

### INCORRECT ASSEMBLY



- APPEARANCE** Hub contact surface distortion, and/or cracking around the fitment holes
- CAUSE** Tightening sequence incorrect. Insufficient tightening torque used
- EFFECT** Vibration particularly on initial brake applications
- REMEDY** Replace the discs and adhere to both correct fitment sequence and manufacturer's recommended torque settings



- APPEARANCE** Hub contact surface is detached or distorted
- CAUSE** Excessive tightening and failure to observe manufacturer's recommended torque and sequence during tightening
- EFFECT** Detachment of disc contact surface. Complete brake failure
- REMEDY** Full inspection of braking system and associated components. Replace any failed components and fit new discs observing manufacturer's recommended torque and sequence during tightening



- APPEARANCE** Blue spots, darker colour of some disc areas. Evidence of localised overheating
- CAUSE** Excessive hub run-out. Uneven disc-to-pad contact generates excessive oscillation which in turn leads to localised heat generation – subsequently discolouration (blueing)
- EFFECT** Progressively increasing noise and vibration
- REMEDY** Correct the wheel hub run-out and ensure that this falls within the correct tolerances



- APPEARANCE** Distortion of the hub contact surface and/or cracking around it
- CAUSE** Overly severe tightening torque used on the positioning screw
- EFFECT** Vibrations experienced from initial brake applications onwards
- REMEDY** Replace the discs avoiding excessive tightening torque. Positioning screws are only intended to ensure that discs are positioned correctly



- APPEARANCE** Dirt and/or rust on hub surface
- CAUSE** Contamination on the hub surface can lead to misalignment during mounting leading to irregular contact between pad and disc surfaces and uneven wear of the disc
- EFFECT** Disc Thickness Variation which leads to oscillation of the disc surface resulting in noise and vibration. The effect becomes progressively greater with use
- REMEDY** Remove the disc and carefully clean the surfaces of wheel hub and disc, eliminating rust and other debris. Check that the support surface is neither distorted nor damaged. Replace discs observing manufacturer's recommended torque and sequence during tightening



- APPEARANCE** Detachment of the disc hat from the braking surface
- CAUSE** Mechanical stress through misalignment. Incorrect assembly or positioning of the caliper and disc results in ongoing asymmetrical wear of the braking surface, eventually causing detachment
- EFFECT** Initially loud noise and vibration during braking with complete mechanical failure after detachment
- REMEDY** Full inspection of braking system and associated components. Replace any failed components and fit new discs observing manufacturer's recommended torque and sequence during tightening. Before fitting discs check the alignment and assembly of the caliper body on the axle

### ASSOCIATED COMPONENT FAILURE



- APPEARANCE** Grooving on the disc
- CAUSE** The deep grooves are caused by loose abrasive particles between the pads and disc. Foreign debris may enter from outside the brake system (road, dirt, water) or from poorly mixed friction material
- EFFECT** Noise during braking and normal running, and lower brake efficiency due to reduced braking contact surface
- REMEDY** Replace pads and discs



- APPEARANCE** Disc surface contamination – glazing and/or dark spots
- CAUSE** Friction material deposits have transferred to the disc surface. This usually occurs where poor quality brake pads have been fitted
- EFFECT** Vibration, poor braking efficiency and hard pedal
- REMEDY** Only install good quality brake pads with friction material suited to the brake and vehicle

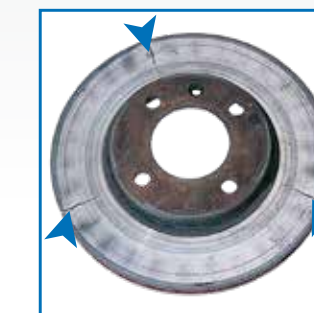


- APPEARANCE** Uneven wear of braking surfaces. Blue spots in the center of braking surface. Possible appearance of cracks
- CAUSE** Incorrect assembly of the caliper and/or pads can result in the pads being at differing angles to the disc, each side wearing at altered rates. The blue spots are generated by severe localised overheating where the friction contact occurs
- EFFECT** Gradual onset of vibrations, due to heat spots. Probable reduction of brake efficiency
- REMEDY** Check and, if necessary, repair the caliper. Replace pads, checking type and shape are correct for application



- APPEARANCE** Uneven wear of brake pads. Major wear on one pad with minimal wear on the opposing side
- CAUSE** Caliper seizure. One brake pad is in constant contact with the disc causing the pad to wear down to the metal backing plate. The side of the disc in contact with the backing plate becomes badly scored, while the other side of the disc and the other pad are practically new
- EFFECT** Ongoing grinding noise, vibration and low braking efficiency. Possible unbalanced braking action with vehicle pulling to one side
- REMEDY** Caliper needs to be checked, replaced or repaired. Replace brake pads and discs as necessary

### MISUSE/THERMAL DAMAGE



- APPEARANCE** Radial fractures/blue spots corresponding to the venting frames
- CAUSE** The blue spots are symptomatic of rising cracks. These are caused by metallurgical change in the surface material making it hard and brittle. This is typical of overloading the brakes beyond normal design limits. This could result from intensive or unusual brake use e.g. aggressive driving or excessive payload
- EFFECT** Brake fade/reduced brake performance, noise, vibrations
- REMEDY** Replace the discs, avoid abuse of the brake system and make more efficient use of the engine/gears to aid speed reduction



- APPEARANCE** Discs show colouring of varying intensity and shades (blue, violet, golden)
- CAUSE** Poor bedding-in. It is normal on new installations to experience slight variations on the surface between the pad and disc. If not properly bedded, the surfaces where friction occurs become overheated leading to a metallurgical change on the friction surface
- EFFECT** Poor brake efficiency due to decreased friction. Vibrations can occur which may worsen over the life of the pad and disc
- REMEDY** Replace the discs and respect the correct bedding procedure, i.e. moderate use of the brake during the first 200 kilometres

### ABNORMAL WEAR



- APPEARANCE** Excessive wear. Disc thickness is lower than manufacturer's recommended 'Minimum Thickness'
- CAUSE** Discs were not checked regularly or changed at the correct point
- EFFECT** Performance decrease, vibration and excessive noise while braking
- REMEDY** Full inspection of braking system and associated components. Replace any failed components and fit new discs observing manufacturer's recommended torque and sequence during tightening. Ensure future checking and periodic maintenance



- APPEARANCE** Disc heavily worn with surface grooves
- CAUSE** Excessive or complete brake pad wear results the brake pad backing plate contacting the disc (metal to metal) damaging the disc surface
- EFFECT** Very low braking efficiency/increased stopping distances and grinding noise
- REMEDY** Replace discs and pads. Where applicable, confirm the pad wear warning indicator circuit is working correctly



- APPEARANCE** Deep grooving between hat and disc surface
- CAUSE** Excessive pad and disc wear may lead to movement of the backing plate within the caliper. In this case, the backplate of the worn pad has come loose from its seat within the caliper causing grooving between hat and disc surface
- EFFECT** Very low braking efficiency with a long pedal stroke and heavy noise
- REMEDY** Replace discs and pads. Check and, if necessary, repair the caliper

