Designation: D5874 – 24

Standard Test Methods for Determination of the Impact Value (IV) of a Soil[1]

This standard is issued under the fixed designation D5874; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 These test methods cover the determination of the Impact Value (IV) of a soil either in the field or a test mold, as follows:

1.1.1 *Field Procedure A*—Determination of IV alone, in the field.

1.1.2 *Field Procedure B*—Determination of IV and water content, in the field.

1.1.3 *Field Procedure C*—Determination of IV, water content and dry density, in the field.

1.1.4 *Mold Procedure*—Determination of IV of soil compacted in a mold, in the lab.

1.2 *Units*—The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for information only and are not considered standard. Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard.

1.3 The standard test method, using a 4.5 kg (10 lbm) hammer, is suitable for, but not limited to, evaluating the strength of an unsaturated compacted fill, in particular pavement materials, soils, and soil-aggregates having maximum particle sizes less than 37.5 mm (1.5 in.).

1.4 By using a lighter 0.5 kg (1.1 lbm) or 2.25 kg (5 lbm) hammer, this test method is applicable for evaluating lower strength soils such as fine grained cohesionless, highly organic, saturated, or highly plastic soils having a maximum particle size less than 9.5 mm (0.375 in.), or natural turfgrass.

1.5 By using a heavier 10 kg (22 lbm) or 20 kg (44 lbm) hammer, this test method is applicable for evaluating harder materials at the top end the scales or beyond the ranges of the standard and lighter impact soil testers.

1.6 By performing laboratory test correlations for a particular soil using the 4.5 kg (10 lbm) hammer, IV may be correlated with an unsoaked California Bearing Ratio (CBR) or may be used to infer percentage compaction. The IV of the 0.5 kg (1.1 lbm) and 2.25 kg (5 lbm) hammers may be independently correlated to an unsoaked CBR or used to infer the percentage compaction for lower strength soils.

1.7 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.8 For purposes of comparing a measured or calculated value(s) with specified limits, the measured or calculated value(s) shall be rounded to the nearest decimal or significant digits in the specified limits.

1.8.1 The procedures used to specify how data are collected/recorded or calculated in this standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of this standard to consider significant digits used in analysis methods for design.

NOTE 1—The equipment and procedures contained in this test method are similar to those developed by B. Clegg in the 1970s at the University of Western Australia, Perth, Western Australia, Australia. Impact Value is also commonly known as Clegg Impact Value (CIV).

1.9 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.10 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

[1] This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.08 on Special and Construction Control Tests.

Current edition approved Feb. 1, 2024. Published March 2024. Originally approved in 1995. Last previous edition approved in 2016 as D5874 – 16. DOI: 10.1520/D5874-24.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D698 Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

D1556/D1556M Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method (Withdrawn 2024)[3]

D1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

D1883 Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils

D2167 Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method (Withdrawn 2024)[3]

D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

D2937 Test Method for Density of Soil in Place by the Drive-Cylinder Method

D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D4643 Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating

D4959 Test Method for Determination of Water Content of Soil By Direct Heating

D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data

D6938 Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of common technical terms used in this standard, refer to Terminology D653.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *as-compacted target IV, n*—the desired strength, in terms of IV, to be achieved in the field for a particular material and construction process at the as-compacted moisture condition. This may also be referred to as the *as-compacted target strength*.

3.2.2 *dried-back target IV, n*—the desired strength, in terms of IV, to be achieved in the field for a particular material and construction process prior to continuing with a subsequent layer, or sealing, or opening to traffic, after moisture has left the system through evaporation and/or drainage. This may also be referred to as the *dried-back target strength*.

3.2.3 *heavy impact value (IV/H), n*—the IV derived from using a 20 kg (44 lbm) mass hammer 130 mm (5 in.) in diameter free falling 300 mm (12 in.).

3.2.4 *heavy medium heavy impact value (IV/HMH), n*—the IV derived from using a 10 kg (22 lbm) mass hammer 130 mm (5 in.) in diameter free falling 300 mm (12 in).

3.2.5 *impact soil tester, n*—testing apparatus used to obtain an IV of a soil.

3.2.6 *impact value (IV), n*—the value expressed in units of tens of gravities (*g*) and reported in whole numbers derived from the peak deceleration of a 4.5 kg (10 lbm) instrumented compaction hammer 50 mm (2.0 in.) in diameter free falling 450 mm (18 in.).

