

WINNARD

Brake Disc and Brake Drum Service Guide

BRAKE DISCS

WEAR

The minimum thickness is the measurement across the width of the worn braking faces and is stamped on the outer diameter, details are also available on the Winnard web site. If the thickness is below the advised minimum then the disc must be replaced. If there are any signs of uneven wear then the caliper should be inspected to ensure correct operation and re-set as per the manufacturer's specifications. Brake discs can be skimmed if they within acceptable limits.

HEAT CRAZING

Heat crazing is the result of normal heating and cooling of the brake disc during service. These fine heat cracks are not detrimental to the performance of the brake. However, heat crazing can develop into deeper cracks. Therefore, any discs with radial cracks deeper or wider than 1.5 mm should be machined, as long as the minimum thickness allows, or replaced. The early development of heat crazing can be an indication of an operational problem.

CRACKING

Deep surface cracks are usually the result of excessive heat. Brake discs with cracks going through to the cooling duct or from the inner to outer edge of the braking face must be replaced. In our experience this type of damage is generally caused by an incorrectly adjusted / damage brake caliper or is the result "coning" due to high operating temperatures. For further information talk to our technical department about our bulletin "BRAKE DISCS - Heat Crazing and Cracking". Once the disc has been replaced the braking system should be checked for correct caliper operation, braking balance between wheels, axles and trailer.

HARD SPOTS

Hard spots are slightly raised coloured areas on the braking surface and are created by non-uniform contact cycles creating localised graphite crystallisation in the surface of the cast iron. It may be possible to remove these hard spots by skimming the braking surface if the disc is within the minimum allowable thickness. However, continuation of this condition can, under extreme conditions, result in a thermal transformation of the casting structure into a material known as "martensite". Martensite is an extremely hard material which cannot be removed, therefore we would recommend immediate replacement.

GROOVED DISCS

A grooved disc is defined by circumferential scoring around the braking surface. If the depth of the grooves exceed 0.5 mm (0.020") then the brake disc must be either machined, if the minimum thickness allows, or replaced. We would also recommend that the brake pads are inspected and replaced if the wear pattern has transferred to the friction surface.

BLUE COLOURING

The blueing of the braking surfaces indicates a high operating temperature. This can be caused by continued hard stops, an imbalance in braking or a malfunction in the brake caliper. It is not necessary to machine or replace the brake disc but the braking system and caliper adjustment should be checked.

FRICTION TRANSFER

Friction transfer, indicated by a layer of friction material on the braking surface, occurs when the brake pads exceed their effective temperature limit. At this point friction material will transfer onto the disc face at random intervals. Once this occurs the probability of material transfer is increased with central lines of friction developing. To resolve the problem the caliper should be examined to ensure correct operation along with distribution of the braking load throughout the system. The brake disc can be re-machined subject to minimum thickness allowance.

CORROSION

Some brake disc designs have the ABS teeth incorporated into the casting at the base of the disc. Unfortunately, despite an anti-corrosive coating the teeth can, over time, corrode and cause faults with the ABS system. If the corrosion is not too severe the teeth can be cleaned with a wire brush and re-coated with anti-corrosive or high temperature paint, otherwise the disc must be replaced. To help prevent this problem we have developed a range of KTL coated Steel ABS ring designs. See our web site for further details www.winnard.co.uk

BRAKE DRUMS

WEAR

The maximum diameter of a brake drum is dependent upon the braking system and the drum's design. To measure the diameter use a micrometer or a steel rule. The maximum diameter should not exceed 1% of it's original new diameter. Information on the original, new, diameter is available at the Winnard web site.

HEAT CRAZING

Heat crazing, as illustrated, is the result of normal heating and cooling of the brake drum during service. These fine heat cracks are not detrimental to the performance of the brake and will frequently wear away and reform as a result of normal braking. However, heat crazing can develop into deeper cracks. Therefore, the surface condition should be examined to ensure the cracks are not too severe.

CRACKING

Deep surface cracks, as illustrated, is usually the result of excessive heat. Brake drums with cracks going through the casting wall must be replaced immediately. Repeated cracking may indicate a system, balance or geometric problem.

HARD SPOTS

Hard spots are slightly raised coloured areas on the braking surface and are created by non-uniform contact cycles creating localised graphite crystallisation in the surface of the cast iron. This condition indicates that the brake drum has been operating at extremely high temperatures. It may be possible to remove these hard spots by skimming the braking surface as long as the diameter is within allowable limits. However, continuation of this condition can, under extreme conditions, result in a thermal transformation of the casting structure, which can result in a material known as "martensite". Martensite is an extremely hard material which cannot be removed, therefore we would recommend immediate replacement.

SCORED DRUMS

A scored brake drum, with a grooved tramline type wear pattern, is the result of an abrasive foreign body working between the brake lining and the braking surface. It can also be the result of excessive brake lining wear, creating a metal on metal contact situation. Scoring will reduce braking performance and should be removed through skimming as long as the drum is within maximum diameter limitations. Brake drums with severe scoring must be replaced and re-fitted with new brake linings.

BLUE COLOURING

A blueing of the braking surface is an indication of extremely high operating temperatures. This can be caused by continued hard braking, a system imbalance, incorrect brake geometry or worn return springs. It is not usually necessary to re-machine or replace the drum as long as it is within diameter and ovality tolerances. To correct this problem the system should be checked for proper balance, the return springs examined for weakness / damage and the brake shoe clearances checked and adjusted as necessary. Failure to resolve this problem could result in a cracked or heat damaged braking surface.

OVALITY

Brake drum ovality is a condition were the drum is out of round. The maximum tolerance we allow for ovality is 0.005" (0.127 mm). Ovality is usually caused by improper handling but can also be affected by incorrect storage or extreme operating conditions. Therefore, brake drums should always be handled with care and stacked correctly (see storage image below). It may be possible to re-machine the braking diameter as long as it does not exceed the drums allowable limitations.

STORAGE

We would always recommend that brake drums are stacked face to face starting with the open end on the floor, as illustrated in the left image. Incorrect storage, as illustrated on the right images, can cause operational issues including ovality. Brake drums should always be handled with care and assistance sought for heavier items.

MAXIMUM DIAMETER EXAMPLES (To the nearest mm)

NEW DIAMETER	MAX. SKIM	MAX. WEAR
350	353	354
394	397	398
413	416	417

