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Standard Guide for Assessing the Condition of Aged Coatings on Steel Surfaces¹

This standard is issued under the fixed designation D5065; 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 guide describes general procedures for conducting a detailed assessment of the condition of aged coatings on steel structures and the extent of rust breakthrough of the coated surface. Additional assessment may be required to support coating failure analyses or other job-specific needs.

1.2 This guide does not address determining the structural condition of a steel substrate. It provides procedures to determine the percent of the surface rusted, but not the severity, condition, or cause of such rusting.

NOTE 1—A more comprehensive condition assessment procedure, Practice F1130, has been developed for determining the condition of coatings on a ship.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *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. Referenced Documents

2.1 *ASTM Standards:*²

- D610 Practice for Evaluating Degree of Rusting on Painted Steel Surfaces
- D660 Test Method for Evaluating Degree of Checking of Exterior Paints
- D714 Test Method for Evaluating Degree of Blistering of Paints

¹ This guide is under the jurisdiction of ASTM Committee D01 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 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.

- D3359 Test Methods for Rating Adhesion by Tape Test
- D4214 Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
- D4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- D5702 Practice for Field Sampling of Coating Films for Analysis for Heavy Metals
- D6206 Practice for Sampling of Coating Films
- D6677 Test Method for Evaluating Adhesion by Knife
- D7091 Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals
- F1130 Practice for Inspecting the Coating System of a Ship
- 2.2 Society for Protective Coatings:³
 - SSPC Technology Update No. 3 Overcoating

3. Summary of Practice

3.1 This practice for assessing the condition of coatings consists of identifying general types of components of a structure and assessing each separately for commonly occurring modes of coating deterioration and substrate rusting using visual guides and evaluation tools. A form for recording the results of the assessment procedure (Fig. 1) is provided.

4. Significance and Use

4.1 Assessment of the condition of aged coated surfaces strengthens decisions on when coating maintenance is required, aids in the selection of effective coating maintenance procedures, and provides a means to characterize performance of coating systems. SSPC Technology Update No. 3 discusses the risks associated with selecting overcoating as a maintenance strategy, particularly without performing visual assessments and evaluating the physical properties of the existing coating system(s) described in Section 5.

5. Procedure

5.1 Survey the structure to (1) determine the general types of unique components (for example, for fuel tanks the components may be shell, roof, ladders, and piping) and the service

³ Available from The Society for Protective Coatings (SSPC), 800 Trumbull Drive, Pittsburgh, PA 15205-4365, http://www.sspc.org.

Condition Assessment

Structure		Date	Inspector					Overall Environment		
Original Coating System			1st Maintenance Coating System					2nd Maintenance Coating System		
Surface Preparation			Surface Preparation					Surface Preparation		
Year Applied			Year Applied					Year Applied		
Primer			Primer					Primer		
Midcoat			Midcoat					Midcoat		
Midcoat			Midcoat					Midcoat		
Topcoat			Topcoat					Topcoat		
Structure	Description		Ratings					Measurements		
Component	Local Environment	Rust ^A	Under film Condition ^A	Peeling	Blistering	Cracking	Chalking	Thickness	Adhesion	Remarks

^A Rusting corresponds to Practice D610, that is, that which is observed upon visual inspection of the coated surface while underfilm condition corresponds to substrate condition under an intact coating as described in 5.3.

FIG. 1 Example 1 Report Form

exposure environment for each, (2) visually identify areas having a typical level of coating deterioration and rust breakthrough for each component, and (3) identify areas having a much greater visual level of deterioration than typical and unique environmental conditions that may correspond to these areas (for example, beneath bridge deck expansion joints). Record a description of the components and their general environment on an inspection form and describe areas having greater deterioration, as well as any unique associated environments in the remarks column. A suggested general format for data collection is shown in Fig. 1. Modification of the form (for example, adding or deleting specific items) will be required for each specific application.

5.2 Based upon the knowledge of what constitutes typical deterioration for each component as determined in the initial survey, examine the condition of the coating on a representative sample of each component. Rate the condition of the coatings using the appropriate ASTM visual standard for rust breakthrough (Practice D610), blistering (Test Method D714), peeling (use Practice D610 to report amount), chalking (Test Methods D4214), and cracking/checking (Test Method D660) of the coating film or other appropriate procedures as agreed upon between interested parties. Record the rating in the appropriate column of the report form for each component. Determine and record the type of peeling, for example, intercoat delamination. Rate the condition in enough areas to ensure that for each component the coating evaluation is representative of the condition over the entire structure. If additional areas of greater deterioration are detected during this assessment, make note of them in the remarks column.

NOTE 2—For the purpose of an initial general assessment, cracking and checking can be assessed as one type of failure, using the pictorial standards in Test Method D660 to define type and extent.

5.3 When rusting beneath an intact coating film is suspected, remove the coating and examine the condition of the underlying substrate. Remove apparently intact coatings using chemical strippers or closely spaced parallel knife cuts. For

structural steel, determine the type of previous surface preparation evidenced by the presence of millscale or surface profile (from abrasive blast cleaning). Identify evidence of corrosion from the presence of pits, black anodic spots, or corrosion scale. Record the results of the examination on the report form.

5.4 Using one of the procedures described in Practice D7091, determine the coating thickness in enough areas of each component to ensure a representative sample. Record the measured thicknesses.

5.5 If a measure of coating adhesion is desired, use one of the procedures described in Test Methods D3359, D4541, or D6677. Determine coating adhesion in enough areas of each component to ensure a representative sample. Record the adhesion rating or value, the procedure, and equipment used.

NOTE 3—The number of areas that coating thickness and adhesion is measured will depend upon the desired precision of the measurement. More measurements would be made on structures in which knowledge of the coating thickness and adhesion variability across the component or structure is required.

5.6 If required for a maintenance decision, identify the generic type(s) of the existing coating film component from records or by analyzing a sample of paint in the laboratory. Collect the paint sample in accordance with Practice D6206. To the extent possible, each layer of the film should be characterized.

5.7 If required for a maintenance decision, determine the concentration of heavy metals in the coating from a field sample. Collect the paint samples in accordance with the requirements of Practice D5702.

6. Report

6.1 Prepare an inspection report. Fig. 1 provides an example of the types of information to be included.

7. Keywords

7.1 assessment; coatings; condition; field; overcoating; paint