3.2.7 *in-service target IV, n*—the desired strength, in terms of IV, to be achieved in the field for a particular material and construction process once the road is opened to traffic and has reached equilibrium. This may also be referred to as the *in-service target strength.*

3.2.8 *light impact value (IV/L), n*—the IV derived from using a 0.5 kg (1.1 lbm) mass hammer 50 mm (2.0 in.) in diameter free falling 300 mm (12 in.).

3.2.9 *medium impact value (IV/M), n*—the IV derived from using a 2.25 kg (5 lbm) mass hammer 50 mm (2.0 in) in diameter free falling 450 mm (18 in.).

4. Summary of Test Method

4.1 The test apparatus is placed on the material to be tested either in a mold or on naturally occurring or compacted soil in the field. The hammer is raised to a set height and allowed to free fall. The instrumentation of the test apparatus displays a value in tens of gravities (*g*) of the peak deceleration of the hammer's impact as recorded by an accelerometer fitted to the top of the hammer body. A total of four blows of the hammer are applied on the same spot to determine the IV for each test performed.

4.2 Lighter hammers at 0.5 kg (1.1 lbm) or 2.25 kg (5 lbm) may be used for softer conditions or fragile materials instead of the 4.5 kg (10 lbm) standard hammer to determine the IV. When used, the resulting value is termed the Light Impact Value (IV/L) for the 0.5 kg (1.1 lbm) hammer or Medium Impact Value (IV/M) for the 2.25 kg (5 lbm) hammer.

4.3 Larger, heavier hammers at 10 kg (22 lbm) or 20 kg (44 lbm) may be used instead of the 4.5 kg (10 lbm) standard hammer to determine the IV for harder conditions or to test through a larger zone both horizontally and vertically. When used, the resulting value is termed the Heavy Medium Heavy Impact Value (IV/HMH) for the 10 kg (22 lbm) hammer or Heavy Impact Value (IV/H) for the 20 kg (44 lbm) hammer.

5. Significance and Use

5.1 Impact Value, as determined using the standard 4.5 kg (10 lbm) hammer, has direct application to design and construction of pavements and a general application to earthworks compaction control and evaluation of strength characteristics of a wide range of materials, such as soils, soil aggregates and stabilized soil. Impact Value is one of the properties used to evaluate the strength of a layer of soil up to about 150 mm (6 in.) in thickness using a 50 mm (2 in.) diameter hammer or up to 380 mm (15 in.) in thickness using a 130 mm (5 in.) diameter hammer, and by inference to indicate the compaction condition of this layer. Impact Value reflects and responds to

[3] The last approved version of this historical standard is referenced on www.astm.org.

changes in physical characteristics that influence strength. It is a dynamic force-penetration property and may be used to set a strength parameter.

5.2 This test method provides immediate results in terms of IV and may be used for the process control of pavement or earthfill activities where the avoidance of delays is important and where there is a need to determine variability when statistically based quality assurance procedures are being used.

5.3 This test method does not provide results directly as a percentage of compaction but rather as a strength index value from which compaction may be inferred for the particular moisture conditions. From observations, strength either remains constant along the dry side of the compaction curve or else reaches a peak and, for both cases, declines rapidly with increase in water content beyond a point slightly dry of optimum water content, at approximately 0.5 percent. This is generally between 95 and 98 % maximum dry density (see Fig. 1 and Fig. 2). An as-compacted target strength in terms of IV may be designated from laboratory testing or field trials as a strength to achieve in the field as the result of a compaction process for a desired density and water content. If testing is performed after compaction when conditions are such that the water content has changed from the critical value, determination of the actual water content by laboratory testing enables the field density to be inferred from regression equations using IV, density and water content.

