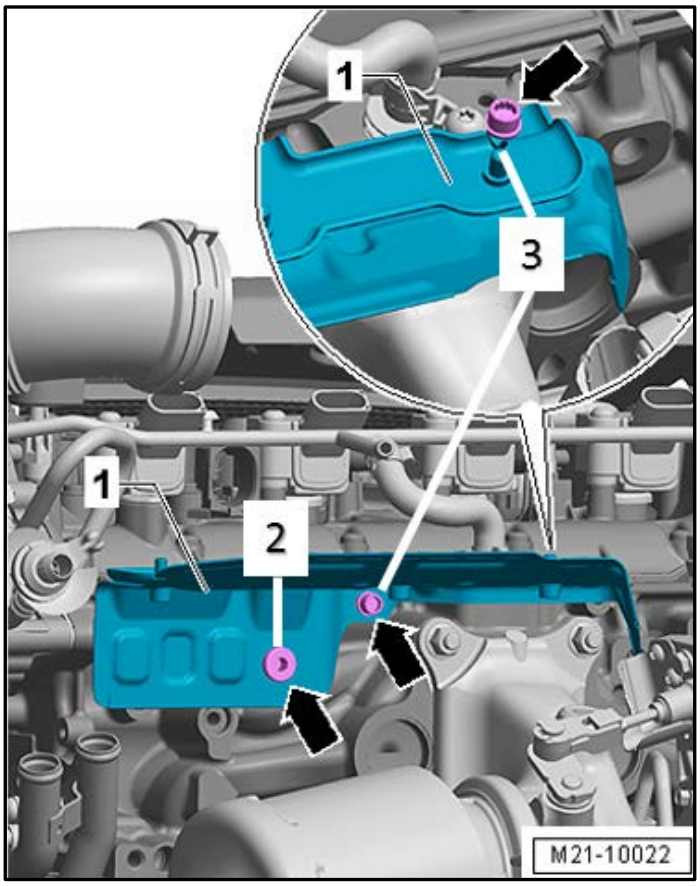
- Reinstall the line -1 with new O-rings and coat both O-rings with coolant prior to installation.
- Reinstall the bolt -arrow- using the Socket - Xzn 10 -T10154- and tighten to 9 Nm.
- Reinstall the bolt -3- and tighten to 9 Nm.



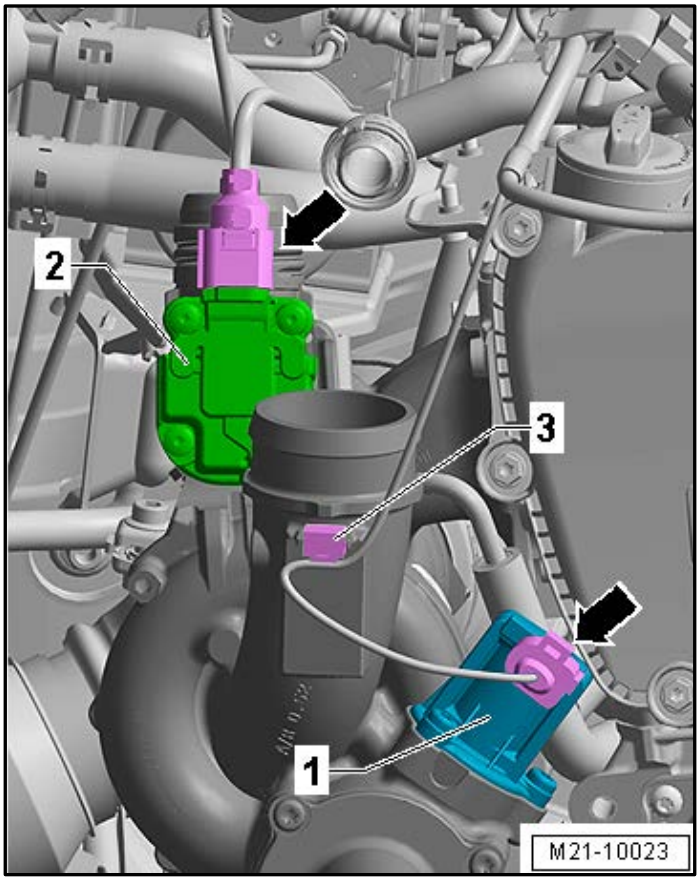
- Reinstall the support brace -1-.
- Reinstall bolts -3 and 4- and tighten to 30 Nm.
    - Lubricate the threads with hot bolt paste before installing. Refer to the Parts Catalog.



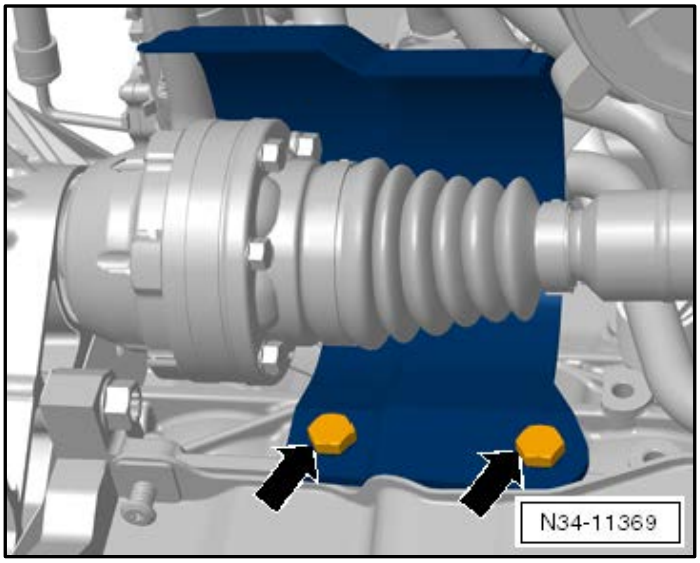
- Reinstall line -1- with a new O-ring.
    - Coat O-ring with coolant prior to installation.
- Reinstall line -2- with a new O-ring.
    - Coat O-ring with engine oil prior to installation.
- Reinstall bolts -arrows- and tighten to 9 Nm.



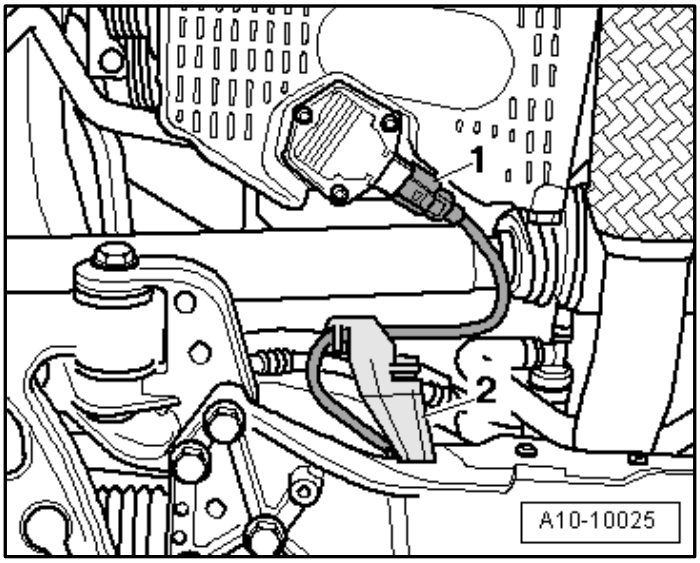
- Reinstall the heat shield -1- and bolts -2,3-
- Tighten bolt -2- to 20 Nm.
- Tighten bolts -3- to 9 Nm.



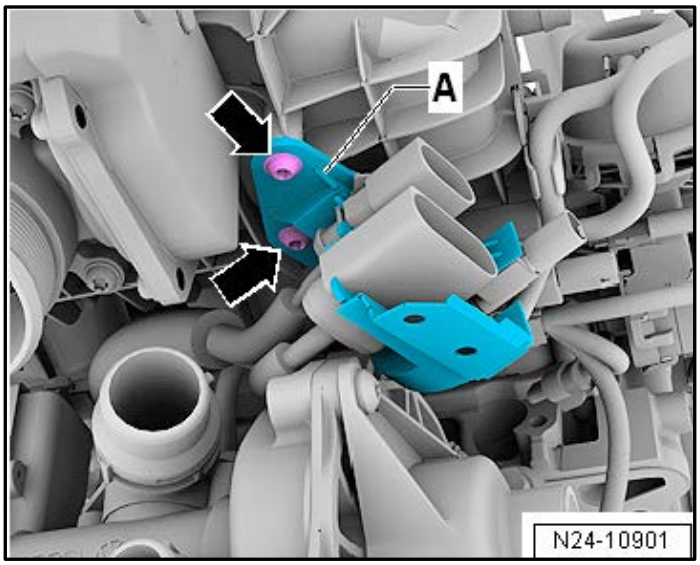
- Connect the connectors -arrows- to the Turbocharger Recirculation Valve -N249--1- and Charge Air Pressure Actuator -V465--2-.
- Reattach clip -3- and secure wire.



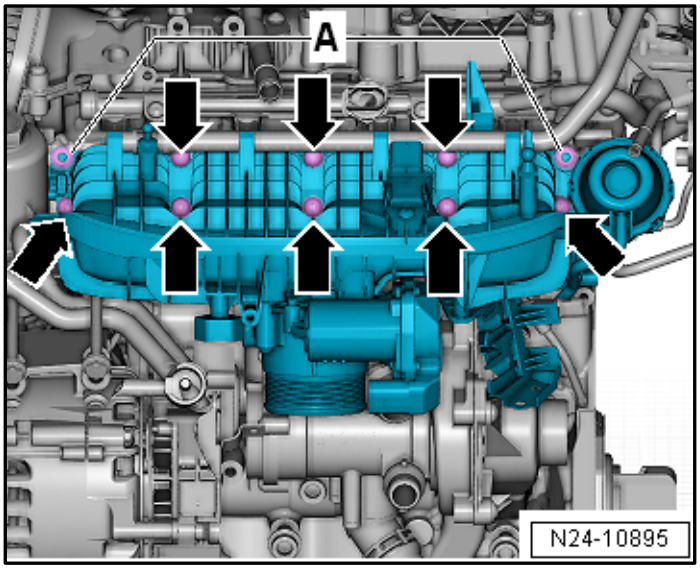
- Reinstall the right drive axle heat shield.
- Reinstall the bolts –arrows and tighten to 25 Nm.



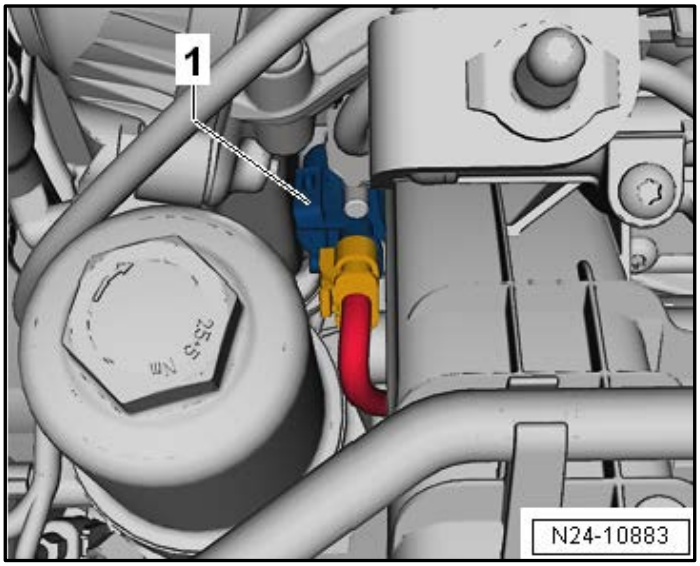
- Reconnect the connector -1- for the Oil Level Thermal Sensor -G266-. Clip the bracket -2- to the subframe.



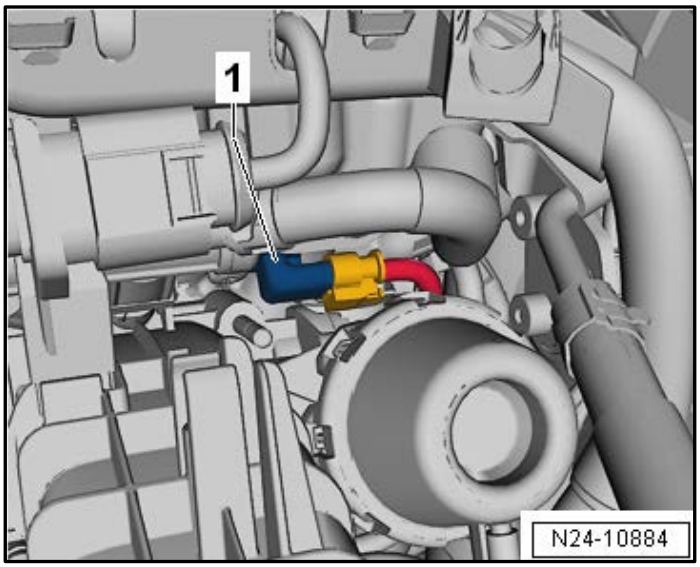
- Align the intake manifold to the cylinder head, reinstall the bolts -arrows- for the bracket –A- and tighten to 5 Nm.
- Clip the vacuum line to the intake manifold and remove the intake manifold.



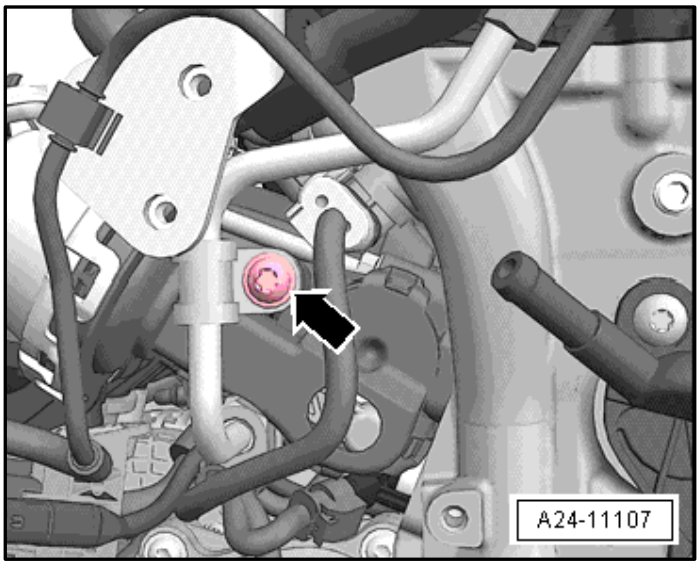
- Reinstall the nuts -A- and bolts -arrows- in the intake manifold and tighten to 9 Nm.



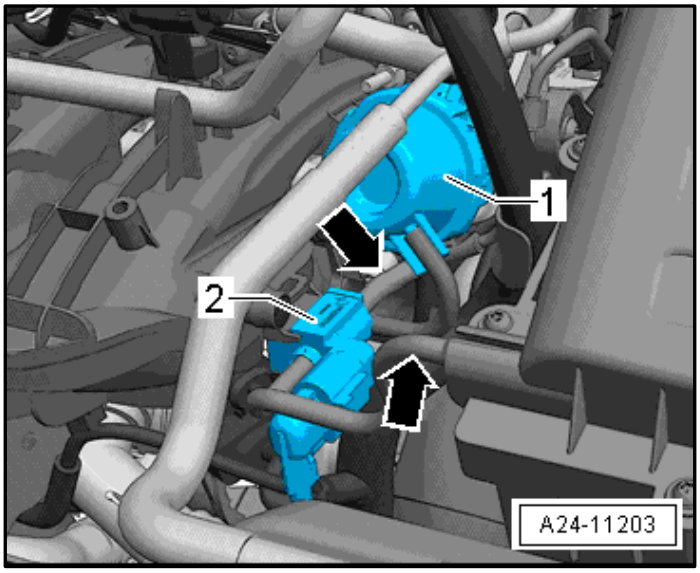
- Reconnect the Intake Manifold Runner Position Sensor -G336- connector -1-.



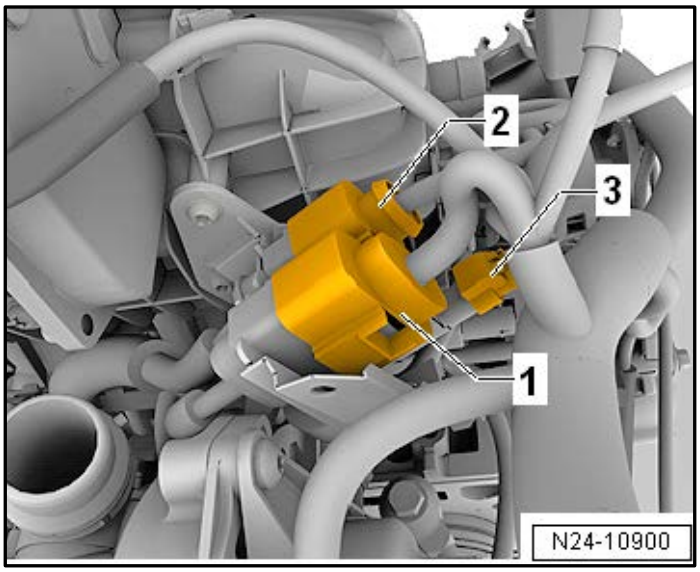
- Reconnect the Camshaft Position Sensor -G40- connector.



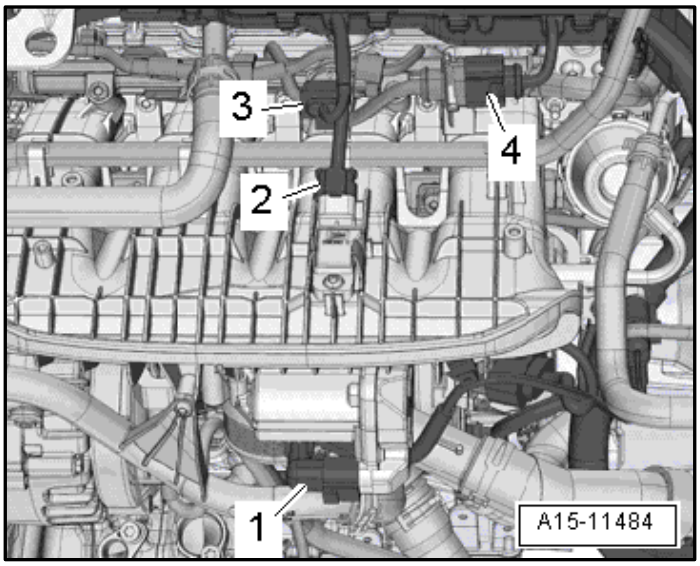
- Install the mount clamps -arrow- for the high pressure line and tighten to 9 Nm.



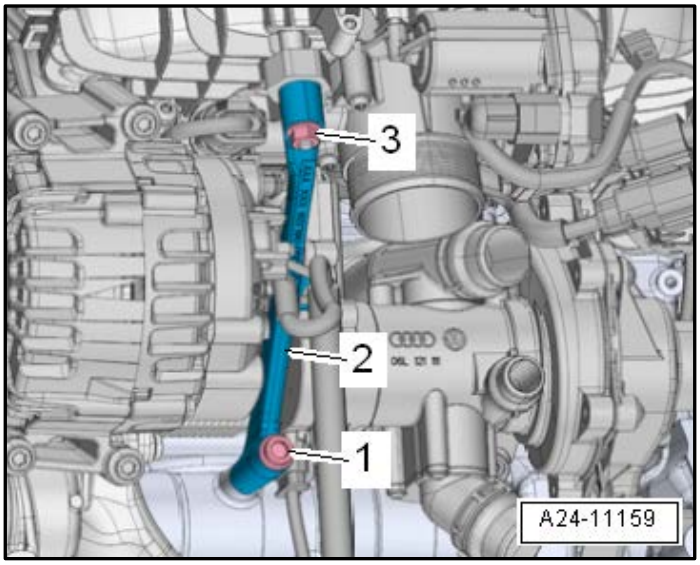
- Reconnect the vacuum line -back arrow- to the Intake Manifold Runner Control Valve - N316--2-.
- Reconnect the connector to the Intake Manifold Runner Control Valve -N316--2-.



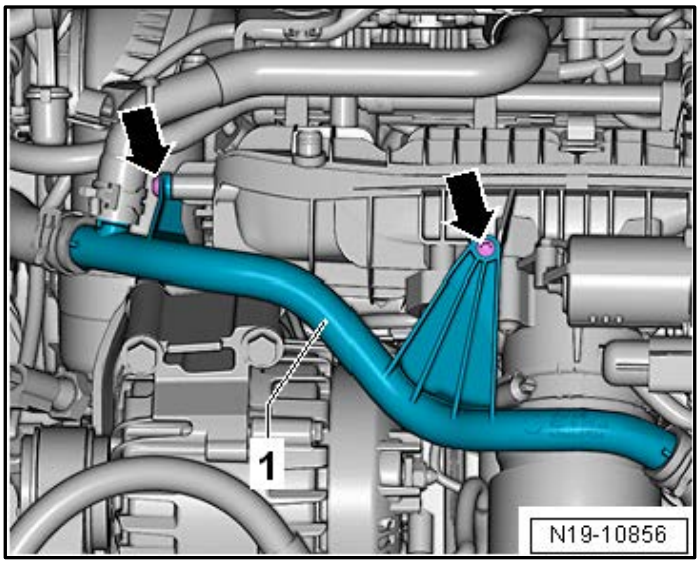
- Reconnect the connectors -1, 2 and 3- underneath the intake manifold.



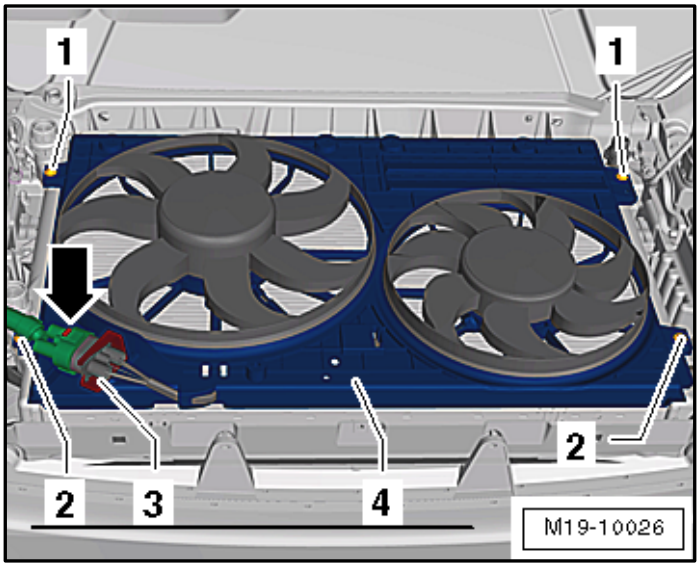
- Reinstall the connector -4- to the bracket.
- Reconnect the Intake Air Temperature Sensor -G42-/Manifold Absolute Pressure Sensor -G71- <2>.
- Reconnect the Throttle Valve Control Module -GX3- connector -1-.



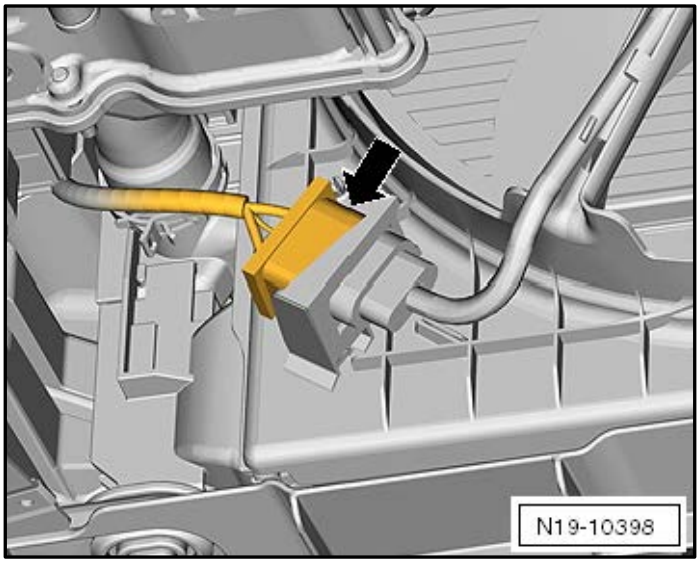
- Install the intake manifold bracket -2- and the bolt -1-. Tighten to 20 Nm.
- Install the nut -3- and tighten to 10 Nm.



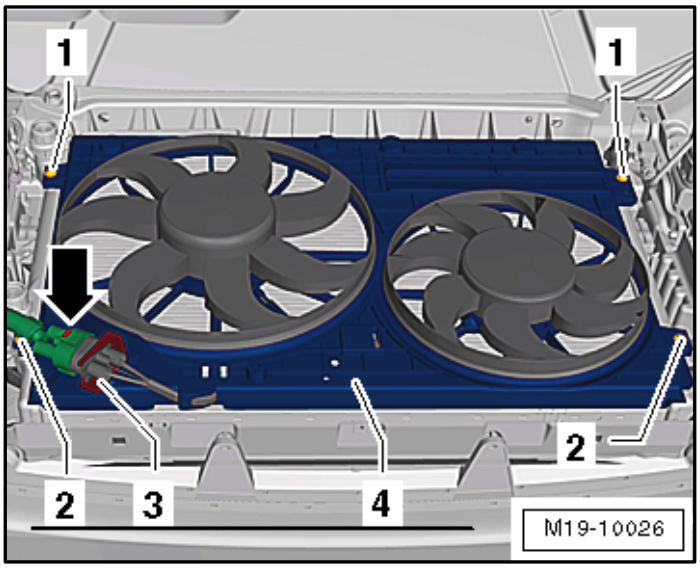
- Install the bolts -arrows- and tighten to 6 Nm.



