



Standard Practice for Sampling of Coating Films¹

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1. Scope

1.1 This practice covers methods to remove samples of coating films for subsequent analysis related to identification of generic coating type and failure analysis or other reasons. These techniques can be used in the field, the fabricating shop, or laboratory.

1.2 The method for obtaining coating samples for heavy metal analysis is presented in Practice D 5702.

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:

D 4840 Guide for Sampling Chain-of-Custody Procedures²

D 5702 Practice for Field Sampling of Coating Films for Analysis for Heavy Metals³

3. Significance and Use

3.1 Specimens for analysis must be adequately sampled, packaged, and documented to obtain meaningful information from the laboratory. The sampling procedure and packaging will be dependent upon the reason for taking the sample.

4. Procedure

4.1 General:

4.1.1 Contaminating samples must be avoided. Hands must be kept clean by washing or wearing protective covers such as latex gloves. Contact the laboratory that will perform the analysis to determine if any other precautions are needed. Clean blades or knife between each sample with a rag soaked in solvent, or change blades between each sample.

4.1.2 The number and location of samples will vary depending upon the reason for sampling. Document the sampling location prior to obtaining the sample. Measure and record dry film thicknesses. If delamination is present, measure and record dry film thickness of the coating remaining in the delaminated

area as well as the intact area. Record the type of delamination, that is, adhesive or cohesive, and the color of the coating layer(s) where the delamination occurred. Document any other visual defects such as alligatoring, mudcracking, checking, blistering, non-uniform appearance, or chalking.

4.1.3 Obtain any history of the coating system available. This should include when the coating was applied, the type of coating, and intended dry film thicknesses. Obtain a copy of the painting, if possible, to verify the information.

4.1.4 Photograph the sample area before and after obtaining the sample.

4.1.5 Samples should be sent to the laboratory with a chain-of-custody form, especially if there are genuine or potential legal ramifications to the results of the laboratory analysis. Guide D 4840 presents the minimum requirements for sample chain-of-custody procedures.

4.2 Peeling Paint or Paint with Poor Adhesion:

4.2.1 Samples should be taken that have not had both sides exposed to the elements. Make an incision approximately 2 in. long in the coating using a sharp knife blade (such as a utility knife). Hold the blade at a low angle to the surface and probe the incision by pushing forward on the knife. Alternatively, it may be possible to remove the sample by cutting a 2-in. square in the coating and peeling a sample by inserting the knife blade held at a low angle to the surface at one of the edges of the incision. For brittle coatings, masking tape may be used to hold the film together during removal.

4.2.2 Obtain at least three samples, each sample being at least 2-in. square. Smaller samples are allowed if a 2-in. square piece cannot be removed. Ensure that the three samples represent the same system. Place the samples in a plastic bag or envelope. Mark the outside of the bag or envelope with the identity of the sample, including date, name of person taking the sample, project location, area location, and type of sample. Use a different container for each area sampled.

4.2.3 Place a mark on the outer surface of the coating chip using a felt-tipped pen or other available marker. If analysis of the topcoat is desired, identify the topcoat and disbondment surfaces in the documentation using attributes such as color, gloss, or obvious presence of a foreign substance. Record the location where the sample was obtained, whether the failure plane was between coats or within a coat, and the identification of the top coat and disbondment surfaces. Request the laboratory to identify cause of disbondment.

4.3 Paint with Solvent Odor:

¹ This practice is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.46 on Industrial Protective Coatings.

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² Annual Book of ASTM Standards, Vol 11.01.

³ Annual Book of ASTM Standards, Vol 06.02.

4.3.1 The important step in obtaining samples of paint films for identification of retained solvents is to deposit the sample in a tightly closed container as quickly as possible. A septum-top vial is the preferred container. A screw-top vial or jar is acceptable. The vial or jar should have the top removed prior to obtaining the sample.

4.3.2 For samples of peeling paint, select an area of poor adhesion where the paint is not visually disbonded. Remove a sample as described in 4.2.1. Place it immediately in the container and screw the top tightly onto the vial or jar. Do not reopen the jar. Other samples are to be placed in different containers. Take a minimum of three samples.

4.3.3 Record the location where the sample was obtained. Request the laboratory to identify the solvent odor.

4.4 *Sampling of Top Coat:*

4.4.1 It may be necessary to identify the generic coating type of a top coat in order to determine its compatibility with overcoating materials. There are the following three possible sampling methods: paint chip, paint sanding, and paint scrapings.

4.4.1.1 *Paint Chip Method:* If it is possible to obtain a paint chip, even if it contains multiple layers, the best method is to let the laboratory obtain a sample of the top coat. A sample at least 5-in. square should be obtained. Identify the color of the top coat if there is more than one layer in the paint chip.

4.4.1.2 *Paint Sanding Method:* Sanding is used to obtain samples of top coat of tightly adherent coatings (or samples of exposed coating) from a delaminated area. Clean the surface of dust, dirt, and debris by washing with clean water and a rag. Fold a piece of paper lengthwise to make a trough, and tape it immediately below the sampling location. Using a fine-grade sandpaper or emery cloth, rub the surface in a circular pattern until enough coating to cover a fingernail has been removed from the surface. Examine the sampling location to determine if the top coat had been penetrated and the next coat is visible. (Discard the sample if the next coat is visible at the sampling location.) Place the sample in a small vial. If no vial is available, take the paper and place the sample in the middle of the trough by lifting the ends of the trough. Fold the paper in thirds lengthwise, and then in half in the opposite direction.

Place the paper in a plastic bag or envelope, and seal. Mark the outside of the bag or envelope with the identity of the sample, including date, name of person taking the sample, project location, area location, and type of sample.

4.4.1.3 *Paint Scrapings Method:* Scraping with a sharp blade is used to obtain samples of the top coat of tightly adherent coatings (or samples of exposed coating) from delaminated areas. The procedure is the same as sanding except a sharp blade such as a single-edge razor blade or utility knife blade is used. The blade edge is held perpendicular to the surface. The long edge of the blade is pressed with sufficient pressure over the surface so that tiny pieces of the coating are removed. However, greater care is needed when using a blade as it is easier to cut into the coating and obtain small specimens of lower coating layers. The surface must be examined more carefully after taking the sample to determine that the sample has not been contaminated.

4.4.2 Document the sample location and method used to obtain the sample. Request the laboratory to identify the generic type of coating.

5. Report

5.1 Maintain field notes that include the following information: structure sampled, date, name of sampler, unique identification number for each sample, location on the structure of each sample, location in coating film of failure (if applicable), dry film thickness measurements, film condition, and any other observations.

5.2 When using a chain-of-custody form, include unique identification number, type of sample, number of samples, and type of container for each sample. Sign and date the chain-of-custody form just prior to sealing the package, or when handing the package to the next person who takes custody.

5.3 Provide information to the laboratory on tests to perform or information desired using an analysis request form, chain-of-custody form, or letter.

6. Keywords

6.1 coating films; paint and coating; sampling methods

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