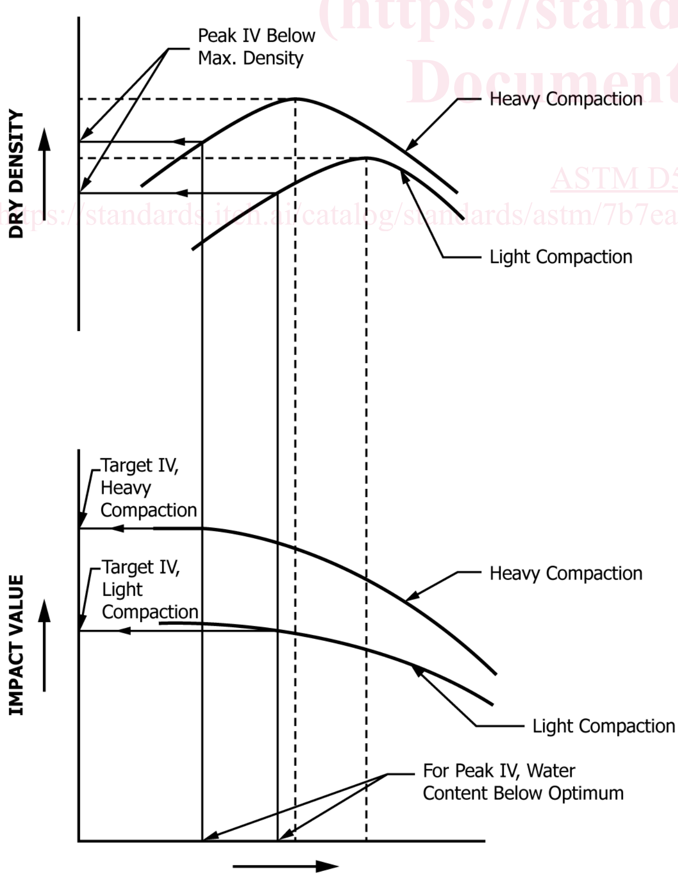

FIG. 1 Illustration of Target IV for Material with No Peak

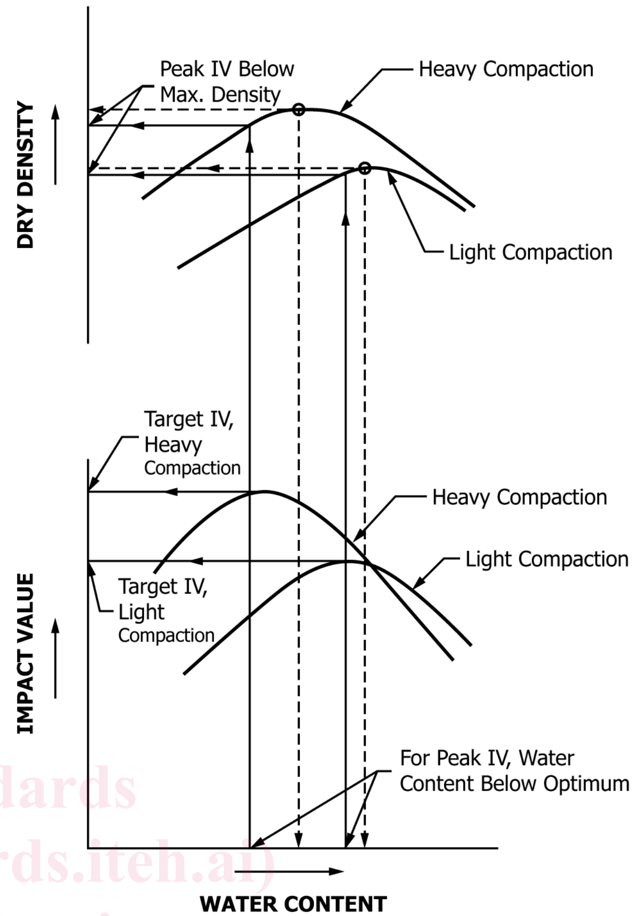

FIG. 2 Illustration of Target IV for Material with Pronounced Peak

NOTE 2—Impact Value may be used as a means to improve the compaction process by giving instant feedback on roller efficiency, uniformity, confirming the achievement of the target strength, and by inference the achieved density. When inferring density solely from IV, however, it is considered as only indicative of density.

5.4 This test method may be used to monitor strength changes during a compaction process or over time due to seasonal, environmental or traffic changes.

NOTE 3—For in-place soil strength evaluation where there may be a dry and hard surface layer (crust), testing both the crust and the underlying layer may be required.

5.5 The standard instrument is based on a 4.5 kg (10 lbm) compaction hammer using a 450 mm (18 in.) drop height. The hammer is equipped with an accelerometer and instrumented using a peak hold electronic circuit to read the peak deceleration on impact. The circuitry is filtered electronically to remove unwanted frequencies and the peak deceleration is displayed in units of ten gravities (*g*) with the output below units of ten gravities truncated.

