Designation: ~~D6336 – 11~~ D6336 – 11 (Reapproved 2017)

Standard Practice for Evaluation of Flushing Vehicles for Pigment Wetting Using a Vacuum Modified Sigma Blade Mixer[1]

This standard is issued under the fixed designation D6336; 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 practice covers guidelines for the evaluations of flushing vehicles for pigment dispersion using a vacuum modified sigma blade mixer, or vacuum flusher.

1.2 The values stated in SI units are to be regarded as the standard. The values 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:*[2]

D280 Test Methods for Hygroscopic Moisture (and Other Matter Volatile Under the Test Conditions) in Pigments
D387 Test Method for Color and Strength of Chromatic Pigments with a Mechanical Muller
D1316 Test Method for Fineness of Grind of Printing Inks By the NPIRI Grindometer
D2066 Test Methods for Relative Tinting Strength of Paste-Type Printing Ink Dispersions
D2067 Test Method for Coarse Particles in Printing Ink Dispersions
D4017 Test Method for Water in Paints and Paint Materials by Karl Fischer Method
D4040 Test Method for Rheological Properties of Paste Printing and Vehicles by the Falling-Rod Viscometer
D4361 Test Method for Apparent Tack of Printing Inks and Vehicles by a Three-Roller Tackmeter

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *additives, n*—various materials that are used in relatively small quantities to condition the pigment or vehicle.

3.1.2 *break, n*—the action that takes place when water is separated from the pigment in a presscake.

3.1.3 *flushed color, n*—a color base in paste form prepared by flushing.

3.1.4 *flusher, n*—a mixing device that has two sigma shaped agitator blades parallel to each other, turning in opposing directions at different speeds.

[1] This practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.37 on Ink Vehicles.

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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.

3.1.4.1 *Discussion*—

The mixing action of a flusher is that of kneading.

3.1.5 *flushing, n*—a method of transferring pigments from dispersions in water to dispersions in oil by the displacement of the water by oil.

3.1.5.1 *Discussion*—

The resulting dispersions of flushing are known as flushed colors.

3.1.6 *pigment, n*—the fine solid particles of colorant used to give color to printing inks.

3.1.6.1 *Discussion*—

The pigment particles are substantially insoluble in the vehicle and in water.

3.1.7 *presscake, n*—a mixture of pigment and water formed into a cake by passing through a filter press under pressure.

3.1.8 *vacuum cycle, n*—the time a flush is under vacuum to remove entrapped water.

3.1.9 *vehicle, n*—the liquid portion of an ink that holds and carries the pigment, provides workability and drying properties and binds the pigment to the substrate after the ink has dried.

4. Summary of Practice

4.1 Vehicle, pigment presscake, and additives are added into a sigma blade mixer and mixed until the water is displaced from the pigment presscake.

4.2 Step 4.1 is repeated two or three times until the capacity of the flusher has been reached.

4.3 The flusher is then sealed and a vacuum applied until the dispersion (flush) is free of moisture.

NOTE 1—Lithol rubine pigment undergoes a color conversion when essentially all water is removed.

4.4 Vehicle solvent and additives are added to adjust the strength, shade and body of the dispersion (flush) to that of a standard dispersion (flush).

5. Significance and Use

5.1 By following this practice it is possible to make reproducible flushes when using the same raw materials. Therefore, if someone wishes to evaluate the effect a different raw material has on a flush, it is possible to evaluate this effect by noting the change that occurs from a control flush to the experimental flush. This change can be, but is not limited to; such things as strength after vacuum, grind, grit, gloss etc. This practice can be used by ink companies, pigment companies or varnish companies. This practice is not meant to give absolute values but is meant to be used as a relative practice in which a control flush is made using a standard formula and the experimental flush is compared to the control flush. This practice is not meant to determine the absolute performance of a formula in production. Again it can be used to give a relative idea of how a formula will perform in production when a correlation has been established between laboratory flushing and production flushing.

6. Apparatus

6.1 *Laboratory Sigma Blade Flusher,* typically 1-L (1-qt) to 4-L (1-gal) capacity.

6.2 *Vacuum Pump,* capable of obtaining a vacuum in the flusher of 69 cm (27 in.) to 76 cm (30 in.).

6.3 *Wide Blade Spatula,* typically 5 by 10 cm (2 by 4 in.).

6.4 *Spatula,* typically 2.5 by 7.5 cm (1 by 3 in.).

6.5 *Scale,* capable of weighing up to 3 kg accurate to 1 g.

6.6 *Scale,* capable of weighing up to 1 kg, accurate to 1 g.

7. Materials

7.1 *Presscake.*

7.2 *Flushing Vehicle(s).*

7.3 *Experimental Vehicle.*

7.4 *Flushing Additives.*

8. Procedure

8.1 Fig. 1 illustrates a typical formula for a 1-L laboratory flusher.

NOTE 2—It is common practice for formulas to be based on the amount of pigment calculated on a dry basis and not on the weight of presscake, since the amount of water in the presscake will vary from batch to batch. For example, a presscake can be referred to as 25 % dry or 25 % solids. This means that for every 100 kg of presscake there are 25 kg of pigment and 75 kg of water. Usually the entire quantity of presscake to be flushed will not fit in the flusher at one time. If this is the case, it is necessary to flush the required amount of pigment in a succession of breaks (see Fig. 1).

NOTE 3—Many formulas call for two or more kinds of oil or varnish or resin solution etc. Directions are usually very specific as to how much should be used, when the various items should be added, and the order in which they are added. It is normal practice to add these items in the same order as

DEVELOPMENT FLUSHING FORM

Date:

Project No.

Product Code Number	9999
Presscake Used	zyxw
Percent Solids	28.5%

I. Flushing Cycle		Amount used(a)	Break 1	Break 2	Break 3	Break 4
Presscake No. zyxw		160.0g	77.0g	37.0g	25.5g	20.5g
Vehicle No	1	35.0g	35.0g			
Vehicle No.	2	90.0g	60.5g	29.5g		
Vehicle No						
Additive No	1	5.0g	5.0g			
Additive No	2	.8g	.8g			
Solvent No	1	23.0g				
Total		308.0g(b)				

II. Reduction Cycle		
Vehicle No.		
Vehicle No.,		
Additive No	3	9.0g
Additive No		
Solvent No	1	1.0g
Solvent No		
Total		10. 0g

III. Adjustments		
Vehicle No. 2		44.0g
Vehicle No		
Solvent No	1	20.0g
Solvent No		
Total		64. 0g

TOTAL FORMULA	382.0g

By: _____

(a) These weights are calculated on the dry weight of the presscake. (pigment weight)

(b) For this formula, it is assumed that additives #1 and #2 are washed out of the system with the water.

FIG. 1 Development Flushing Form