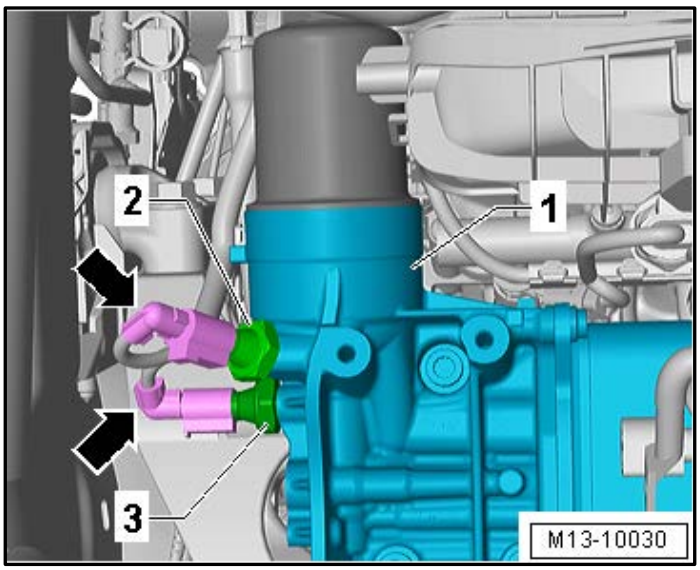
- Reinstall the air shroud and the bottom bolts -2-. Tighten to 8 Nm.



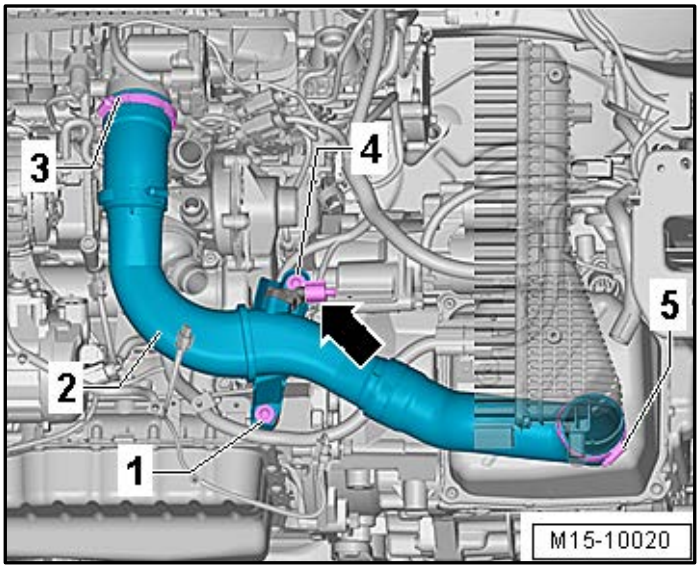
- Reconnect and secure the connector -arrow-.



- Reinstall the top bolts -1-. Tighten to 8 Nm.



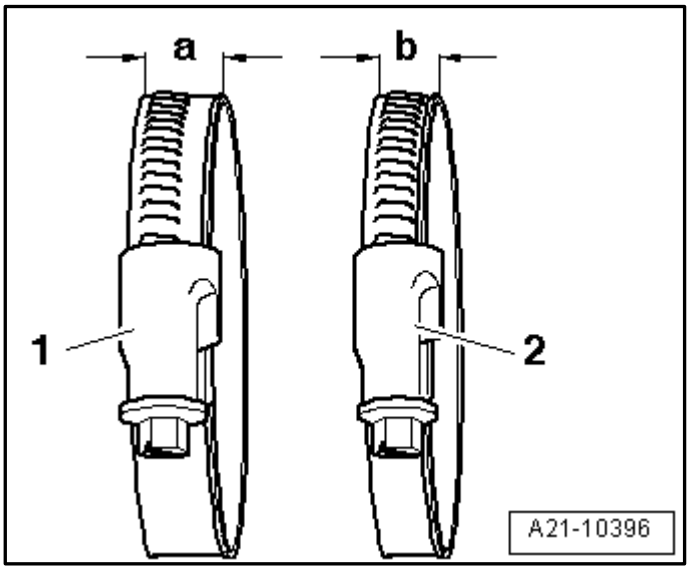
- Reconnect the connectors -bottom arrow- for the Reduced Oil Pressure Switch -F378—2-.
- Reconnect the connectors -top arrow- for the Oil Pressure Switch - F1--3-.



- Remove any previously installed plugs from the Engine Bung Set -VAS6122-.
- Reinstall the air duct pipe and the bolts -1 and 4-. Tighten to 7 Nm.
- Reconnect the connector to the Charge Air Pressure Sensor -G31--arrow-.
- Reinstall the hose clamps -3 and 5-.

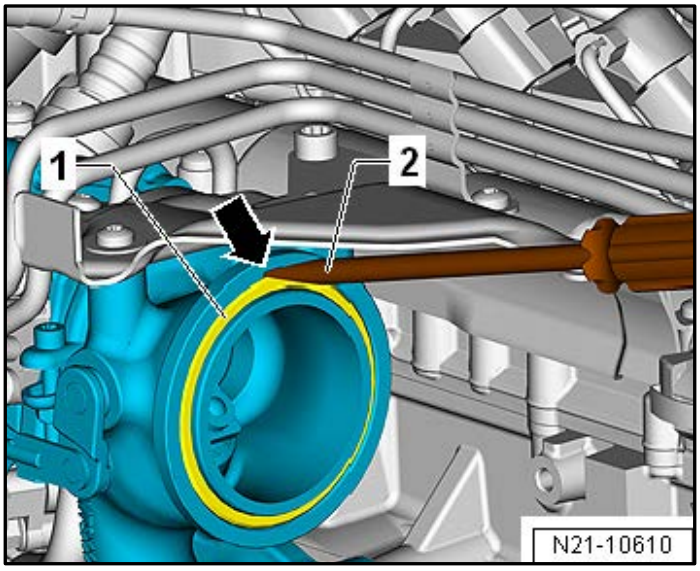
NOTE

- The hose connections as well as air duct pipes and hoses must be free of oil and grease before installing.
- Secure all hose connections with hose clamps that match the ones used in series production. Refer to the Parts Catalog.
- To safely secure the air duct hoses to their connections, spray the screws on the previously used screw-type clamps with rust remover.

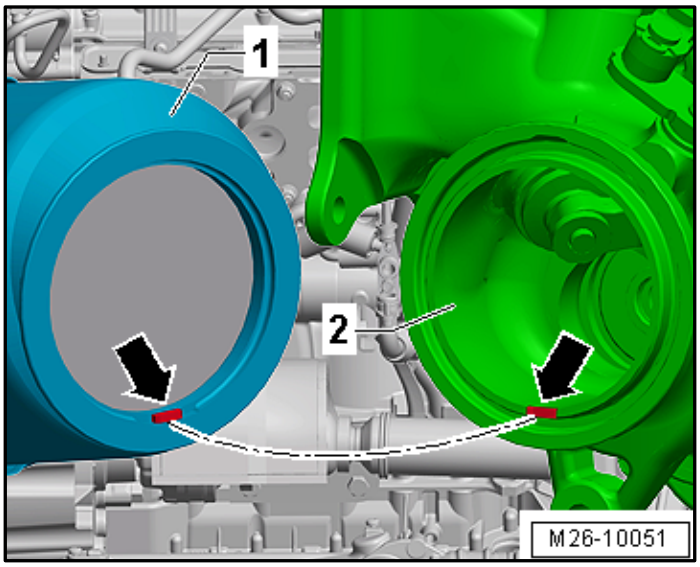


- Tighten the hose clamps as specified below.

Hose Clamp	Width	Tightening Specification
1	-a- = 13 mm wide	5.5 Nm
2	-b- = 9 mm wide	3 Nm

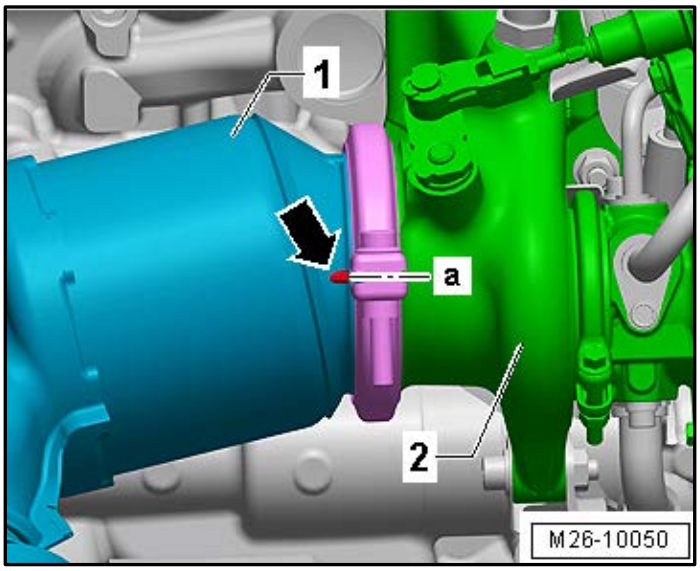


- Replace the turbocharger seal -1-.



Observe the Installed Position of the Catalytic Converter -1- on the Turbocharger -2-.

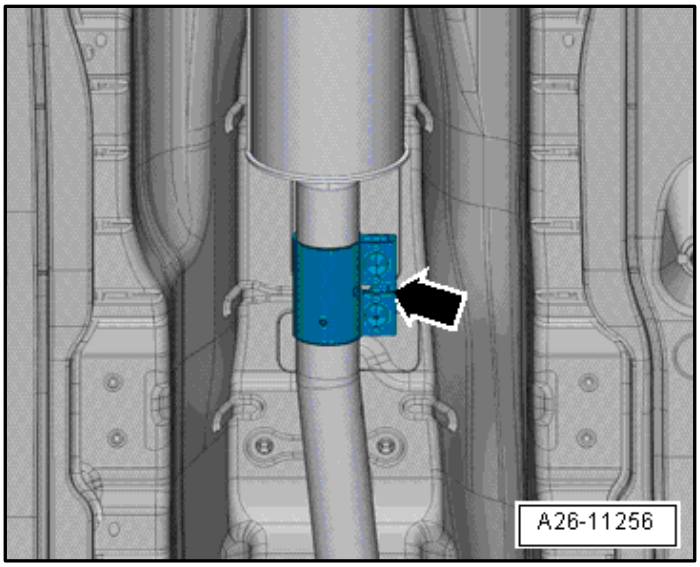
- The retaining strap and notch -arrows- must interlock.
- Attach the catalytic converter to the turbocharger and secure the new v-clamp loosely.
- Tighten the v-clamp.



Installed Position of the V-Clamp

- The opening of the v-clamp -a- must align with the marking -arrow- on the catalytic converter -1-.

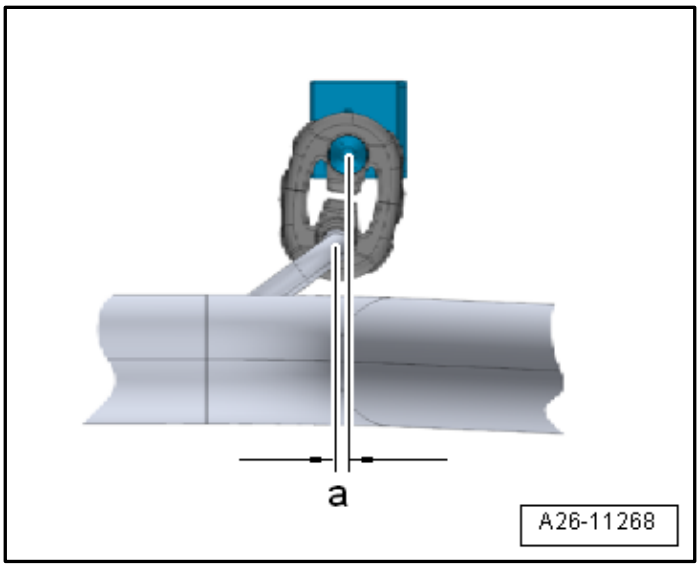
Reinstall the exhaust system without tension by performing the following steps.



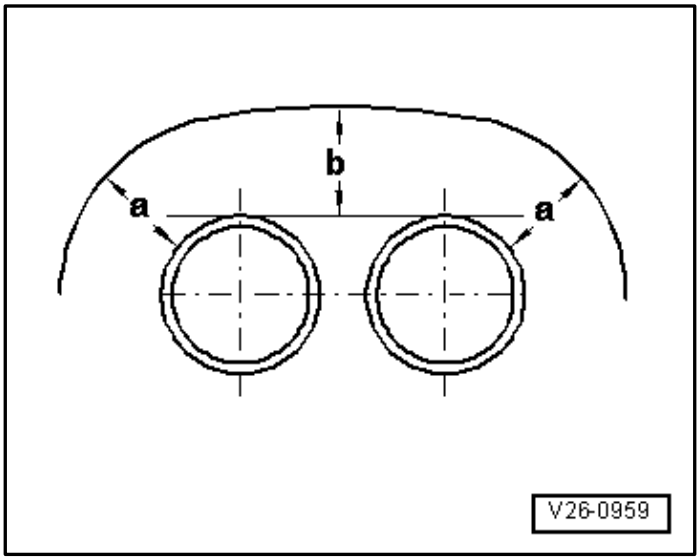
NOTE

The -arrow- points in the direction of travel.

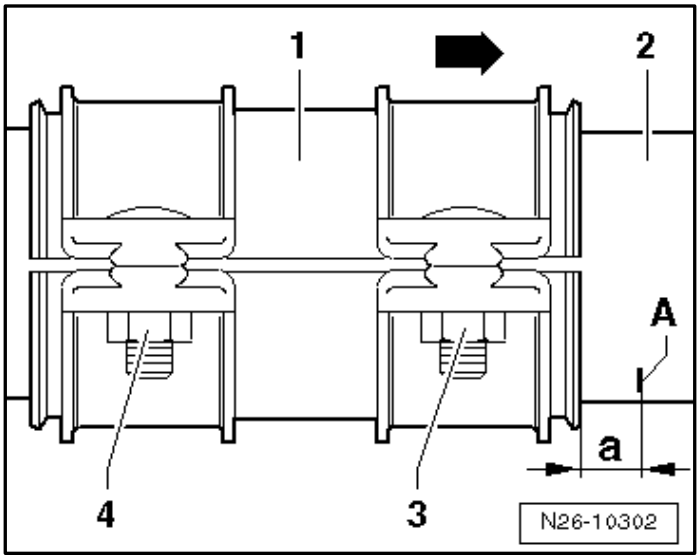
- Reinstall the catalytic converter with front exhaust pipe and the clamping sleeve, leaving the bolts loose.



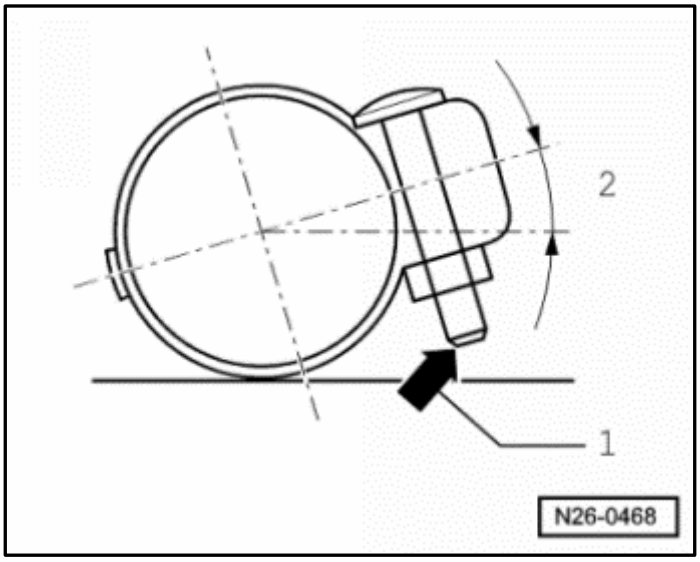
- Push the exhaust system far enough forward until the pre-load on the retaining loops at the exhaust pipe -a- = 5 mm.



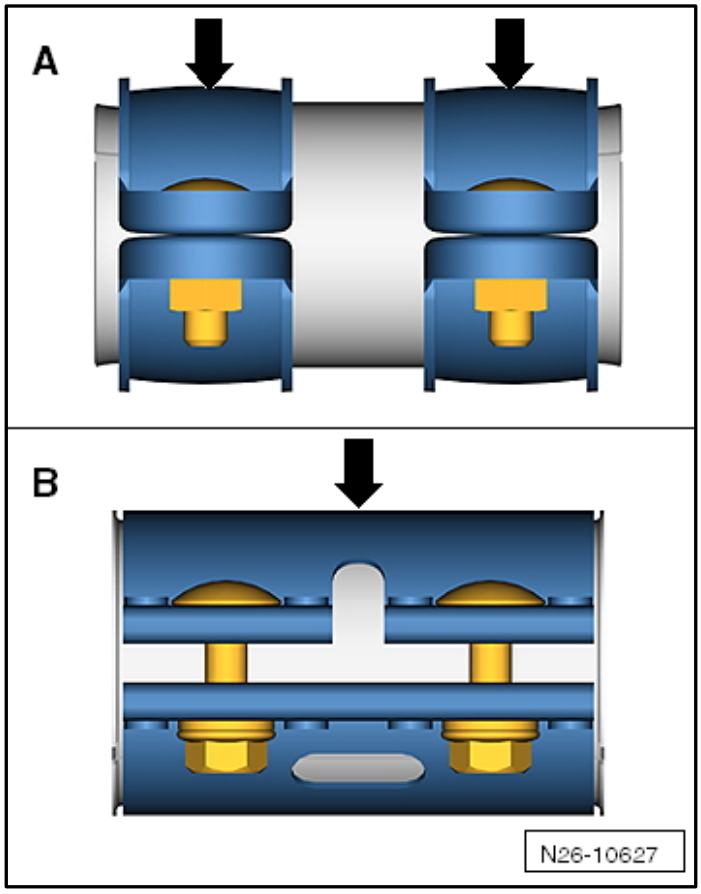
- Align the rear muffler so that the space -a and b- between the opening for the bumper and the tail pipes is the same.



- Install the clamping sleeve.
- Installed dimension -a- is approximately 1 cm
  - A: End of bead
  - 1: Clamping Sleeve
  - 2: Front Exhaust Pipe
  - a: Installed Dimension

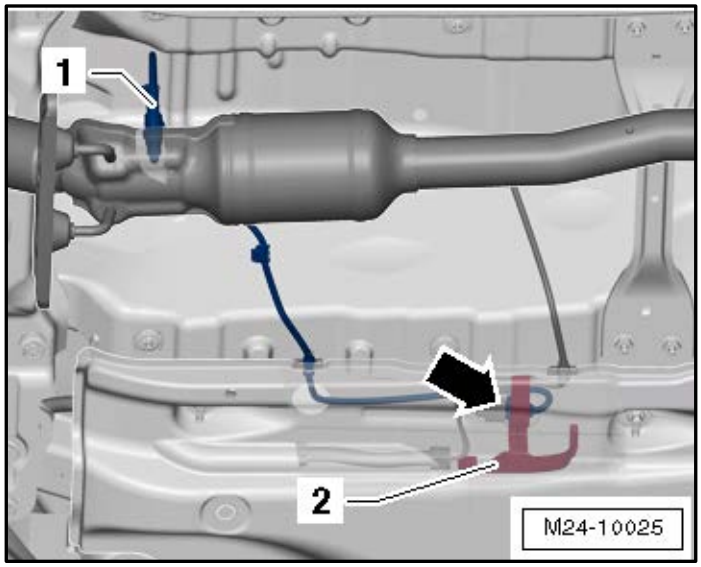


- Install the clamping sleeve so that the bolt end -arrow- does not project beyond the lower edge of clamping sleeve.
  - Threaded connection points toward the right.

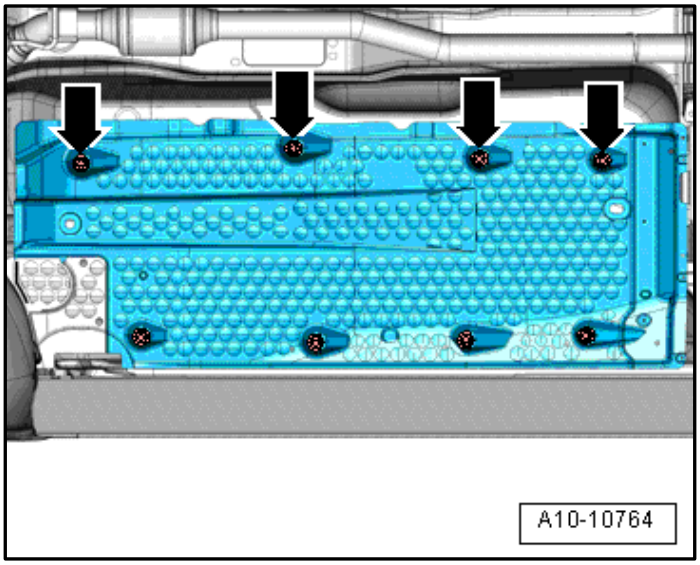


- Tighten the clamping sleeve according to the specifications below.

Clamping Sleeve	Tightening Specification
Clamping sleeve -A- with two individual clamps	25 Nm
Clamping sleeve -B- with continuous clamp.	35 Nm



- Clip the connector -arrow- to the bracket -2- and reconnect it.

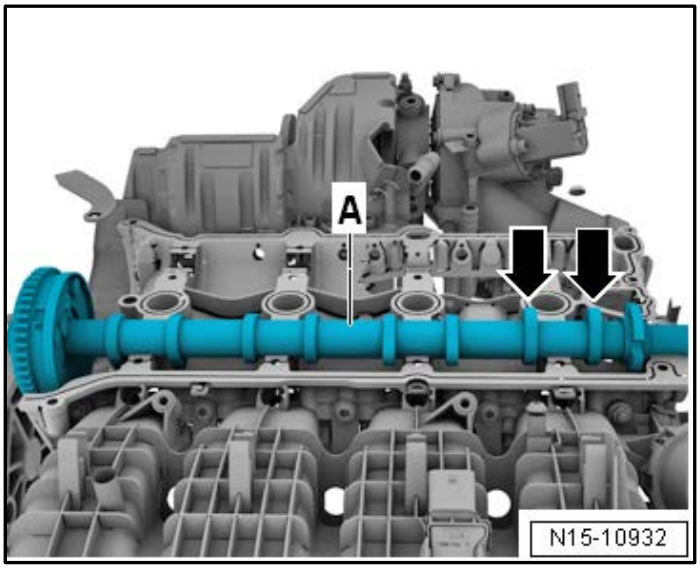


-

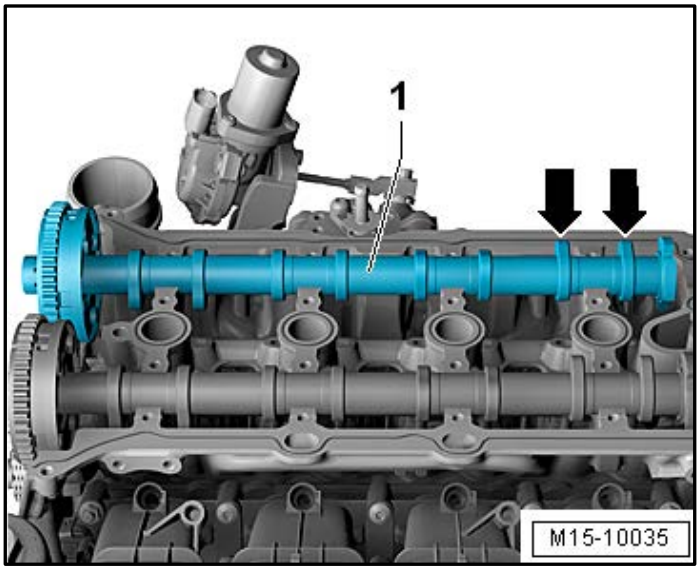
- Install the camshaft by performing the following steps.

NOTE

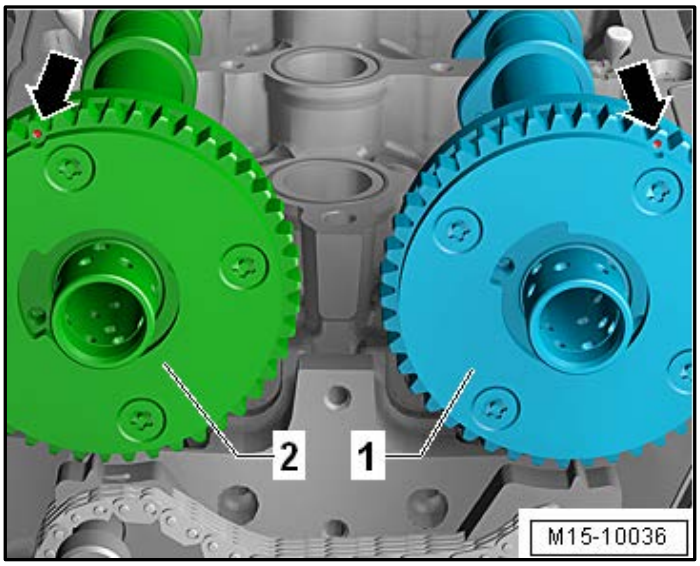
- Sealing surfaces must be completely free of oil and grease.
- Pay attention that all roller rocker levers rest on the valve stem ends.
- If the crankshaft was turned in the meantime, bring the piston for cylinder 1 to TDC and then turn the crankshaft back again slightly.
- Remove any sealant residue from the groove on the cylinder head cover as well as on the sealing surfaces.
- Sealing surfaces must be free of oil and grease.
- Lubricate the running surfaces of both camshafts.



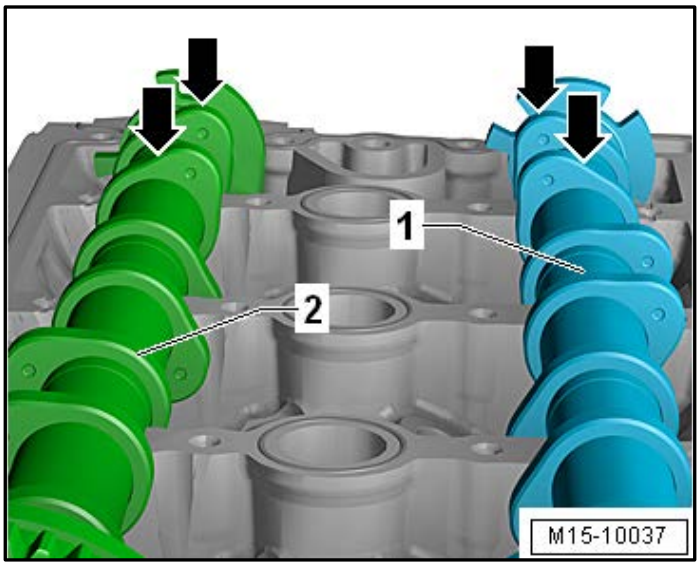
- Place the intake camshaft -A- in the cylinder head. Turn the cam lobes of cylinder 4 - arrows- upward.