5.6 The peak deceleration on which IV is derived represents the area under the deceleration versus time curve which for most soils may be assumed as half a sinusoid. Applying double integration provides first the time-velocity relationship and second the time-penetration relationship. As force is also directly related to deceleration, the IV therefore represents both stress and penetration and may be taken as a direct measurement of stiffness or strength (see Fig. 3).

5.7 Impact Value may be correlated with an unsoaked CBR.

5.8 Impact Value may be expressed as a hammer modulus, analogous with elastic modulus or deformation modulus.

5.9 The lighter hammers use the same accelerometer and instrumentation as the standard hammer. Utilization of lighter masses at 0.5 kg (1.1 lbm) and 2.25 kg (5 lbm) results in more sensitivity for lower strength materials compared to the standard mass; that is, the scale is expanded with these lighter hammer masses and provides more definition on softer materials, along with there being less indentation into the material. To avoid confusion, the IV of the lighter hammers is notated as IV/L for the 0.5 kg (1.1 lbm) mass and as IV/M for the 2.25 kg (5 lbm) mass.

5.10 The medium hammer provides a sensitivity between that of the standard hammer and light hammer.

5.11 Light Impact Value and Medium Impact Value have application to testing of sand, peat and for natural and artificial recreation turf hardness evaluation, where it is that the hardness of recreation turf surfaces affects ball bounce characteristics and the performance or injury potential to participants. Medium Impact Value is preferable over Light Impact Value in relation to assessing natural turf where there is thicker thatch and longer grass whereas Light Impact Value is preferable for finely mown grass surfaces where less indentation than that of the medium hammer is desired, such as testing of grass tennis courts and golf putting greens.

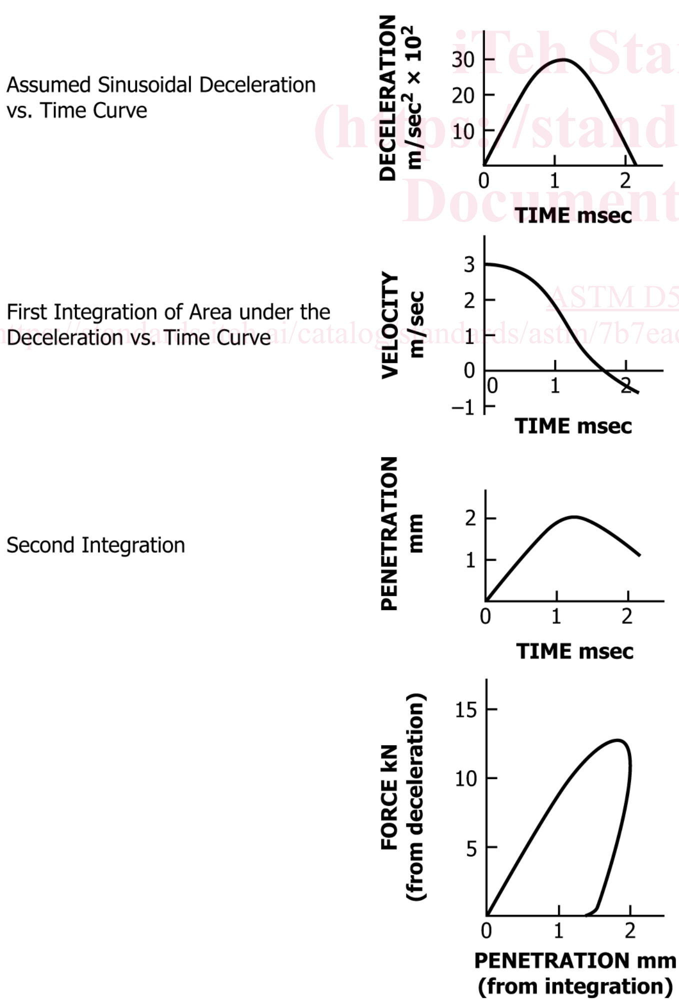

FIG. 3 Development of Force-Penetration from Deceleration Versus Time

5.12 The medium hammer has application to testing of earthworks materials.

5.13 The heavy medium heavy hammer uses the same accelerometer and instrumentation as the standard hammer and tests through a larger zone both horizontally and vertically than the lighter impact soil testers because of its larger diameter mass. The IV of the heavy medium heavy hammer is notated as IV/HMH.

