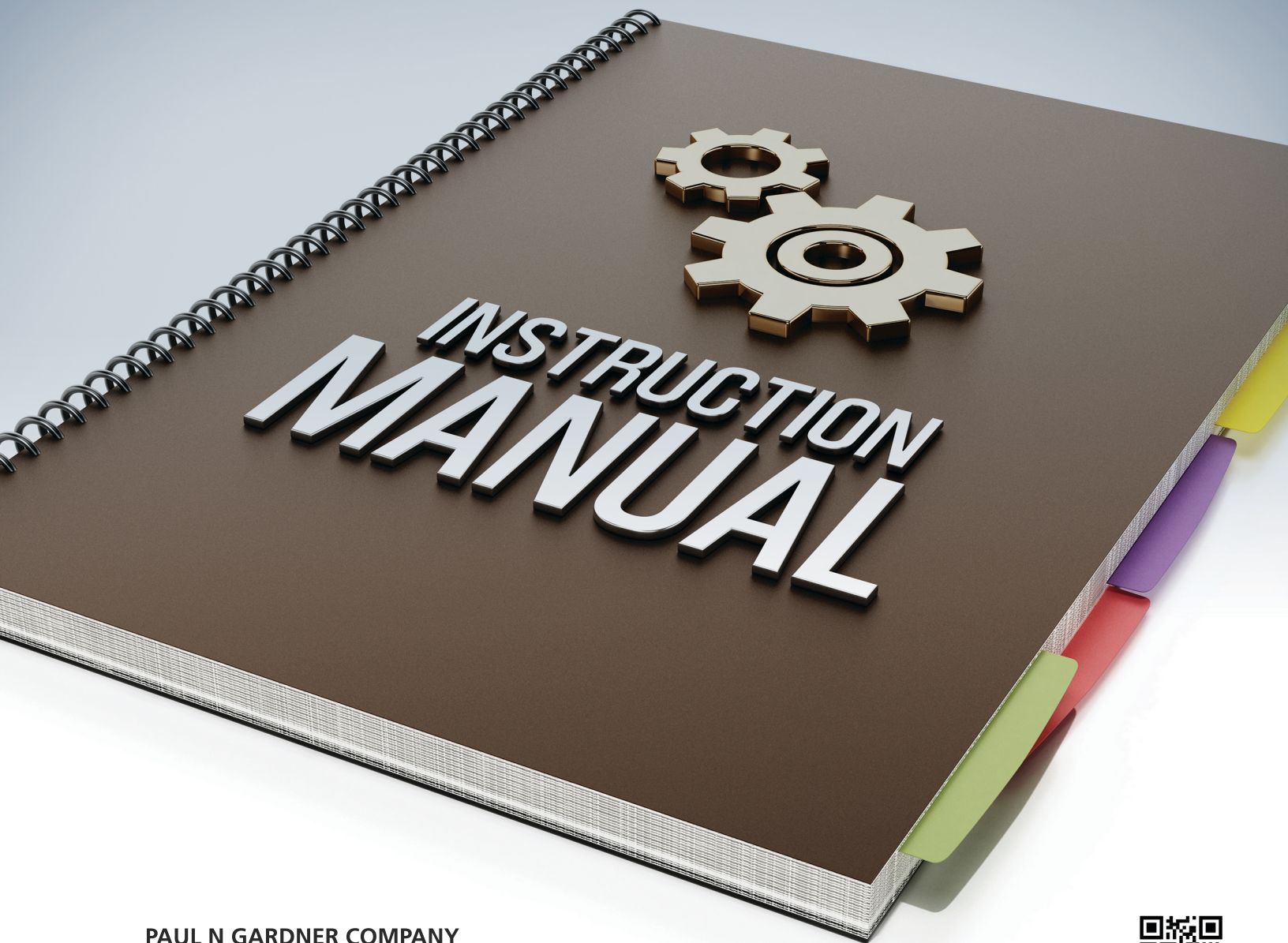




PAUL N GARDNER COMPANY
9104 GUILFORD ROAD, SUITE H
COLUMBIA, MD 21046 USA

EMAIL GARDCO@ALTANA.COM
PHONE +1-954-946-9454



INSTRUCTIONS

GARDCO DISTRIBUTED PRODUCTS



COMPANY CONFIDENTIAL OPERATIONS PROCEDURE

NUMBER: 3022
DATE: 08/03/10
REVISED:
PAGE: 1 OF 4

CALIBRATION PROCEDURE AND CALIBRATION CERTIFICATE FOR SERIES ME ELMENDORF TEAR TESTERS

OBJECTIVE:

To establish a procedure for performing Elmendorf Tear Tests on Plastic Film Specimens, following ASTM D1922: "Standard Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method".

PROCEDURE:

Number of Specimens to Test:

Enough specimens shall be cut in each direction to provide a minimum of ten tear strength determinations.

