



Designation: D660 – 93 (Reapproved 2019)

Standard Test Method for Evaluating Degree of Checking of Exterior Paints¹

This standard is issued under the fixed designation D660; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 The illustrated reference standards included in this test method are representative of degrees and types of checking of exterior paint films. These standards are primarily intended for comparative evaluation.

1.2 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *checking, n*—that phenomenon manifested in paint films by slight breaks in the film that do not penetrate through the last applied coating.

2.1.1.1 *Discussion*—Where precision is necessary in evaluating a paint film, checking may be described as *visible* (as seen with the naked eye) or as *microscopic* (as observed under a magnification up to ten diameters).

3. Significance and Use

3.1 Since checking is not easily recognizable, this test method is intended to provide, through definition and illustrations, a means of evaluating the degree of this film failure.

4. Types of Checking

4.1 Many types of checking are recognized, of which some are:

4.1.1 *Irregular Pattern Type*—Checking in which the breaks develop in the surface of the film in no definite pattern.

4.1.2 *Line and Short Parallel Type*—Checking in which the breaks in the surface of the film are generally arranged in parallel lines.

4.1.3 *Switch Type*—Checking in which the breaks in the surface of the film form short and long irregular lines crossing each other in a wire brushed pattern.

4.1.4 *Crow Foot Type*—Checking in which the breaks in the surface of the film form in a definite three-pronged pattern with the breaks running from a center and forming an angle of about 120° between the prongs.

4.1.5 *Mosaic Type*—Checking in which the breaks in the surface of the film form straight sided, geometric patterns which join on all sides.

4.1.6 *Shrinkage Type*—Checking in which the breaks in the surface of the film usually form individual short breaks with shorter irregular breaks progressing at right angles.

4.1.7 *Short, Random Type*—Checking in which breaks in the surface of the film form short, irregular patterns. These breaks are usually individual and do not join.

4.1.8 *Sigmoid Type*—Checking in which the breaks in the surface of the film form oval patterns. These oval shapes rarely complete their circle.

5. Use of Illustrated Reference Standards²

5.1 The use of the reference standards shown in **Fig. 1** requires the following precautions:

5.1.1 Since the type and degree of failure may vary over any given area, a representative portion should be rated. It is recommended that ratings be made at several locations, noting types and degree of failure.

5.1.2 Care must be taken to recognize that several types of checking may be present on the same surface.

5.1.3 Paint films may collect excessive quantities of dirt, which may mask the type and degree of failure. If necessary, dirt should be removed by careful and gentle brushing with a moderately soft brush. Care must be taken not to damage the finish.

5.1.4 **Fig. 2** illustrates microscopic checking under 10-diameter magnification.

5.1.5 For convenience in recording the data obtained, the records should be kept on forms agreed upon between the purchaser and the seller.

¹ This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.25 on Evaluation of Weathering Effects.

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² TNO illustrated reference standards are provided as a courtesy of TNO (Toegepast Natuurwetenschappelijk Onderzoek), Schoemakerstraat 97, Delft, Netherlands.

