



Designation: A 926 – 97

Standard Test Method for Comparing the Abrasion Resistance of Coating Materials for Corrugated Metal Pipe¹

This standard is issued under the fixed designation A 926; 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 a procedure for comparing materials used for coating, paving and lining corrugated metal pipe by use of a bed load abrasion testing machine. The procedure attempts to simulate the effect of stone, gravel and sand carried by a stream through corrugated metal pipe.

1.2 The values stated in inch-pound units are to be regarded as standard. The SI units 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 the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

A 444/A 444M Specification for Steel Sheet Zinc-Coated (Galvanized) by the Hot-Dip Process for Storm Sewer and Drainage Pipe²

A 742/A 742M Specification for Steel Sheet, Metallic-Coated and Polymer Precoated for Corrugated Steel Pipe²

A 929/A 929M Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe²

C 131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine³

C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates³

3. Summary of Test Method

3.1 Curved steel panels, coated with the matter to be evaluated, are mounted on the inside surface of a cylindrical drum. A charge of fine aggregate coarse aggregates and water are added and the drum is sealed. Then the drum is rotated to

cause an abrasive flow over the materials being tested. After the prescribed number of revolutions, the panels are removed from the drum, inspected and weighed for loss.

4. Significance and Use

4.1 This test method provides a means of determining an abrasion rate (weight and calculated average thickness loss) when comparing materials, coatings, pavings, or linings under test conditions that will be subjected to abrasive bed loads. The importance of this information is recognized when dealing with culverts, storm and sanitary sewer applications, although the last two generally do not have the same degree of abrasion due to the flatter slopes and less bed loads than culverts. Specifically, the invert of these types of pipe, regardless of the material used, can be exposed to flows containing abrasive bed loads or solid particulates that cause wearing of the pipe wall.

4.2 By subjecting materials to wear in the bed load abrasion machine with a controlled bed load charge made up of fine aggregate and coarse aggregate over a specified period, a comparison of the resistance between materials can be established.

4.3 This test method does not simulate the effect of abrasive material striking the upstream face of corrugations, as would be typical for coating materials which do not completely fill the corrugations.

NOTE 1—**Caution:** This test method uses specific quantitative values to encourage repetitive results and does not consider varying bed load characteristics, ratio of water to bed load, velocity, time or actual field conditions, and the effect of exposed edges on laminates. The user must use extreme care in comparing one test result to another because of these and other variables.

5. Apparatus

5.1 *Bed Load Abrasion Machine*, equipped with a counter and conforming in all essential characteristics to the design shown in Fig. 1. The machine shall consist of a hollow steel cylinder, closed at both ends, having an outside diameter of 24 ± 0.2 in. (610 ± 5 mm). One closed end of the cylinder shall have four bolted plexiglass windows one of which is elongated to provide placement of the specimens. A shaft mounted horizontal and through the cylinder shall have a drive pulley at

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² *Annual Book of ASTM Standards*, Vol 01.06.

³ *Annual Book of ASTM Standards*, Vol 04.02.