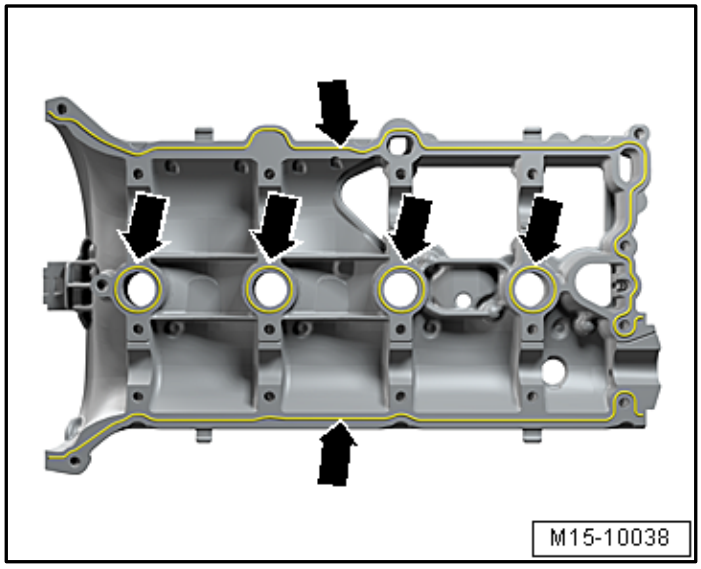
- Insert the exhaust camshaft -1- in the cylinder head cover. Turn the cam lobes of cylinder 4 -arrows- upward



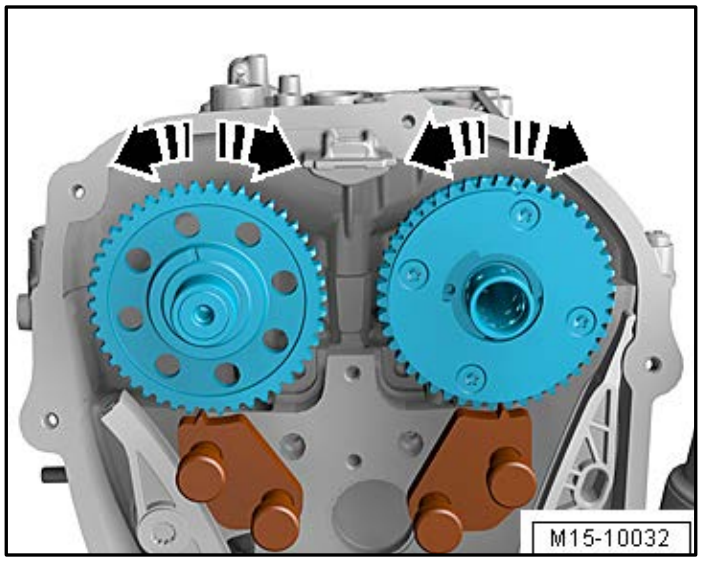
- Turn the intake camshaft -1- and the exhaust camshaft -2- until the markings -arrows- are in the -position shown.



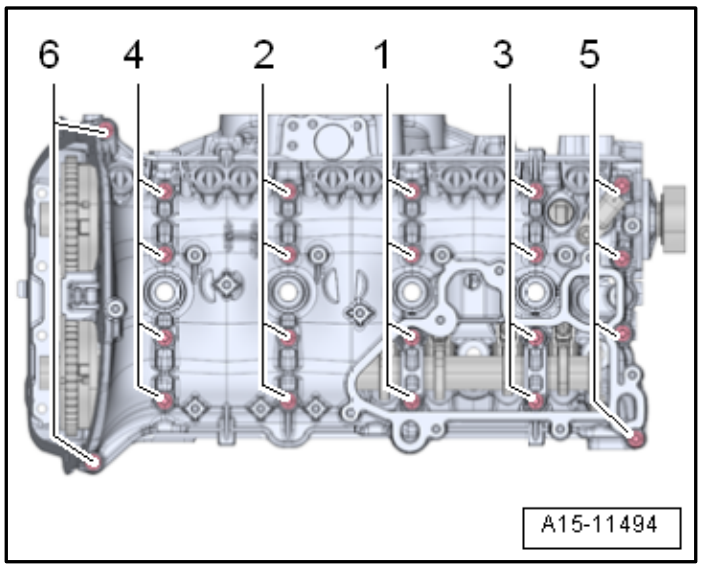
- The cams of the intake camshaft -1- and the exhaust camshaft -2- must point upward as shown –arrows-.



- Apply the sealant on the clean sealing surface of the cylinder head cover as illustrated -arrows-.
    - Sealant bead thickness: 2 to 3 mm.
- Mount the cylinder head cover on the cylinder head.



- Lightly push on the cylinder head cover by hand and while doing so turn the camshaft slightly until the cylinder head cover lays **»free of tension«** on the cylinder head.

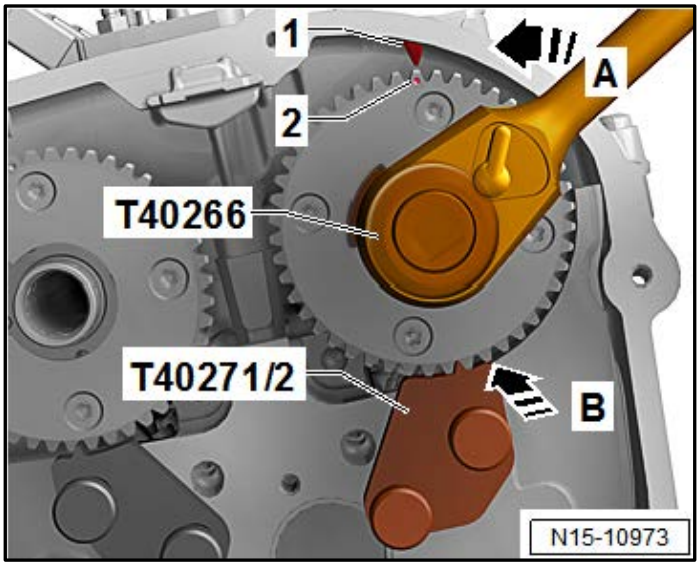


- Install new cylinder head cover bolts and tighten according to the sequence below.

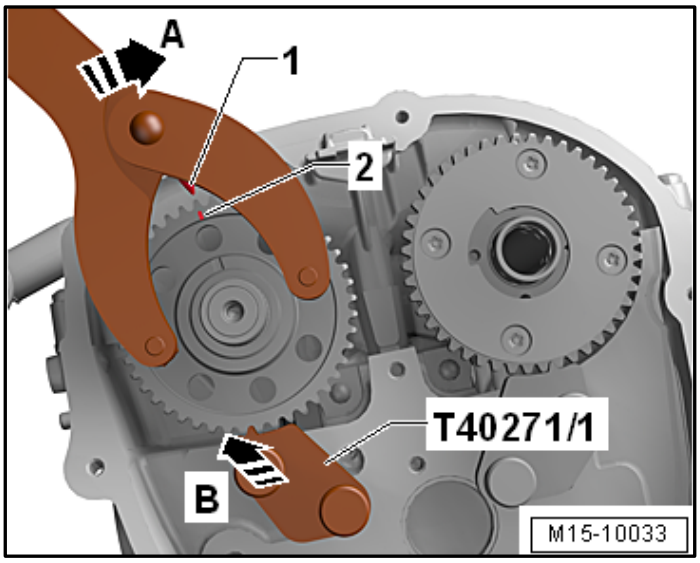
NOTE

Pay attention that the cylinder head cover is not tilted.

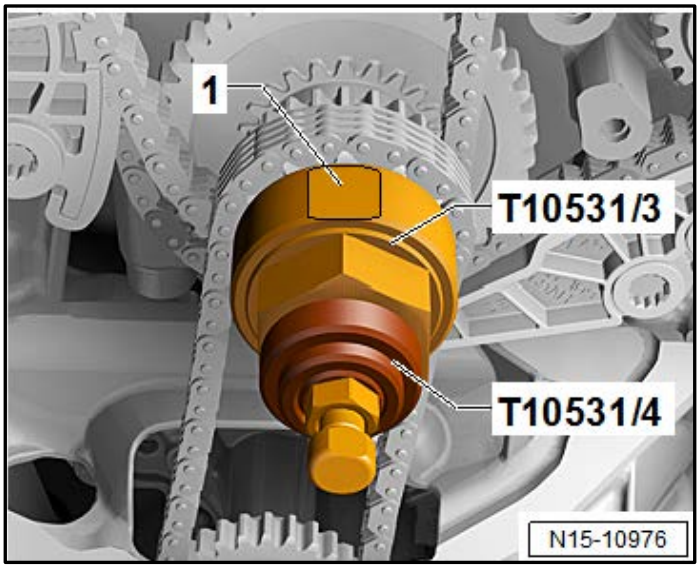
Step	Bolts	Tightening Specification /Additional Turn
1	-1- through -6-	Install hand-tight in several stages
2	-1- through -6-	8 Nm
3	-1- through -6-	Turn an additional 90°



- Turn the intake camshaft with the Adapter -T40266- in the direction of the -arrow A- until the markings -1 and 2- align. Push the Camshaft Lock -T40271/2- in the chain sprocket splines in direction of -arrow B-.

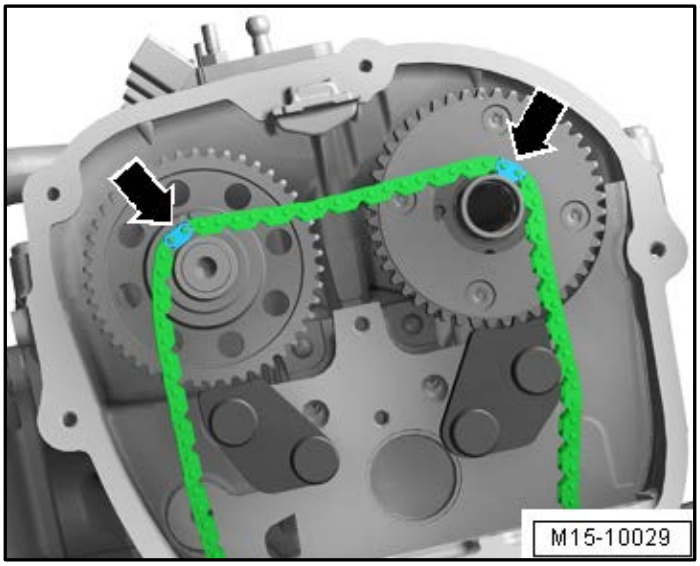


- Turn the exhaust camshaft using the Counterhold - Multiple Use -T10172A- in the direction of -arrow A- until the markings -1 and 2- align. Slide the Camshaft Lock - T40271/1- into the chain sprocket splines in direction of the -arrow B-. The mark -2- is offset slightly to the right.

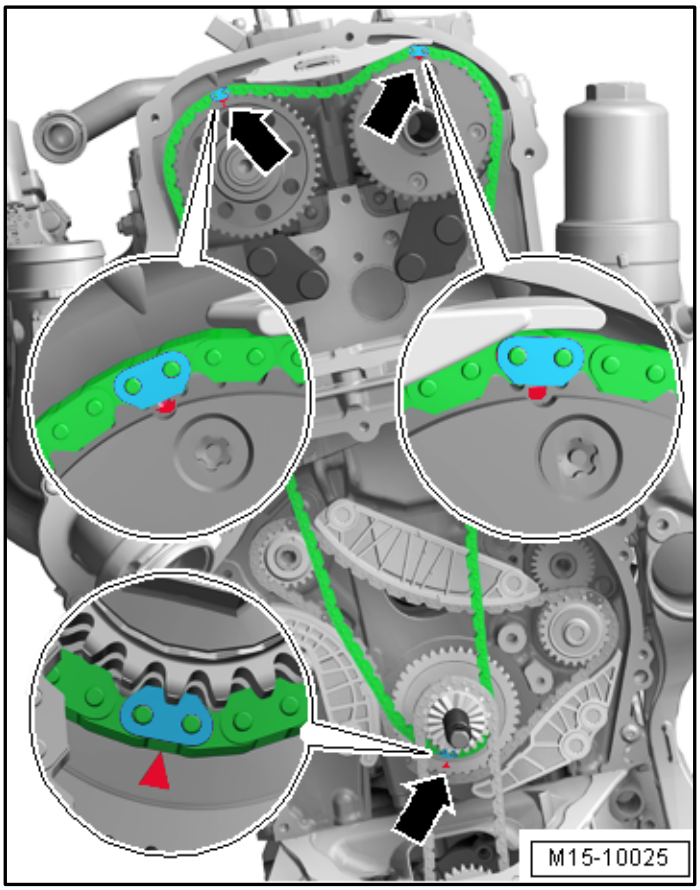


- Turn the crankshaft on the hex fitting to the “TDC point”. In the “TDC point” flat area -1- is upward.

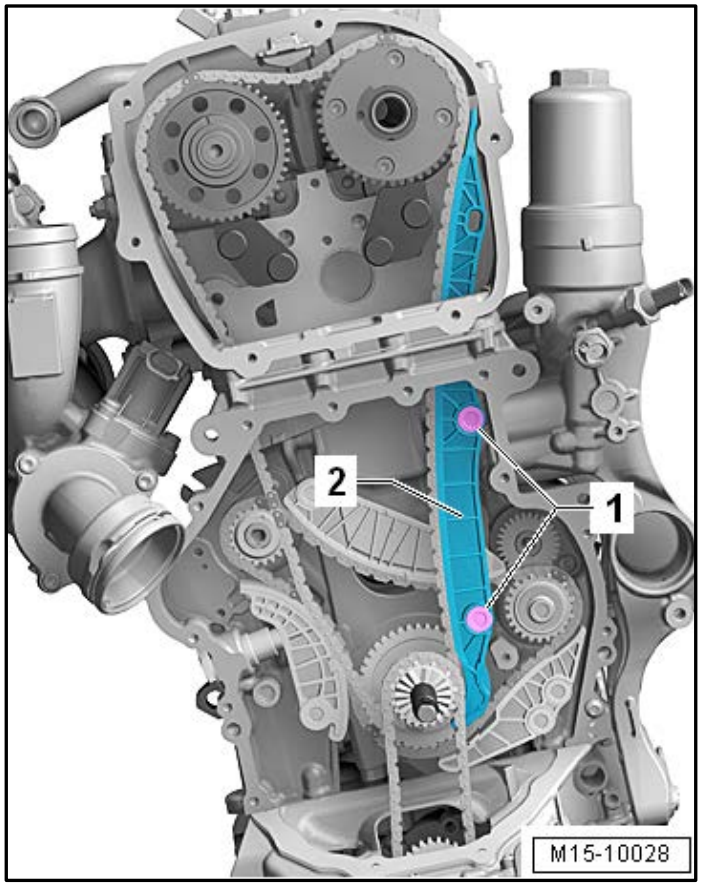
- Install the Camshaft Timing Chain by performing the steps below.



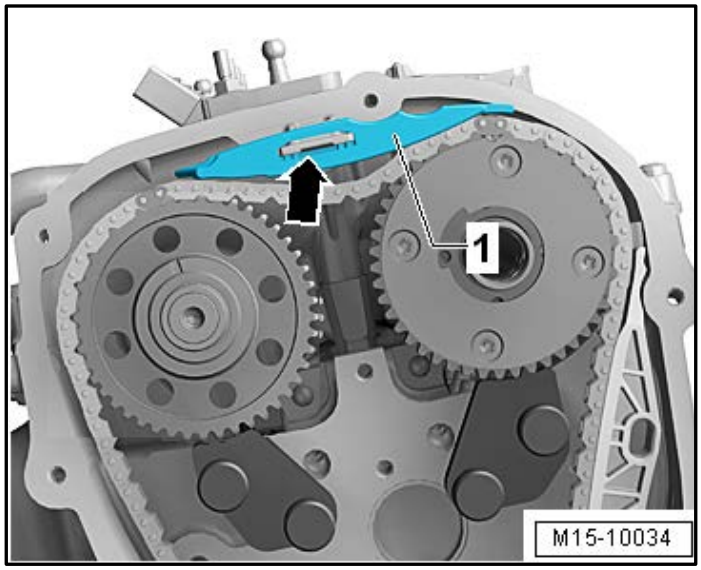
- Engage the camshaft timing chain with the painted links -arrows- on the camshaft pins.



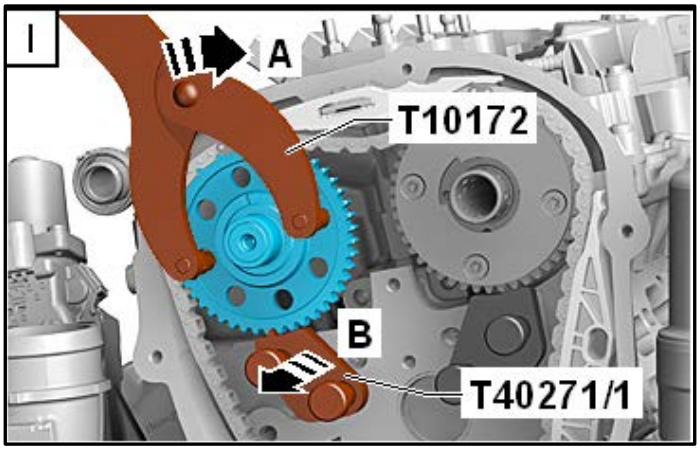
- Place the camshaft timing chain on the intake camshaft, exhaust camshaft and the crankshaft. Position the painted chain links -arrows- on the markings on the chain sprockets.



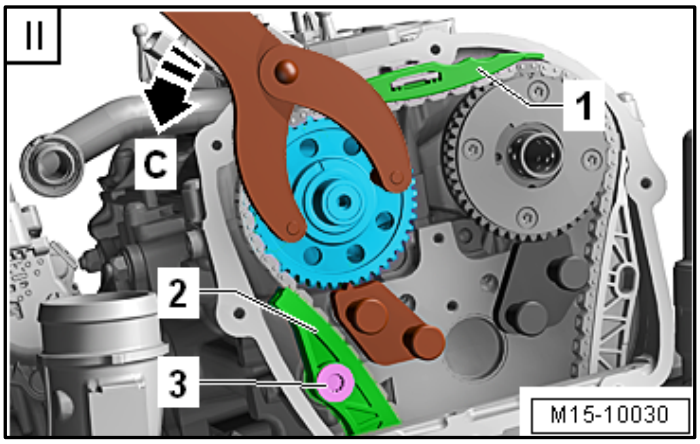
- Install the guide rail -2- and tighten the bolts -1- and tighten to 20 Nm.



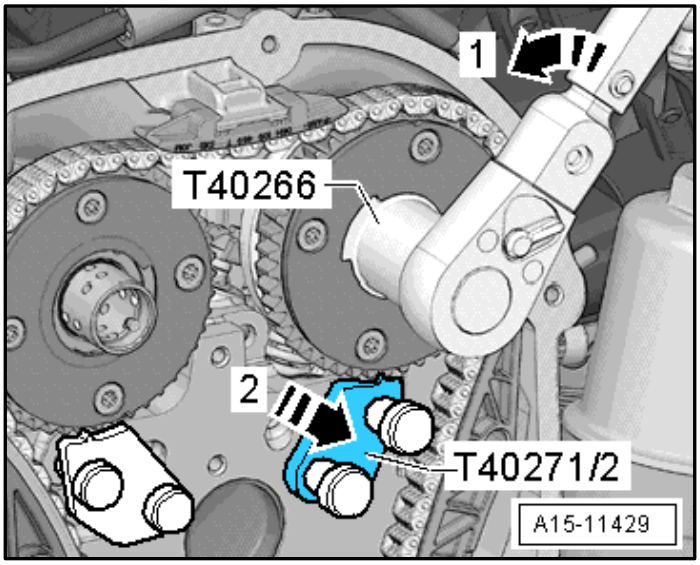
- Install the upper glide rail -1-.



- With the help of a second technician, turn the exhaust camshaft with the Counterhold - Kit - Multiple Use -T10172- slightly in the direction of the -arrow A- and pull the Camshaft Lock - T40271/1- out of the chain sprocket splines in direction of -arrow B-.



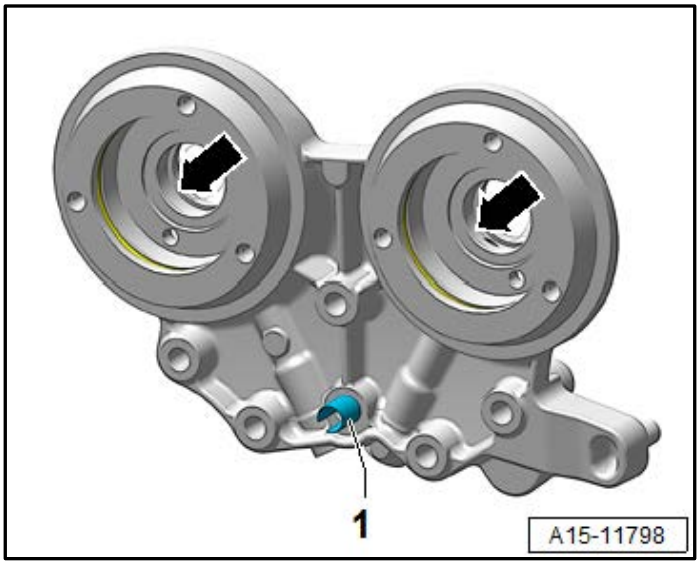
- Release the camshaft in the direction of -arrow C-, until the timing chain touches the glide rail -1-. Hold the camshaft ion this position, install the tensioning rail -2- and tighten the bolts -3- to 20 Nm.
- Release the camshaft.



NOTE

The control valve has left-hand thread.

- Turn the intake camshaft with the Adapter - T40266- in the direction of the -arrow 1- until the Camshaft Lock -T40271/2- can be pushed out of the chain sprocket splines in the direction of the -arrow 2-. Release the camshaft.
- Remove the Camshaft Lock -T40271/1- and Camshaft Lock -T40271/2-.

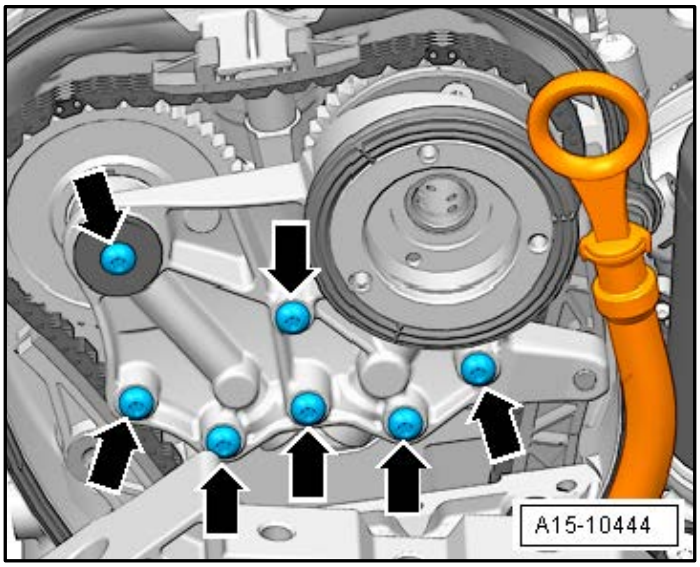


- Coat the holes -arrows- with engine oil.

NOTE

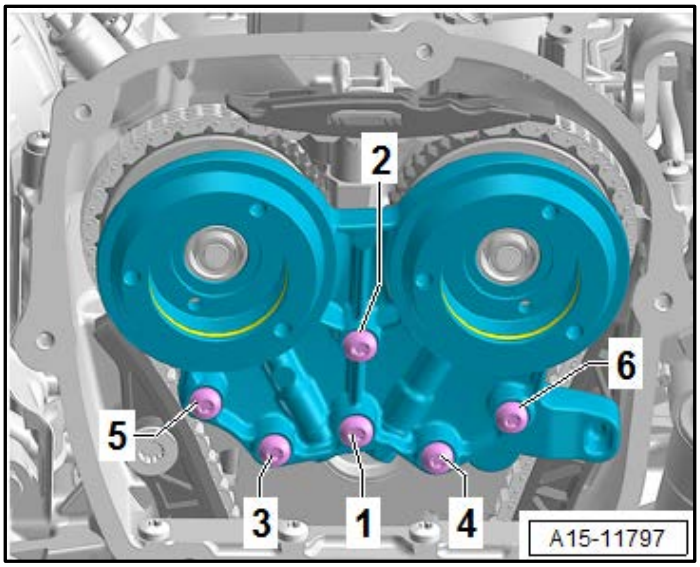
Adapter sleeve -1- is not present on every bearing bracket.

Vehicles without Adapter Sleeve



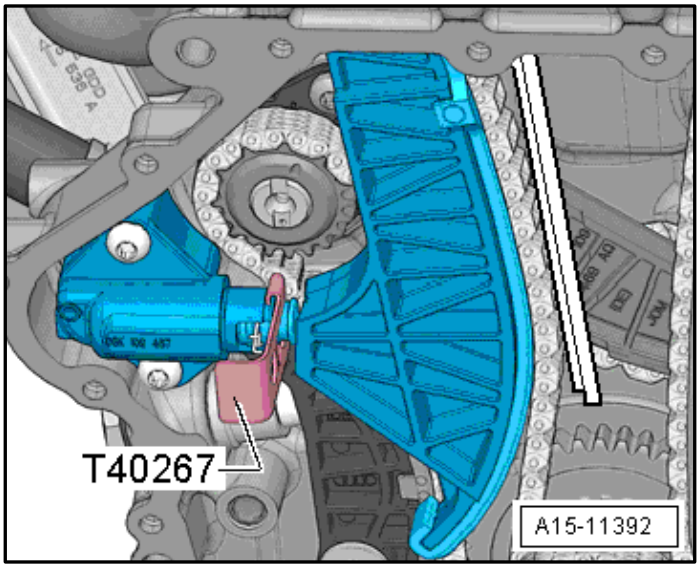
- Mount the bearing bracket and install new bolts -arrows- and tighten by hand.