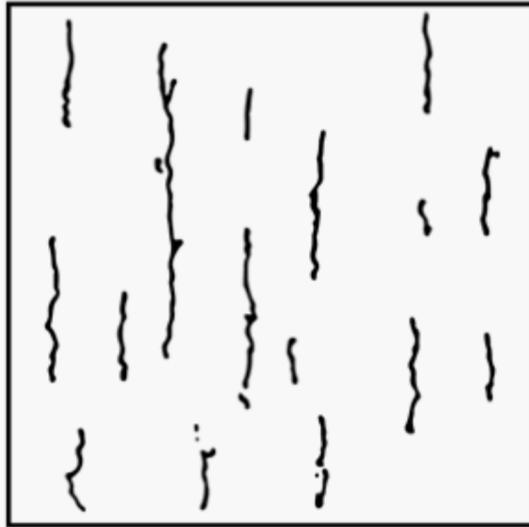


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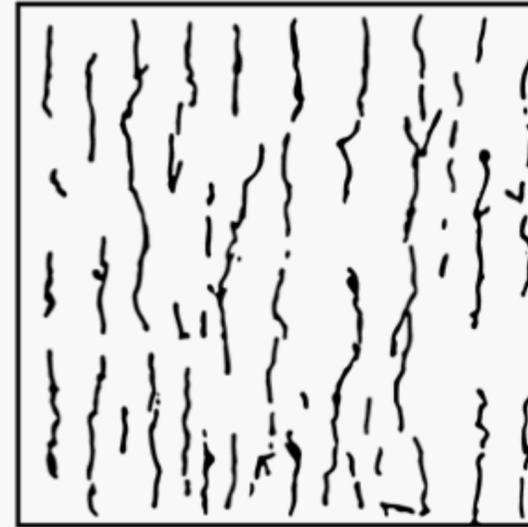


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5.1.1 IRREGULAR



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FIG. 1 Illustrated Reference Standard

6. Precision and Bias

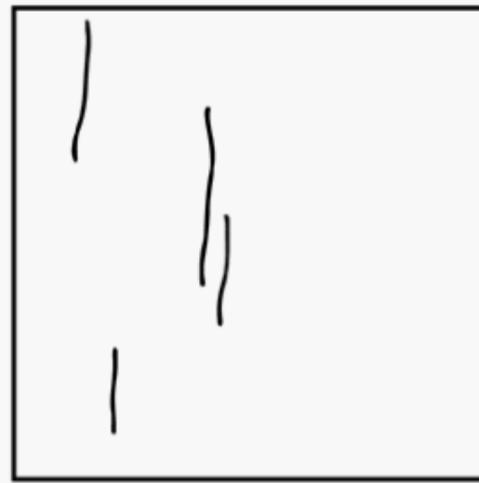
6.1 No precision or bias statement has been established for this test method.

7. Keywords

7.1 checking; evaluations; reference standards

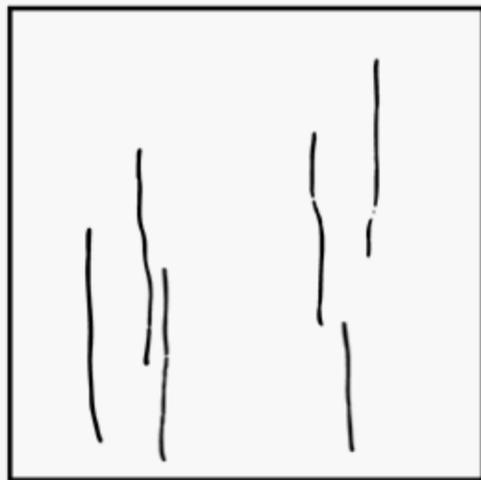


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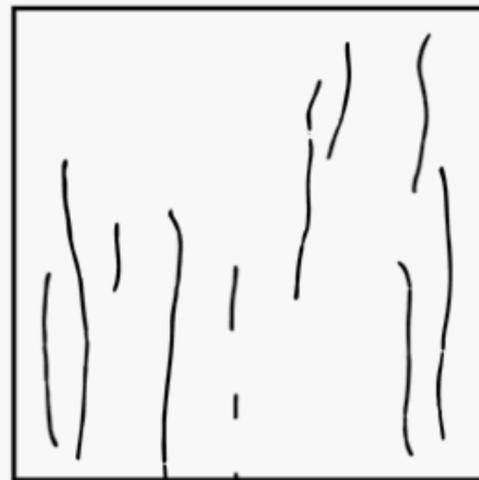


