



# CLEGG IMPACT SOIL TESTER

(The Clegg Hammer)

*Newsletter*

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## TESTING RECREATION TURF WITH THE CLEGG IMPACT SOIL TESTER

The Clegg Impact Soil Tester was designed initially as a means of evaluating road materials. The research and development was carried out in the Department of Civil Engineering at the University of Western Australia in the 1970's. A 4.54 kg mass with 50 mm diameter dropped from 0.457 m was found to provide suitable parameters for such evaluation. One aspect looked into not long after the development of the Clegg Impact Soil Tester was its possible testing of cricket pitches. It was found that by using a hammer mass of 0.5 kg instead of "4.5 kg" (as it's commonly known), a scale change resulted that covered the hardness range of turf up to and including the hardest of pitches. Because this scale change is not "one-for-one" with that of the 4.5 kg Hammer, notation for the output of the 0.5 kg "Light" Clegg Hammer, dropped from a set height of 0.3 m as standard, is as "CIV/L" to represent "Light Clegg Impact Value" instead of as simply "CIV" as the output is known for the 4.5 kg Hammer (four blows per test spot, with the highest value blow in the series used as the strength/stiffness or "hardness" parameter).

The first tests of significance using the 0.5 kg Clegg Hammer were carried out at the West Australian Cricket Association (WACA) ground in Perth at the time of a Sheffield Cup game in November 1982 by Dr Baden Clegg. These were followed by tests at the Melbourne Cricket Ground (MCG) in January 1983 by Dr Mary Lush. Overseas turf research organizations soon became interested, principally the Sports Turf Research Institute at Bingley, West Yorkshire, the New Zealand Sports Turf Institute, Pennsylvania State University, Michigan State University and the International Sports Turf Institute in Texas in association with Texas A & M University.

In addition to the 0.5 kg Hammer, the 2.25 kg Medium Clegg Hammer (output reported as "CIV/M" regarding using the highest result in a series of four blows per test spot) has been developed for turf testing, initially with sports grounds in mind. The Medium Hammer is based on, and supersedes for all practical purposes, the 2.5 kg Clegg Hammer (output reported as "CIV/HM" for the 2.5 kg "Heavy Medium" Hammer) which itself was based on the 5.5 lb Proctor Laboratory Compaction Hammer (or "Rammer"). The standard drop height for the 2.25 kg Clegg Hammer is 0.457 m (whereas it is 0.3 m for the 2.5 kg Clegg Hammer). Different drop heights than standard may be used in certain situations. In such instances, reporting should be made accordingly because a change in output results. For example, depending on the circumstances and other reasons, the 0.5 kg Hammer is also dropped from 0.457 m, 0.5 m, 0.55 m and 1 m. Likewise the 2.25 kg Hammer is dropped from 0.3 m and 1 m. When other than the established drop heights are used, the height, be it notated in inches, metres, millimetres, etc, should be reported, as the case may be. If, for example too, if only one blow is made per test spot, or say the highest value in a series of three blows instead of four is used, this should also be reported or made clear accordingly. This is because the outcome is no longer necessarily the same as the highest value of four blows. Standards for these Hammers are ASTM F 1702 (2.25 kg) or D 5874 (0.5 kg, etc).

There are ten gravities ("g" or " $G_{max}$ ") per one "Clegg" unit, what we might term as " $C_{max}$ " to indicate units of "tens of gravities" regarding the "raw output" of the Clegg Hammer for any individual blow, regardless of hammer weight, diameter, construction, or drop-height. Though the majority of Clegg Hammers have outputs that display in terms of  $C_{max}$ , reporting in gravity units is commonly seen, though this is not necessarily indicated. For the sake of clarification, the following should be reported if the testing isn't in accordance with the procedure regarding CIV/L, CIV/M or CIV/HM (output in terms of  $C_{max}$ ) or ASTM F 1702 or D 5874, and reported accordingly as such: the hammer mass, diameter, drop height and number of blows per test - and, for more than one blow per test, whether the reading is for a particular blow, or for the peak reading of a series of blows, or for the averaging of particular readings for a series of blows - along with the units of measurement, ie, in terms of  $G_{max}$  or  $C_{max}$  units.

The applications have extended from cricket pitches to bowling greens, tennis courts, horse racetracks and arenas, greyhound racetracks, golf greens, and football fields of various codes, ie, rugby, soccer, gridiron and Australian Rules.

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*These Newsletters report on activities in the field of soil impact testing and are designed to increase awareness, awaken interest and encourage discussion. Your contributions are most welcome.*