Technical Service Bulletin

Audi

46 Brake pulsation diagnostic guidelines

46 15 25 2022584/6 October 20, 2015. Supersedes Technical Service Bulletin Group 46 number 14-86 dated July 14, 2014 for reasons listed below.

Model(s)	Year	VIN Range	Vehicle-Specific Equipment
All	2006 - 2016	All	Not Applicable

Condition

REVISION HISTORY		
Revision	**Date**	**Purpose**
6	-	Revised *Service* (Updated instructions)
5	7/14/2014	Revised header data (Added model years)
4	1/9/2014	Revised header data (Changed model years) Revised *Service* (Added images; updated instructions)

Note: DO NOT use this TSB if there is another TSB for same concern applicable to the VIN. This TSB is only intended for diagnostic purposes and does not serve as a guideline for determining warrantable conditions.

Customer may report that the steering wheel vibrates or pulsates when the brakes are applied.

Technical Background

Brake-related vibrations and pulsations can have multiple root causes, which include—but are not limited to: driving style, environmental conditions, and service history of the vehicle. Additionally, as brake pads and discs wear, their dampening ability is reduced.

Disc thickness variation (DTV) is a common condition that contributes to brake pulsation (Figure 1). DTV occurs when the two braking surfaces of the brake disc are no longer parallel to each other. This condition cannot be accurately measured with normal workshop tools. Most common conditions that create DTV include:

- Corrosion/rust build-up
- Pad material transfer
- Prolonged use of a disc with high run-out condition

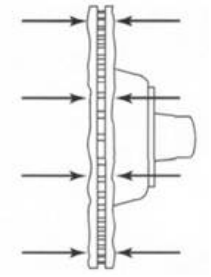

Figure 1. *Example of DTV.*

Production Solution

Not applicable.

Service

Brake pulsation may be noticeable only with specific vehicle speed, brake pedal pressure, and temperature of the brake components. In order to accurately diagnose the vehicle it is critical to test drive the vehicle under the same conditions as the customers would (e.g., speed, braking pressure, etc.). The following are examples of other conditions that can cause brake pulsation.

Overheated brake components

Overheated brake components can cause permanent damage to the brake discs and brake pads.

Condition: Brake pad material smeared on the brake disc (Figure 2). This condition can create DTV.

Common cause: An overly-aggressive driving style, which results in frequent sharp braking without proper cooling off periods.

Service: Replace brake discs and pads.

Figure 2. *Deposits on the brake disc.*

Condition: Blue-tempered or overheated brake discs (Figure 3).

Common cause: Failed component(s) causing constant brake application. This can also be caused by an overly-aggressive driving style, which results in frequent sharp braking without proper cooling off periods.

Service: Replace brake disc and pads.

Figure 3: *Brake disc with heat marks.*

Corrosion/rust build-up

The ability to remove any build-up on a brake disc is impacted by the severity of the build-up. If left unattended, the build-up can permanently damage brake discs and pads.

Condition: Corrosion/rust build-up on the brake discs (Figure 4). This condition can create DTV.

Common causes:

- Exposure to road salt during winter months, high humidity, or moisture.
- Vehicle not being driven for prolonged periods of time.
- A gentle driving style with very light brake application may not be enough to remove build-up (such as rust or corrosion) on the brake discs and pads.

Service: With careful consideration of the traffic situation, perform 2-3 ABS stops from speeds above 50mph. Between each stop, allow the brake components to cool by driving the vehicle for more than one minute at speeds greater than 50mph. Do not perform ABS stops if brand new pads and/or discs are installed. Replace brake disc and pads if the condition is not eliminated.

Figure 4. *Corrosion/rust build-up.*

Condition: Pad material transfer or corrosion marks from brake pads on the brake disc, also known as “pad marks” (Figure 5). This condition can create DTV.

Common cause: These marks can appear if the vehicle has not been driven for a prolonged period of time or if the brakes are exposed to high humidity or moisture.

Service: With careful consideration of the traffic situation, perform 2-3 ABS-stops from speeds above 50mph. Between each stop, allow the brake components to cool by driving the vehicle for more than one minute at speeds greater than 50mph. Do not perform ABS stops if brand new pads and/or discs are installed. Replace brake disc and pads if the condition is not eliminated.

Figure 5. *Pad marks on the brake disc.*

Condition: Excessive brake disc or wheel hub run-out (Figure 6). Measure according to the *Run-out Measurement Instructions* listed below.

Common causes:

- **Over-torqued or improperly-torqued wheels** (torque sticks, impact gun, etc.) can distort the brake disc and hub, causing a run-out condition. Refer to Elsa for proper torque values and procedures for the VIN.
- **Wheels that are not Audi-approved** may not have the same contact surface on the back of the wheel and may not have the correct center bore dimension, which can distort the brake disc and hub, causing a run-out condition.
- **External impact or rust build-up** between brake disc and hub.

Service: Replace brake disc(s) and/or hub(s) if measurements exceed the maximum value listed in the *Run-out Measurement Instructions*.

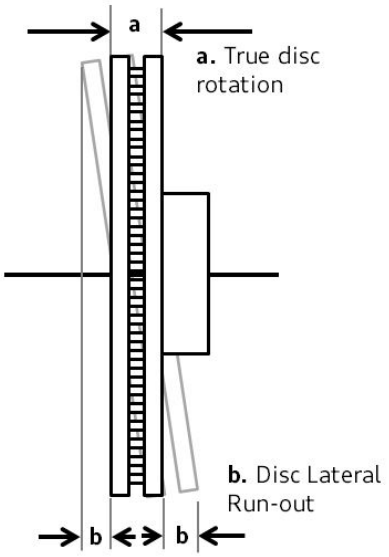

Figure 6. *True disc rotation (a) and disc lateral run-out (b).*

Condition: Worn brake pads (Figure 7).