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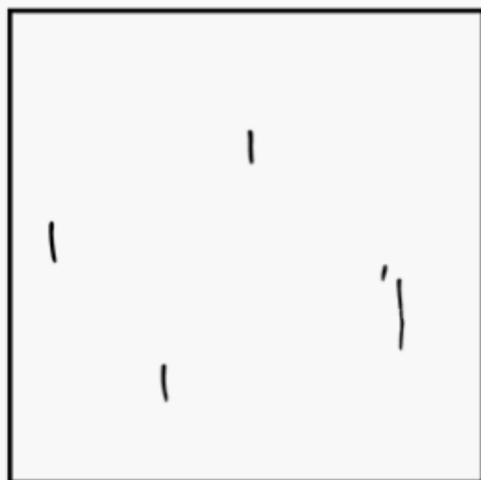
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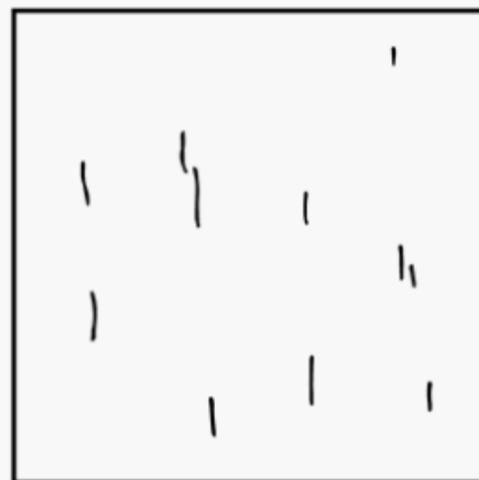
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TNO 2



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5.1.2 SHORT PARALLEL



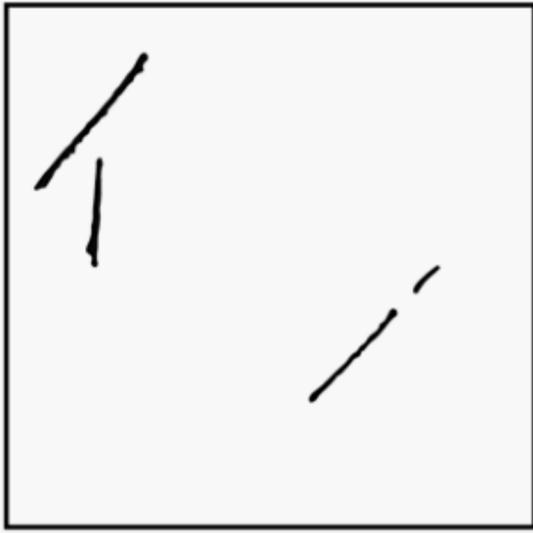
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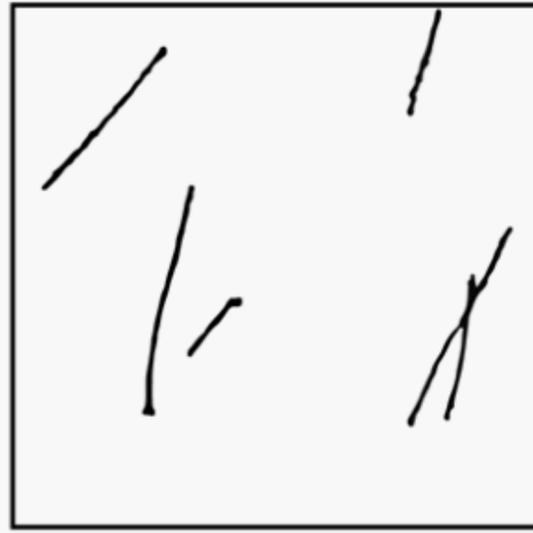
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FIG. 1 (continued)