Prepare 10 representative specimens in each principal direction.

Test not less than ten specimens in each of the principal film or sheeting directions.

Measure Specimen Thickness:

Measure and record the thickness of each specimen as the average of three readings across its center in the direction in which it is to be torn. Read the thickness to a precision of 0.0001 inch (0.1 mil) or better.

Examine the Specimen: Accepting or Rejecting the Reading:

After tearing the specimen, examine the specimen. If it tore through the constant radius section within an approximate angle of 60° on either side of the vertical line of the intended tear, record the pointer reading to the nearest 0.5 unit. If the line of tear was more than approximately 60° from the vertical, reject the reading and test an extra specimen in its place.

Oblique/Oriented Tearing:

When oblique tearing is frequent, the test may be performed along and normal to the axis of maximum orientation instead of along machine and transverse directions.

Elongation Tendency of Certain Films:

In addition to tearing in a curved or oblique direction, some specimens may elongate along the line of tear to such an extent that the actual tearing length may be considerably more than the standard 43-mm (1.7-in.) dimension. As the degree or length of this elongation cannot be measured, the data cannot be corrected for its effect. However, when this has occurred, a note should be included in the report of data. This elongation tendency of certain films may cause poorer reproducibility.

Scale Range for Maximum Accuracy:

The maximum accuracy of the pendulum apparatus lies in the scale range between 20 and 60. When thin specimens are being tested, it may be advisable to test enough specimens sandwiched together to produce a scale reading between 20 and 60. However, certain specimens in the same sandwich may tear obliquely in opposite directions, which may lead to falsely high results. When this tearing behavior is encountered, single specimens must be tested, even though scale readings may be in the range below 20. If tearing loads are in excess of 60, the augmenting weight attachment may be used to double the capacity of the apparatus or a higher capacity pendulum may be used. For thin film, it is recommended that single specimens and a lower capacity tester be used rather than several specimens and a higher capacity machine. If the scale reading is below 10 on a 200 g pendulum, multiple plies may be used. The number of plies used should be the number required to bring the reading above 10.

Proportionality Between Tearing Force and Specimen Thickness:

A direct proportionality may not always exist between tearing force and specimen thickness. Therefore, this test method provides for reporting data in grams of force required to propagate tearing with specimen thickness reported separately.

Calculation:

- 11.1 Calculate the average tearing force in milli-newtons and, if desired, in grams-force as follows:

11.1.1 If the standard 1600-gf instrument with 0-100 scale is used:

$$\text{Average tearing force, mN} = \frac{16 \times 9.81 \times \text{average scale reading}}{n}$$

$$\text{Average tearing force, g}_f = \frac{16 \times \text{average scale reading}}{n}$$

where:

n = 1, or number of piles, if used.

11.1.2 If an instrument of different grams-force capacity with 0-100 scale is used:

Average tearing force, mN

$$= \frac{16 \times 9.81 \times \text{average scale reading} \times \text{g}_f\text{-capacity}}{n \times 1600 \text{ g}_f}$$

Average tearing force, g_f

$$= \frac{16 \times \text{average scale reading} \times \text{g}_f\text{-capacity}}{n \times 1600 \text{ g}_f}$$

where:

n = 1, or number of plies, if used.

11.2 Calculate the arithmetic mean. $\bar{X}$, tearing resistance in each principal direction of the film or sheeting.

11.3 Calculate the standard deviation of the tearing resistance in each principal direction to two significant figures as follows:

$$s = \sqrt{(\sum X^2 - n(\bar{X})^2 / n - 1)}$$

where:

s = estimated standard deviation,

X = value of a single observation,

n = number of observations, and

$\bar{X}$ = arithmetic mean of the set of observations.

- 11.4 The average, standard deviation, maximum, and minimum values of the tearing resistance may be obtained from the digital readout device, if applicable.

Report:

- 12.1 The report shall include the following:

- 12.1.1 Complete identification of the sample tested including source, manufacturer's name and code number, method of fabrication, roll or lot number, and date received or made,
- 12.1.2 Type and direction of specimens tested: rectangular or constant radius, parallel or normal to the machine direction of the film. If tests were performed with reference to an axis of maximum orientation that did not coincide with the machine or transverse direction of the film, the report should also include the location of this axis relative to the latter directions,
- 12.1.3 Number of specimens tested at one time, and the number tested in each principal direction of the film,
- 12.1.4 Average, maximum, and minimum values for specimen thickness and for machine and transverse tearing resistance (if data are obtained from specimens in both principal directions), expressed in millinewtons, or grams-force, if desired to the nearest whole number,
- 12.1.5 Standard deviation from the average(s) of the tearing resistance in the machine and transverse directions, if both directions are tested, and
- 12.1.6 Capacity of the tester.