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~~Standard Test Method for Relative Resistance of Printed Matter to Liquid Chemicals by a Sandwich Method~~ Designation: D6688 – 11

Standard Practice for Relative Resistance of Printed Matter to Liquid Chemicals by a Sandwich Technique¹

This standard is issued under the fixed designation D6688; 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~~ practice covers the evaluation of the relative resistance of printed matter to liquid chemicals, as evidenced by lack of discoloration, bleeding, or loss of gloss.

1.2 This ~~test method~~ practice utilizes a sandwich procedure similar in principle to ISO/TC 130 N 589. Spotting or immersion procedures are covered in Test Methods D1308, D1647, and D2248.

1.3 This ~~test method~~ practice is applicable to prints on any flat substrate including paper, paperboard, metallic foil, metal plate, and plastic films, and produced by any printing process including letterpress, offset lithography, flexography, gravure, silk screen, and non-impact.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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.* For specific hazard statements, see Section 7.

2. Referenced Documents

2.1 ASTM Standards:²

D1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes

D1647 Test Methods for Resistance of Dried Films of Varnishes to Water and Alkali

D2248 Practice for Detergent Resistance of Organic Finishes

2.2 Other Standards:

ISO/TC 130 N 589 Graphic Technology-Prints and Printing Inks-Assessment of Resistance to Various Agents³

3. Summary of Test Method—Summary of Practice

3.1 Prints of the test and reference printing inks are each sandwiched between filter paper, which has been saturated with the specified liquid. After the agreed upon contact times, the prints and filter paper are dried and then examined for objectionable changes such as discoloration, bleeding, or loss in gloss. The test print is then rated as better, equal, or worse than the reference print.

4. Significance and Use

4.1 Many types of printed matter, notably container labels, packaging materials, magazine and book covers, must be resistant to liquid materials that may contact them advertently or inadvertently. This ~~test method~~ practice permits an assessment of resistance of printed matter to several types of liquids.

¹ This ~~test method~~ practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.56 on Printing Inks.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

*A Summary of Changes section appears at the end of this standard.

4.2 The requirement that a reference print be run at the same time as the test print minimizes effects of atmospheric conditions (humidity and temperature) and other variations which may develop.

4.3 This test method practice can be used to determine whether new formulations are suitable for the end-use purpose and for specification acceptance between producer and user.

5. Apparatus

- 5.1 *Glass Plates*, 60 by 90 mm, two for each printed specimen (minimum four per test).
- 5.2 *Petri Dish*, at least 100 mm in diameter.
- 5.3 *Weight*, 1 kg.
- 5.4 *Timer*, calibrated in minutes up to 24 h.
- 5.5 *Oven*, capable of maintaining 50°C.

6. Materials

- 6.1 *Reference Print*, of known resistance to the specified test liquid, cut to 20 × 50 mm and marked with *R*.
- 6.2 *Filter Paper*, white neutral for qualitative analysis, with a very smooth and soft surface, cut to 60 by 90 mm. Minimum eight pieces per test. Mark four pieces with a *R* and four pieces with a *T*, for each test.
- 6.3 *Soft, Pliable Nonporous Film*, such as food wrap.
- 6.4 *Test Liquid*, as agreed upon between the producer and user. See examples in Table 1.

7. Hazards

7.1 Some test liquids may be harmful to the skin and eyes. Wear safety glasses and protective gloves when handling such chemicals. In case of contact, wash skin with water; flush eyes for 15 min with water and call a physician. See supplier's Material Safety Data Sheet for further information on each chemical used.

7.2 After testing is completed, dispose of leftover chemicals according to prevailing regulations.

8. Test Specimens

8.1 This test method practice does not cover preparation of printed samples. The color, substrate, method of printing, and ink film thickness shall be consistent with that of the reference print.

8.2 Cut test specimens to 20 by 50 mm and mark with a *T*. If freshly prepared prints are utilized, wait at least 72 h before conducting resistance tests. Set aside at least one specimen for comparative purposes.

8.3 Include the unprinted substrate as a blank in tests conducted with colored liquids. It may also be useful to test the unprinted substrate in cases where the print fails to remain intact.

8.4 Unless otherwise specified, at least two specimens are to be run with each test liquid.

9. Procedure

9.1 Unless otherwise specified, conduct tests at 23° ± 2°C.

9.2 Pour a quantity of the test liquid into a petri dish.

9.3 Take four pieces of filter paper marked *T* and using forceps, immerse them completely in the liquid. Remove and drain until no free liquid drips from the papers.

9.4 Place two pieces of the saturated filter paper on a glass plate, center the 20 by 50 mm specimen of test print on top of the filter paper, and cover with the other two pieces of saturated filter paper.

TABLE 1 Suggested Contact Times for Liquid Chemicals

Liquid	Suggested Contact Time
Distilled water	
Lactic acid (5 %)	
Citric acid (1 %)	
Acetic acid (1 %)	
Hydrochloric acid (1 %)	24 h
Sulfuric acid (1 %)	
Alcohols	
Oils (Vegetable, Lubricating)	
Soap or Detergent Solution (1 %)	3 h
Lactic Acid (10 %)	1 h
Citric Acid (5 %)	
Acetic acid (5 %)	30 min.
Hydrochloric acid (5 %)	
Sulfuric acid (5 %)	10 min.
Sodium hydroxide (1 %)	
Wax (molten wax)	5 min.
Other	As agreed upon between producer and user