

4Terrain Clutch System

Engineered for the brave,
bred for the serious 4WDING enthusiasts.



**3 TIMES
STRONGER**

TO BATTLE THE TOUGHEST TERRAIN



4TERRAIN OFF ROAD COVER ASSEMBLIES



4Terrain
OFF-ROAD ENGINEERING



4x4 systems need a higher torque capacity while retaining good pedal feel with fine modulation control. These characteristics inevitably increase heat which reduces service life. So the ideal 4x4 clutch system must also have improved heat dissipation.

4Terrain cover assemblies are in themselves high clamp load covers providing increased clamping force as compared to standard product. There are however two additional features.

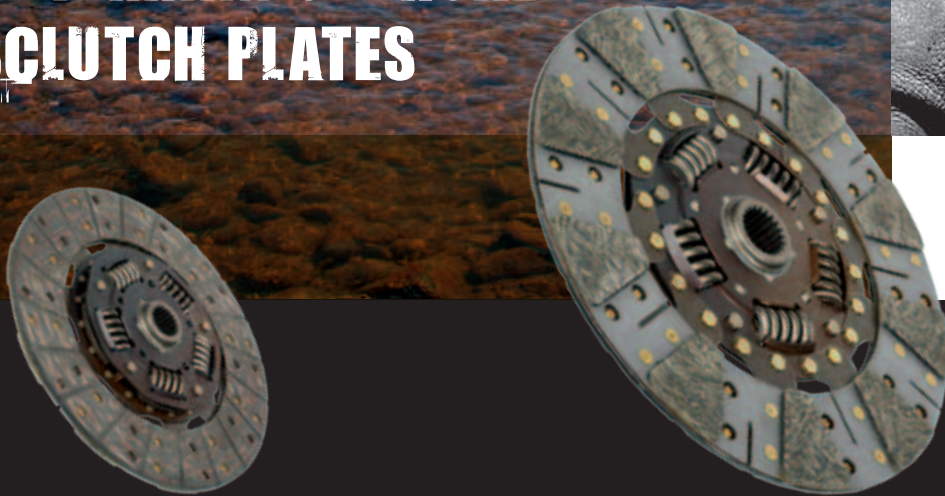
Spheroidal Graphite Castings: Approximately 300% stronger than a standard casting this material (sometimes referred to as an “Anti Burst” casting) not only increases strength by approx 3 times, it also improves heat dispersion. This is especially necessary in 4WD applications where constant use of the clutch is highly likely and therefore high operating temperatures can be expected.

Comfortable Pedal: Importantly the 4Terrain system is designed to benefit you the driver. The unique combination of features delivers a high torque capacity clutch while also providing very comfortable pedal efforts, progressive modulation and good pedal feel.

Balanced Covers: To insure that the clutch system performs at maximum efficiency and that no unwanted vibration is generated as the cover spins, all 4Terrain cover assemblies undergo a 2 stage balancing process. Prior to assembly the pressure plate is independently balanced. Then after final assembly, the entire cover is re-balanced.

However, the cover assembly is only half the equation. It is only when combined with our 4Terrain clutch plate, a segmented clutch plate design which reduces the surface area upon which this force is distributed, that the full increase in Torque transmission capability is unleashed.

4TERRAIN OFF ROAD CLUTCH PLATES



4Terrain
OFF-ROAD ENGINEERING

Off Road driving is a specialized field. The 4Terrain Clutch Plate is engineered and designed specifically for the unique demands of 4WDING.

So unique is the design, that no other 4WD performance clutch plate design offers the same characteristics and benefits. The great advantage or key to the success of the 4Terrain clutch plate lies in the unique design and formulation of the friction materials.

Smooth Engagement, fine modulation control, extended service life, less fade, increased torque capacity are all benefits of the unique 4Terrain clutch plate design.

- **Segmented Clutch Plate Design:** One side of the clutch plate incorporates a series of pressed organic segments specifically formulated in an Aramide compound, bonded to a H10 steel backing plate. Each Aramide segment is precision formed and bonded to ensure consistency in terms of surface area and weight distribution. The friction material itself was selected for its:

- **Long Life:** 4Terrain Aramide material displays wear characteristic which are 50% lower than conventional material. This ensures long life and reduces collateral material contamination.

- **Less Fade:** Fade is a term used to describe the drop in performance experienced in a clutch as the unit becomes heat affected. In serious 4WD applications high temperatures and therefore fade is common place. 4Terrain Aramide material reduces heat induced fade by almost 50%. This feature combined with 4Terrains spheroidal graphite clutch pressure plate further improves the ability of 4Terrain to dissipate heat allowing the clutch to run cooler for longer.

- **Smooth Engagement:** As all experienced 4WDers know the smooth engagement and disengagement of the clutch relates directly to the control you have over the motion of the vehicle. 4Terrains friction material combination reduces judder (shudder) during operation. This improves "feel" and control of the vehicle.