5.1.3 SWITCH



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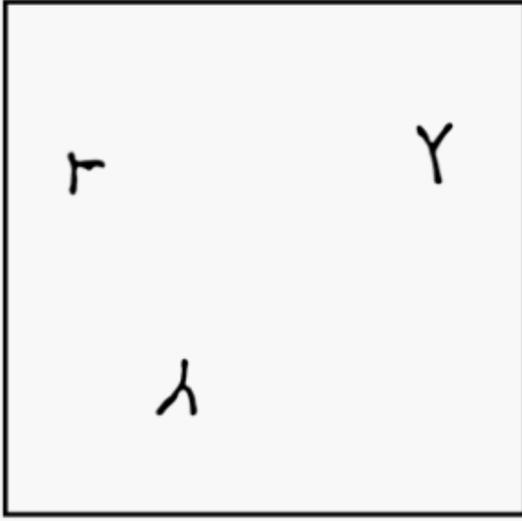
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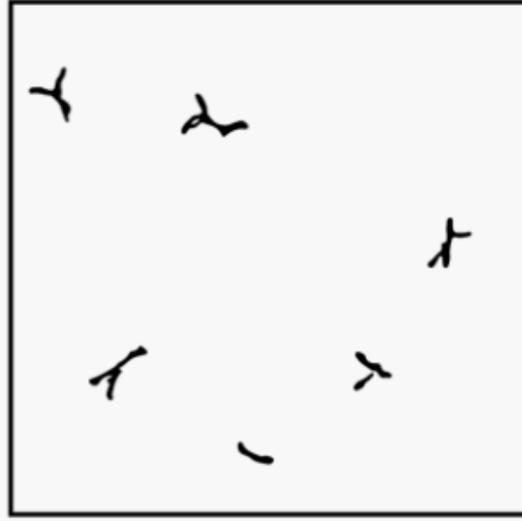
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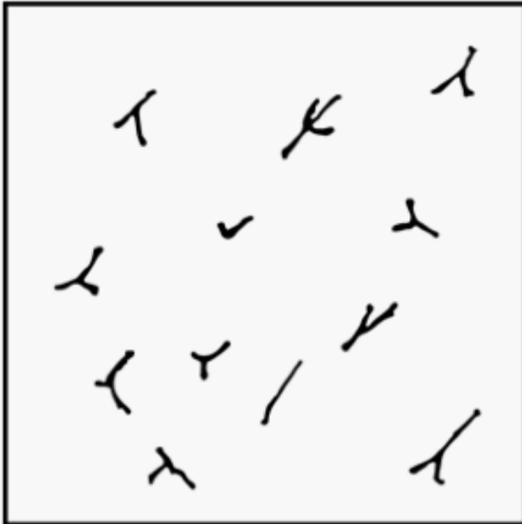
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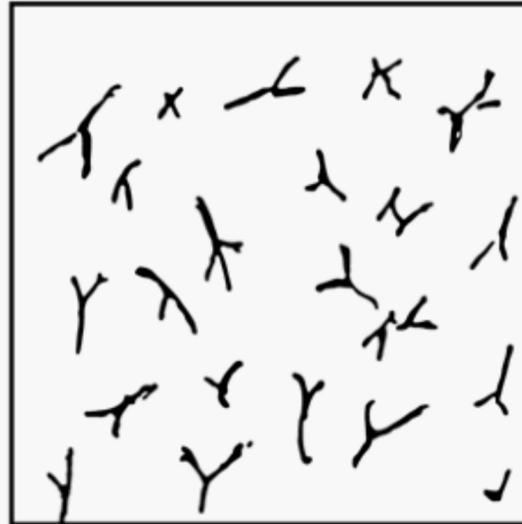
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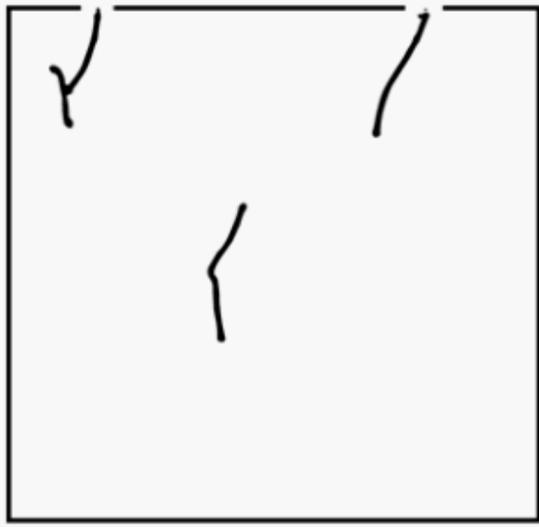


