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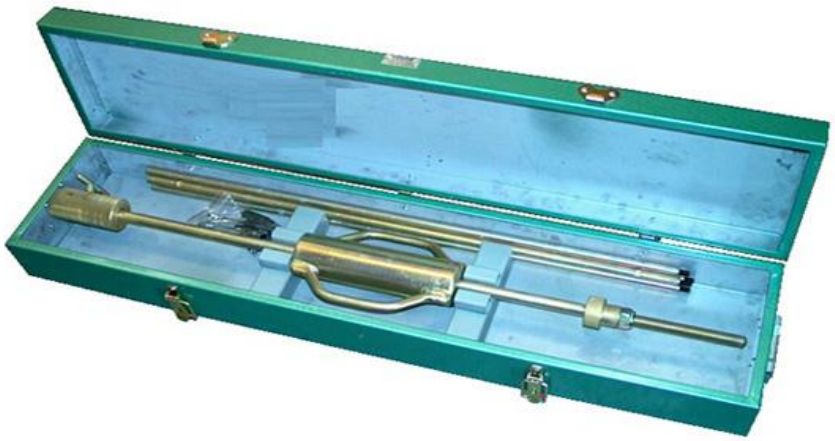
April 2025 V1.0

Dynamic Cone Penetrator (DCP)

Complies with 1289.6.3.2



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DESCRIPTION

The Civilab Dynamic Cone Penetrometer (DCP) is a rugged, Australian-made piece of equipment with a proven track record. The DCP is a compact, cost-effective tool used in many field-testing projects to measure the strength and density of soil. Civilab produces two types of penetrometers, CL24310 (original model) and CL24310FS (finger saver model).

SPECIFICATIONS

The Dynamic Cone Penetrometer (DCP) conforms to the dimensions and mass given in Australian Standard AS 1289.6.3.2 for the determination of the penetration resistance of a soil, dynamic cone method. Civilab Australia manufactures

The Civilab DCP - CL24320 – accessories are listed in the table below, and the DCP layout is illustrated in Figure 1.

Accessory Number	Product Code	Product Name
01	CL24310/01	Conical Tip
02	CL24310/02	Blunt Tip
03	CL24310/03	Flogging Piece
04	CL24310/04	Anvil
05	CL24310/05	Top Rod
06	CL24310/06	Top Nut/Handle
07	CL24310/07	Locking Nut
10	CL24310/10	Hammer Weight 9 kg Mass
16	CL24310/16	Tee Screw
20	CL24310/20	Spanners
21	CL24310/21	Extension Rod 900 mm c/w grub screw
22	CL24310/22	Extension Rod 1000 mm c/w grub screw
23	CL24310/23	Extension Rod 1200 mm c/w grub screw
25	CL24310/25	Grub Screw M10

The design of the DCP incorporates a flogging piece which fits snugly into the anvil. The connection between the flogging piece and the rod is protected from lateral bending movements, which prolong the life of the rod connections.

The ‘slide in’ arrangement also makes it impossible to reverse the rods such that the CL24330 ROD EXTRACTOR is required.

The recommended accessories from Civilab are listed below:

Product Code	Product Name	
CL24330	DCP Rod EXTRACTOR	There is a risk of equipment breaking when hammering in reverse to remove rods. The rod extractor was designed to mitigate these hazards.
CL24340	DCP Carry Case with Wheels	

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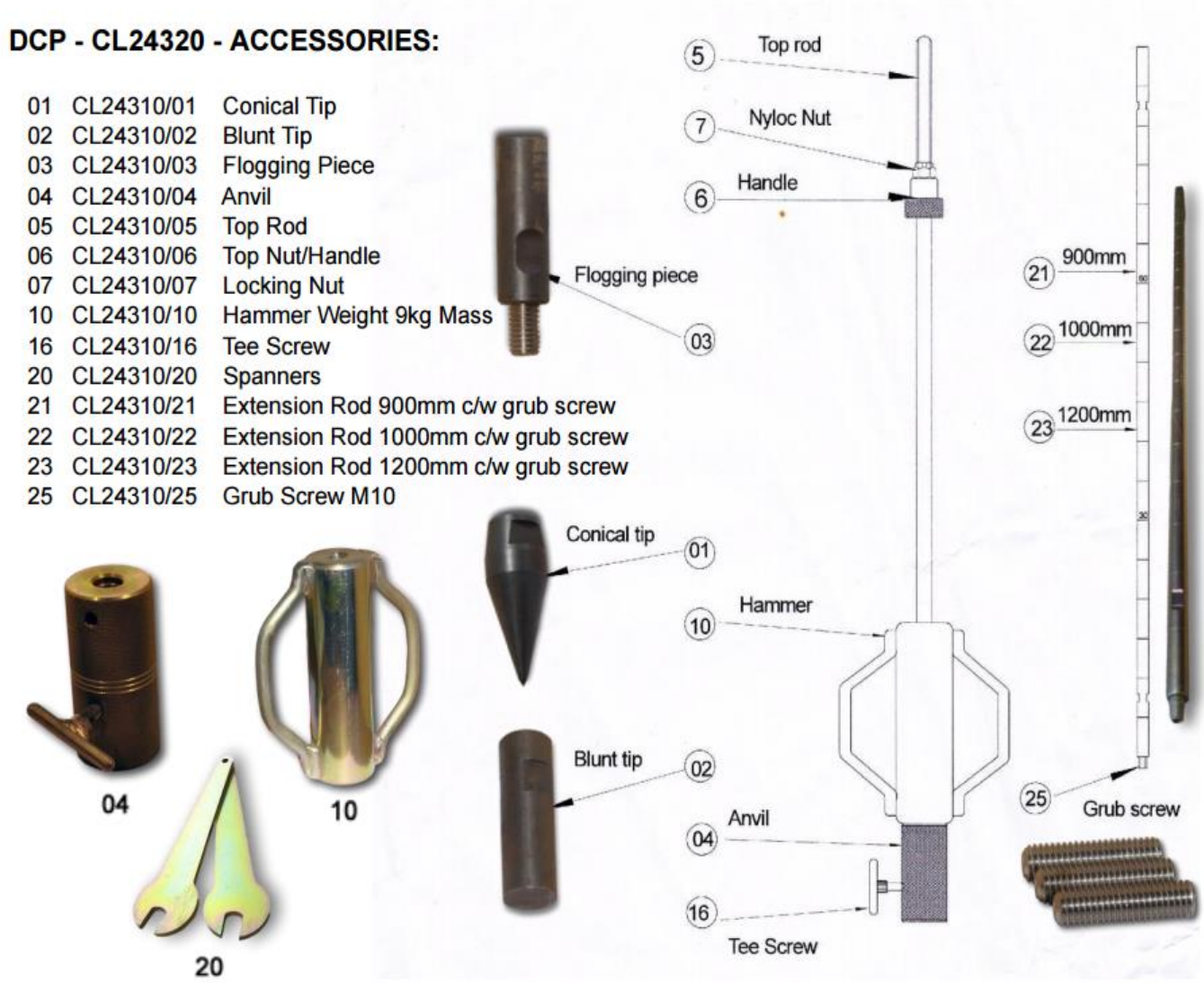