4TERRAIN OFF ROAD CLUTCH PLATES

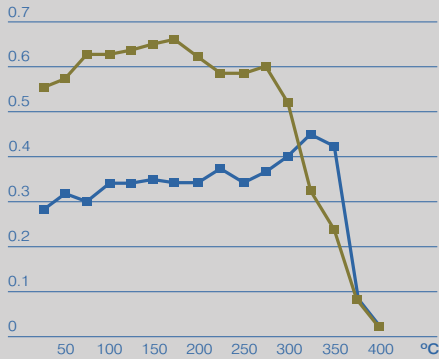


Less Fade

■ Standard ■ 4Terrain

Fade characteristics at temperature - 4Terrain more resistance to clutch fade at high temperatures

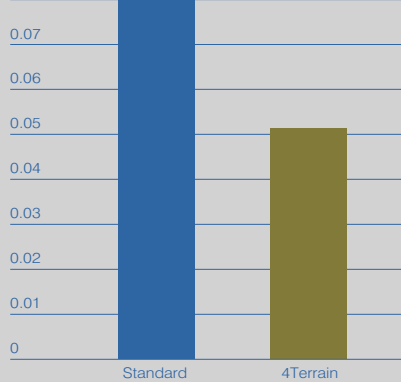
Coefficient of Friction



Increased Service Life

(Subject to vehicle use)
(Based upon 9000 applications)

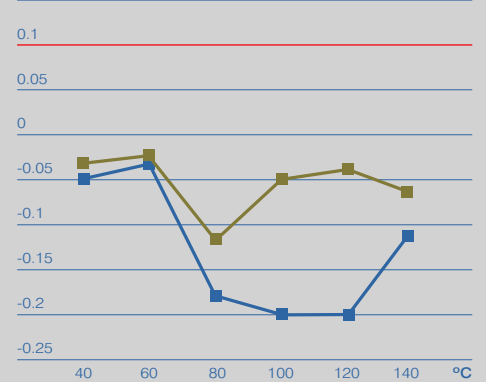
Friction material wear characteristics -
4Terrain almost 50% increase in wear life



Reduced Shudder

■ Limit Value ■ Standard ■ 4Terrain

Clutch judder / shudder characteristics
4Terrain offers smooth engagement



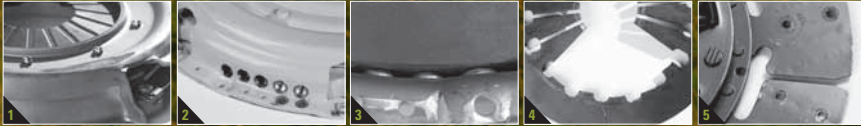
The non segmented side of the clutch plate incorporates high quality, synthetic composite material selected for its co-efficient of friction over a wide temperature range, configured as a full hoop.

The combination of the 2 materials affords 4Terrain a range of significant performance and operational advantages as compared to a standard clutch plate using a standard configuration.

4Terrain clutch plates also use the latest Multi rate compression design clutch hub assembly. This design allows the clutch plate to dampen NVH (Noise Vibration and Harshness), particularly beneficial in high compression engine applications such as diesels where higher engine vibrations are common.

THINGS TO LOOK OUT FOR

Amateur Engineering presents well and delivers poorly.
Ensure any product you source is backed by a real manufacturer.



Tanalt
OFF-ROAD ENGINEERING

Making a cover with heavy clamp load is simple. Making one that delivers acceptable lift, acceptable pedal effort, temperature dissipation, durability and burst strength, matched with friction material and damped, properly tested and warranted is not that simple.

1/ In the first image above the source codes of the product were ground off to disguise the origin of the product. You need to know the origin and therefore the quality of the part.

2 & 3/ In the second and third example above the builder balanced the cover by drilling through both the housing and the casting. Burrs from the drill hole actually foul the Casting while the holes themselves weaken the part.

Very poor engineering.

Shot blasted covers: A used cover pressing can be shot blasted and coated to present as new. It will present as an even mat finish with a clear coat of varnish. You should be able to see draw marks on the pressed metal cover and a shine to the metal or plated finish.

Paint can be used for aesthetics: In other cases it can be used to hide prior use, flaws, defects, wear, witness marks etc. A used standard cover assembly can be stripped, reconditioned and sold as an upgraded clutch. Make sure you get what you pay for.

Quality Certification: ISO9000-2000 or TS16949 are generally recognized as minimum standards in the Automotive Industry. We recommend that you always look for product developed and produced by a manufacturer certified to one of these levels. Clutch Industries, manufacturers of the CI Performance range are certified to ISO9000-2000.

4/ The fourth image shows a diaphragm spring which was drilled out to accommodate a larger rivet. Weakened, the part failed.

5/ The fifth image shows how someone has used a punch and hammer to manually flatten segments, disguising poor lift in the associated cover.

Amateur Engineering.

Engineering and Test Capability: There is a big difference between an engineered part and someone's best guess. Simple questions to ask of your supplier include:

- Qualifications of the Engineers developing the products
- Location of the Engineers (Australian or New Zealand based provides local insight)
- CAD/CAM capability
- Dynamic Test capability (Clutch Dynamometer on site for durability and dynamic testing)
- Details of test cells for: Torque Capacity, Torque Angularity, Burst Strength, Clamp Load, Pedal Effort, Lift, Durability

CI Performance have all these capabilities and more, based and staffed in Australia, dedicated to developing performance clutch systems suitable for the conditions we experience in Australia and New Zealand.



BRAVE?

THERE ARE NO BOUNDARIES.

Freecall 1300 369 787

www.ciperformance.com.au

www.clutchindustries.com.au

CI PERFORMANCE

HIGH PERFORMANCE CLUTCH SYSTEMS

CI Performance is the Performance Division of Clutch Industries. Clutch Industries was established in 1951 and since then has grown into the only full service clutch manufacturer based in Australia and New Zealand. Over time Technologies have been developed, Engineering and Test capabilities refined, Manufacturing capabilities expanded, Quality Accreditation achieved and a wealth of knowledge, experience and expertise accumulated.

As a specialist clutch manufacturer we are able to offer high level services to both Original Equipment and Aftermarket Customers.

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