Vehicles with Adapter Sleeve



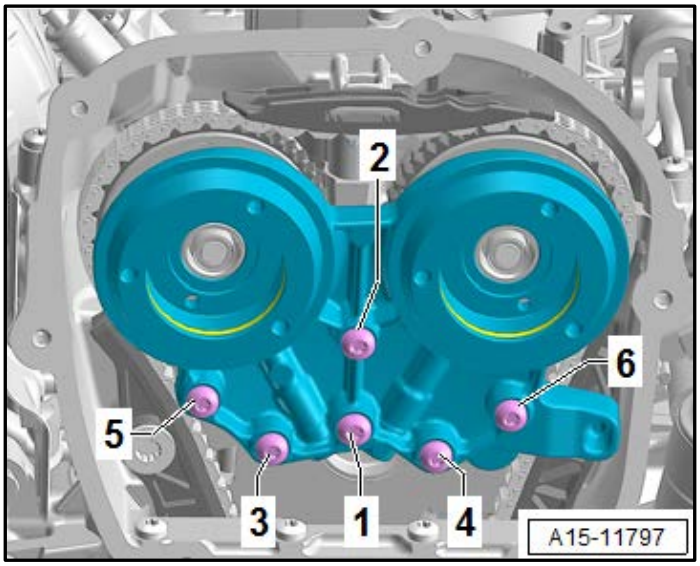
- Attach the bearing mount. Do not tilt it when doing this. Tighten the new bolts -1 to 6- hand-tight.
- If an adapter sleeve is installed, this will be replaced with the bolt -1- in the cylinder head

Continuation for All Vehicles



- Remove the Tensioner Locking Tool -T40267- .

- Tighten the bolts in steps in the sequence shown below.

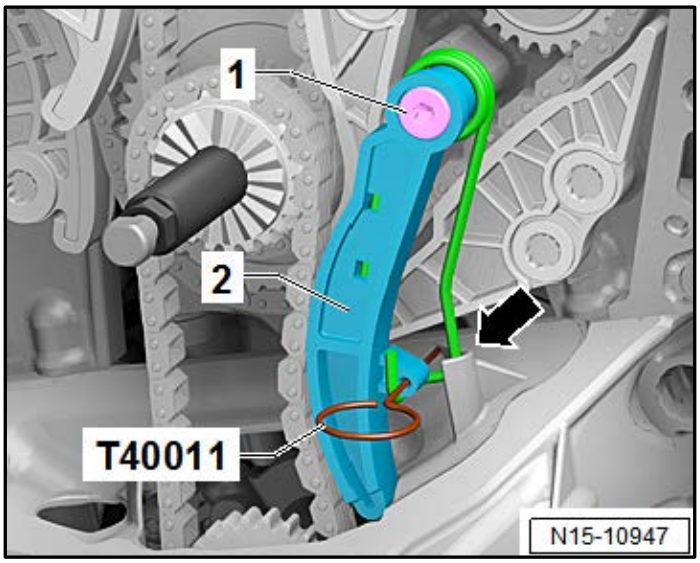


Bearing Bracket with Adapter Sleeve and Steel Bolts

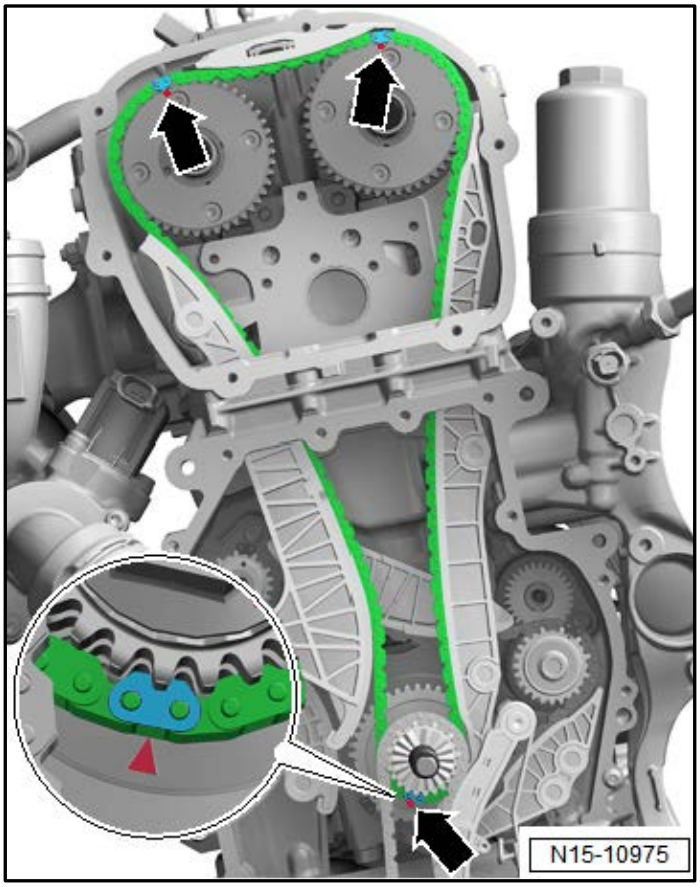
Step	Bolts	Tightening Specification /Additional Turn
1	-1-	3 Nm
2	-1- through -6-	9 Nm

Bearing Bracket without Adapter Sleeve and Aluminum Bolts

Step	Bolts	Tightening Specification /Additional Turn
1	-1- through -6-	4 Nm
2	-1- through -6-	180°



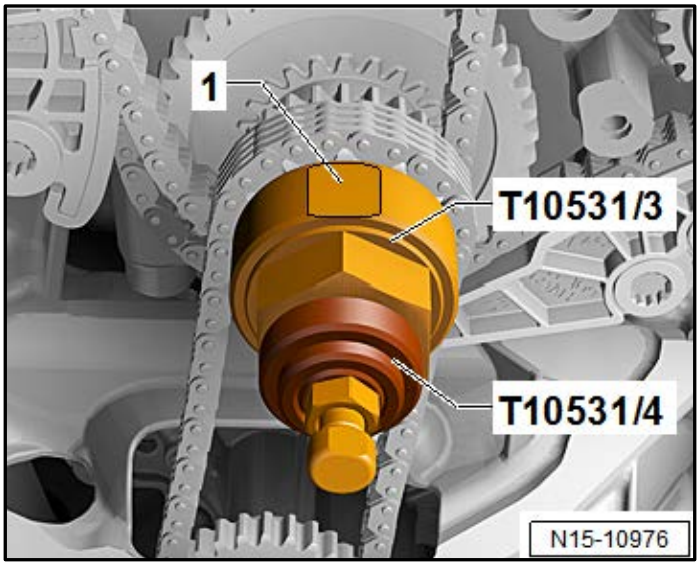
- Install the chain tensioner -2-. The wire clip must come in to contact with the oil pan upper section opening -arrow-.
- Tighten the bolt to 20 Nm -1- and remove the Locking Pin (3 pc.) -T40011-.



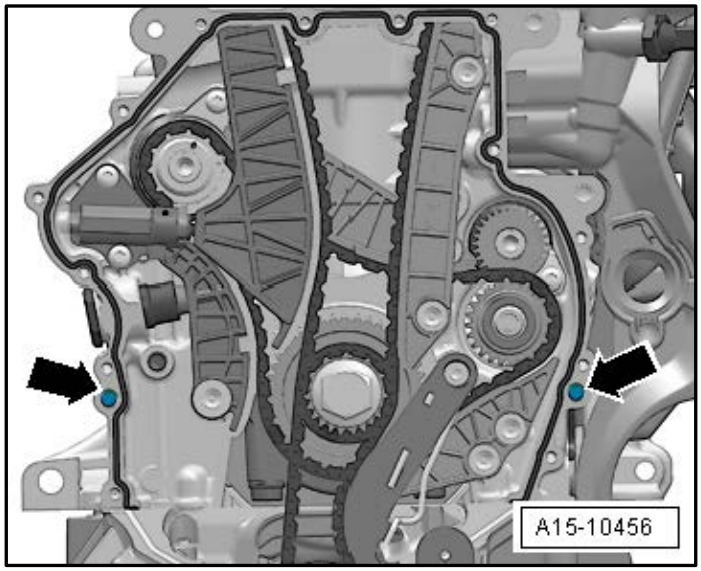
- Check the adjustment. The painted chain links -arrows- must line up with the markings on the chain sprockets.
- Turn the engine a second time in the direction of engine rotation.

NOTE

Due to the ratio, the painted chain links no longer match up after the engine has been turned.



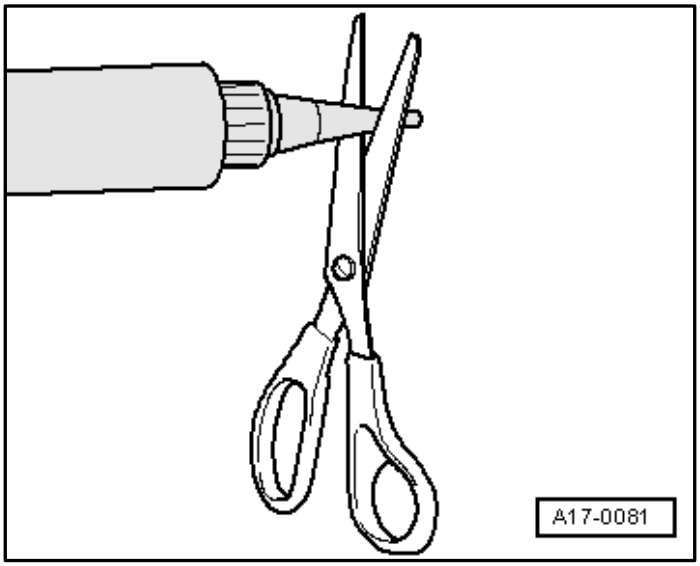
- Remove the Knurled Nut -T10531/4- and remove the Assembly Tool - Turning Over Tool -T10531/3-.



- Install the lower timing chain cover by performing the following steps.
- Make sure both alignment bushings for centering the cover -arrows- are present.

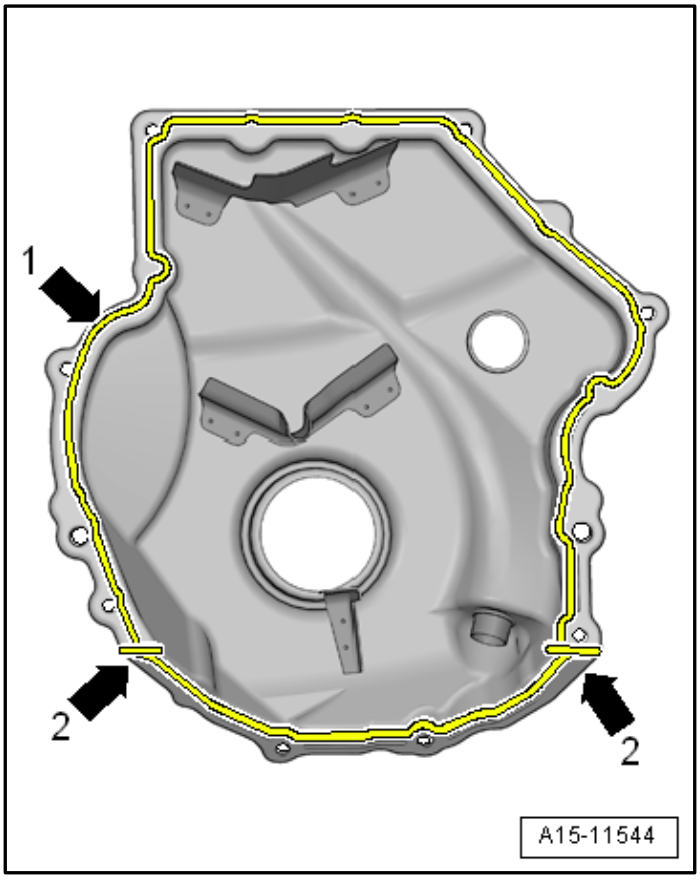
NOTE

- Be sure to check the expiration date of the silicone sealant
- Silicone sealant. Refer to the Parts Catalog.
- The cover must be installed within five minutes after applying the silicone sealant.
- Replace sealing ring and O-ring.
- Risk of contaminating the lubricating system. Cover open parts of the engine.
- Remove any sealant residue on the cylinder block using a flat blade scraper.
- Clean any oil or grease off the sealing surfaces.
- The cover must be installed within five minutes after application of silicone sealant.
- The sealant bead may not be thicker than specified, otherwise excess sealant could enter the oil pan and clog the oil intake pipe screen.
- After installing cover, allow sealant to dry for approximately 30 minutes. Only afterward may the engine oil be replenished.

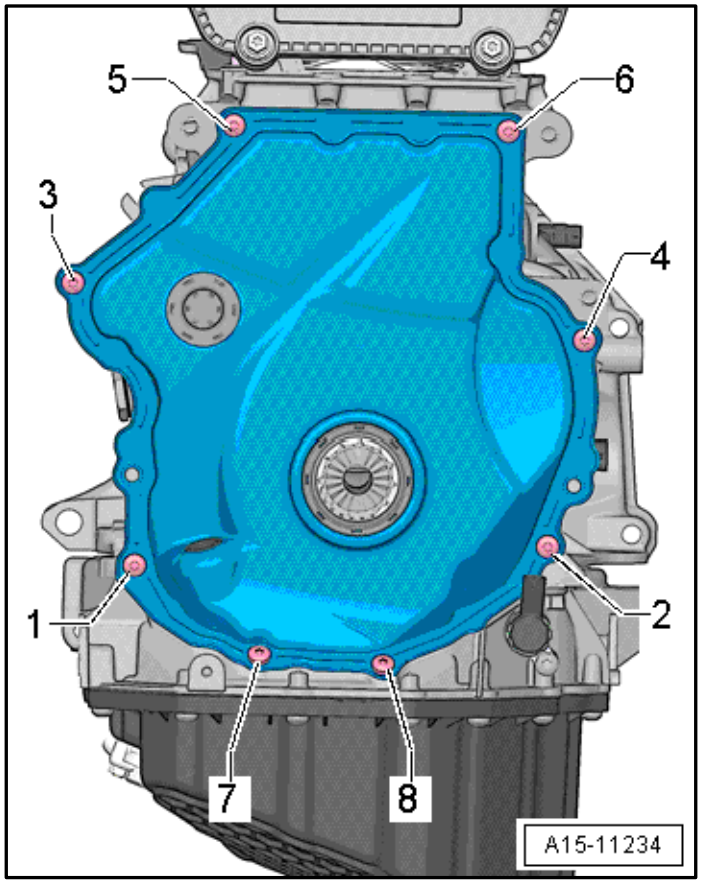


- Cut the tube nozzle at the front marking (nozzle diameter: approximately 3 mm).

Lower Timing Chain Cover Installation - Eight Bolts



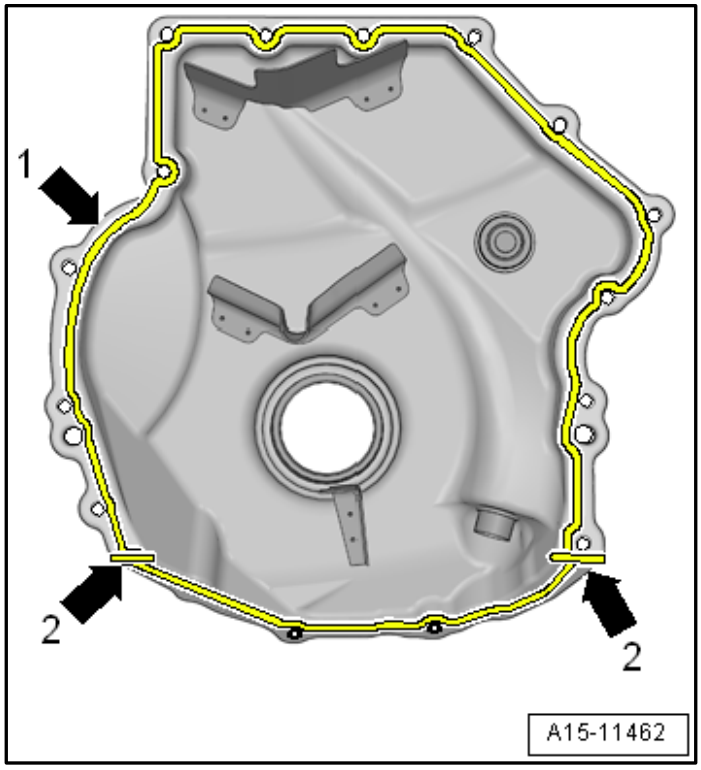
- Apply the silicone sealant to the clean sealing surface -arrow 1- and on the edges -arrows 2- of the new cover as shown.
    - Sealant bead thickness: 2 to 3 mm.



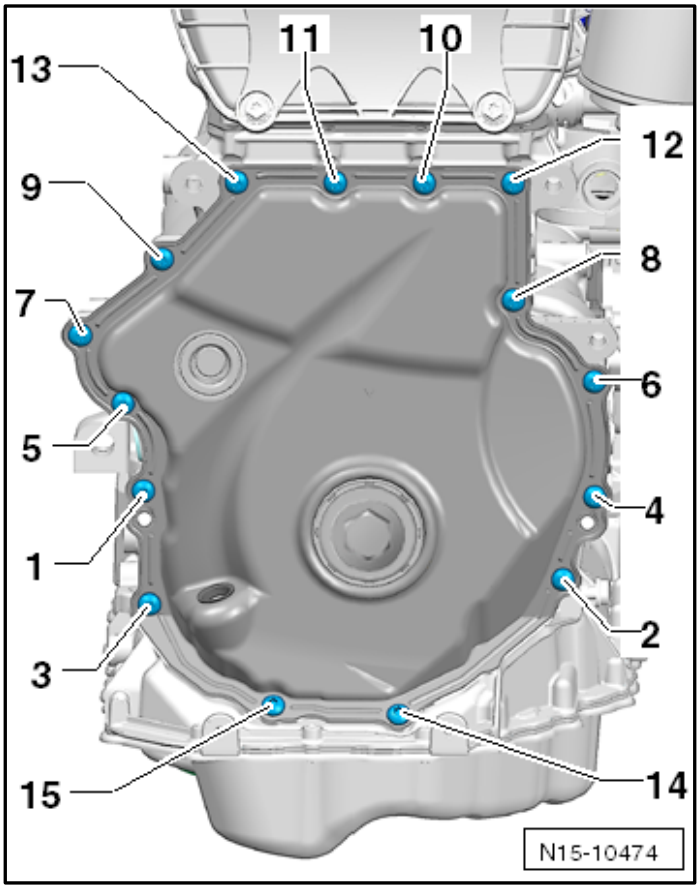
- Mount the cover immediately and tighten the bolts in the sequence shown.

Step	Bolts	Steel Bolts	Aluminum Bolts
1	-1- through -8-	8 Nm	4 Nm
2	-2 to 3- and -5 to 8-	45°	45°
3	-1 and 4-	After installing the vibration damper tighten with an additional turn.	

Lower Timing Chain Cover Installation - 15 Bolts

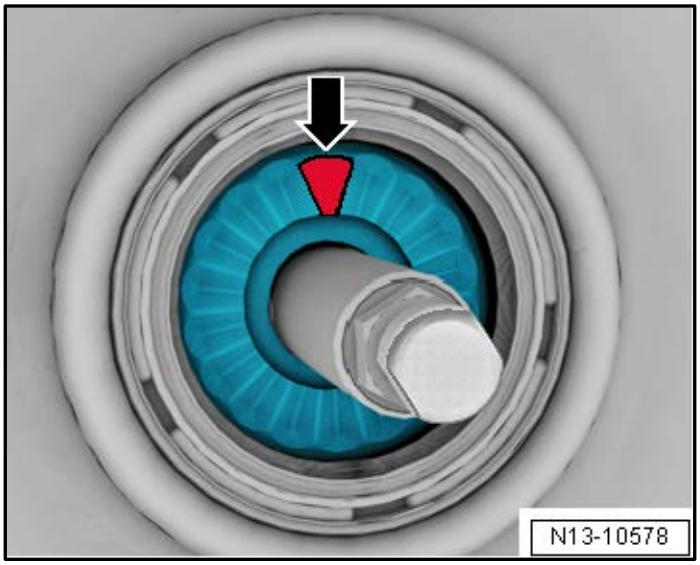


- Apply the silicone sealant to the clean sealing surface -arrow 1- and on the edges -arrows 2- of the new cover as shown.
    - Sealant bead thickness: 2 to 3 mm

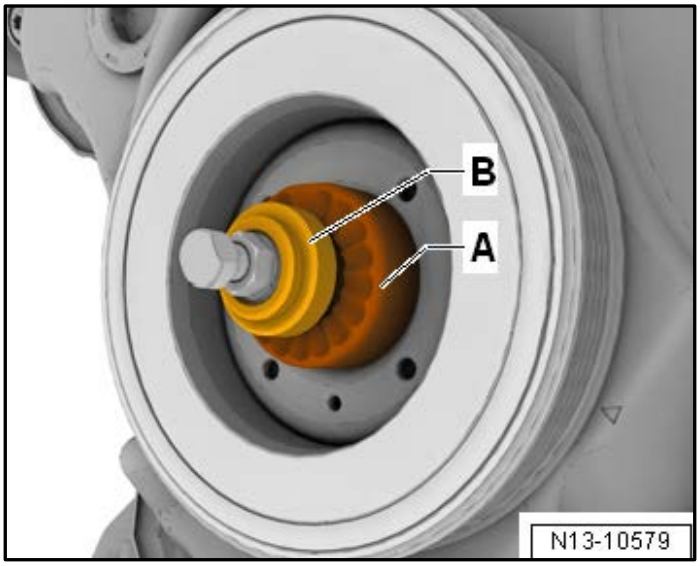


- Mount the cover immediately and tighten the bolts in the sequence shown.

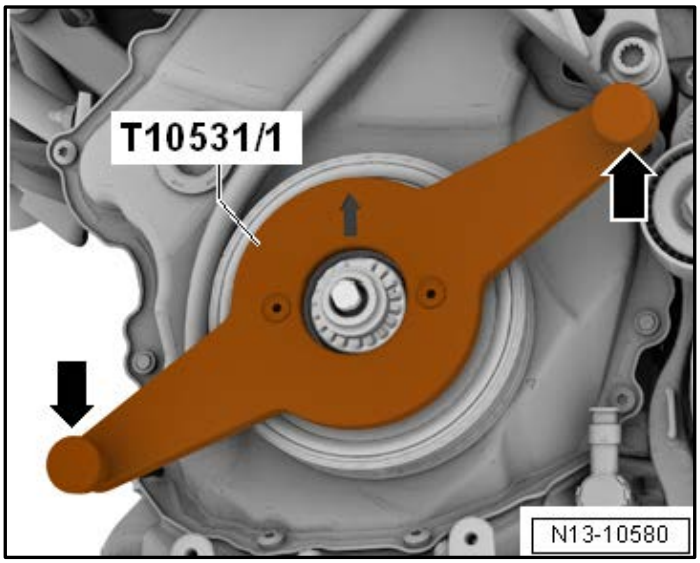
Step	Bolts	Steel Bolts	Aluminum Bolts
1	-1- through -15-	8 Nm	4 Nm
2	-1,2,4,5- and -7 to 15-	45°	45°
3	-3 and 6-	After installing the vibration damper tighten with an additional turn.	



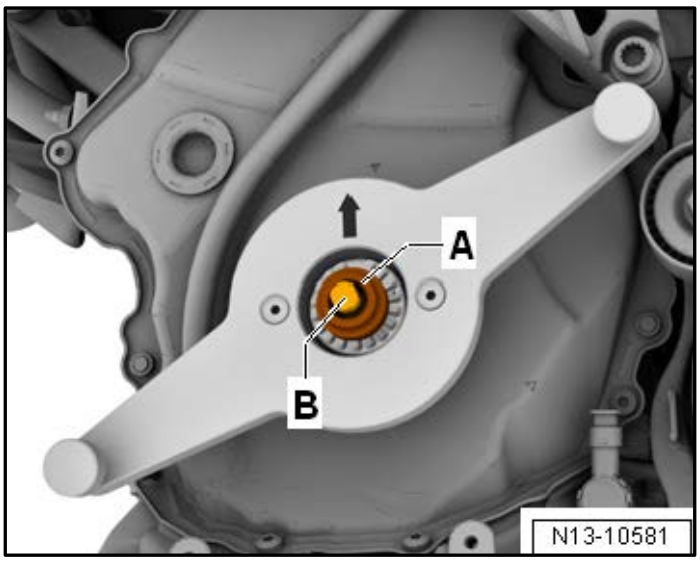
- Attach the vibration damper in TDC. While doing so, pay attention to the tooth contour of the chain sprocket –arrow.



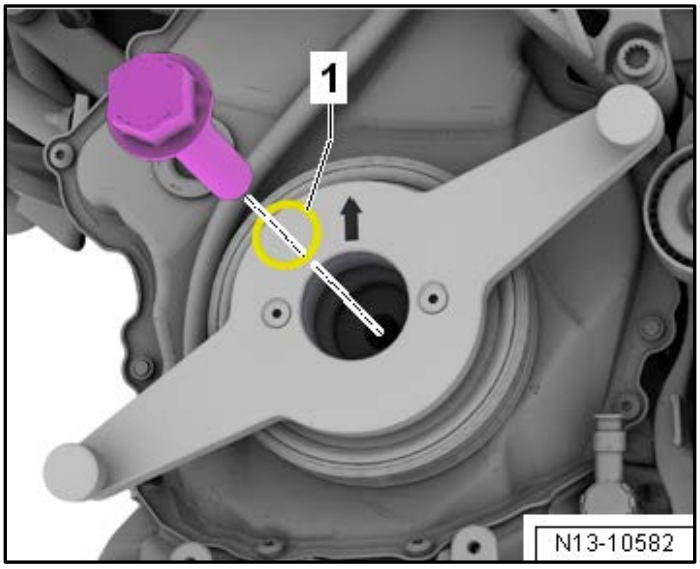
- Place the Vibration Damper Assembly Tool - Turning Over Tool -T10531/3--A- on the tensioning pin. While doing so, the hex fitting points to the vibration damper.
- Install the Knurled Nut -T10531/4--B-. While doing so, move the vibration damper back and forth slightly to check if the vibration damper is seated correctly in the tooth contour. Tighten the collar nut until the vibration damper can no longer be turned.



