



Dual Mass Dynamic Cone Penetrometer Kit

FOREWORD

This manual is intended to be a guide for the safe and correct operation and maintenance of the Dual Mass Dynamic Cone Penetrometer Kit. This manual must remain with the device at all times, for quick reference. This manual must be replaced if lost, damaged, or it becomes unreadable. This manual should be read carefully, before using and maintaining the Dual Mass Dynamic Cone Kit, for the first time.

INTRODUCTION

Thank you for choosing AMS, Inc.

All operators must read and understand this operator's manual. This operator's manual should remain with the equipment at all times and should be passed to the new owner in the case that it's resold. Allow only trained and competent personnel to operate this equipment. Stop work and remedy the problem, if an unsafe situation or problem occurs. The situation or problem must be resolved before work is resumed.

Always refer to the latest version of ASTM D6951/D6951M for more detailed information about this testing method. If you have any questions about your AMS product or its application, please contact us with the information provided at the bottom of the page.

APPLICATION

- Assess in-situ strength of undisturbed soil and compacted materials.



SKU: 300.00
KIT WEIGHT: 55 lbs

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DESCRIPTION

Developed by the Army Corps of Engineers, Dynamic Cone Penetrometers (DCPs) provide a low-cost, efficient test method for quickly determining in situ California Bearing Ratio (CBR) values of pavement base, subbase, and subgrades. They can readily be used for depths up to 39" and up to 6', with optional drive rods and extensions. This model complies with ASTM D6951 specifications and comes with a chart to compute CBR values.

The Dual Mass DCP Kit measures the shear strength of soil. This single-operator kit is ideal for City, County, and State Highway Departments, along with Geotech firms. CBR and psf can be estimated in the field from tables in the manual. It comes with a Stainless Steel Dual Mass DCP (17.6 lb (8Kg) or 10.1 lb (4.6 Kg)) Hammer and Quick Attach Upper Rod, 30" Drive Rod, 40" Aluminum Scale, Scale Guide Set, Dual Mass DCP Hard Cone Tip, and a Disposable Cone Tip Adapter with 25 Dual Mass DCP Disposable Tips for fast and easy extraction of the instrument from hard/cohesive soil. This kit also includes a crush-proof carrying case with transport wheels and a wrench set.

SYMBOLS



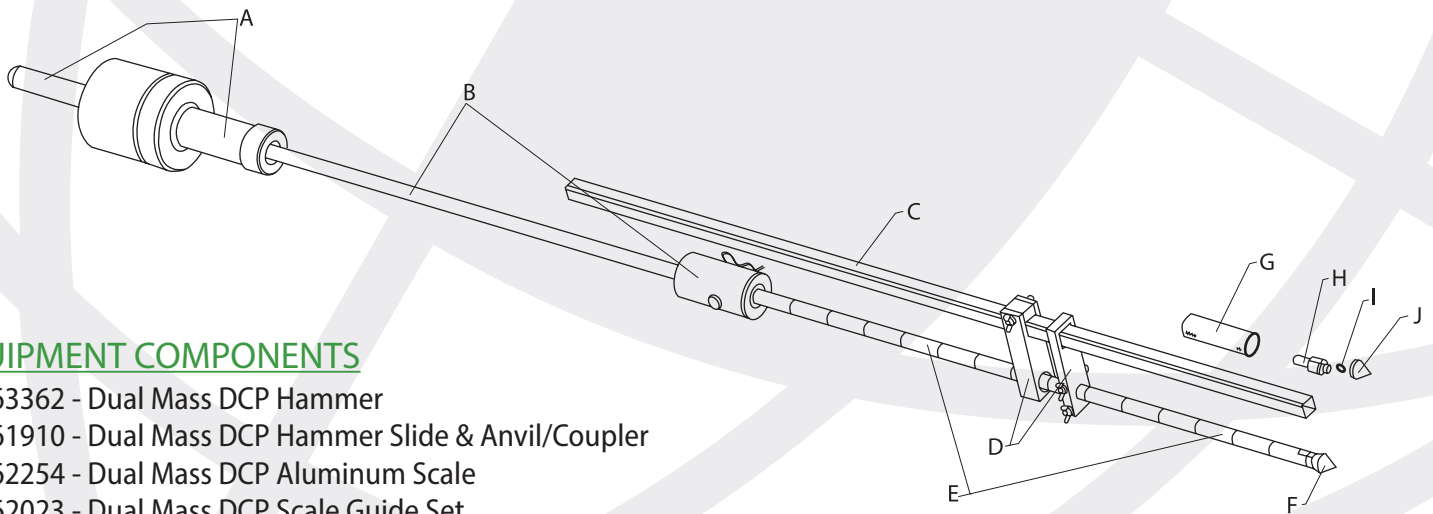
This safety symbol identifies important safety messages in the manual. When you see this symbol, be alert (your safety is involved) and carefully read the messages that follow the symbol. Please inform other operators of these safety messages.

INTENDED USE

The Dual Mass Dynamic Cone Penetrometer is a test method used to assess in-situ strength of undisturbed soil and compacted materials (or both). The equipment can be used to estimate in-situ California Bearing Ratio (CBR), to identify strata thickness, shear strength of strata, and other material characteristics.