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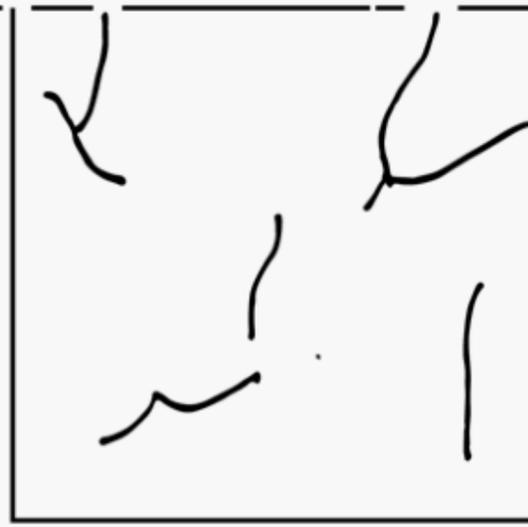


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FIG. 1 (continued)

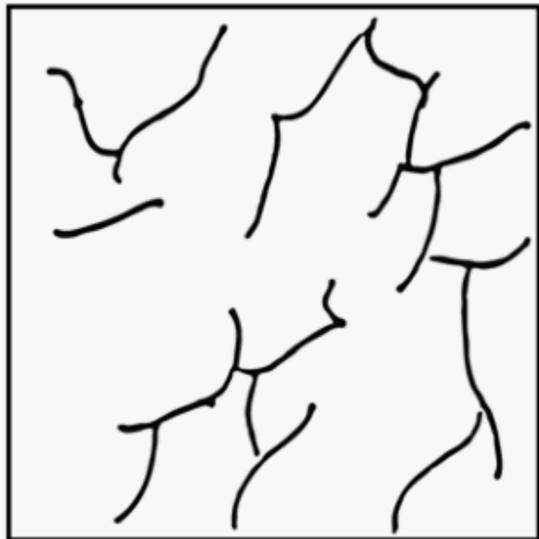


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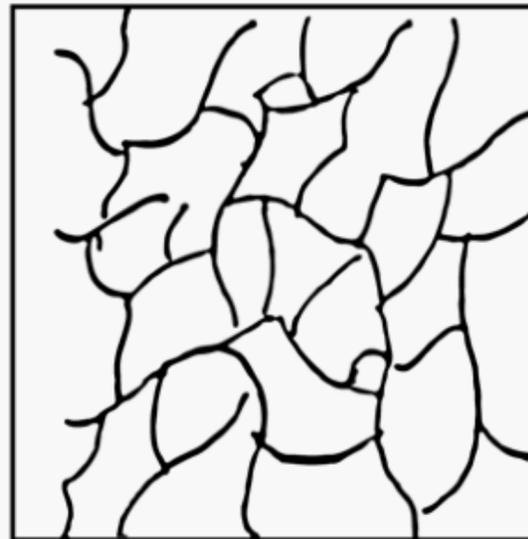


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5.1.5 MOSAIC



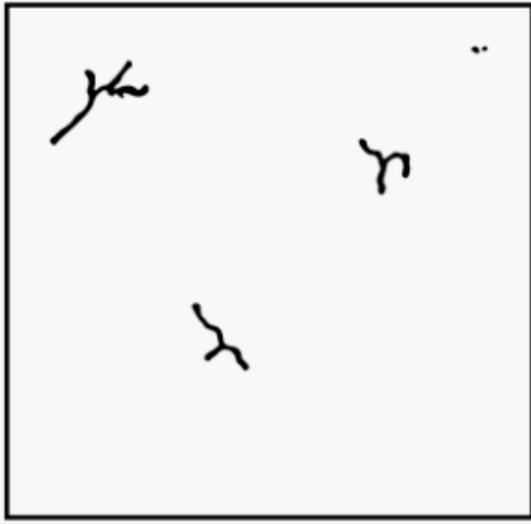
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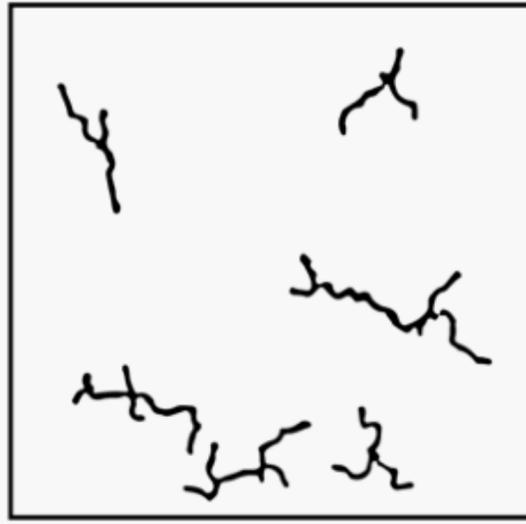
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FIG. 1 (continued)