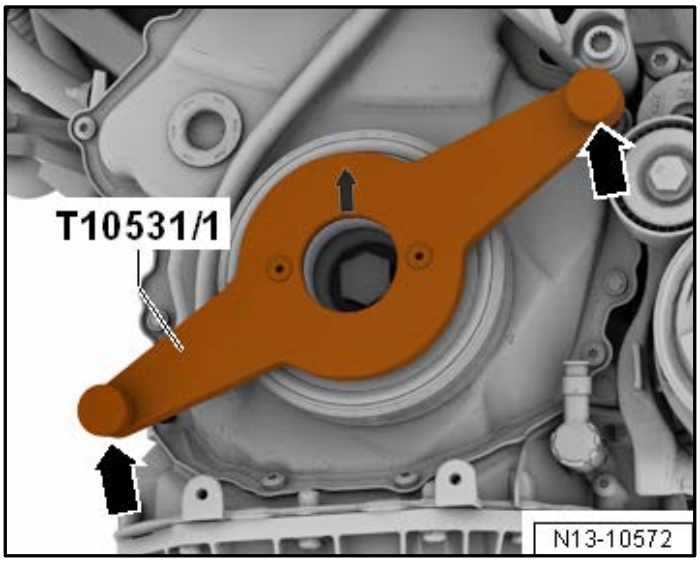
- Place the Vibration Damper Assembly Tool - Counterhold Tool -T10531/1- as shown on the vibration damper and tighten it hand-tight using the knurled bolts -arrows-.



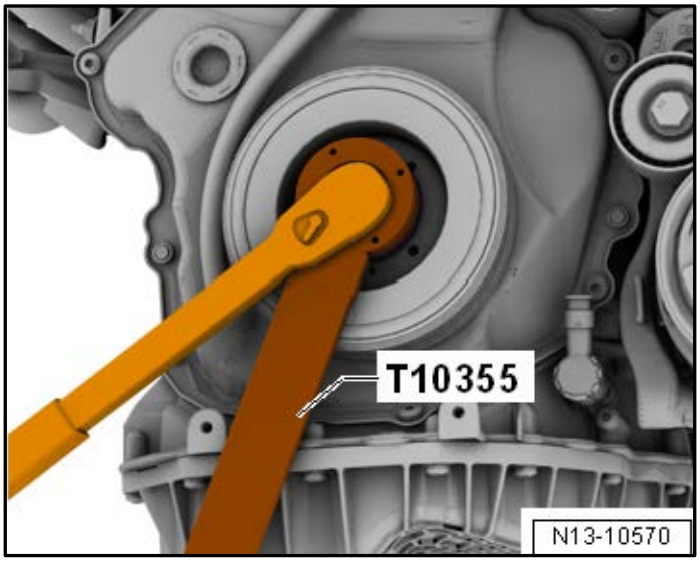
- Remove the Knurled Nut -T10531/4--A- and loosen the adjusting bolt -B-. Remove the Tensioning Pin -T10531/2- and remove with Assembly Tool - Turning Over Tool -T10531/3- .



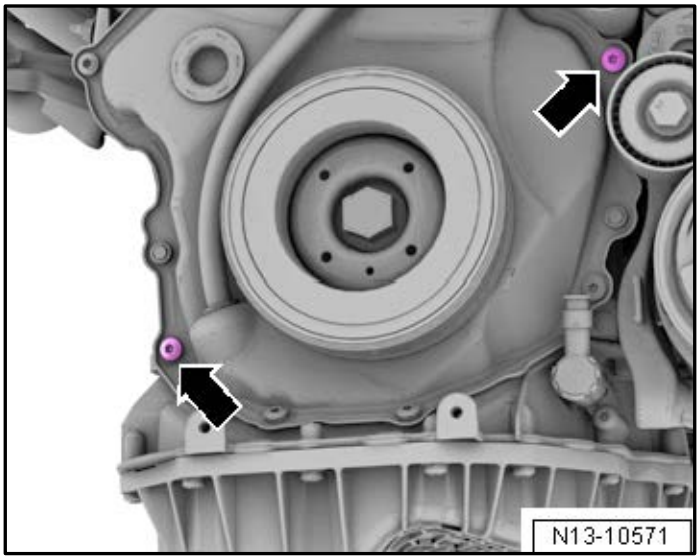
- Install a new vibration damper bolt hand-tight with an oiled O-ring -1-.



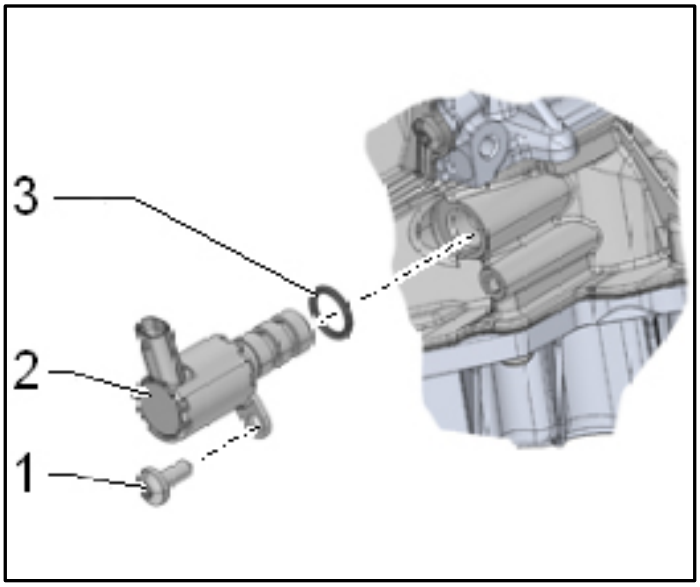
- Remove the knurled bolts -arrows- and remove the Vibration Damper Assembly Tool - Counterhold Tool -T10531/1-.



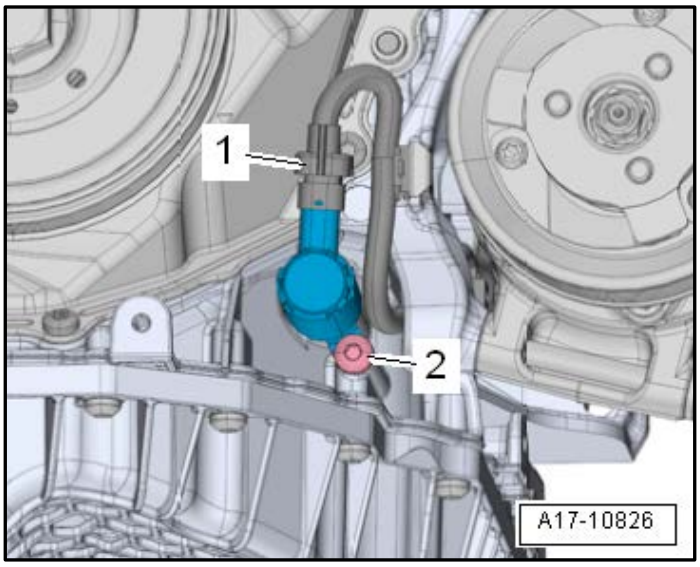
- Using the Counterhold - Vibration Damper - T10355, tighten the vibration damper bolt to 150 Nm +90°.



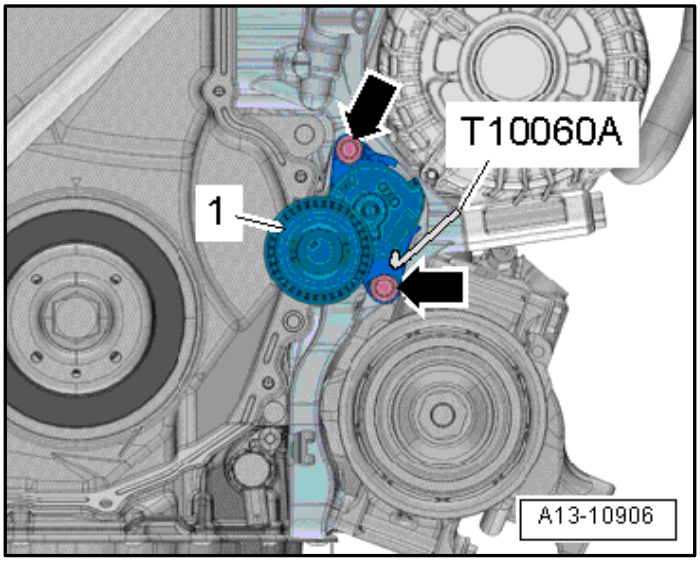
- Tighten the two bolts -arrows- one full turn.



- Reinstall the Oil Pressure Regulation Valve - N428 -2-, making sure to replace the O-ring -3-.
- Install new bolt -1- and tighten to 4 Nm, then an additional 90°.



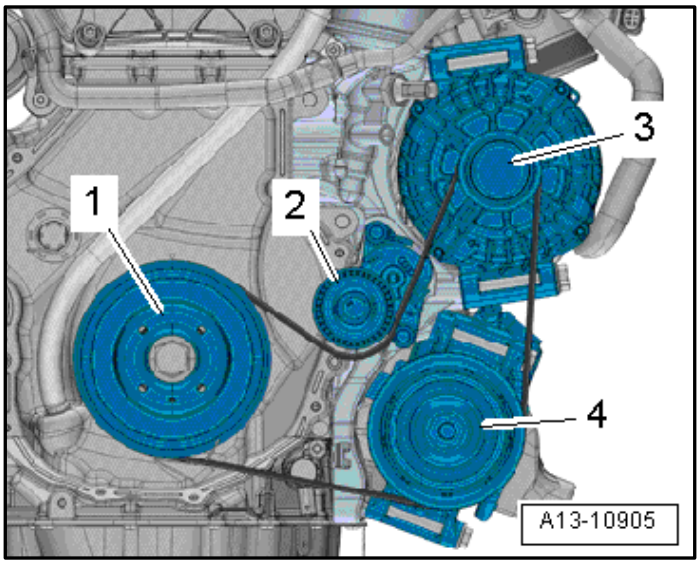
- Reconnect the connector -1-.



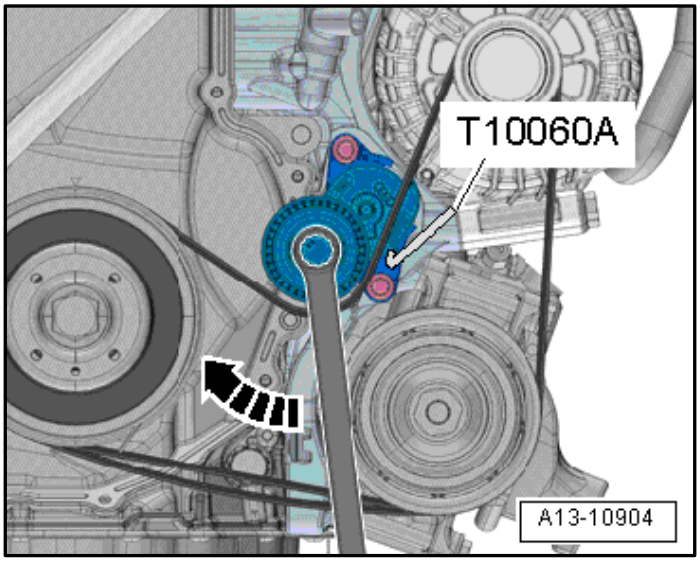
- Install the ribbed belt tensioner -1- and new bolts -arrows-. Torque to 8Nm, then an additional 45°.

NOTE

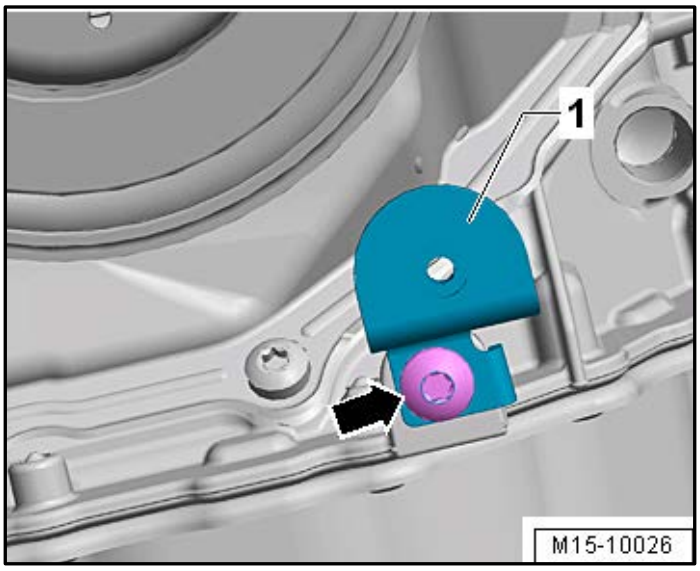
When reinstalling a used ribbed belt, pay attention to the running direction marked during disassembly.



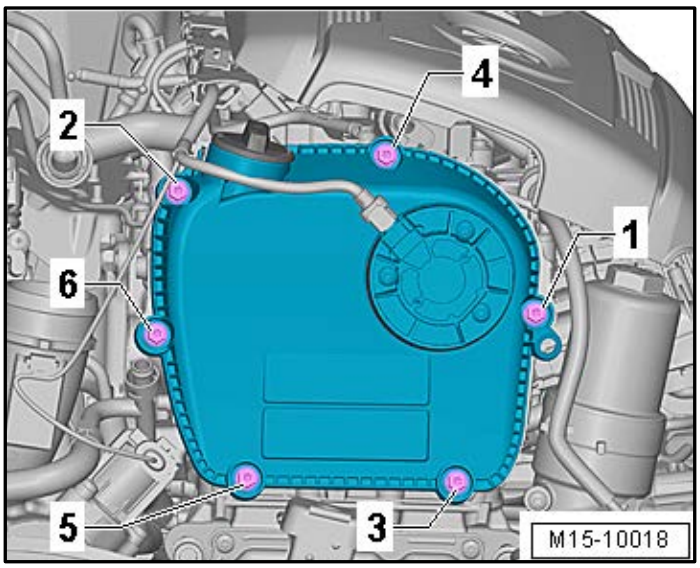
- Position the ribbed belt as illustrated.
  1. Vibration Damper
  2. Ribbed Belt Tensioner
  3. Generator
  4. A/C Compressor



- Turn the tensioner in the direction of -arrow- and remove the Locking Pin -T10060A-.
- Release the tension on the tensioner.
- Check whether the ribbed belt is routed correctly.

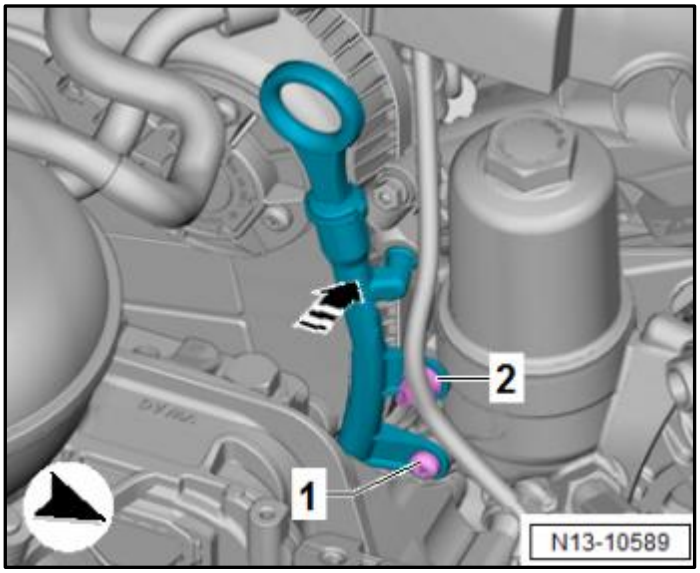


- Install the air pipe duct bracket -1- and bolt – arrow- and tighten to 6 Nm.

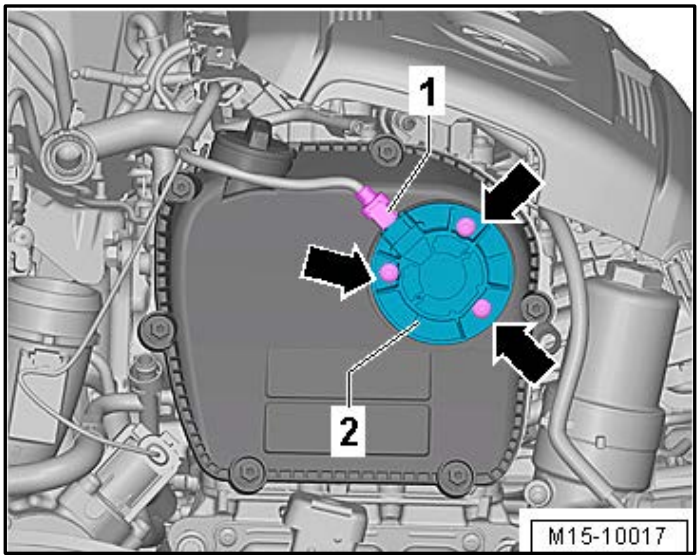


- Install the upper timing chain cover with a new seal and bolts, and tighten in the sequence shown.

Step	Bolts	Tightening Specification/ Additional Turn
1	-1- through 6-	Tighten completely by hand.
2	-1- through 6-	9 Nm



- Clip the oil dipstick tube into the timing chain upper cover -arrow-.
- Install the bolt -1- and torque to 9 Nm.

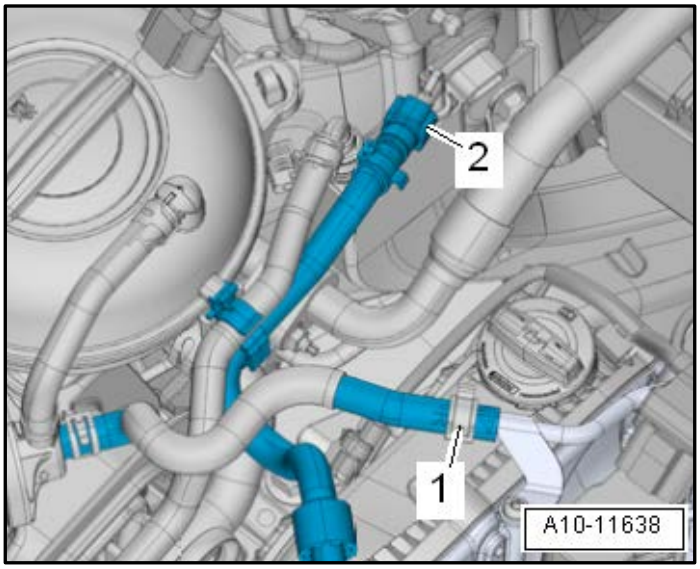


NOTE

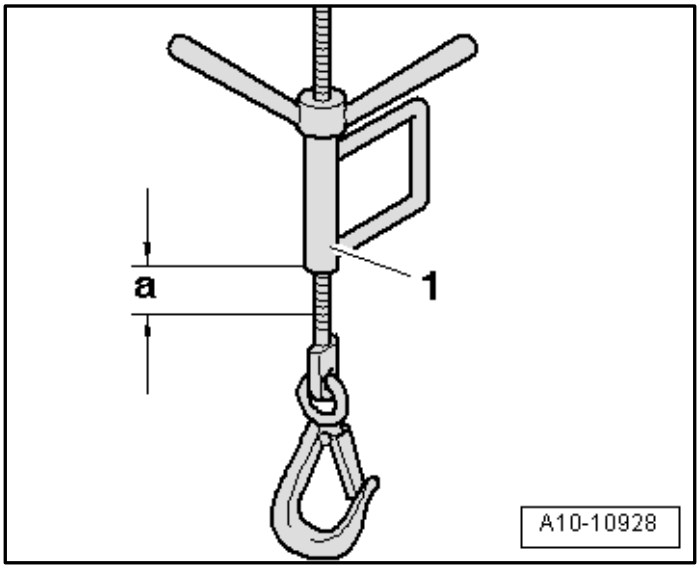
Replace seals and O-rings.

- Lubricate seals on the Camshaft Adjustment Valve 1 -N205-/Exhaust Camshaft Adjustment Valve 1 -N318- sealing surfaces with engine oil
- Install new bolts and tighten in steps in the sequence shown below.

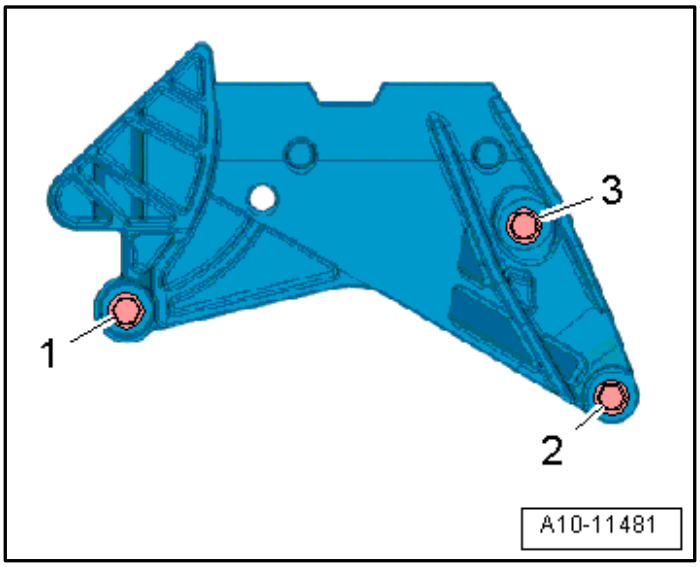
Step	Bolts	Tightening Specification /Additional Turn
1	-arrows-	4 Nm
2	-arrows-	45°



- Clip the coolant and fuel lines into the retainers.
- Reinstall the EVAP canister hose -2-.
- Reinstall the coolant hose and reattach the hose clamps -1-.

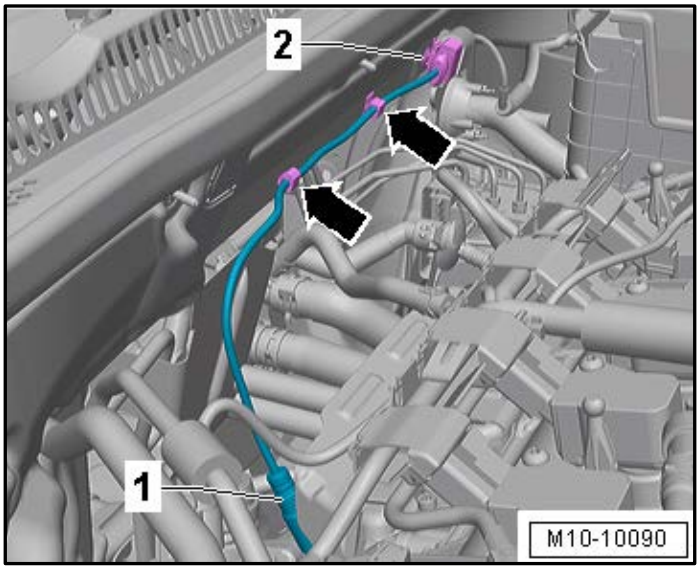


- Using the Engine Support Bridge - Spindle - 10-222A/11-1, carefully lower the engine allow reinstallation of the engine support.

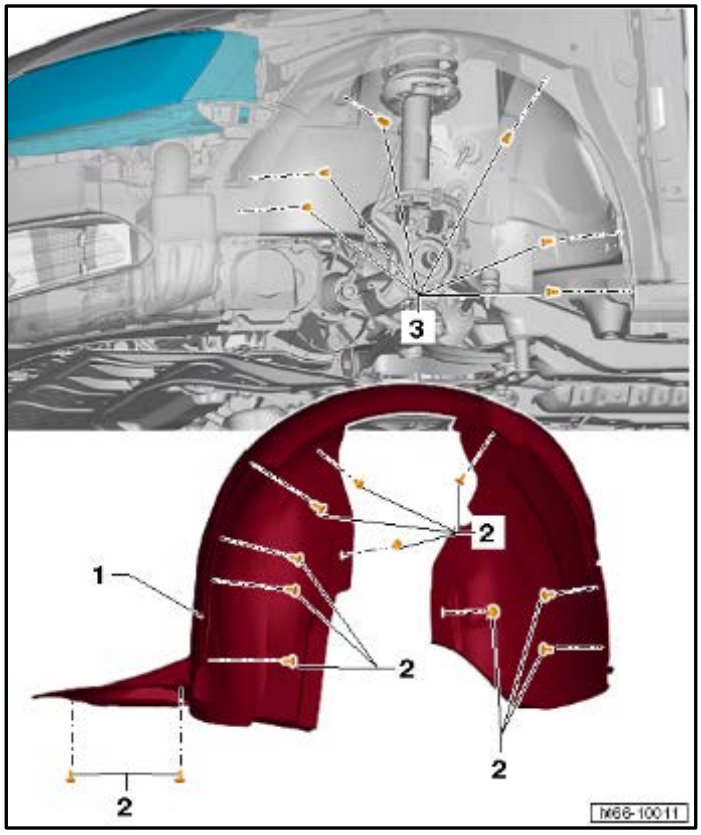


- Reinstall the engine support and the new engine support bolts -1, 2 and 3- and tighten in the sequence below.

Step	Bolts	Tightening Specification /Additional Turn
1	-1- through -3-	7 Nm
2	-1- through -3-	40 Nm
3	-1- through -3-	Turn an additional 90°



- Reinstall the Oxygen Sensor 1 before Catalytic Converter -GX10--1- using a tool from the Ring Wrench 7-Piece Set -3337-.
- Clip the cable into the brackets -arrows-.
- Reconnect the Oxygen Sensor 1 before Catalytic Converter - GX10- connector at the separating point -2-.



