

Put the Brake on noise.



Brake assembly unit being tested inside a sound booth.



Some pads have multi-directional chamfers to reduce noise.



Shims use a variety of fixings, including adhesive and rivets.



The arrows should follow the direction of disc rotation.



Fitting a directional pad the wrong way round will cause noise.

Car manufacturers have made enormous advances in refinement. Today's family cars offer NVH (Noise, Vibration and Harshness) levels that would have been impressive for luxury models 30 years ago. One of the key focus areas for manufacturers is eliminating brake noise. Complete caliper, disc and pads assemblies are tested in specialist sound booths to detect noise generation over a range of speeds and conditions.

The role of shims

Most brake noise is caused by vibration between pads, caliper and discs, and pad manufacturers deal with this by using shims to locate the pad correctly in the caliper. As brake caliper design has become more sophisticated to meet motorist's increasing expectations for braking performance and quiet operation, so shims have evolved too.

Advanced manufacture

Today shims are made from metal, composites, rubber and even fibreglass. Shim shapes have also become more complex, to aid positive location. However, the shim must still stay attached to the pad, otherwise noise will still occur. Manufacturers use various techniques to make sure the shim is firmly fixed.

Some shims are attached by phenolic resin and compressed against the pad's back plate at approximately 150°C. Some are simply riveted, while others are fixed by pins and pressed into recesses in the back plate. This latter type allows the pad to compress more when cold, minimising noise, without allowing too much compression when hot, which could lead to excessive brake pedal travel.

Directional fittings

Metal shims may have cut-outs, allowing the caliper piston to pitch the pad at an angle to the disc to aid bedding-in and eliminate noise. These shims may have arrows on them; it's essential the arrow follows the direction of disc rotation to prevent noise. This is also true of pads with chamfers at one end; these should be at the leading edge, against the direction of rotation. Some brake pads have multi-directional chamfers, designed specifically for vehicles with known noise problems.

Good workshop practice

What does all this mean for the workshop, dealing with a car that had silent brakes when new but has now covered thousands of miles? It's vital to make sure the shims can still do their job. Don't forget they will have endured exactly the same heating, cooling and pressure cycles as the pads, so if the pads are worn, the shims will also be past their best. Most pads supplied by Apec Braking are already fitted with shims, and as these are to OE specification, you can be sure they are fit for purpose. Where pads have separate shims, the shim needs to be re-tensioned so it still locks firmly to the pad. Apec Braking offers a complete range of accessories such as springs, to provide correct tension, prevent uneven wear, and silence those complaints about noise.