



Designation: D 4417 – 93 (Reapproved 1999)

Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel¹

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1. Scope

1.1 These test methods cover the description of techniques for measuring the profile of abrasive blast cleaned surfaces in the laboratory, field, or in the fabricating shop. There are additional techniques suitable for laboratory use not covered by these test methods.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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

2. Summary of Test Method

2.1 The methods are:

2.1.1 *Method A*—The blasted surface is visually compared to standards prepared with various surface profile depths and the range determined.

2.1.2 *Method B*—The depth of profile is measured using a fine pointed probe at a number of locations and the arithmetic mean determined.

2.1.3 *Method C*—A composite plastic tape is impressed into the blast cleaned surface forming a reverse image of the profile, and the maximum peak to valley distance measured with a micrometer.

3. Significance and Use

3.1 The height of surface profile has been shown to be a factor in the performance of various coatings applied to steel. For this reason, surface profile should be measured prior to coating application to ensure that it meets that specified. The instruments described are readily portable and sufficiently sturdy for use in the field.

NOTE 1—Optical microscope methods serve as a referee method for surface profile measurement. Profile depth designations are based on the

¹ These test methods are under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and are the direct responsibility of Subcommittee D01.46 on Industrial Protective Painting.

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concept of mean maximum profile (\bar{h} max); this value is determined by averaging a given number (usually 20) of the highest peak to lowest valley measurements made in the field of view of a standard measuring microscope. This is done because of evidence that coatings performance in any one small area is primarily influenced by the highest surface features in that area and not by the average roughness.²

4. Apparatus

4.1 *Method A*—A profile comparator consisting of a number of areas (each approximately one square inch in size), usually side by side, with a different profile or anchor pattern depth. Each area is marked giving the nominal profile depth in mils or micrometres. Typical comparator surfaces are prepared with steel shot, steel grit, or sand or other nonmetallic abrasive, since the appearance of the profile created by these abrasives may differ. The comparator areas are used with or without magnification of 5 to 10 power.

4.2 *Method B*—A dial gage³ depth micrometer fitted with a pointed probe. The probe is machined at a 60° angle with a nominal radius of 50 μm . The base of the instrument rests on the tops of the peaks of the surface profile while the spring loaded tip projects into the valleys.

4.3 *Method C*—A special tape⁴ containing a compressible foam attached to a noncompressible uniform plastic film. A burnishing tool is used to impress the foam face of the tape into the surface to create a reverse replica of the profile that is measured using a spring-loaded micrometer.

5. Test Specimens

5.1 Use any metal surface that, after blast cleaning, is free of

² John D. Keane, Joseph A. Bruno, Jr., Raymond E. F. Weaver, "Surface Profile for Anti-Corrosion Paints," Oct. 25, 1976, Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh, PA 15213.

³ The sole source of supply of suitable depth micrometers known to the committee at this time is the surface profile gage, Model 123, Elcometer Instruments, Ltd., Edge Lane, Droylston, Manchester M35 6UB, United Kingdom, England. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁴ The sole source of supply of suitable replica tape, Press-O-Film, known to the committee at this time is Testex, 8 Fox Lane, Newark, DE 19711. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.