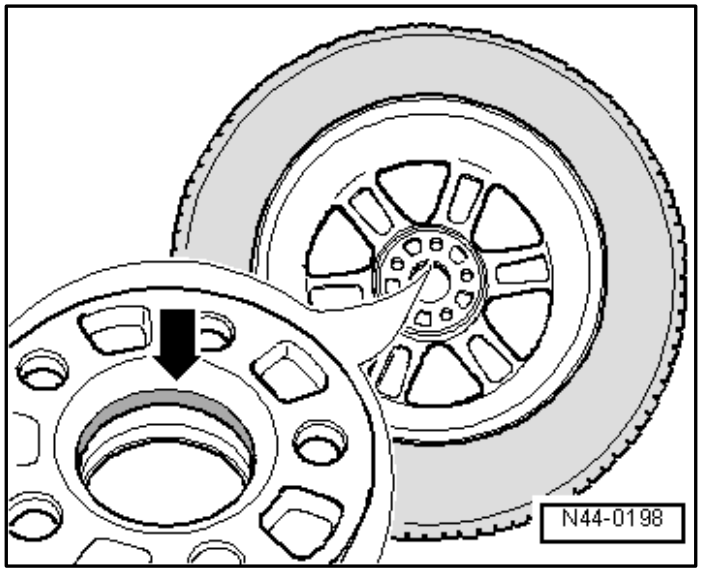
NOTE

Check the expanding nuts -3- damage and replace if necessary.

- Install the wheel housing liner -1- to the fender.
- Install the bolts -2- and tighten to 2 Nm.

NOTE

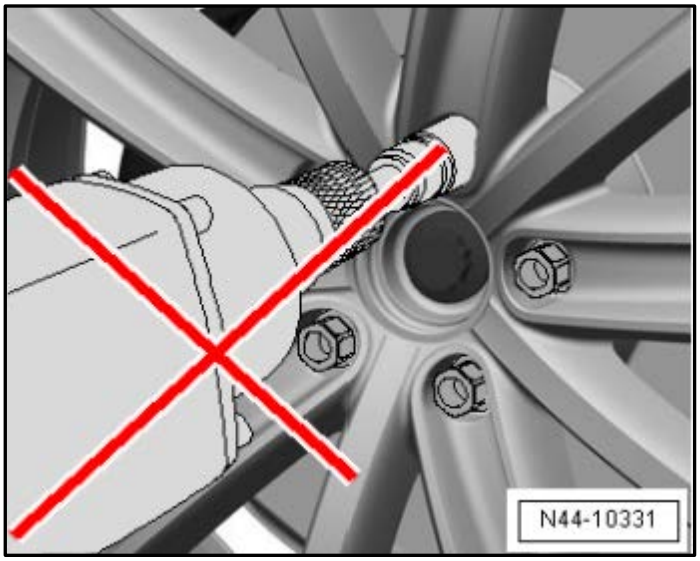
- Prior to installing the wheel, the centering seat should be sprayed with Wax Spray to prevent corrosion between the centering seat and the wheel rim. Refer to the Parts Catalog.



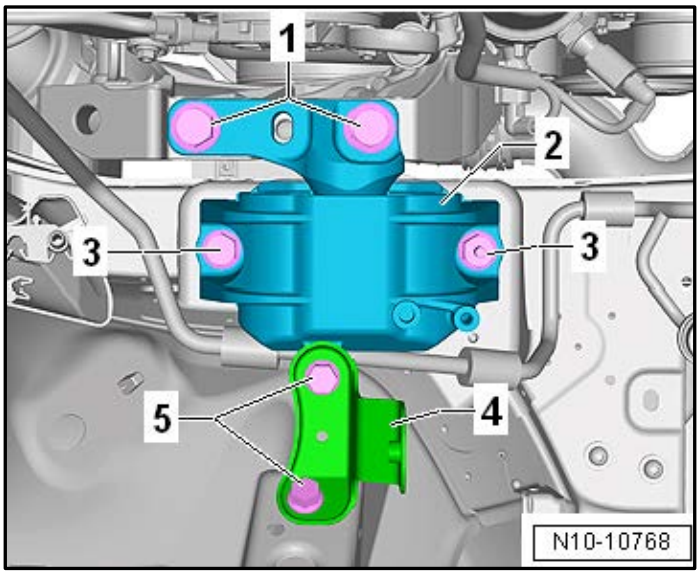
- Thoroughly clean the centering seat on the wheel hub and the centering surface on the rim.
- Apply wax in area of the centering seat -arrow- using a brush.

NOTE

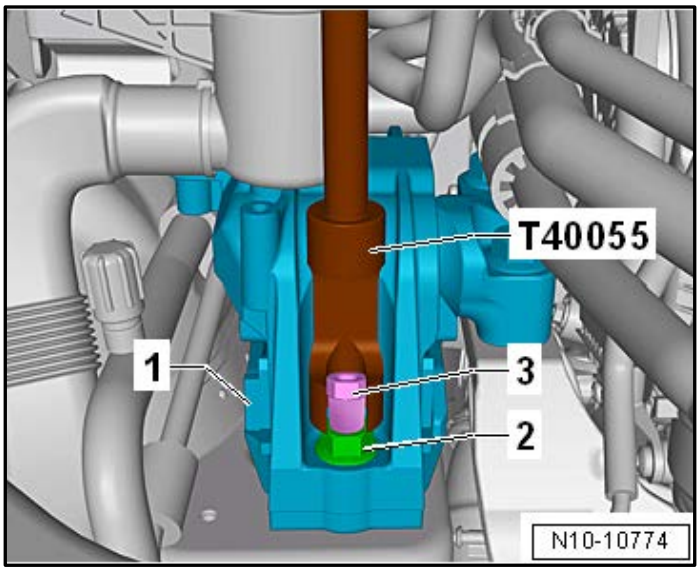
Always make sure that only centering seat -arrow- is waxed and not rim contact surfaces. As a consequence, the brakes would become contaminated while driving and thereby result in poor braking.



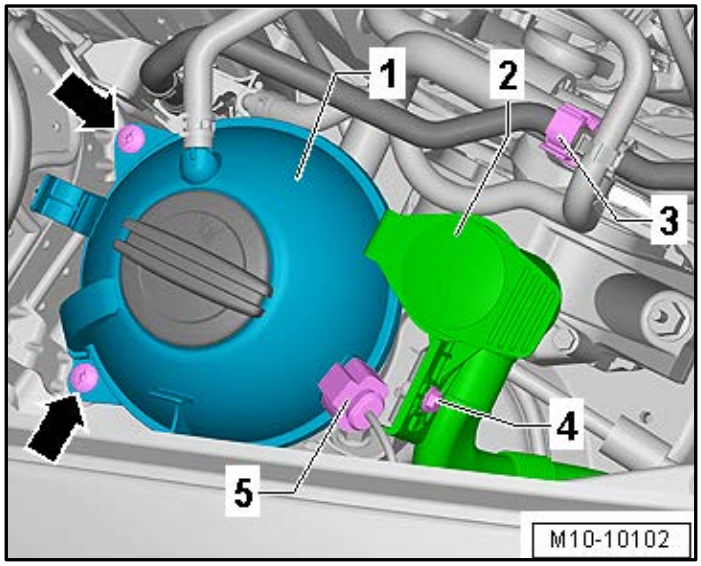
- Install the wheel bolts and tighten uniformly by hand. Do not use an impact gun to tighten bolts.
- Tighten the wheel bolts diagonally to approximately 30 Nm.
- Lower the vehicle to the ground and tighten all the wheel bolts diagonally to 120 Nm.



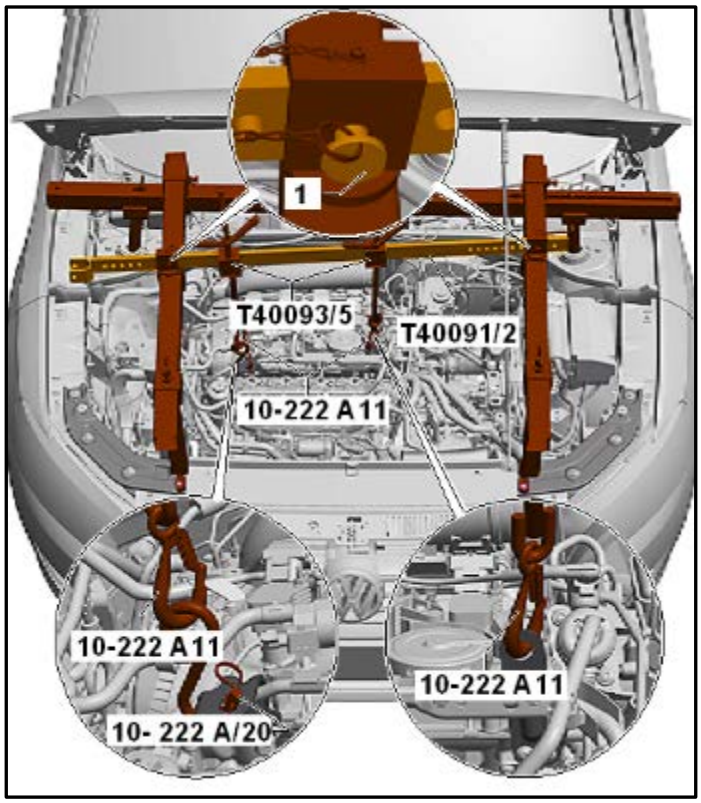
- Reinstall the engine mount and new engine mount bolts -1 and 3-.
- Tighten bolts -1- to 60 Nm + 90°.
- Tighten bolts -3- to 40 Nm + 90°.



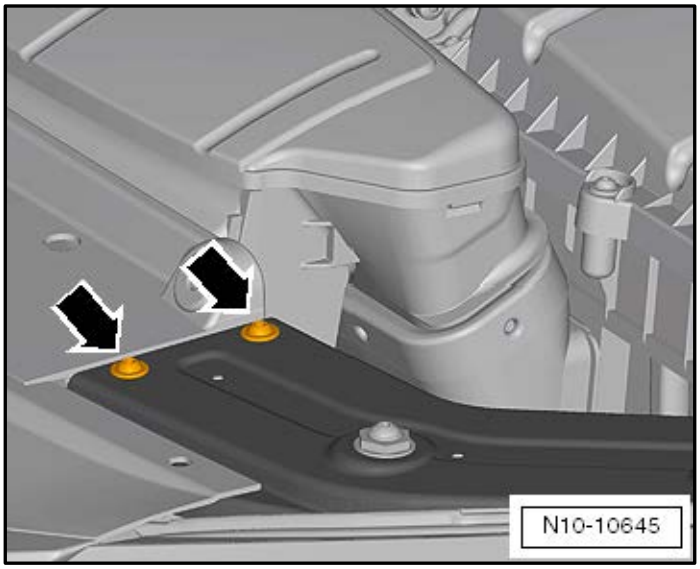
- If equipped, install the jump start terminal -3- on the front engine mount bolt -2- using the Union Nut Socket -T40055- and tighten to 20 Nm.



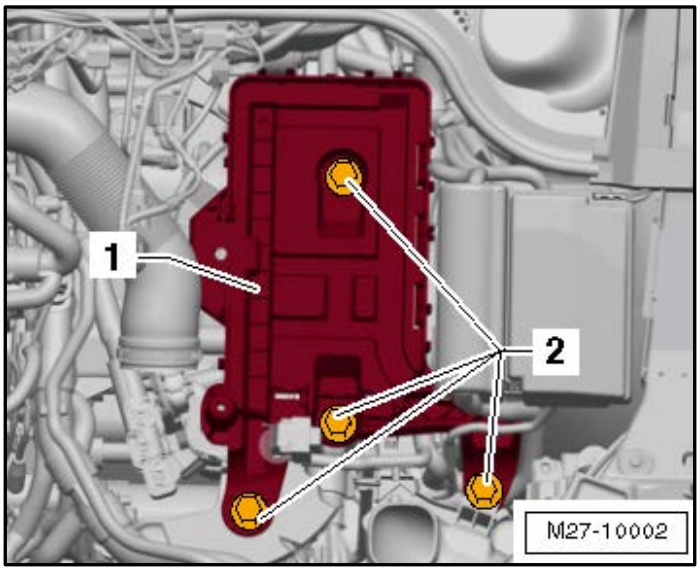
- Reinstall the coolant expansion tank -1- and the bolts -arrows- to 8 Nm.
- Reconnect the connector -5- to the coolant expansion tank -1- and reattach the clip -3-.
- Rotate the washer fluid reservoir filler tube -2- back into position and install the bolt -4-.
- Tighten the bolt -4- to 8 Nm.



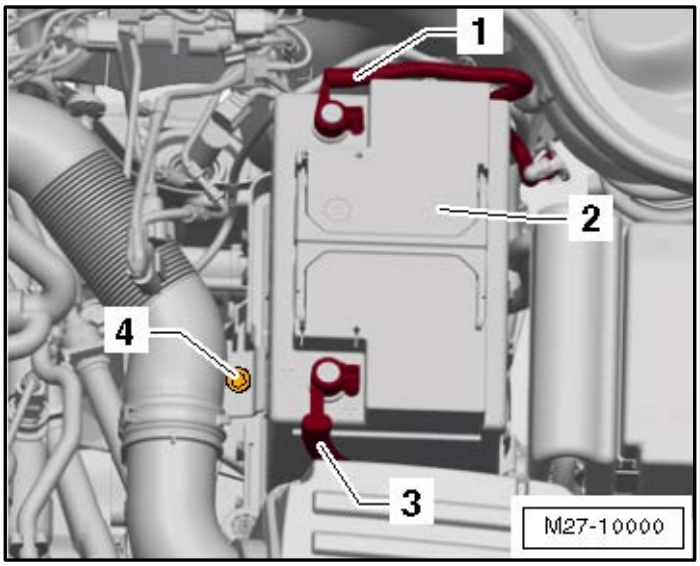
- Remove the Engine Support Bridge from the vehicle.



- Reinstall the bolts -arrows- for the left and right sides of the lock carrier bracket and tighten to 8 Nm.

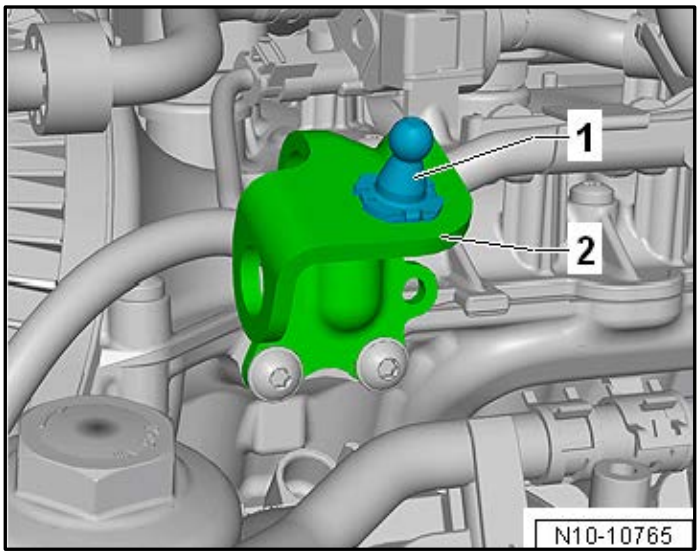


- Reinstall the battery tray -1- and the bolts -2-.
- Tighten the bolts -2- to 9 Nm.

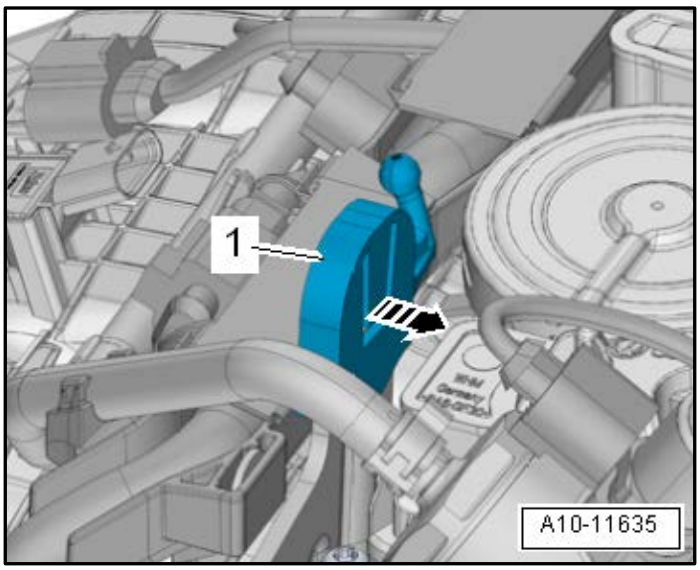


- Reinstall the battery.
- Reinstall the clamping plate and the bolt -4-.
- Tighten the bolt -4- to 20 Nm and ensure the battery is secure.
- Reconnect the battery cables -1 & 3- to the battery terminals and tighten the nuts to 6 Nm.

- Reinstall the battery jacket -1-.



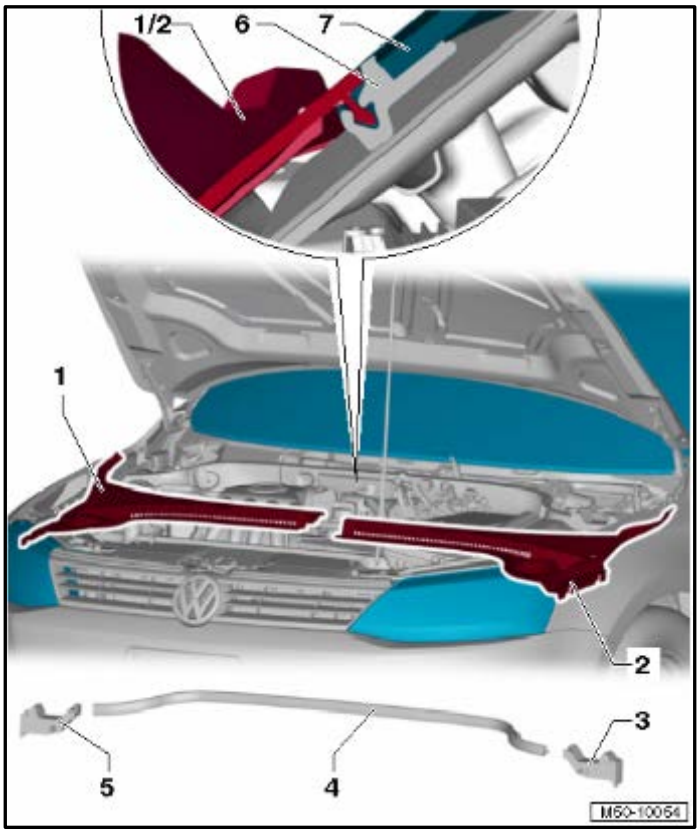
- Reattach the right engine cover mount -1- to the locating bore -2-.



- Reattach the engine cover mount retainer -1-.

NOTE

- The windshield -7- could break.
- Using a hammer to install the plenum chamber covers -1 and 2- into the retainer -6- on the windshield -7- can cause the windshield to crack.
- In new front windshields, an insert is installed in the binding profile. Remove the insert before installing the plenum chamber cover
- Press the plenum chamber cover into the retainer lightly by hand. Do not strike it or press on it with a tool.

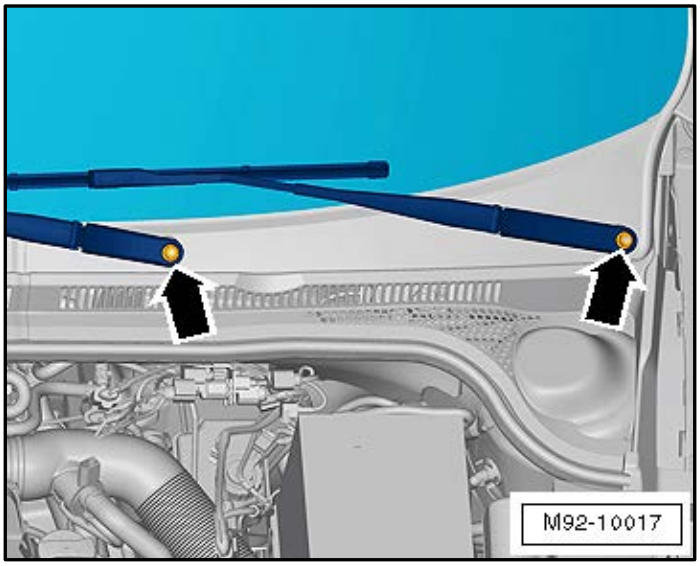


- Spray the retainer -6- with soapy water to make it easier to install the plenum chamber covers -1- and -2-.
- Push in the right plenum chamber cover -1- between the windshield and the fender.
- Make sure the clip on the right plenum chamber cover -1- fits correctly into the top of the crossmember.
- Position the right plenum chamber cover -1- on the retainer -6- and then, starting in the middle, press it into the retainer -6-.
- Remove the bracket that holds the lines for the spray nozzles, from the right plenum chamber cover -1-.
- Insert the left plenum chamber cover -2- between the windshield and the fender.
- Make sure the clip on the left plenum chamber cover -2- fits correctly into the top of the crossmember.
- Position the left plenum chamber cover -2- on the retainer -6- and then, starting in the middle, press it into the retainer -6-.
- Install the seal -4-.

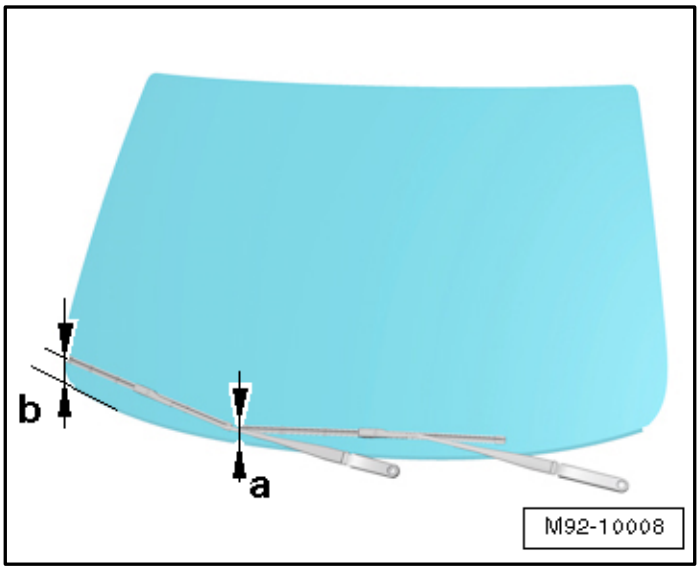
NOTE

- The windshield wiper system is equipped with the APP function (alternating park position). That causes the wiper at every second shut off to move upward slightly after reaching the lowest position.
- The APP function must be deactivated prior to reinstalling the wiper arms.

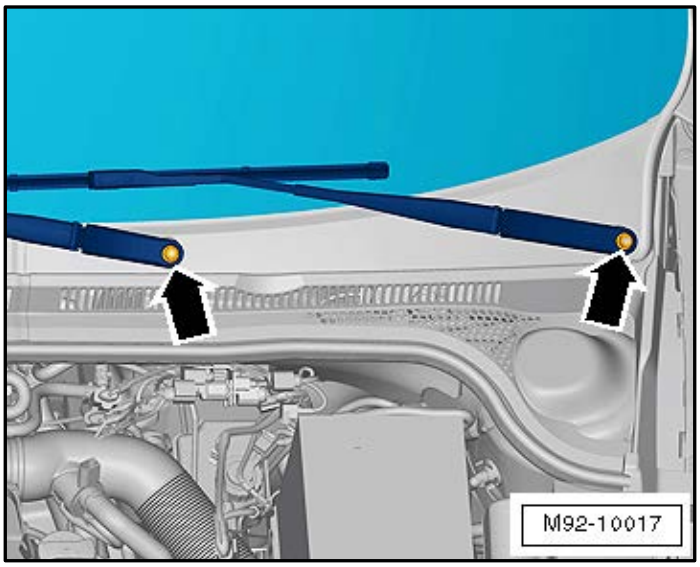
- Deactivate the APP function using the Vehicle Diagnostic Tester.
    - Go to *Guided Fault Finding*
        - Then *Coding the wiper electronics control module / deactivating the App function* and follow the on screen instructions.
- Turn on the ignition and then switch the windshield on and off so that the Windshield Wiper Motor -V- goes into its park position.



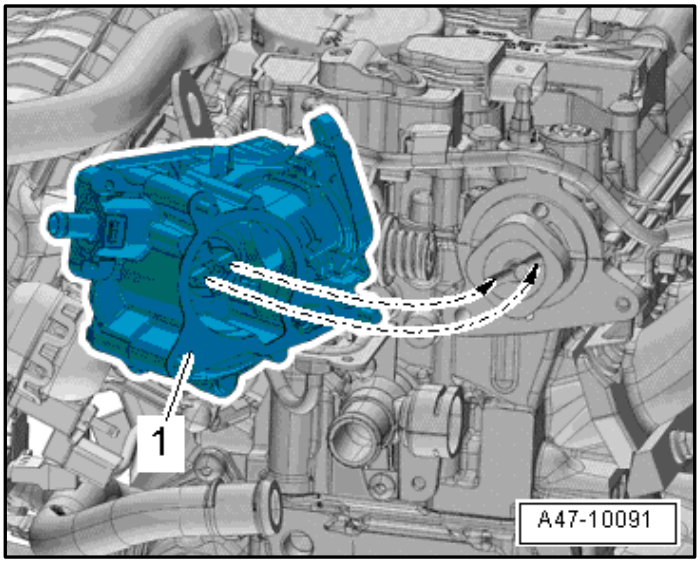
- Mount both wiper arms on the windshield wiper arm shafts and tighten the nuts -arrows- hand-tight.



