Service Engineering Bulletin

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Installation of Semi-Finished, Thin Wall, Dry Liners.

Semi-finished, thin wall, dry liners are typically fitted to engine blocks as a way of repairing damaged parent bores and saving an engine block. These repair liners can be either unflanged/parallel or flanged. They are installed with an interference fit in the block and the following guidelines are provided for assistance.

• Fit the main caps and tension the main cap bolts. If possible, fit a torque plate to simulate assembled engine loadings and distortion - especially of the bores.
• Measure the ground-finish, outside diametre of the liner at four equi-spaced locations around the circumference - 20 mm down from the top of the liner, 20 mm up from the bottom and in the middle. Average the four readings at each level and then average the three level averages. You would expect the three level averages to be within a total range of 0.03 mm. Readings at any given level can vary greatly, but the liner was machined round and will return to round when fitted to the block.
• When aligning a bore in the boring bar, set up from an unworn/undamaged section of the bore. At this setting, check and/or machine the flange recess to ensure the bore and flange recess are concentric and square to the deck of the block.
• If using a parallel liner, a 5 - 6 mm long step should be left at the bottom of the bore to support the liner. This is not required for a flanged liner.
• 0.025 - 0.038 mm interference fit is ideal for bores 75 - 100 mm diametre, and 0.038 - 0.050 mm interference fit for bores 100 - 125 mm diametre.
• As heat transfer is a critical function of the bore walls, correct contact between the liner outside wall and parent bore is paramount. The parent bore finish must be very fine if bored, and ideally be a fine hone finish. Wash and clean as you would a bore for assembly.
• Wipe the outside of the liner and the inside of the parent bore with acetone before installation.
• Put a 25 mm wide smear of Loctite 518 or similar around the bottom of the parent bore, immediately before installing the repair liner. This serves two purposes - it helps stop the liner moving in critical circumstances and will stop oil seeping up between the parent bore and outside of the liner. Any excess will get pushed out the bottom. There should be very little heat transfer at the very bottom of the bores and so this is not an issue. Do not use products on any other location in the parent bores, other than if there has been a break through to a coolant passage.
• When installing a liner, first freeze it in dry ice or liquid nitrogen. Up to 0.050 mm interference fit, the frozen liner should drop into place in the prepared bore. If it does not go all the way home, use a proper liner installation tool that draws the liner in with a bottom plate or bar, top plate and draw bolt; or carefully press the liner home using a hydraulic press. **Allow the block to sit over-night before doing any machining.** This allows the liner to relax in position and the Loctite to cure.
• Under **absolutely no circumstances** should a liner be installed using impact force or loads (e.g. hammer, sledge hammer, air hammer/driver etc.), even if using a steel plate, and definitely not a block of wood. Preferably, a liner should not be pressed or pulled all the way in at room temperature. If this is the only option, the block should be heated to a maximum of 200°C.
• If not fitting a liner to an adjoining bore, check the diametre/s, roundness and taper of the adjoining finished bore/s before and after fitting the repair liner, and boring and honing. This is to ensure fitting the liner has not resulted in unacceptable distortion.