5.14 The Heavy Medium Heavy Impact Value has application to testing the same materials as those tested by the standard, light, medium and heavy impact soil testers.

5.15 The heavy hammer uses the same accelerometer and instrumentation as the standard hammer and tests through a larger zone both horizontally and vertically as compared to the 50 mm (2 in.) diameter impact soil testers. The IV of the heavy hammer is notated as IV/H.

5.16 The Heavy Impact Value has application to testing the same materials as those tested by the standard, light, medium, and heavy medium heavy impact soil testers but the greater mass of this impact soil tester provides less sensitivity of the output so is applicable for harder materials at the top end the scales or beyond the ranges of the lighter impact soil testers.

NOTE 4—The quality of the results produced by this test method is dependent on the competence of the personnel performing it and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing. Users of this test method are cautioned that compliance with Practice D3740 does not in itself ensure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

6. Interferences

6.1 Due to the laws of physics and soil mechanics, a significant change in the output occurs as a result of a significant change in the mass and/or diameter and/or drop height and/or design and/or construction of an impact soil tester. Therefore, where there is a significant change in any of the above parameters between impact soil testers, the output of one cannot be taken as one-for-one with the output of another. A significant change in any of these parameters however allows for the Impact Value concept to be extended to a greater number of situations and applications while utilizing the same instrumentation. The different signifiers for the Impact Value output as given herein not only help to avoid confusion but provide a shorthand means to identify the output of an impact soil tester according to the particular mass and diameter of hammer and its standard drop height.

6.2 The maximum of the first four blows has been found through experiment and practice to be the simplest means by which to obtain consistent results. Analysis of the blow count has shown that the first blow or two may be considered as a seating procedure as they create a compacted wedge or hemisphere of soil that is subsequently forced into the body of the soil causing an increase in deceleration, that is, an increase in IV, as successive blows are applied. In general, deceleration remains practically unchanged after the third or fourth blow with additional blows continuing to produce a constant amount of penetration. If lower values occur with subsequent blows, this is due apparently to the hammer striking the sides of the indentation or by loose material falling onto the strike surface causing a bias in this direction.

7. Apparatus

7.1 *Impact Soil Tester*—A test apparatus consisting of a hammer, guide tube and electronic instrumentation. Detailed information on the apparatus is contained in Annex A1. A typical configuration for a 50 mm (2 in.) diameter hammer that utilizes a tubular handle is illustrated in Fig. 4.

7.2 *Mold*—A 152.4 ± 0.7 mm (6.000 ± 0.026 in.) diameter mold conforming to the requirements of Test Methods D698 Procedure C, D1557 Procedure C or D1883 with a spacer disk.

7.2.1 Molds of other, typically larger, dimensions or that of D1883 without a spacer disk may be used but such shall be reported accordingly in the report.

NOTE 5—For a particular material, the smaller 101.6 mm (4 in.) mold of Test Method D698 may be used if it has been proven by a laboratory test comparison with the 152.4 mm (6 in.) mold of Test Method D1557 that there is no significant difference in the IV results.

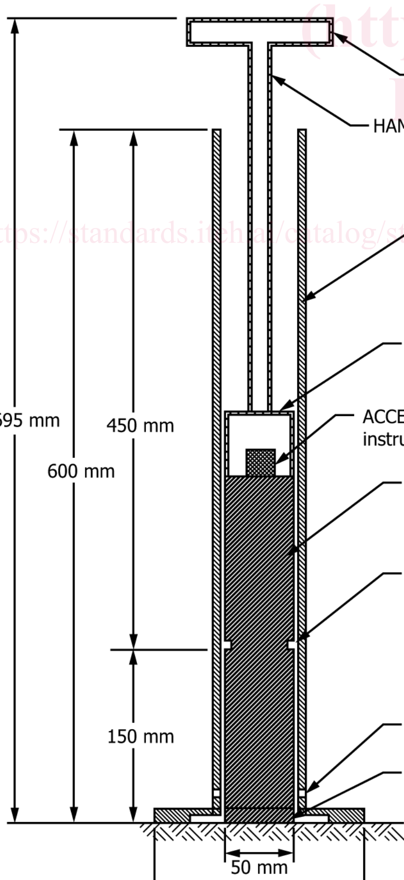

FIG. 4 Illustration (Cross Section) of the Standard 4.5 kg Impact Soil Tester with Hammer at Rest in the Guide Tube

8. Procedure

8.1 *Operational Verification Checks*—Perform operational verification checks at the commencement of any testing program, after repair or fresh calibration, or when the instrument is suspect using the operational check ring as follows.

