Designation: B 926 – 03

Standard Method for Pinhole Determination in Aluminum and Aluminum Alloy Plain Foil by Means of a Light Table[1]

This standard is issued under the fixed designation B 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 method covers the identification and counting of pinholes, including roll holes, in plain foil using a light table, and inspector with normal 20/20 or corrected 20/20 vision, and a darkened inspection area.

1.2 *This method may involve hazardous materials, operations, and equipment. 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:*

B 373 Specification for Aluminum Foil for Capacitors[2]

B 479 Specification for Annealed Aluminum and Aluminum-Alloy Foil for Flexible Barrier, Food Contact, and Other Applications[2]

E 252 Test Method for Thickness of Thin Foil and Film by Weighing[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *calibration*—determination of the values of the significant parameter(s) by comparison with a value(s) indicated by a reference instrument or by a set of reference standards.

3.1.2 *foil*—a rolled metallic product rectangular in cross-section and of a thickness less than 0.006 in. (0.15 mm). This method was developed based on aluminum foil, but could be applied to other types of metallic foil as well.

3.1.3 *pinhole*—any small void in the foil that will permit the transmission of light. Classification criteria for pinholes limits these voids to those that are too small in size to be clearly visible to the unaided eye (1× visual inspection).

3.1.4 *roll hole*—the producer's classification of a pinhole caused by an imperfection on any type of roll the foil contacts during production. The distinguishing feature of a roll hole(s) is the repeatability of this void on a regular interval. This interval is directly proportional to the circumference of the roll causing the void (this interval will also increase proportionally to subsequent thickness reductions).

4. Summary of Method

4.1 This method contains guidelines for determining the number of pinholes present in the area with the highest pinhole concentration in a sample of foil.

4.2 A full width sample is placed on the light table, and the pinholes are counted in a sample of known area (five or more square feet).

5. Significance and Use

5.1 Foil in thickness of about 0.002 in. (0.05 mm) and heavier is virtually free of pinholes. With decrease in thickness, the number of pinholes may increase.

5.2 This method is provided to develop and maintain uniformity in the methods of evaluating pinholes in aluminum foil. The pinhole data provides assessments of process capability and quality levels of the foil as well.

6. Apparatus

6.1 A light table which provides illumination between 1500 and 1800 lux light intensity with a smooth and uniform inspection surface on which the foil is examined. The light table must be in a black booth or in an area where the lights are turned off to provide darkness of less than 50 lux. The light table should be able to accommodate the widest width of foil to be examined. The usual construction of the light table consists of a shallow box painted white on the inside with rows of fluorescent lights and with a frosted or milk glass covering to provide uniform light diffusion.

6.2 One or more counting frames (grids) that have openings of one square foot (one square decimeter for SI counts).

6.3 Sheet of foil to be tested.

6.4 Calibration of the necessary light intensities can be accomplished using a standard light meter.

---

[1] This test method is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

Current edition approved April 10, 2003. Published August 2003.

[2] *Annual Book of ASTM Standards*, Vol 02.02.

7. Procedure

7.1 Test a full-width representative sample with a minimum of five square feet. Examine the full width of the sheet. The foil gage should be within tolerance.

7.2 Place the foil sample on the light table carefully to avoid wrinkling/creasing with the long direction of the bulbs perpendicular to the rolling direction of the foil and turn the lights on in the light table and off in the booth or area. Allow a reasonable time for eyes to adjust to darkened conditions.

7.3 If necessary, move the foil on the light table until the entire width has been examined. (Move the foil carefully and as little as possible because moving the sample may create voids in the sample.)

7.4 If a counting frame is used, place it over the area and count the holes. The person should be approximately 18 in. from the sample when counting.

7.5 Record the count.

8. Report

8.1 The report shall include the following:

8.1.1 Identification of the roll from which the sample was taken,

8.1.2 The average number of pinholes per square foot of sample,

8.1.3 Gage of the foil sample, and

8.1.4 Sample lot identification.

9. Precision and Bias

9.1 *Precision*—It is not practicable to specify the precision of the procedure in Method B 926 for counting pinholes because as the gage decreases, their variability and number increase.

9.2 *Bias*—Since the vision of the inspector(s) are the most significant aspect of bias in counting pinholes, it is recommended that samples of know counts be used routinely to verify if bias exists. Operating outside of the range of light intensities stated will also cause biased counts.