

# acker

## **EFFECTIVE IN DIFFICULT FORMATIONS**

The Acker Denison Sampler (core barrel) has proven its effectiveness and has withstood the test of time in providing geologists and geotechnical engineers with reliable undisturbed samples from a wide range of materials.

The Denison is a valuable and highly efficient tool patented by the Acker Drill Co., Inc. and first used by the Denison District, Corps of Engineers, U.S. Army, Denison, Texas, U.S.A.

The Sampler successfully recovers undisturbed samples from hardpan, highly compacted formations including soft shales, cohesive soils, rare earths, kaolin, sands, sea bottom and other soft and easily eroded materials. This type of versatility accounts for the Denison's worldwide acceptance by soils engineers, foundation designers, contractors, architects and consultants.

### **THE DENISON PERFORMS WHERE OTHERS FAIL**

Under certain conditions, ordinary thin wall samplers obtain undisturbed samples from clay, silts and organic (peat) deposits. But, when the deposit hardens, and extreme pressure is needed to collect the sample, the Denison does the job with ease.

The Denison Core Barrel has proven that it is at its best when adverse conditions are encountered.

### **TRULY UNDISTURBED SAMPLES RECOVERED**

The most important advantage of Acker Denison Core Barrel is that the samples obtained are not deformed or undisturbed during the recovery process. Such samples are truly undisturbed as defined in the generally accepted meaning of the term.

### **LARGER SAMPLES OBTAINED**

Because of the size of the Denison Sample, sampling distortion is considerably less than that in samples from smaller, thin tube samplers. The larger Denison Sample can be trimmed in the laboratory to minimize the possibility of any slight deformation by wall friction or slight drag of the core retainer springs.



## **DESIGNED FOR USE IN NW CASING**

The Acker 2-15/16 inch (76.2 mm) Denison is the smallest Denison available and incorporates all the engineering refinements of the 4 larger sizes - yet having the added features of being considerably lighter and easier to handle in the field. The 2-15/16 inch Denison operates inside NW casing.

<b>Size</b>	<b>Hole Diameter</b>	<b>Core Diameter</b>	<b>Rod Conn. (Box)</b>
2-15/16"	3-1/16"	1-7/8"	NW
3-1/2"	3-5/8"	2-3/8"	NW
4"	4-1/8"	2-13/16"	2-7/8" API Reg.
5-1/2"	5-5/8"	4-3/32"	2-7/8" API Reg.

## **FEATURES**

Essentially a double tube, swivel type of core barrel, the Denison is capable of producing undisturbed samples from soft materials as well as hard soils where the pressures required to push or even drive thin wall samplers might produce undesirable results. The Denison has several important distinctions from a double tube core barrel:

1. The inner tube of the sampler contains a plastic liner designed to retain the sample during sampling and to protect the sample once it is removed for its trip to the laboratory.

2. The inner tube show precedes the cutting bit into the formation to prevent torsional disturbance of the sample by the circulating drill fluid.
3. Three interchangeable hard faced cutting bits are provided for variation in materials, allowing undisturbed sampling to be accomplished.

### **OPERATION**

The Denison Sampler is rotated while being pressed into the soil in either a cased hole or a hole stabilized by drilling mud. The soil sample or core is retained in the sampler by wall friction or by a basket type of retainer. Three different lengths of saw tooth cutter bits are provided to aid sampling in soft, medium or hard materials. When extremely hard and compacted formations are encountered, the Denison can be fitted with a cutter bit is recommended for average conditions. The intermediate cutting bit is recommended for average conditions. Standard length Denisons recover two foot (.6 m) samples. Optional conversion parts are available if 5 ft. (1.5 m) samples are required. The Denison Sampler can be operated by any standard drill rig. The Sampler is designed for use with either clear water, drilling mud or air.

### **HOW THE DENISON CORE BARREL OPERATES**

In operation, the Denison Core Barrel is rotated into the soil either in a cased hole or a hole stabilizer with drilling mud. The inner barrel is a full swing type mounted on anti-friction bearings. The inner tube protrudes below the cutting bit carried by the outer barrel. Purpose of this protrusion is threefold:

1. To insure that the sample is recovered from material undisturbed by cutting action of the rotating bit,
2. To seal off the sample from water or drilling fluid discharged at the bit face, and
3. To protect the sample from deformation by preventing any rotative drag on the inner barrel. The inner tube remains stationary at all times.

As the Denison Core Barrel is forced down with gradually increased pressure, the sample passes through the core retainer into the inner barrel and its plastic liner. The plastic liner serves as a permanent container for the sample. Two types of core retainers are used - a split ring type for harder materials or a basket spring type with thin flexible springs for soft soils. In the smaller size Denison Core Barrels (2-15/16" & 3-1/2"), it is sometimes possible to omit the core retainer altogether and rely on the skin friction of the inner tube to retain the sample. The shoe of the inner tube is made to provide a slight clearance so that the sample swells after entering the barrel, it will tend to be retained by wall friction. As the

sample pushes upward in the barrel, drill fluid or water on top of it is vented through a disk valve to the low pressure area on the outside of the core barrel itself. With soft materials the pressure differential thus created is instrumental in helping to retain the sample. During the sampling operation, fluid flow is reduced to the point of keeping the bit clean and return cuttings slowly flowing out of the hole. When the full length of sample has been run and the core barrel removed from the hole, the inner tube liner is removed with the sample intact and sealed with paraffin in the standard manner for delivery to the laboratory as a true undisturbed sample.

1. **THREADED HEAD** - Available for standard DCDMA rod connections or API couplings.
2. **RUGGED HEAD SECTION** - High strength alloy steel construction reinforced on outer surfaces with tungsten carbide ribs.
3. **RECESSED GREASE FITTING** - Permits complete lubrication of internal moving parts and swivel joint without dismantling barrel.
4. **O-RING SEAL** - Insures a complete hydraulic seal between the core barrel head and the outer barrel.
5. **OVERSIZE INTERNAL FLUID PASSAGES** - Large, annular passageways insure full fluid flow directly to the face of the cutting bit without restriction between inner and outer barrels.
6. **MECHANICAL SEALS** - Protect bearings by keeping out mud and drilling fluid.
7. **SEALED HEAVY-DUTY BALL BEARING** - 4 stacked anti-friction bearings provide extra rigidity to the inner barrel. Because of their high thrust capacity the possibility of sample distortion is minimized. Bearings are completely sealed against drilling fluid and cuttings.
8. **POSITIVE LOCKING DEVICE** - Disc type with raised seat and large port openings insure full flow without sticking.



Drilling fluids are vented to the low pressure area on the outside of the core barrel.

9. **OVERSIZE VENT VALVE** - Disc type with raised seat and large port openings insure full flow without sticking. Drilling fluids are vented to the low pressure area on the outside of the core barrel.
10. **OUTER AND INNER BARRELS** - Made from selected seamless steel tubing with sufficient wall strength to insure continued use under difficult operation. Extra long thread areas insure rigidity and prevent damage to barrels.
11. **THIN-WALL PLASTIC LINER** - Provides a permanent, non-corrosive container for undisturbed samples.
12. **CORE RETAINER** - Tempered, flexible steel basket type remains sample without undue distortion and friction. (Split-ring type retainers also available.)
13. **SAW TOOTH CUTTING SHOE** - Cutting teeth are faced with tungsten carbide alloy for operation in tightly compacted soil and soft rock formations.
14. **REMOVABLE CUTTING SHOE (EXTENDED TYPE)** - Removal of shoe fully exposes the bottom assembly, permitting recovery of inner liner and sample intact, without further disassembly of barrel.