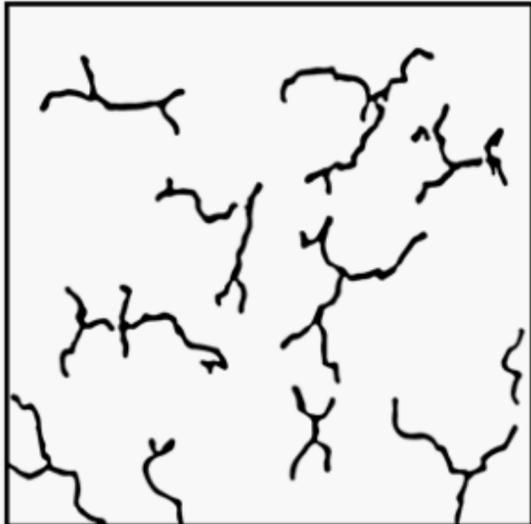
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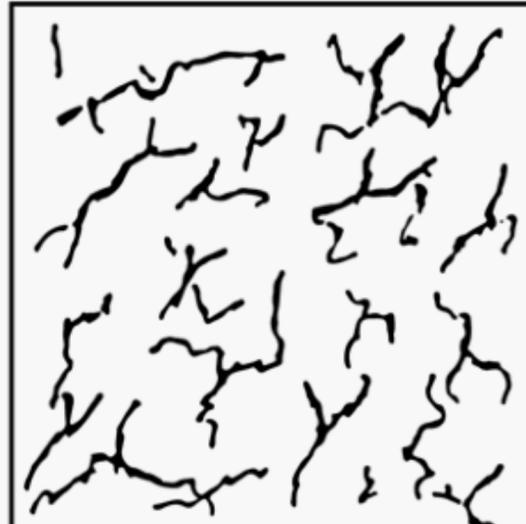
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ASTM 4
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ASTM 2
TNO 8

FIG. 1 (continued)

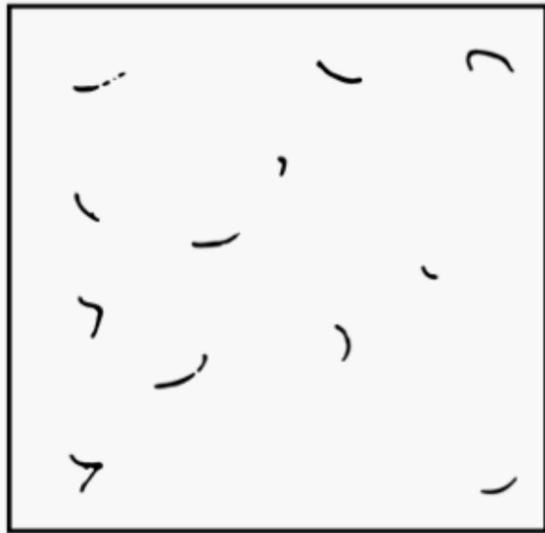


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5.1.7 SHORT,
RANDOM



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TNO 6



ASTM 2
TNO 8

FIG. 1 (continued)