8.1.1 Place the ring on a dry, grease free, smooth, hard surface of a solid massive object, such as a concrete floor over ground. Place the guide tube centrally over the ring and drop the hammer five times from the set height mark as described in A2.1.3 for the standard 4.5 kg (10 lbm) hammer, A2.1.4 for the light 0.5 kg (1.1 lbm) hammer, A2.1.5 for the medium 2.25 kg (5 lbm) hammer or A2.1.6 for the heavy medium heavy 10 kg (22 lbm) hammer and 20 kg (44 lbm) heavy hammer. Operate the instrumentation so as to obtain five separate readings. If this operational check procedure gives significantly different values than shown on the ring, examine the dryness, cleanliness, smoothness and firmness of the support for the ring and the ring itself, check the external signal cable for damage in relation to open circuiting or short circuiting or poor connection(s), review the operational check procedure and rerun the check at the same or another location. If the ring value is not satisfactorily achievable, consult the manufacturer.

NOTE 6—To avoid the possibility of damage to the electronics or the hammer, it is recommended that the impact soil tester is not used directly on hard surfaces such as concrete or otherwise in such a way on materials that it would give results of more than 100 IV (1000 *g*).

NOTE 7—The impact energy provided by an impact soil test hammer with a mass greater than 0.5 kg can cause damage to materials such as brick or concrete paving slabs or smoothly prepared hard turf surfaces such as grass tennis courts or golf putting greens.

8.2 Determine an IV as follows:

8.2.1 The peak deceleration that is the highest of four successive blows on a test spot is taken as the IV.

8.2.2 Impact Values obtained from other blow counts, or an average thereof, shall be reported accordingly in the report.

8.3 *Field Procedure A*—If necessary, prepare the surface to be tested by lightly scuffing with the foot to remove loose surface material. Before beginning a test ensure that the hammer strike face is clean of any soil or foreign material build-up and that the guide tube is reasonably clean so as not to restrict a free fall. Place the impact soil tester in position with the guide tube base set on the ground. Steady the guide tube to hold vertical in place, activate the instrumentation and apply four free falling blows in succession from the set height of drop. The highest value of the four blows is taken as the IV.

NOTE 8—Methods of securing the guide tube in a vertical position include placing a foot on the guide tube base and steadying the guide tube with the knee, or by using a spare hand instead of placing a foot on the base if the design allows. It is suggested if securing the base with a foot to use the hand on the same side of the body for raising the hammer.

NOTE 9—For sloping sites, a level test surface may need to be prepared so that the guide tube base rests on the surface with the guide tube as near to vertical as possible.

8.4 *Field Procedure B*—Follow *Field Procedure A* but determine the water content of the material at a location 100 mm (4 in.) to 150 mm (6 in.) from the edge of the guide tube flange. Determine the water content according to the applicable test methods listed in 2.1.

8.5 *Field Procedure C*—Follow *Field Procedure B* but determine also the density of the material at a location 100 mm (4 in.) to 150 mm (6 in.) from the edge of the guide tube flange. Determine the density according to the applicable test methods listed in 2.1.

8.6 *Mold Procedure*—Obtain a soil sample representative of that to be tested in the field and prepare a test specimen according to the requirements of either Test Method D698 or D1557. Prepare the test specimen at a water content and density at which it is desired to determine the IV. Compact the test specimen in a mold as given in 7.2. Perform the impact test on the compacted specimen in the mold with the base plate left attached to the mold. Before beginning a test ensure that the hammer strike face is clean of any soil or foreign material build-up and that the guide tube is reasonably clean so as not to restrict a free fall. To aid in centering and steadying the guide tube, replace the mold collar after trimming the surface of the compacted soil and, if necessary, brushing off loose material. Place the mold with the specimen on a firm, smooth base such that it cannot be rocked. Place the impact soil tester on the trimmed surface in a vertical position with the guide tube base set inside the mold collar or otherwise centered on the sample. Activate the instrumentation, and without moving the guide tube apply four free falling blows in succession from the standard height of drop. Record the highest value of the four blows as the IV.