The Dual Mass Dynamic Cone Penetrometer is typically used in horizontal construction applications, such as pavements and floor slabs. These materials may consist of fine grained soils, coarse grained soils, granular construction materials, and weak stabilized or modified materials. **⚠ Warning: This equipment cannot be used in highly stabilized, cemented materials, or for granular materials containing a large percentage of aggregates greater than 2 in (50mm). This could cause damage to the equipment and have inaccurate test results.**

This equipment can be used to test material properties down below the surface to 39 in (1000 mm). There are applications where this equipment can be used to test materials deeper than 39 in (1000 mm). Proper correlations must be taken, beyond the recommended testing depth.



EQUIPMENT COMPONENTS

- A. #63362 - Dual Mass DCP Hammer
- B. #61910 - Dual Mass DCP Hammer Slide & Anvil/Coupler
- C. #62254 - Dual Mass DCP Aluminum Scale
- D. #62023 - Dual Mass DCP Scale Guide Set
- E. #61909 - Dual Mass DCP Drive Rod
- F. #61902 - Dual Mass DCP Hard Cone Tip
- G. #62019 - Dual Mass DCP Go No Go Tip Gauge
- H. #61906 - Dual Mass DCP Disposable Cone Tip Adapter
- I. #24210 - Dual Mass DCP Disposable Cone O-Ring
- J. #61907 - Dual Mass DCP Disposable Cone Tip

ACCESSORIES:

- #62984 - 12" Dual Mass DCP Drive Rod
- #62781 - 24" Dual Mass DCP Extension
- #61992 - Dual Mass DCP Disposable Cone Tip (25 Pack)
- #61993 - Dual Mass DCP Disposable Cone Tip (100 Pack)

OPTIONAL EQUIPMENT

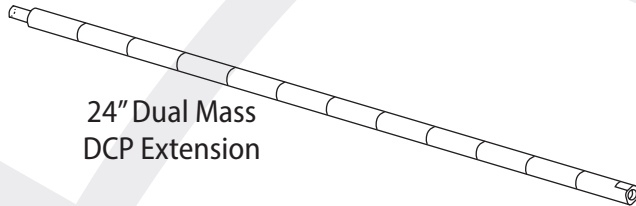
There are various attachments for the Dual Mass Dynamic Cone Penetrometer. Only use the listed options for safe and accurate testing.

ELECTRONIC MEASURING DEVICES

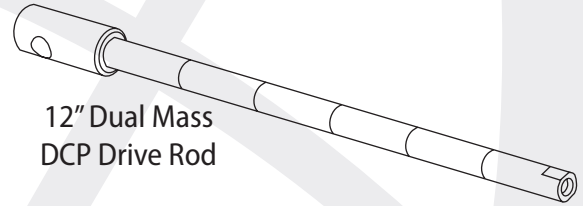
There are electronic measuring devices that mount onto the Dual Mass Cone Penetrometer. These devices record and log data, from the testing procedure. Electronic measuring devices can be used to substitute the graduated scale for measuring and recording data.

DRIVE ROD EXTENSIONS

Drive rod extensions are used for testing deeper depths, which cannot be acquired by the stock length drive rod. This test is not recommended for depths beyond 39 in (1000 mm). Testing beyond 39 in (100 mm) can be done with these extensions and proper data correlations.



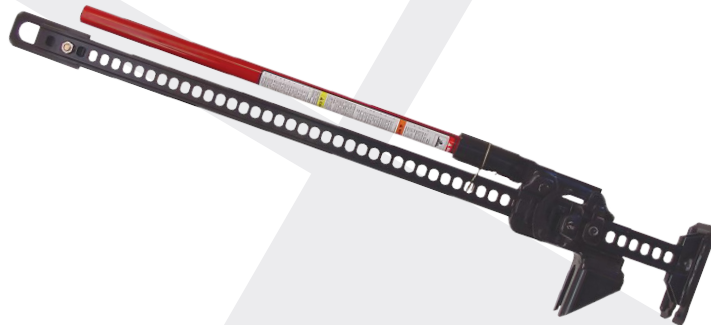
24" Dual Mass
DCP Extension



12" Dual Mass
DCP Drive Rod

REMOVAL JACK

An Removable Jack (usually a modified high lift jack) is a device to help pull/remove the drive rods from the ground. A Removable Jack can be used, once the desired testing depth has been reached. (AMS Part #211.05)



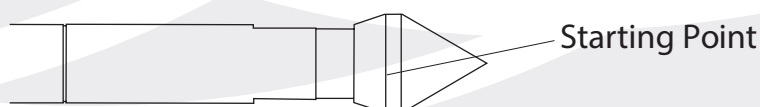
TESTING PROCEDURE


Follow the proceeding steps for operating the dual mass dynamic cone penetrometer. **Note: Always adhere to the latest version of ASTM D6951/D6951M for the most accurate testing procedure.**

- Check all equipment for fatigue or damaged parts. **⚠ Warning: Replace all damaged parts for safe and accurate testing.**
- Check the tips, using the tip gauge. The tip must fit in the "Go" side and shouldn't fit in the "No Go" side or non-grooved side. Replace the tip if it fits into the "No Go" side.