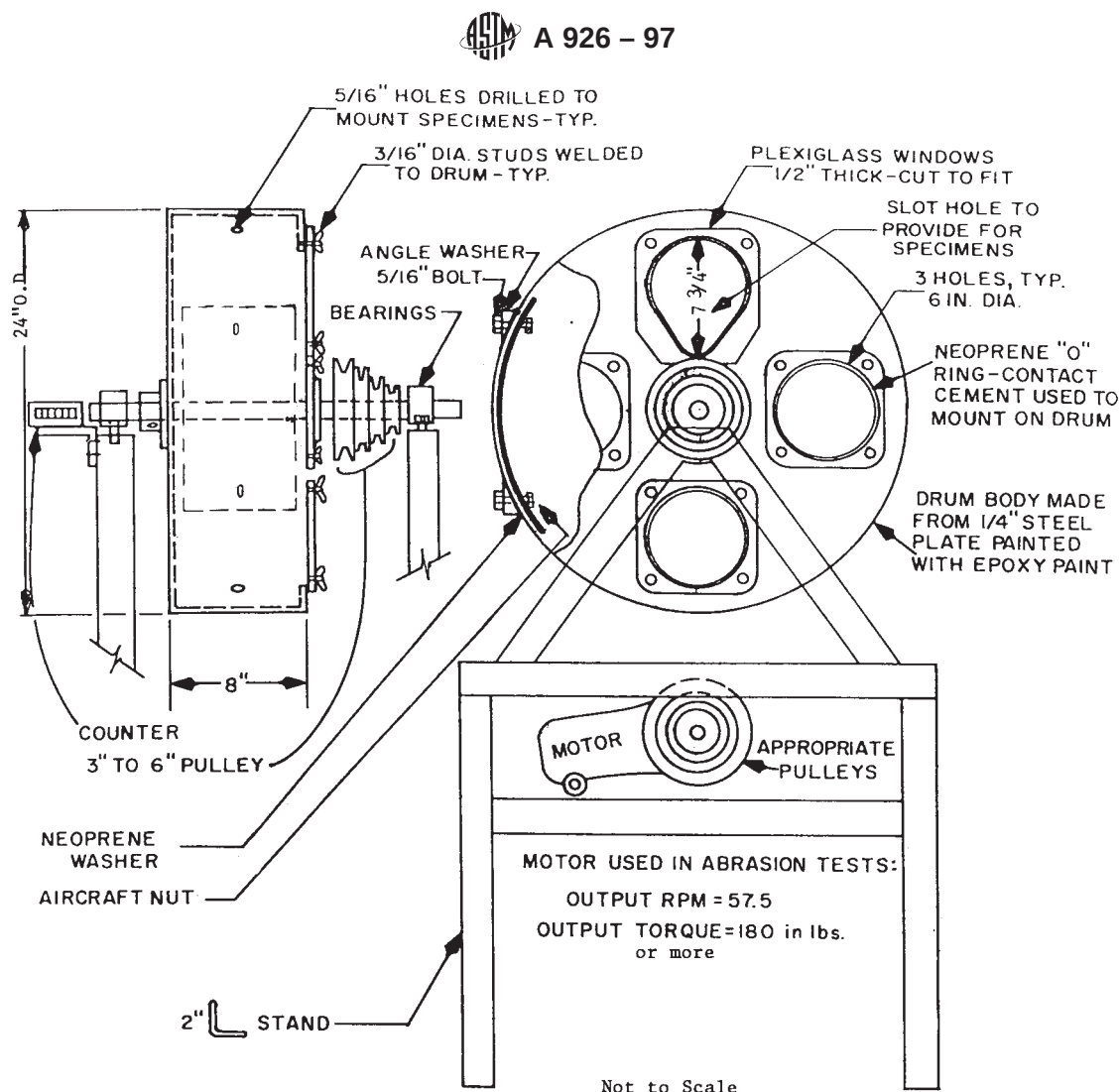


FIG. 1 Bed Load Abrasion Testing Machine

one end and be supported by bearings connected to a frame allowing the cylinder to turn freely and be in alignment with a drive motor below.

5.2 The machine shall consistently rotate at 50 ± 5 r/min when specimens are mounted and drum is fully charged.

6. Test Specimens

6.1 *Panels*—Test specimens shall consist of zinc-coated steel sheet with or without a nonmetallic protective coating to be evaluated. The steel sheet shall conform to Specification A 444/A 444M with a specified thickness of 0.064 in. (1.63 mm). All panels are curved as shown in Fig. 2, with the test surface concave. A plain zinc-coated panel serves as a control specimen.

6.1.1 Panels to serve as a substrate for coating materials to be applied to fabricated pipe shall be curved prior to application of the coating material. The control panel and panels having factory applied nonmetallic coating (such as polymer precoated sheet, Specification A 742/A 742M) shall be in the as-received condition.

6.1.2 Fabricate the panels as shown in Fig. 2. Take care in fabricating panels with preapplied nonmetallic coatings to avoid damage to the coating. Curve the panels to a smooth,

uniform radius with no straight tangent portions at the ends. A device as described in Appendix X1 may be used.

6.2 *Coating*—Coat the panels as recommended by the manufacturer of the coating material. The thickness of the coating shall be equal to, or greater than, the minimum thickness proposed or required to be used on pipe (usually on the crest of corrugations).

6.3 *Mounting*—Mount the coated test panels in the drum using $\frac{5}{16}$ in. (or M8) steel bolts. Other sizes of bolts may be used provided appropriate adjustments are made in the mounting hole slot. Use washers under the bolt head (or nut) to protect the coating from damage when tightening the bolt (or nut). Place a thin foam cushion (expanded neoprene, etc.) under the panels to provide a tight fit against the drum and to keep fines from eroding the backside of the panel. Shims may be required under the test panels to maintain the same height between the surface of adjacent specimens and the drum when mounted.

6.4 *Panel Weight*—In order to evaluate the effect of the test, determine the panel weight using a balance accurate to 0.01 g in the following conditions:

6.4.1 Panel substrate prior to application of coating,

6.4.2 Panel with the coating before test, and