9. Correlation of IV with Other Soil Properties and Determination of an As-Compacted Target IV

9.1 *An As-Compacted Target Strength,* for a particular soil, may be chosen from the following IV correlations. All procedures given below for determination of an As-Compacted Target IV are performed with a compaction curve according to either Test Method D698 or D1557. Each of the following three procedures apply to density or CBR correlations. Where CBR correlations are requested, a duplicate specimen is required for each of the following procedures; that is, an IV test is performed on one specimen and an unsoaked CBR test is carried out on the duplicate specimen.

9.1.1 *As-Compacted Target IV at Optimum Water Content Only*—After determining the optimum water content of the sample in accordance with either Test Method D698 or D1557, compact a specimen in a mold as described in 7.2 to the desired optimum water content and maximum dry unit weight or percent compaction using the specified compaction procedure from soil prepared to within ± 0.5 % of optimum water content. Obtain the As-Compacted Target IV on the compacted specimen according to 8.6. If requested, obtain an unsoaked CBR according to Test Method D1883 on a duplicate specimen.

9.1.2 *As-Compacted Target IV from a Range of Water Contents*—Determine the optimum water content of the sample according to either Test Method D698 or D1557. Prepare four specimens using the mold size as described in 7.2 at a range of water contents such that they bracket the optimum water content. The water contents shall vary about 2 %. Compact each specimen using 100 % compactive effort according to the nominated compaction method. Obtain an IV according to 8.6 for each molded specimen to produce a curve of IV versus water content. Determine the As-Compacted Target IV from the correlation curve at the point at which an increase in water content results in a corresponding loss of strength. If requested, obtain corresponding unsoaked CBRs on duplicate specimens and plot the IV versus CBR relationship.

9.1.3 *As-Compacted Target IV from a Range of Densities at Optimum Water Content*—Determine the maximum dry density and optimum water content of the sample according to either Test Method D698 or D1557. Compact four specimens all at optimum water content ± 0.5 % using the mold size as given in 7.2. Compact each specimen using a differing number of blows per layer for each specimen. Vary the number of blows per layer as necessary to prepare specimens having unit weights above and below the desired value, typically covering the range of 90 to 100 % percent compaction. Specimens compacted at 10, 20, 30 and 56 blows per layer is often satisfactory. Obtain an IV according to 8.6 for each molded specimen. Plot the IV versus the relative compaction at optimum water content. Determine the As-Compacted Target IV for the desired percent compaction from the correlation curve. If requested, obtain corresponding unsoaked CBRs on duplicate specimens and plot the IV versus CBR relationship.

10. Field Trial Procedure to Determine As-Compacted Target IV

10.1 This procedure determines an As-Compacted Target IV using a field trial to compact several test strips at differing water conditions using compaction procedures known to be capable of producing the required density level.

10.1.1 Uniformly mix the particular soil to be used in the field trial. If necessary, allow for field moisture curing before compacting according to standard water preparation practice for the particular soil. Prepare four test strips of uniform layer thickness at different water contents determined visually or predetermined by laboratory tests to bracket optimum water content. It is suggested that the test strips be not less than one roller width by five roller lengths (including the prime mover), and that testing be confined to a central three roller length section of each test strip. The layer thickness may be varied to suit the material type and compaction equipment being used. In general, a loose placed nominal layer thickness of 230 mm (9 in.) gives a final compacted layer thickness of 150 mm (6 in.).

10.1.2 For each test strip, randomly perform at least five IV tests after the second, fourth, eighth, and sixteenth successive roller pass. Calculate and record the mean IV for each set of impact tests for each test strip at the completion of each of the above designated number of roller passes. It is important that there is no significant change in the water content of the test strips throughout the trial.

10.1.3 Determine the field water content of each test strip at the completion of the field trial in accordance with either Test Method D4643 or D4959. Plot a correlation curve for the mean IV at the sixteenth roller pass for each test strip versus the water content. Determine the As-Compacted Target IV from the correlation curve at the point at which an increase in water