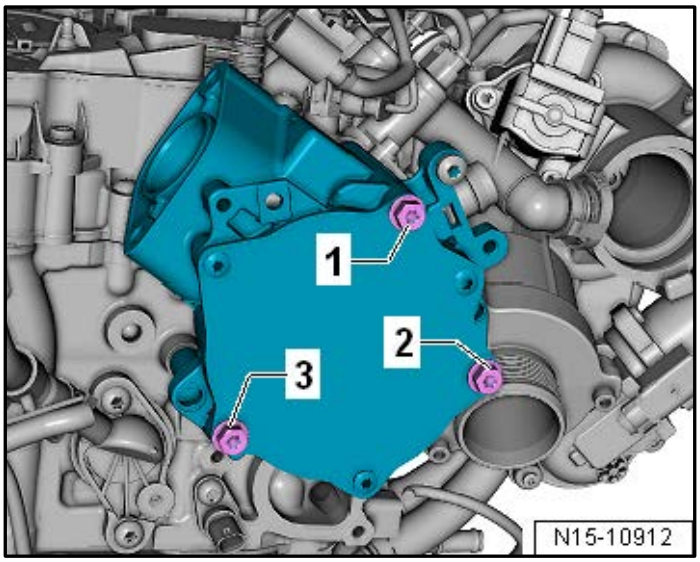
- Adjust the wiper arms so that the distance between the tips of wiper lips and upper edge of plenum chamber cover -a and b- is 10 mm.
    - If necessary, adjust the windshield wiper blade park position by repositioning the windshield wiper arm.



- Tighten the nuts -arrows- to 20 Nm.
- Reinstall the caps.

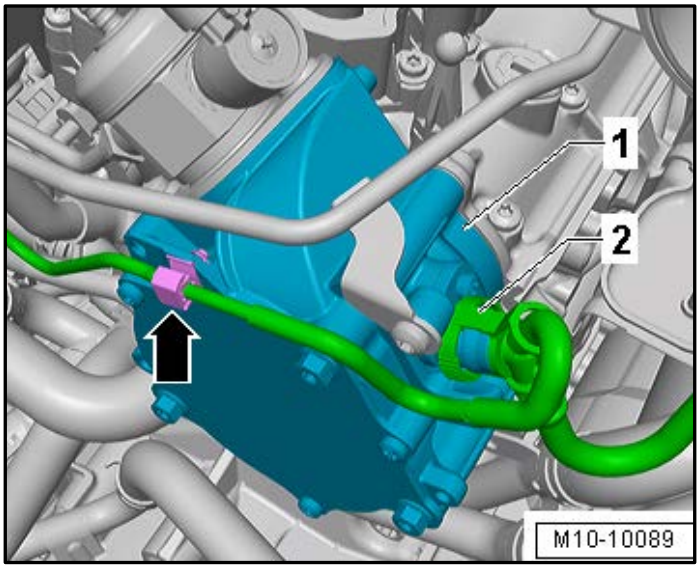


- Clean the vacuum pump sealing surfaces.
- Turn the vacuum pump coupling plate so that it engages in the camshaft groove when installing the vacuum pump.
- Position the new seal on the vacuum pump and insert the new bolts.
- Position the vacuum pump with the seal on the cylinder head ensuring that it lays flush on the flange.

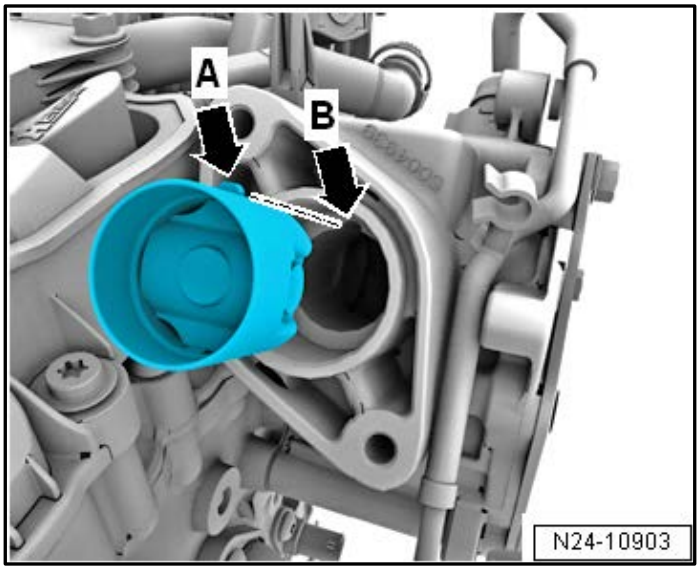


- Tighten the new bolts in steps in the sequence shown below.

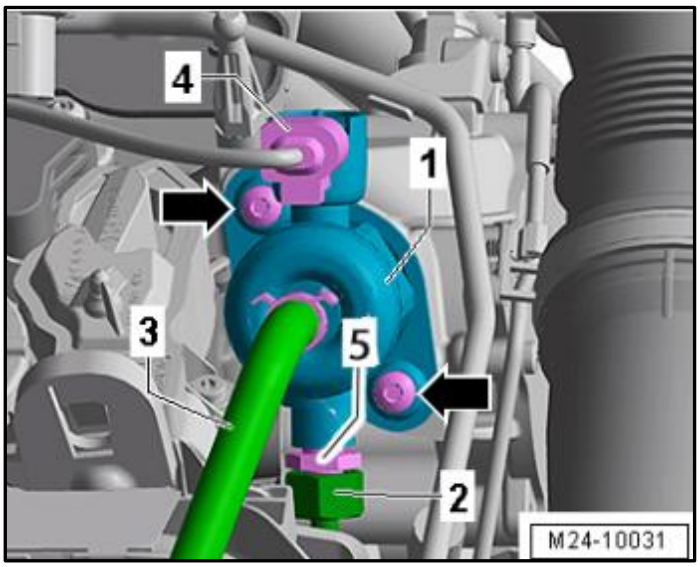
Step	Bolts	Tightening Specification/ Additional Turn
1	-1- through -3-	Install hand-tight
2	-1- through -3-	8 Nm
3	-1- through -3-	180° additional turn



- Reconnect the vacuum hose -2- and clip into the bracket –arrow-.



- Install the high pressure fuel pump by following the steps below.
- Check the O-ring on the high pressure pump, and coat it lightly with clean engine oil.
- Inspect the roller tappet for damages before installing and replace if necessary.
- Insert the roller tappet into the vacuum pump as shown.



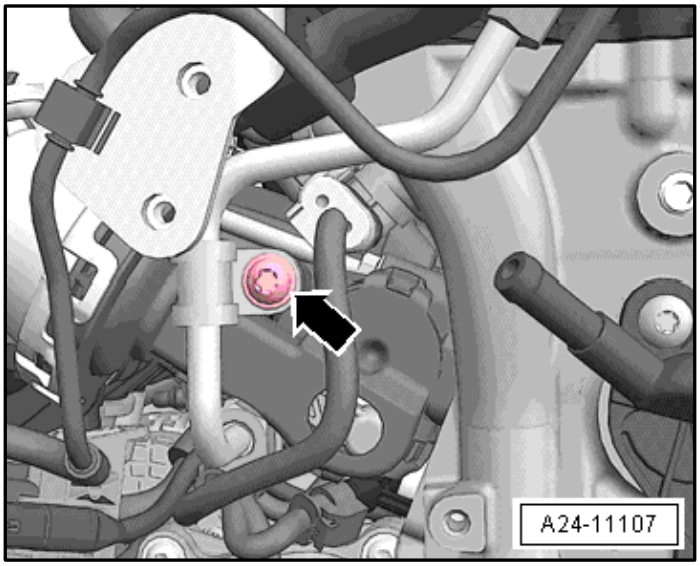
NOTE

- To insert the high pressure pump, the roller tappet must be at its lowest point.
- If the connection -5- for the high pressure line was loosened, it must be replaced.

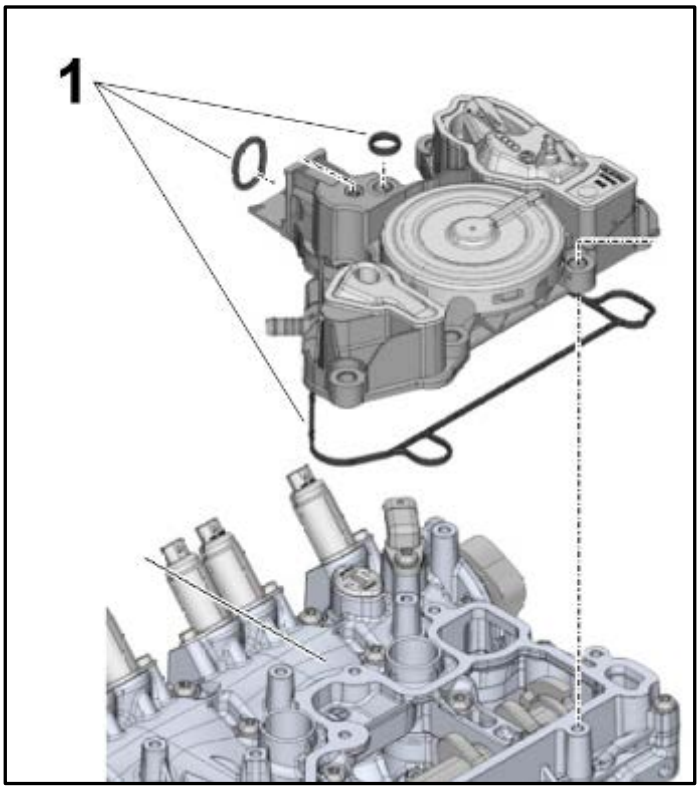
- Rotate the crankshaft until the roller tappet is at the lowest point.
- Install the high pressure pump -1- into the vacuum pump and install new bolts -arrows-.
- Tighten the bolts -arrows- hand tight, then to 8Nm +90°.
- If necessary, replace the connection -5- on the high pressure pump.
- Insert the fuel line -3- and secure it with a spring clamp.
- Lubricate the fuel supply line ball with engine oil, reinstall the fuel supply line, and fasten both union nuts two turns.
- Hand-tighten the union nut on the fuel supply line -2-.
- Align them without tension and tighten to 27 Nm.
- Re-insert the connector -4- from the Fuel Pressure Regulator Valve -N276.

NOTE

Check the fuel system for leaks.

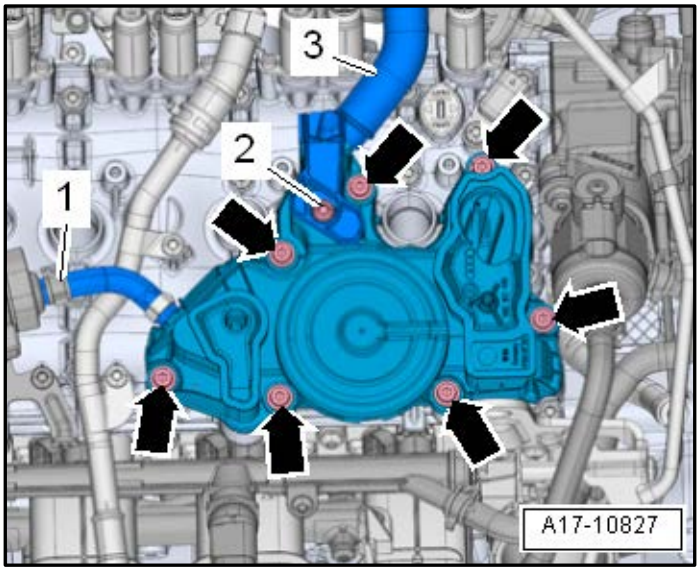


- Reinstall the mounting clamp -arrow- if previously removed.

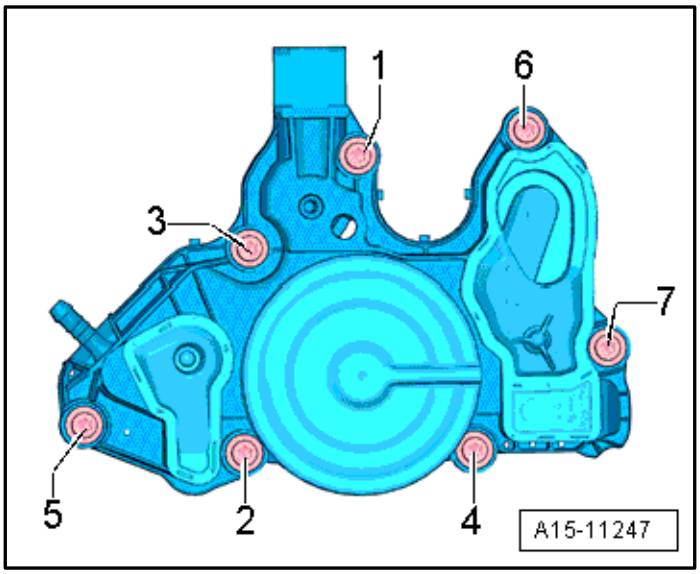


NOTE

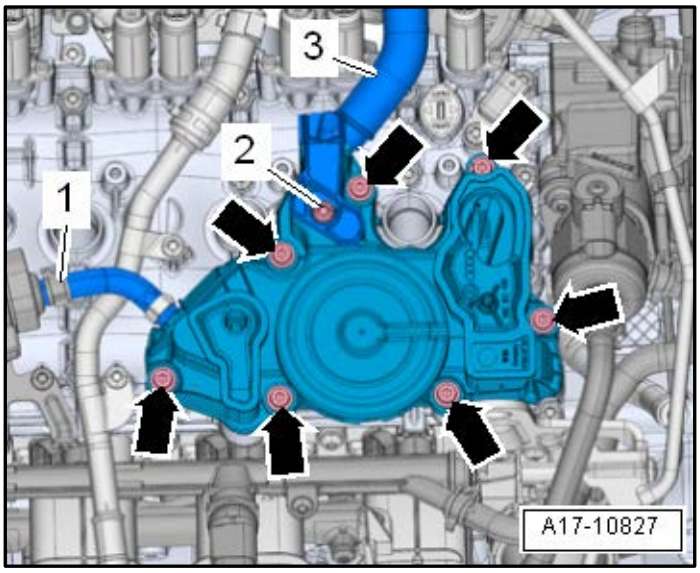
- Always replace oil separator gasket and seals (1).
- Secure all hose connections with hose clamps that match the ones used in series production. Refer to the Parts Catalog



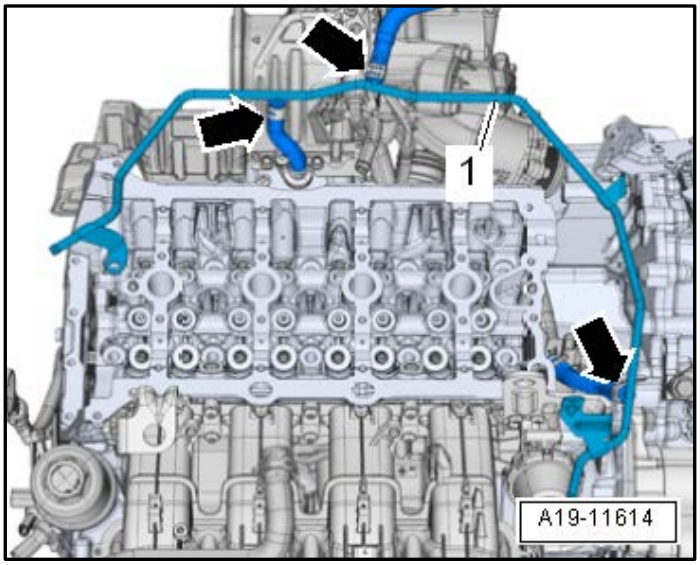
- Install the oil separator and the oil separator bolts -arrows-.
- Position the bolts by hand and tighten until they find the old threads.



- Tighten the bolts in the sequence -1 through 7- to 9 Nm.



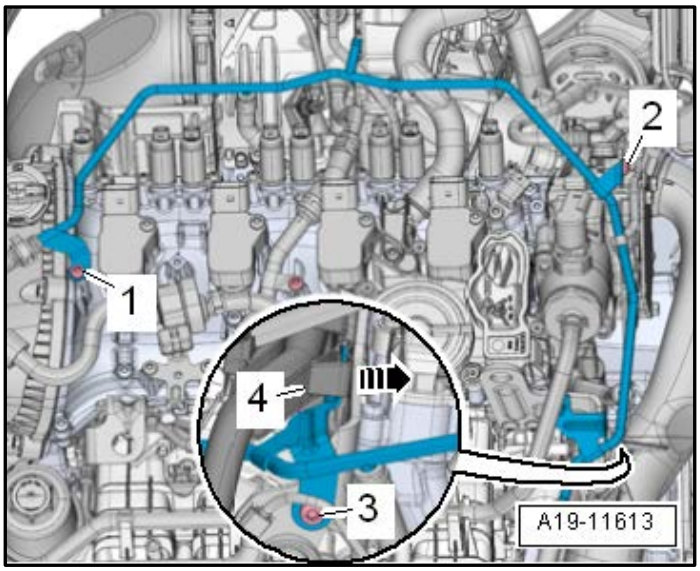
- Install the crankcase ventilation hose -3- to the oil separator.
- Install the bolt -2- by hand and tighten until it finds the old threads. Tighten to 4 Nm.
- Reconnect the EVAP Canister Purge Regulator Valve 1 -N80 connector -1-.



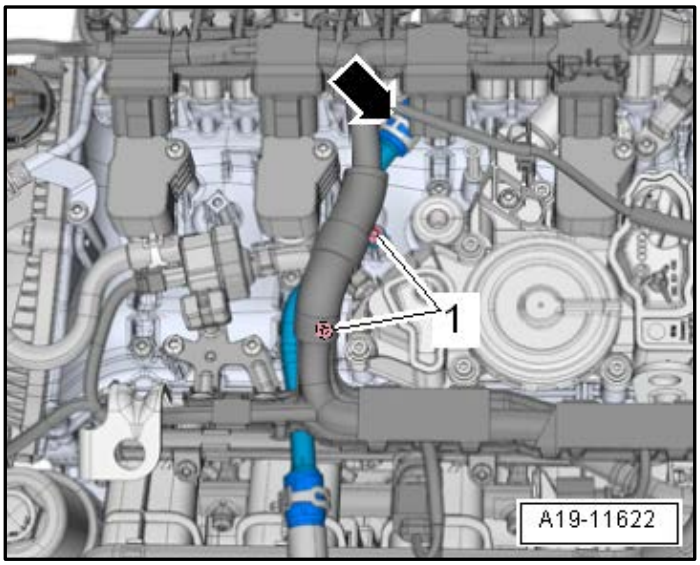
NOTE

Risk of destroying the coolant pipes through deformation. Never change the coolant pipe bent shape.

- Carefully reinstall the coolant line and the clamps -arrows- and remove the coolant hoses



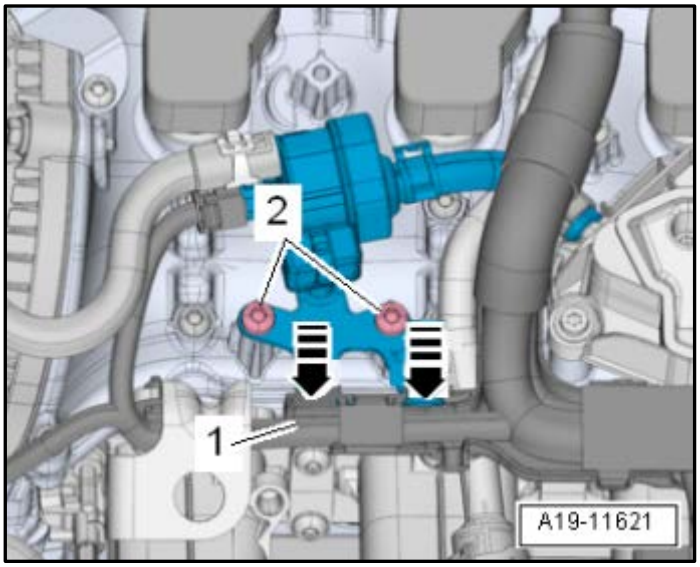
- Reinstall bolts -1, 2 and 3- and tighten to 9 Nm.
- Reattach the coolant pipe connector to the clip -4-.



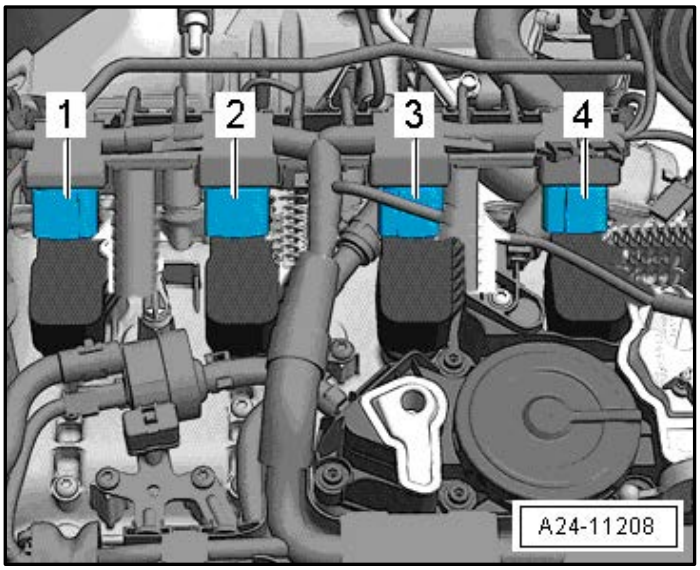
NOTE

Secure all hose connections with hose clamps that match the ones used in series production. Refer to the Parts Catalog.

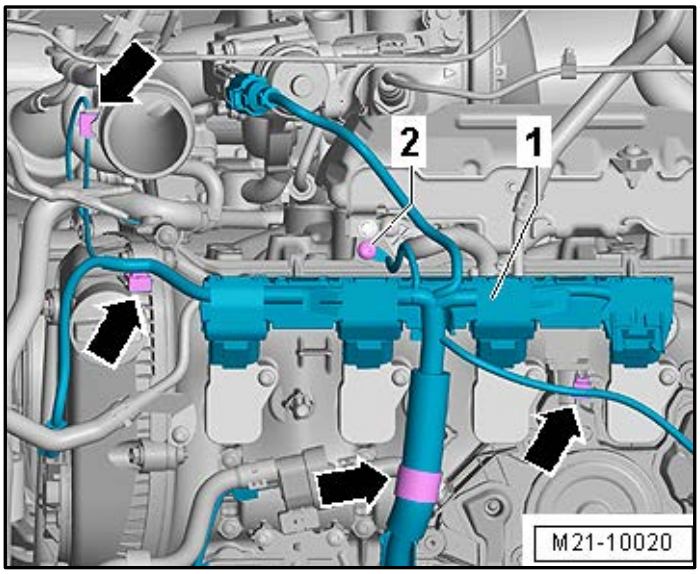
- Reinstall the upper coolant pipe to the coolant hoses.
- Secure the coolant hose connections with hose clamps.
- Reinstall the bolts -1- and tighten to 9 Nm.



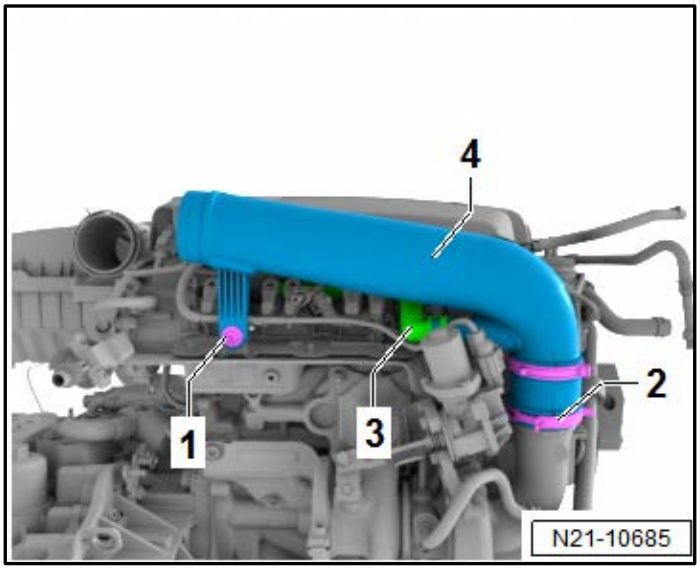
- Reinstall wiring duct -1- to bracket retainers in direction of -arrows- and remove.



- Reconnect all the ignition coil connectors.
- Reinstall the ignition coils by pushing them evenly onto the spark plugs using your hands (do not use any impact tools).
- Reinstall the ignition coil bolts and tighten to 10 Nm.



- Clip the ignition coil electrical wiring harness -1- into the retainers –arrows.
- Install the bolt -2- and tighten to 9 Nm.

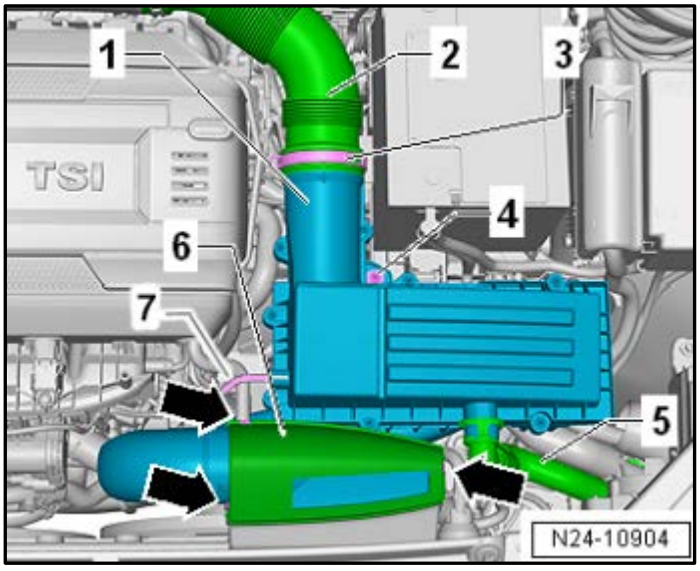


Air Duct Pipe Has Two Different Versions

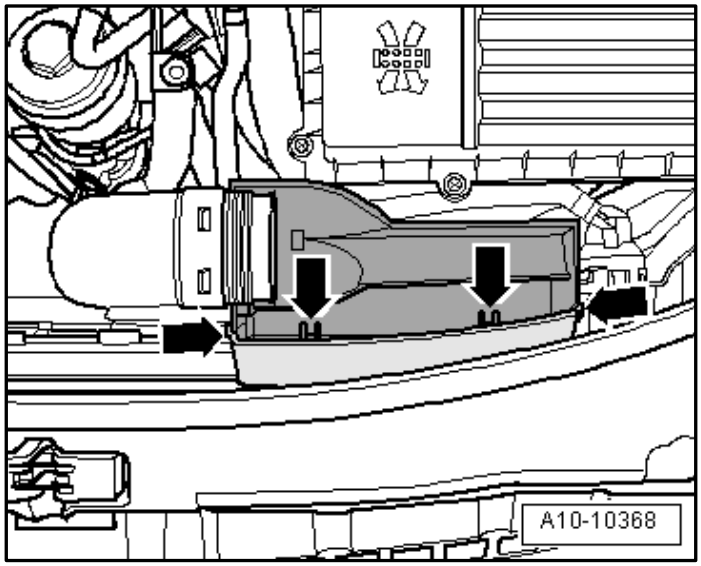
- Version 1 with Two Locking Tabs
  - Reinstall the crankcase ventilation hose -3- and push the locking mechanism together.
- Version 2 without Locking Tabs
  - Reinstall the air guide pipe with the connected line -3-.
- Reinstall the air duct pipe -4-.
- Reinstall the clamp -2-.
- Reinstall the air duct pipe bolt -1- and tighten to 5 Nm.