Figure 1: Civilab Dynamic Cone Penetrometer

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OPERATION

The DCP is made up of a 9 kg sliding weight that provides a defined amount of energy by falling down a 520 mm height into an anvil block. To extend the depth of testing, more rods can be attached after the hammer has been driven.

Procedure as per AS 1289.6.3.2:

- Remove material such as crushed rock or gravel, which will be too hard to penetrate with the penetrometer or which may damage the equipment.
- Measure the depth from the surface level to the upper surface of the layer to be tested to the nearest 10 mm and record.
- Hold the penetrometer vertically with the point of the cone on the surface of the layer to be tested, and gently strike the anvil with the hammer until the broadest section of the cone begins to penetrate the surface.
- Raise the hammer to the stop and let it drop freely onto the anvil. Count how many drops it takes to drive the penetrometer and record either blows per mm or mm per blows, whichever is most applicable to your application. Take the depth reading to the nearest 1 mm.
- Material type, moisture condition and location of groundwater should be recorded.
- Continue to penetrate to the required depth up to the full length of the rod until eighth consecutive blows give less than 20 mm penetration.
- Record the analysis readings in your workplace worksheet.
- To remove the DCP from the hole a DCP Extruder can be used.

Do not remove the DCP by forcefully striking the hammer against the handle. This will damage the DCP.

SAFETY INFORMATION

This section covers potential hazards and preventive measures to minimise risks and protect the operator.

Potential Hazards:

- **Falling Objects:** The dynamic impact of the hammer and components could dislodge equipment.
- **Equipment Malfunction:** Unexpected failures in the apparatus, such as loose or damaged parts.
- **Pinching Hands:** Keep hands away from the anvil during operation.
- **Environmental Factors:** Adverse weather (strong winds, rain, or extreme temperatures) can affect equipment stability and operator control.
-

Personal Protective Equipment (PPE):

To help mitigate the identified risks, all personnel involved in the test should wear appropriate PPE:

Hard Hats: Protect against falling objects and accidental impacts.

Safety Glasses: Shield eyes from flying debris.

Gloves: provide hand protection from sharp edges and heavy equipment.

Steel-Toe Boots: Offer foot protection against impact and crushing hazards.

High-Visibility Clothing: Ensures that operators are seen by others in busy or low-light environments.

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MAINTENANCE

Maintenance of the DCP equipment is crucial for accurate results and involves regular checks of components like the hammer, shafts, and cone tip. Proper calibration and cleaning ensure the device functions optimally during tests. Proper calibration and cleaning ensure the device functions optimally during tests.

Routine Visual Inspection

Before and after each use:

- **Check for damage:** Look over the cone tip, impact hammer, rods, and connecting screws. Any cracks, dents, or signs of wear should be addressed immediately.
- **Verify Alignment:** The cone tip and rods should remain perfectly aligned. Misalignment can cause skewed readings and potential component stress.
- **Inspect Fasteners:** Ensure that all bolts, screws, and clamps are secure. Loose fasteners can alter the dynamic response of the penetrometer.
- **Replace Worn Components:**
  Regularly compare wear patterns against baseline measurements. Rods, tips, or hammers showing significant wear should be replaced to maintain test consistency.

Cleaning Procedures

- **Remove Debris Promptly:**
  Soil, dust, and moisture can accumulate on and within the components. Immediately after testing, use a brush or a soft cloth to remove any dirt. Proper maintenance of the drive rod, including cleanliness and oil lubrication, is crucial for ensuring optimal performance and preventing wear or damage.
- **Avoid Harsh Chemicals:**
  Stick to mild cleaning agents if necessary. Harsh chemicals may corrode metal parts or damage sensitive surfaces.
- **Dry Thoroughly:**
  Ensure the equipment is dry before storage to prevent rust and degradation, especially if tests are conducted in wet conditions.