

## 4.5" (114 mm) Carbon / Carbon Racing Clutches

The patented Tilton carbon/carbon (C/C) clutch provides the best combination of light weight, low moment-of-inertia, smooth engagement, and durability. It is an excellent value when properly maintained. Every clutch is tested for clamp load, torque holding capacity, and clean release prior to shipping. Records of the results are included with the clutch. Tilton maintains a file on every C/C clutch they build. This file includes all of the original build and testing information, and all service/rebuild history performed by Tilton.

**Note:** Save the Carbon/Carbon clutch data sheet provided with the clutch. It includes critical maintenance information.

### INSTALLATION

1. Proper alignment of the input shaft with the crankshaft is critical for long clutch life. Use the following procedure if your gearbox uses a separate bell housing. Bolt the housing onto the engine. Place a magnetic base dial indicator on the end of the crankshaft. Sweep the transmission register diameter on the inside of the back of the bell housing. Total indicated runout (TIR) must not exceed **.010" (.25 mm)**. Sweep the back face of the bell housing at a **6" (150 mm)** diameter. The TIR in this position also should not exceed **.010" (.25 mm)**.
2. Install a new pilot bearing. A prematurely worn pilot bearing indicates a bent input shaft or an input shaft that is otherwise not properly aligned. Misalignment can be caused statically (see Step 1) or dynamically, like when the weight of an unsupported gearbox causes a weak bell housing to flex under racing conditions.
3. The drive hub should slide smoothly on the input shaft. An application of anti-seize compound is acceptable if very little is used. You want to avoid having any type of compound making its way to the friction discs.
4. The drive hub can be installed in one of two directions. The clutch will work either way as long as the hub clears the flywheel bolts and the hub's splines fully engage the input shaft splines. The hub will move towards the flywheel as the clutch wears.
5. With the flywheel already bolted to the crankshaft, place the clutch assembly onto the flywheel. Make sure that the pressure plate ring is sitting flush against the top floater plate of carbon and that all of the round bosses are locating in the pockets on the carbon plate. Tighten the bolts in a star pattern turning each one less than one full revolution at a time. The 1/4" bolts should be torqued to **125 lb-in (14.1 N•m)** for dry threads or **97 lb-in (11.0 N•m)** with oil or thread locking compound. Threaded aluminum flywheels may require less torque to prevent stripping the threads. Once the bolts have been tightened, the diaphragm spring fingers should appear nearly flat. If the fingers appear to be inverted, you may not have the proper pressure plate installed in the clutch or the pressure plate may not be seated in the top floater plate.
6. Set the bearing clearance. If you are using a Tilton hydraulic release bearing the recommended clearance is **.230" - .150" (5.8 mm - 3.8 mm)**. With a new clutch, depending on your particular clutch configuration, the bearing clearance loss will be four to five times the amount of the clutch wear. You need to have enough bearing clearance to allow the full wear range of the clutch.
7. When installing the gearbox, do not allow its weight to be supported by the clutch.
8. The clutch diaphragm spring must not be stroked beyond **.200" (5 mm)**. A pedal stop may be required to prevent damaging the clutch. One can prevent overstroking the clutch during the bleeding process by applying a light force to the pedal and opening the bleed screw before stroking the pedal. The master cylinder should have a bore size of 5/8" (16 mm) when using a Tilton hydraulic release bearing.
9. Set the pedal stop. A simple method for setting the pedal stop is to place the car on jack stands. With the engine off and the transmission in gear, slowly depress the clutch pedal while having another person trying to rotate a drive wheel or driveshaft until the point where the clutch breaks free. Measured at the footpad, give the pedal an additional 1/4" (6 mm) of travel and set the pedal stop there.



## MAINTENANCE

1. Thicker replacement pressure plates are supplied to compensate for clutch. The wear compensating pressure plates are available in thickness increments of **.010" (.254mm)**. It is recommended that pressure plates be changed at least at **.020" (.508mm)** increments, as the clutch torque capacity begins to drop quickly after **.025 (.635mm)** of wear. The most accurate method for checking wear is to measure the thickness of the individual plates and compare them to the dimensions of plates listed on the build sheet supplied with the clutch. The diaphragm springs in the clutch cover should be changed at **.040" (1.02mm)** of wear intervals, as the diaphragm spring will lose clamp load over time due to stroke cycles and heat cycles. Please contact Tilton Engineering to arrange for diaphragm spring change and servicing of the clutch.
2. Check the clearance between drive hub fingers and the slots in the driven plates. The slots must not be more than **.020" (.5 mm)** wider than the drive hub's fingers. This is best checked with a feeler gauge. Premature wear of the slots is usually an indication of input shaft misalignment with respect to the crankshaft.
3. Check hub float. With the clutch installed on the flywheel the drive hub should be able to float forward and backward at least **.010" (.25 mm)** on the input shaft. Once the axial float disappears the clutch will start to slip.
4. Check for signs of excessive heat. A blue-colored hub is a sign of high temperatures from a clutch having been slipped excessively. High temperatures can cause the spring to lose clamp load. Send the assembly back to Tilton for inspection if damage is suspected.
5. Increased wear at the release bearing contact area is a sign of a heavy left foot or a bearing that needs to be replaced. Many clutches have been lost to the failure of a \$30 bearing that was run one race too many.
6. Whenever inspecting a clutch, be sure to replace all of the plates in the same position and orientation in which they were originally installed. Alignment marks can be found on the plates and the clutch cover.
7. Blowing out a clutch cover with an air nozzle is acceptable. Cleaning the clutch cover in a solvent tank is not recommended as this removes the grease from the internal diaphragm spring pivot locations.
8. Always start a 12 or 24-hour race with a new or freshly rebuilt clutch.
9. If the clutch is used too far beyond recommended wear (pressure plate change) intervals, the clutch may slip excessively and result in total clutch loss. Carbon clutches are rebuilt at Tilton and can be sent directly or through your distributor. If you send it directly, call first to obtain a Returned Merchandise Authorization (RMA) number. It is to your benefit to supply information on the type of car, type of racing, and any other particulars concerning the reason for the return. You will be provided with a quote before work is performed. All rebuilt clutches are tested for clean release, torque capacity, and clamp load before being returned to the customer.