NOTE

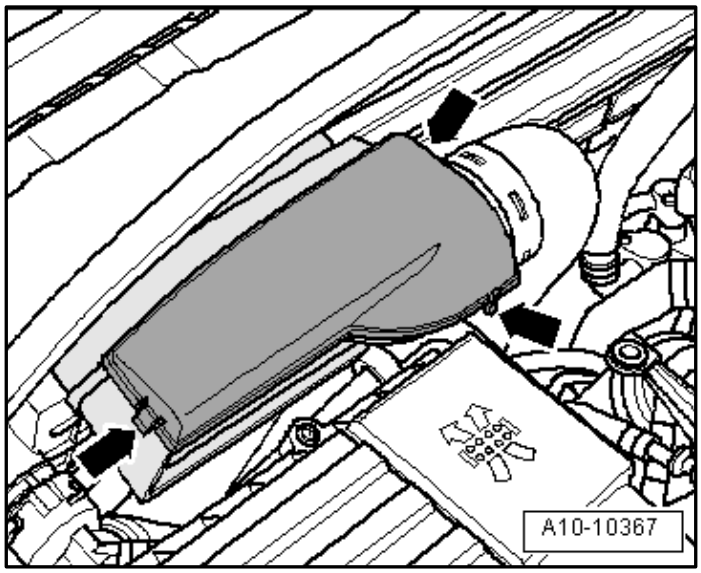
- The hose connections and the hoses must be free of oil and grease before being installed. Use silicone-free lubricant when installing.
- Only use approved clamps for hose connections. Refer to the Parts Catalog.



- Reinstall the air filter housing -1- to the attachment bearing.
- If the vehicle is equipped with a Secondary Air System, reinstall the secondary air line connection -5- to the air filter housing.
- Reinstall the bolt -4- and tighten to 8 Nm.
- Reinstall the vacuum line -7- to the air filter housing.
- Reinstall the air duct hose -2-.

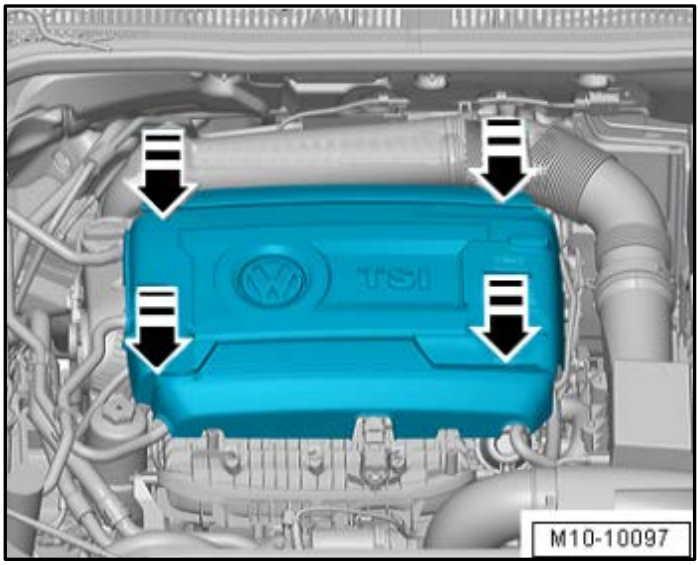


- Secure the wire retainers -arrows- to clip in the lower air duct.



- Reinstall the cover for the air duct and secure the air filter housing side clips -arrows-.

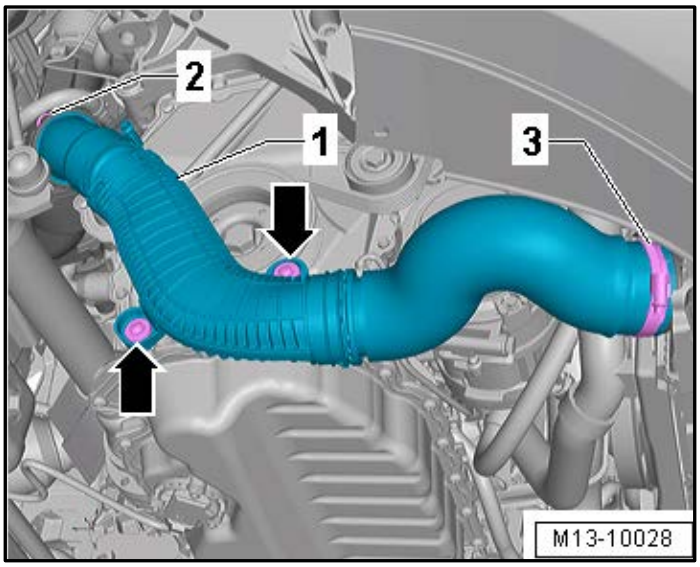
- Change the engine oil. Refer to the repair manual for capacities and specifications.



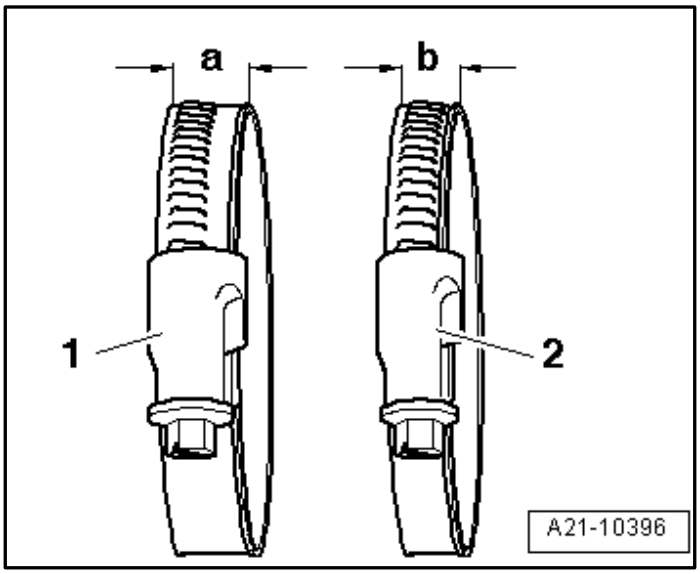
NOTE

- To prevent damage to the engine cover, do not hit it with a fist or a tool.
- Position the engine cover while paying attention to the oil filler tube and oil dipstick.
- Press the engine cover into the rubber grommets on the left side first, then into the ones on the right side.

- Reinstall the engine cover by carefully pressing the engine cover onto the retaining pins in direction of -arrows- one after the other. Do not press sharply on the engine cover or push it to one side.

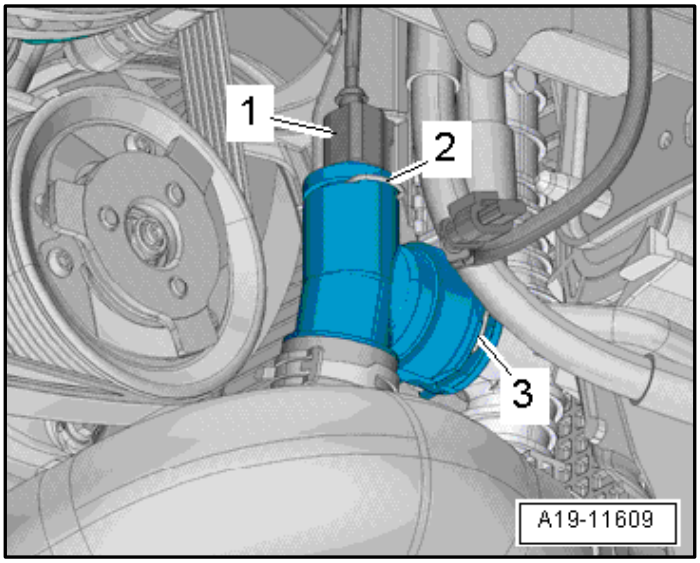


- Reinstall the air duct pipe, the clip -2-, and the screw-type clamp -3-.

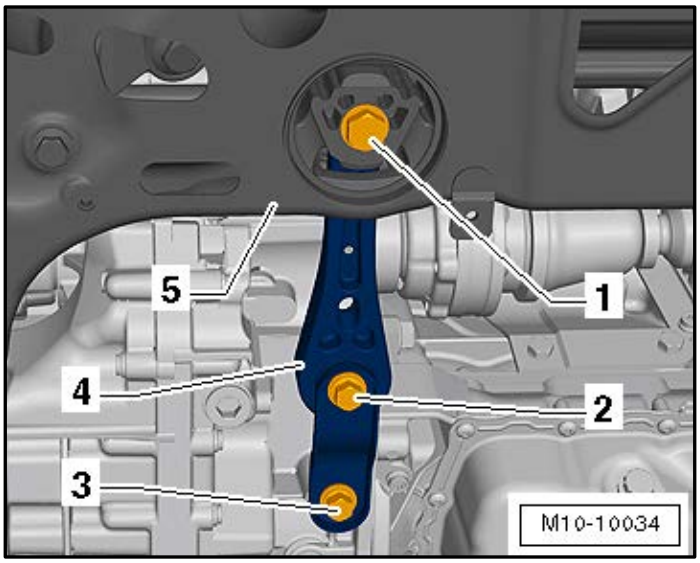


- Tighten the screw-type clamp -3- as outlined in the specifications below.

Hose Clamp	Width	Tightening Specification
-1-	-a- = 13 mm wide	5.5 Nm
-2-	-b- = 9 mm wide	3 Nm

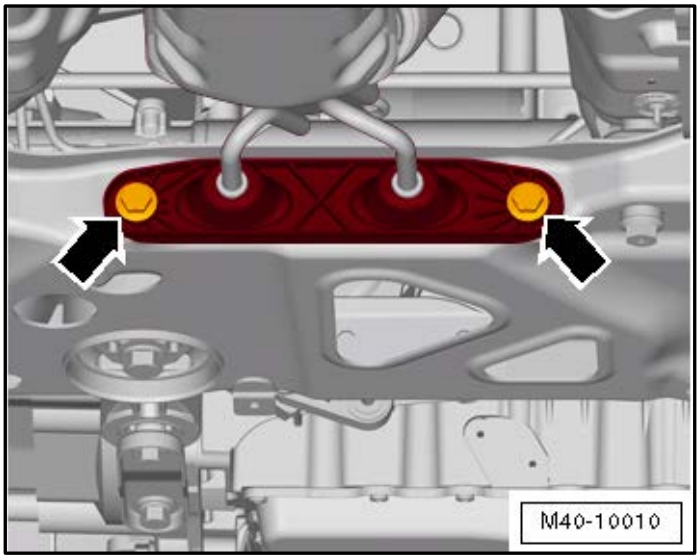


- Reattach the clamp -3- to the lower right coolant hose from the radiator.
- Reconnect the Engine Coolant Temperature Sensor connector -2- on the Radiator Outlet - G83-.



- Underneath the vehicle, fasten the pendulum support -4- to the transmission and then to the subframe.
- Install new bolts and tighten in steps in the sequence shown below.

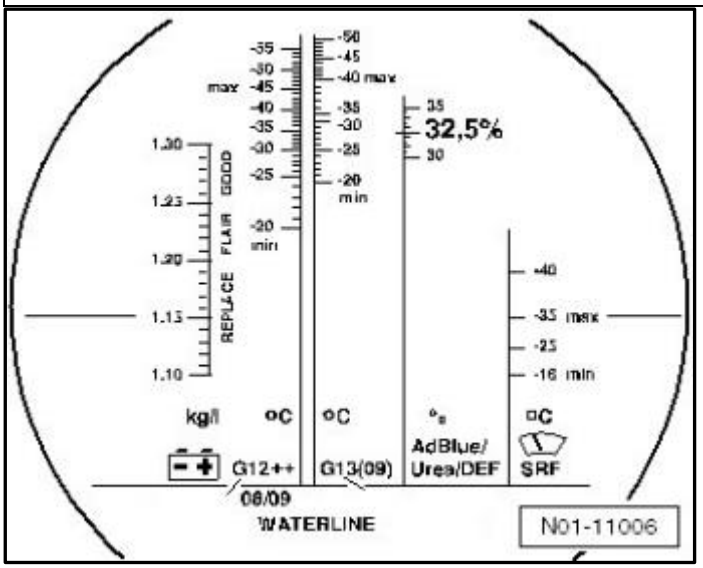
Step	Bolts	Tightening Specification/ Additional Turn
1	-2- and -3-	50 Nm
2	-1-	100 Nm
3	-1- through -3-	Turn an additional 90°



- Reinstall the exhaust system bracket to the subframe and tighten the bolts -arrows- to 23 Nm.

NOTE

- The mixture of the water used greatly influences the effectiveness of the coolant. The water quality to be used is based on the contents, which can be specific to a country or even a region. Distilled water fulfills all requirements. For this reason, use distilled water when adding coolant or filling coolant for the first time.
- Use only coolant additives listed. Refer to the Parts Catalog. Other coolant additives may above all reduce the corrosion protection effect significantly. The damage resulting from this may lead to loss of coolant and consequently to severe engine damage.
- Coolant with the correct mixture ratio prevents freezing and corrosion damage and calcium deposits. Additionally, the boiling temperature will be raised. For this reason the cooling system must be filled with coolant additive year-round.
- Because of its high boiling point, the coolant contributes to engine reliability under heavy engine loads, particularly in countries with tropical climates.

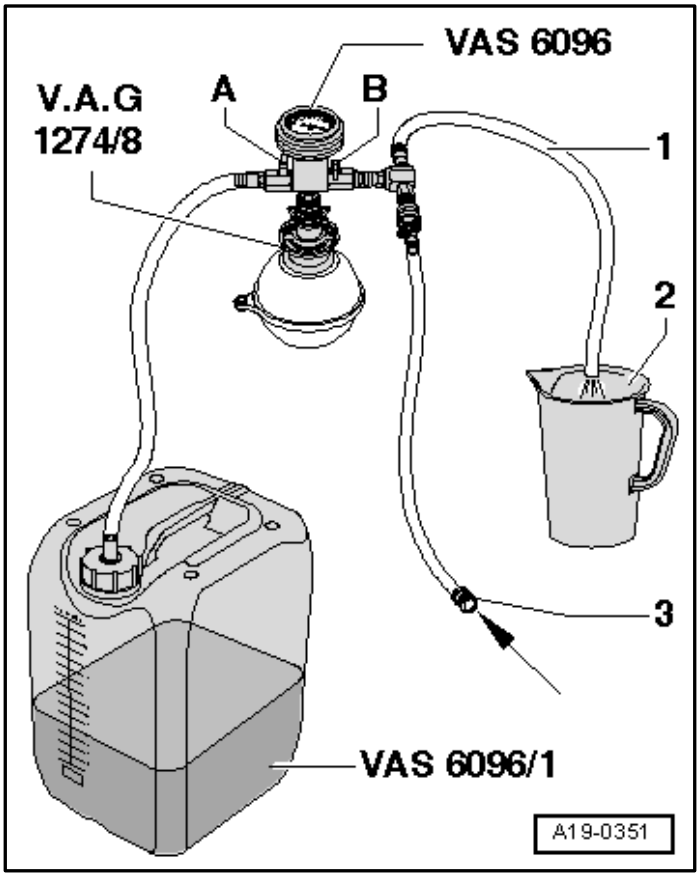


NOTE

- The Refractometer -T10007A- MUST be used to determine the current freeze protection value.
- Protection against frost must be assured down to minimum -25 °C (-13 °F) (in arctic climatic countries down to approximately -36 °C (-32.8 °F)). The freeze protection may only be increased, when stronger freeze protection is needed due to the climate. But only down to -48 °C (-54 °F), otherwise the effectiveness of the coolant decreases.
- The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The frost protection must be at least -25 °C (-13 °F).
- Read the freeze protection value on the scale for the coolant additive that has been added.
- The temperature on the Refractometer -T10007A- corresponds to the »freezing point«. At this temperature, ice crystals may begin to form in the coolant.
- Do not reuse used coolant.
- Only use water/coolant additive to lubricate the coolant hoses.

Frost Protection	Portion of Coolant Additive	Coolant Additive [1]	Distilled Water [1]
-25 °C (-13 °F) -36 °C (-32.8 °F)	40 % 50 %	3.2L (3.38 quarts) 4.0L (4.22 quarts)	4.8L (5.07 quarts) 4.0L (4.22 quarts)

[1] The amount of coolant may vary depending on vehicle equipment.

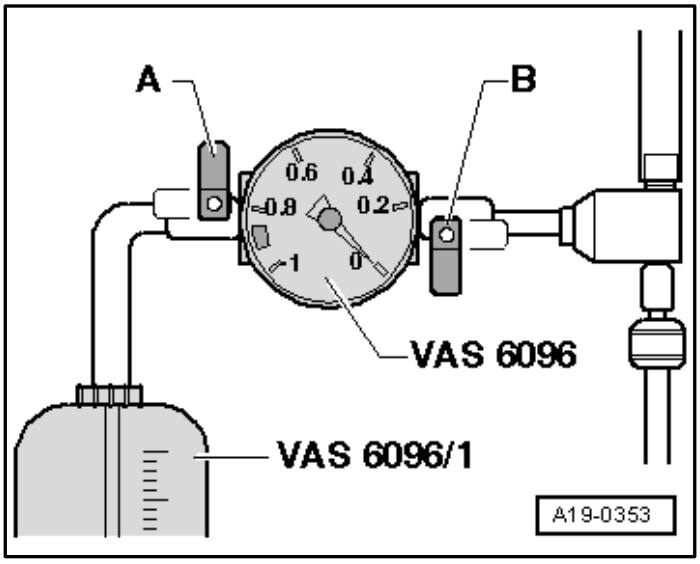


- Fill the Cooling System Charge Kit - Reservoir -VAS6096/1- on the Cooling System Charge Kit -VAS6096- with at least 10 liters (10.56 quart) of coolant.
- Use the proper mixture ratio of coolant.
- Install the Cooling System Tester - Adapter -VAG1274/8- on the coolant expansion tank.
- Mount the Cooling System Charge Kit -VAS6096- on the Cooling System Tester - Adapter -VAG1274/8-.
- Place the drain hose -1- in a small container -2-.

NOTE

A small amount of coolant which should be collected is drawn off with the discharged air.

- Close valves -A and B- by turning lever at a right angle to the flow direction.
- Connect the hose -3- to compressed air.
    - Pressure: 6 to 10 bar (87 to 145 psi) positive pressure.

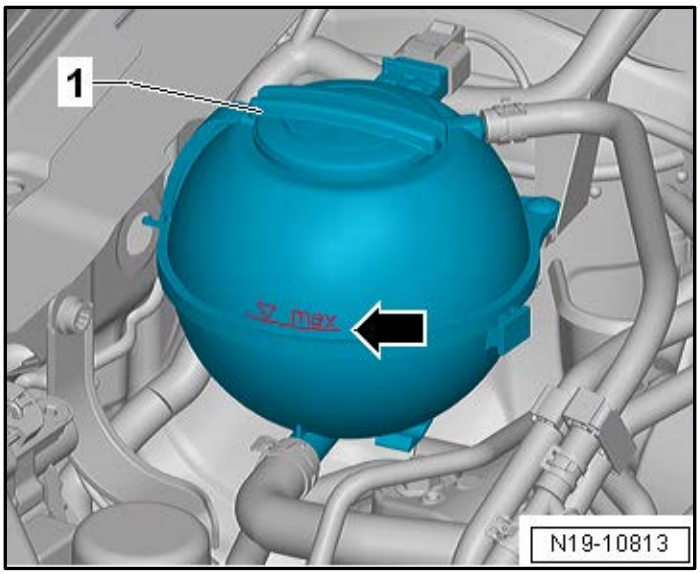


- Open the valve -B- by turning the lever in the flow direction.
    - A further vacuum is created in the cooling system by the suction jet pump.
    - The needle on the instrument display must travel into the green region.
- Open the valve -A- slightly for a moment.
- Turn the lever in the direction of flow so that the Cooling System Charge Kit - Reservoir -VAS6096/1- hose fills with coolant.
- Close the valve -A- again.
- Leave the valve -B- open another two minutes.
    - A further vacuum is created in the cooling system by the suction jet pump.
    - Needle on the instrument display must still remain in the green region.
- Close the valve -B-.
    - The needle on display must remain in the green range.
    - Only then is there enough vacuum in the coolant system for the filling.

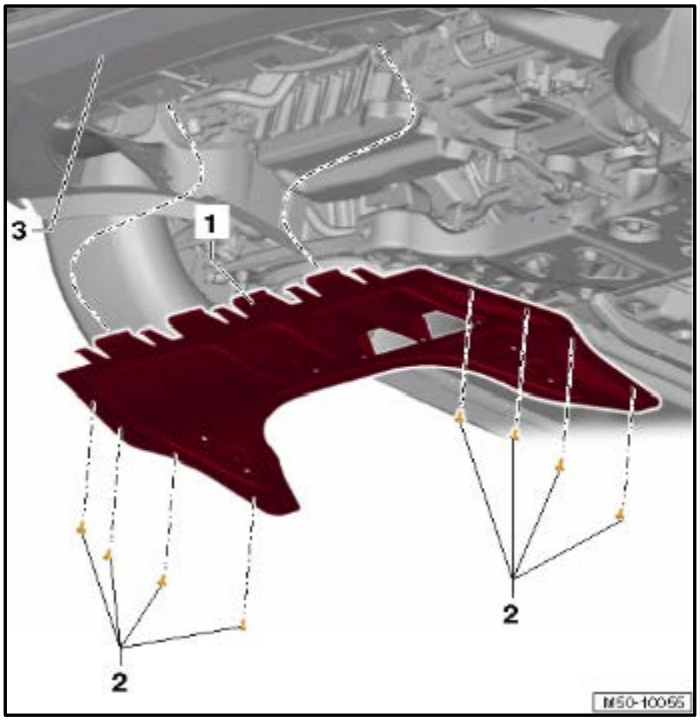
NOTE

- Repeat the procedure if the needle goes below the green range.
- Check the cooling system for leak if the pressure drops.

- Remove the pressure hose.
- Open the valve -A-.
- The vacuum in the cooling system causes coolant to be extracted from the Cooling System Charge Kit - Reservoir -VAS6096/1- and to fill the cooling system.
- Remove the Cooling System Charge Kit -VAS6096- from the coolant expansion tank.



- Fill up the coolant expansion tank -1- with coolant to the “max” marking –arrow-.
- If the vehicle has a parking heater, switch it on for about 30 seconds.
- Set the HVAC temperature controls to “HI”.
- Press AC to turn off the A/C compressor.
  - The LED in the button must not come on.
- Start the engine and run it at approximately 1500 RPM for a maximum of two minutes.
- With engine running, fill coolant up to overflow hole on coolant expansion tank.
- Close the cap on the coolant expansion tank until it locks into place.
- Allow engine to run at idle until both large coolant hoses on the radiator are warm.
- Turn off engine and allow it to cool off.
- Check the coolant level in the coolant expansion tank -1-.
  - The coolant level must be between the “min” and “max” markings when the engine is cold.
  - The coolant level may be at the “max” marking -arrow- when the engine is warm.
- Add more coolant if necessary.



- Reinstall the noise insulation to the front bumper cover -3-.
- Reinstall the noise insulation bolts -2- and tighten to 2 Nm.

NOTE

After installing new parts (engine/partial engine, cylinder head or turbocharger) limit the oil pressure regulation for approximately 1000 km to the higher pressure stage. From this, the higher friction is taken into account when breaking in new components, and the optimum removal of particles from the initial wear in is ensured. To do this connect the vehicle diagnostic tester, switch on the ignition and select the following menu items:

01 - Engine electronics

Guided Functions

01 - Oil Pressure Regulation/Retraction Activating

Continue to Section D

Section D – Campaign Completion Label and Parts Return

Install Campaign Completion Label

- Fill out and affix Campaign Completion Label, part number CAMP 010 000, next to the vehicle emission control information label.

TIP

Ensure Campaign Completion Label does not cover any existing label(s).

Parts Return and disposal

Properly store (retain), destroy or dispose of removed parts in accordance with all state/province and local requirements, unless otherwise indicated and/or requested through the Warranty Parts Portal (WPP) for U.S. and SAGA for Canada.

ALL WORK IS COMPLETE

Appendix A – Warning and Safety Precautions

WARNING

Do not use an impact wrench to install the wheel bolts.

WARNING

Wheel bolts, contact surfaces of wheel/wheel hub and the threads in the wheel hubs must not have wax applied to them. Never apply lubricants or anti-corrosion treatment to threads in wheel hubs.

CAUTION

If battery is not secured properly, the following risks are possible:

- Shortened service life due to vibration damage (explosion hazard).
- The plates within the battery can be damaged.
- Damage to the battery housing caused by bracket (possible electrolyte leakage, high subsequent costs).
- Inadequate crash safety.

CAUTION

The cooling system is under pressure when the engine is warm. Risk of scalding due to hot steam and hot coolant. Scalding the skin and other parts of the body is possible.

- Wear safety gloves.
- Wear protective eyewear.
- Reduce the pressure by covering the coolant reservoir cap with a cloth and carefully opening it.

CAUTION

The fuel system is under pressure. Risk of injury from fuel spraying out.

- Wear protective eyewear.
- Wear safety gloves.
- Reduce the pressure: place clean cloths around the connection point and carefully open the connection point.