- Determine the hammer weight that is to be used. The weights will be 17.6 lb (8 Kg) or 10.1 lb (4.6 Kg). **Note: The weights can be changed, by unscrewing or installing the shoulder bolt with the accompanying weight.**
- Hold the assembled Dual Mass Dynamic Cone Penetrometer vertical or plum to the material being tested.
- Put start point of tip, flush with surface of material being tested.



- Record initial measurement on the graduated scale.
- Refer to ASTM D6951/D6951M for details about access holes, coring, drilling fluids, etc.
- Raise hammer weight to bottom of handle. **Note: Don't hit handle, while performing the test. This could cause the equipment to bounce and cause inaccuracies.**
- Drop the hammer weight.  **Warning: Do not put any extremities between the hammer weight and anvil. This could cause severe injury.**
- Record the number of blows and penetration, according to ASTM D6951/D6951M. Record data in table as seen in the Data Sheet Example and the DCP Data Sheet.
- Move to different testing site if after 5 blows the device has not moved more than .08 in (2 mm). The new site must be at least or more than 12 in (300 mm) away from previous testing site.
- Drive the point to the desired depth.
- Extract the device from the ground.

DATA SHEET EXAMPLE

Record all the necessary data that was acquired during the testing prices.

Project: Forest Service Road
 Location: STA 30+50, 1 M RT of C/L
 Depth of zero point below surface: 0
 Material Classification: L GW/CL
 Pavement conditions: Not applicable

Date: 7 July 2001
 Personnel: JLS & SDT
 Hammer Weight: 8-kg [17.6-lb]
 Weather: Overcast, 25°C, [72°F]
 Water Table Depth: Unknown

Number of Blows ^A	Cumulative Penetration mm [in.] ^B	Penetration Between Readings mm [in.] ^C	Penetration Per Blow mm [in.] ^D	Hammer Factor ^E	DCP Index mm/blow [in./blow] ^F	CBR % ^G	Moisture % ^H
0	0 [0]	--	--	--	--	--	--
5	25 [0.98]	25 [0.98]	5 [0.196]	1	5 [0.196]	50	
5	55 [2.17]	30 [1.19]	6 [0.238]	1	6 [0.238]	40	
15	125 [4.92]	70 [2.75]	5 [0.183]	1	5 [0.183]	50	
10	175 [6.89]	50 [1.97]	5 [0.197]	1	5 [0.197]	50	
5	205 [8.07]	30 [1.18]	6 [0.236]	1	6 [0.236]	40	
5	230 [9.06]	25 [0.99]	5 [0.198]	1	5 [0.198]	50	
10	280 [11.02]	50 [1.96]	5 [0.196]	1	5 [0.196]	50	
5	310 [12.20]	30 [1.18]	6 [0.236]	1	6 [0.236]	40	
5	340 [13.39]	30 [1.19]	6 [0.238]	1	6 [0.238]	40	
5	375 [14.76]	35 [1.37]	7 [0.274]	1	7 [0.274]	35	
5	435 [17.13]	60 [2.37]	12 [0.474]	1	12 [0.474]	18	

^A Number of hammer blows between test readings.

^B Cumulative penetration after each set of hammer blows.

^C Difference in cumulative penetration (Footnote B) between readings.

^D Footnote C divided by Footnote A.

^E Enter 1 for 8-kg [17.6-lb] hammer; 2 for 4.6-kg [10.1-lb] hammer.

^F Footnote D X Footnote E.

^G From CBR versus DCP Index correlation.

^H % Moisture content when available.

EQUATIONS

Use the equations below, for the appropriate soil conditions listed. These equations are used to calculate and interpret results. See equations below:

- For CL soils with a CBR less than 10:
 - $CBR = 1/(0.017019 \times DCP)^2$ for DCP in mm/blow
 - $CBR = 1/(0.432283 \times DCP)^2$ for DCP in inches/blow
- For CH soils:
 - $CBR = 1/(0.002871 \times DCP)^2$ for DCP in mm/blow
 - $CBR = 1/(0.072923 \times DCP)^2$ for DCP in inches/blow
- For all other soils:
 - $CBR = 292/DCP^{1.12}$ for DCP in mm/blow
 - $CBR = 292/(DCP \times 25.4)^{1.12}$ for DCP in inches/blow

MAINTENANCE AND STORAGE

Follow the maintenance suggestions for keeping the Dual Mass Dynamic Cone Penetrometer in good condition. This also ensures the equipment will be accurate.

- Check drive tips, with the tip gauge. Do this for each use.
- Wash off all soil stuck on equipment and graduated slots. **Note: The Dual Mass Dynamic Cone Penetrometer is made from stainless steel, for cleaning and reducing rust.**
- Replace any broken or fatigued parts. Call AMS Inc. for any replacement parts.
- Check O-rings for cracking (replace if necessary)
- Make sure scale moves up/down smoothly.
- Keep in storage case when not in use.

NOTES



A series of horizontal dashed lines for writing notes, spanning the width of the page.