Designation: D 4166 – 99

An American National Standard

Standard Test Method for Measurement of Thickness of Nonmagnetic Materials by Means of a Digital Magnetic Intensity Instrument[1]

This standard is issued under the fixed designation D 4166; 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 This test method covers the measurement of thickness of any nonmagnetic material by means of a digital magnetic intensity instrument.

1.2 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

1.3 There is no similar or equivalent ISO standard.

2. Summary of Test Method

2.1 In this test method, a magnetic sensing device is calibrated and placed on one side of the material to be measured. A magnet of known intensity is placed on the opposite side and the distance between the magnet and the magnetic sensing device shows as a digit that can be converted to inch-pound or metric units by reference to a table.

3. Significance and Use

3.1 This test method is useful for measuring the wall thickness of plastic vessels and other plastic structures where the geometry of the equipment does not permit direct measurement by conventional methods, such as micrometers, calipers, and rulers. This test method is not limited to plastics and can be used for all nonmagnetic materials. It provides for a rapid and accurate thickness measurement, without the need for drilling and repair of holes.

3.2 Accuracies are not affected by density variations, permitting the measurement of composites made up of a variety of materials of varying densities. By placement of the magnetic source on the mold surface, thickness measurements can be made during and after fabrication of plastic products to verify thickness and adherence to specifications.

4. Interferences

4.1 Any instrument measuring the intensity of a magnetic field can sometimes be influenced by a strong artificial or natural magnetic field.

4.2 Any magnetic material located in the space between the magnet and the sensor will distort the measurement.

4.3 A major temperature change (+10°F, +5.6°C) will cause a slight drift in calibration, requiring a recalibration at the new temperature prior to making the measurement.

5. Apparatus

5.1 *Micro Digital Magnetic Thickness Sensor*. [2]

6. Sampling

6.1 Two separate measurements at each location shall be taken. If a variation in excess of 0.01 in. (0.25 mm) appears, a third measurement shall be taken.

7. Procedure

7.1 *Calibration*—Calibrate the magnetic sensing device as follows:

7.1.1 Center the magnet supplied with the apparatus on the end of the sensor head and depress the "set'' button. This establishes the zero measurement point.

7.2 *Measurement*:

7.2.1 Place the magnet used in the calibration procedure (7.1) on one side of the material to be measured.

7.2.2 Place the magnetic sensing device on the opposite side and move it in a criss-cross motion until the digit reaches its lowest point. This denotes that the magnetic sensing device is centered on the magnet.

7.2.3 Depress the "set'' button to lock in the measurement shown in the digital read-out.

7.2.4 To perform further measurements, repeat 7.1.1-7.2.3.

[1] This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.23 on Reinforced Plastic Piping Systems and Chemical Equipment.

Current edition approved July 10, 1999. Published September 1999. Originally published as D 4166 – 82. Last previous edition D 4166 – 94.

[2] The Polygauge Micro Digital Magnetic Thickness Sensor, manufactured by Polygauge, 188 Wilkinson Rd., Unit 9, Brampton, Ontario Canada L 6T 4W9, or its equivalent has been found satisfactory for this purpose.

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