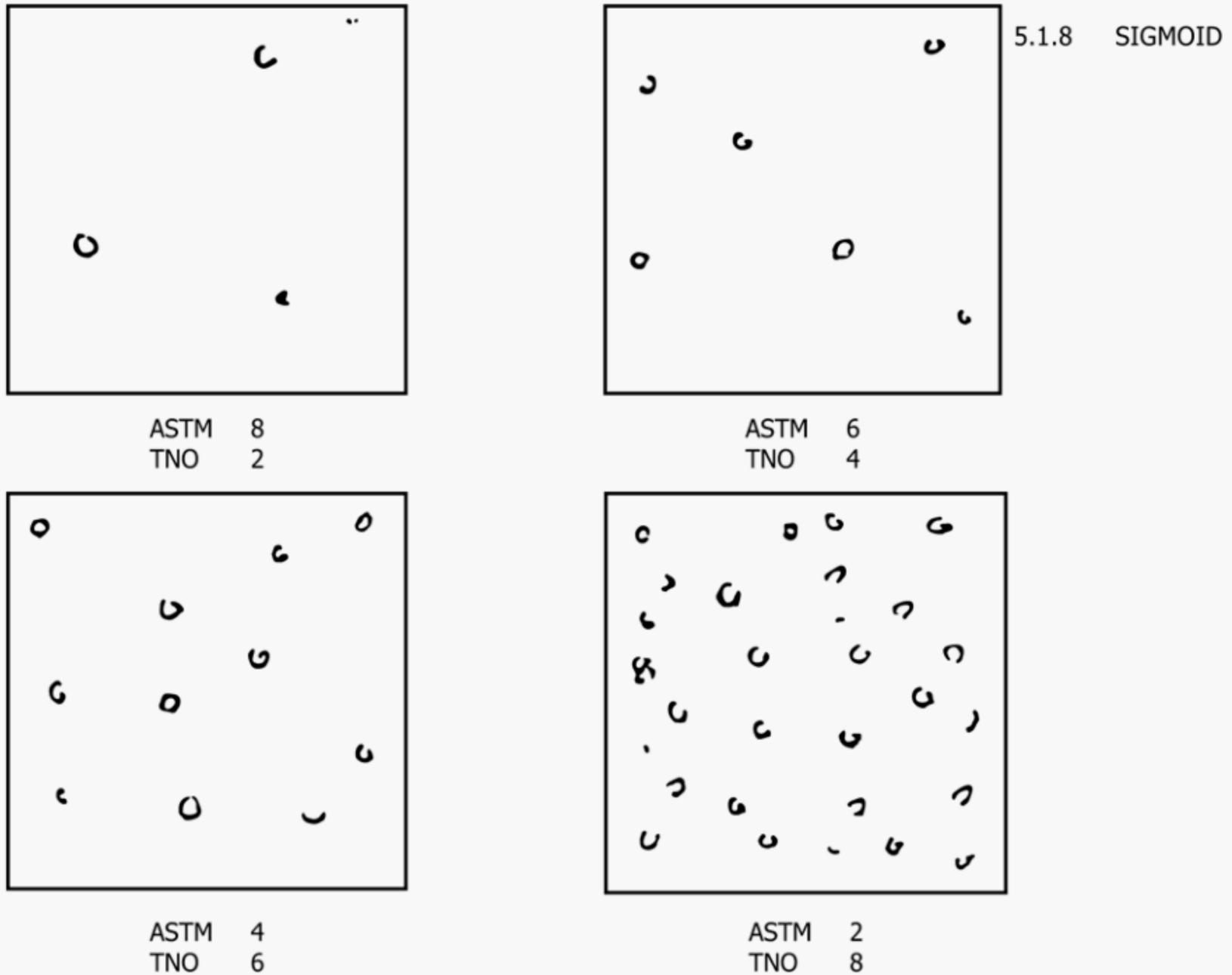


FIG. 1 (continued)



FIG. 2 No. 8 (Checking Magnified 10 Diameters)

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