Common cause: As brake pads and discs reach their wear limit, their dampening characteristics are reduced.

Service: Replace worn brake pads and discs.

Figure 7. *Worn brake pad.*

Other common causes

The following factors can impact the condition of the brake and suspension components, which can lead to pulsation during braking. Always check the repair history and the overall condition of the vehicle.

Condition: Faulty, damaged, or aftermarket suspension components (ball joints, links, tie rods, bushing, etc.) can significantly amplify vibration/pulsation or lead to body vibrations which only become noticeable when braking (Figure 8 and Figure 9).

Service: Diagnose these components accordingly.

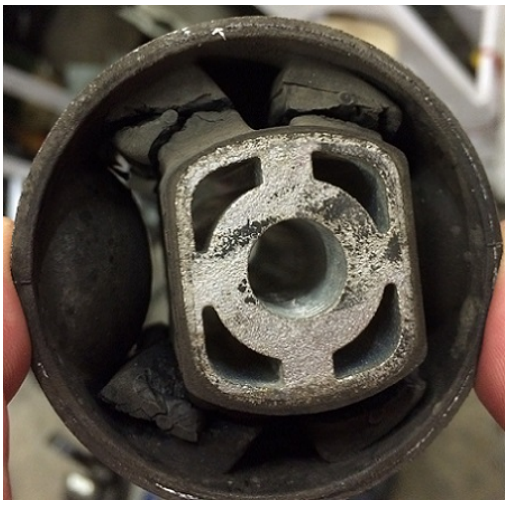

Figure 8. *Damaged suspension bushing.*

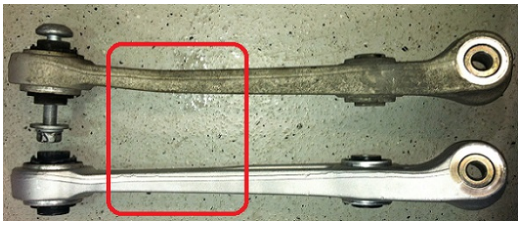

Figure 9. *Damaged suspension link.*

Condition: Wheel/tire imbalance (Figure 10) or radial run-out can significantly amplify the vibration/pulsation or lead to body vibrations which only become noticeable when braking.

Service: Inspect the condition of these components and diagnose accordingly.

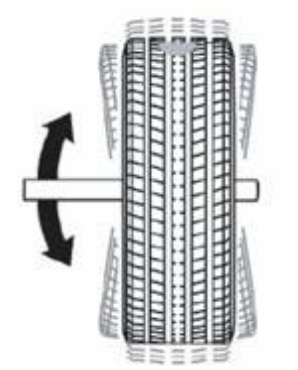

Figure 10. *Wheel/ tire imbalance.*

Run-out Measurement Instructions

To obtain accurate run-out measurements, the following conditions must apply:

- All surfaces that will be measured must be free of rust/corrosion build-up or pad material transfer.
- VAS6079/1 (or similar measurement tool) is securely attached to the vehicle (Figure 11).
- The brake disc is secured to the hub with 5 bolts.
- Axle bolt/nut is installed and properly torqued.
- Run-out measurements should be taken with all parts installed on the vehicle

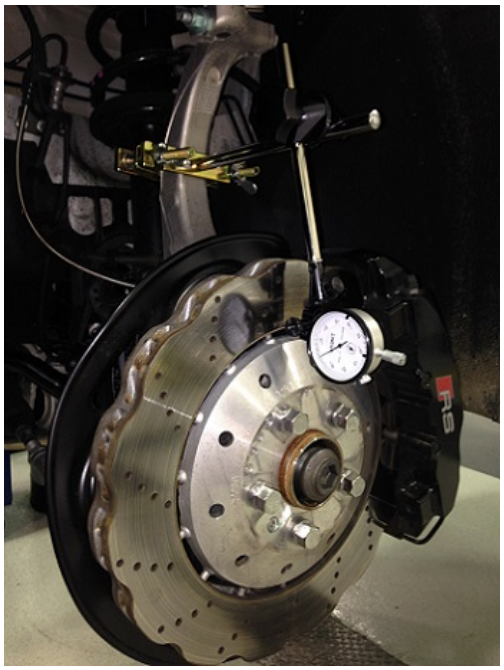

Figure 11. *Example of run-out measurement tool VAS6079/1 properly secured to a solid suspension component*

Use the following values to determine the severity of the run-out:

Disc braking surface (Figure 12, point 1):

- Disc hub and wheel hub run-out impact this value.
- Maximum run-out: **0.06 mm / 0.002”**

Disc hub (center of the brake disc) (Figure 12, point 2):

- Wheel hub run-out impacts this value.
- Disc hub run-out impacts the disc braking surface run-out.
- Maximum run-out: **0.03 mm / 0.0012”**

Wheel hub (without the disc installed) (Figure 12, point 3):

- This value impacts the disc hub and disc braking surface run-out. High run-out can distort the brake disc.
- Maximum run-out: **0.02 mm / 0.0008”**

Figure 12. *Run-out measurement locations: disc braking surface (1), disc hub (2), wheel hub (3).*

Warranty

This TSB is informational only and not applicable to any Audi warranty.

Additional Information

All parts and service references provided in this TSB (2022584) are subject to change and/or removal. Always check with your Parts Department and service manuals for the latest information.