



Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces¹

This standard is issued under the fixed designation D 610; 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 Department of Defense.

1. Scope

1.1 This test method covers the evaluation of the degree of rusting on painted steel surfaces using visual standards. These visual standards² were developed in cooperation with the Steel Structures Painting Council (SSPC) to further standardization of methods.

1.2 *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 Adjuncts:
D 610 Degree of rust (four photos)²

3. Significance and Use

3.1 The amount of rusting beneath or through a paint film is a significant factor in determining whether a coating system should be repaired or replaced. This test method provides a standardized means for quantifying the amount of rust present.

4. Interferences

4.1 The colored photographic reference standards that are part of this test method and the associated rust-grade scale cover only rusting not accompanied by blistering and evidenced by visible rust.

4.2 The use of the photographic reference standards² requires the following cautions:

4.2.1 Some finishes are stained by rust. This staining must not be confused with the actual rusting involved.

4.2.2 Accumulated dirt or other material may make accurate

determination of the degree of rusting difficult.

4.2.3 Certain types of deposited dirt that contain iron or iron compounds may cause surface discoloration that should not be mistaken for corrosion.

4.2.4 Failure may vary over a given area and discretion must therefore be used when selecting a single grade that is to be representative of a large area or structure.

4.2.5 The color of the finish coating should be taken into account in evaluating surfaces as failures will be more apparent on a finish that shows color contrast with rust, such as used in these reference standards, than on a similar color, such as an iron oxide finish.

5. Procedure

5.1 Visually compare the surface with the photographic reference standards to determine the percentage of the area rusted. As a guide use Fig. 1 and the scale and verbal descriptions shown in Table 1.

NOTE 1—The numerical rust grade scale is an exponential function of the area of rust so that slight amounts of first rusting have the greatest affect on lowering the rust grade; the rust grade versus area of rust is a straight line plot on semilogarithmic coordinate from rust grade 10 to rust grade 4. The slope of the curve was changed at 10 % of the area rusted to 100 % rusted to permit inclusion of complete rusting on the 0 to 10 rust scale.

NOTE 2—The pictorial representations illustrated in Fig. 1³ show examples of area percentages that may be helpful in rust grading.

5.2 The photographic reference standards are not required for use of the rust-grade scale since the scale is based upon the percent of the area rusted and any method of assessing area rusted may be used to determine the rust grade.

6. Precision and Bias

6.1 No precision or bias statement can be made for this test method.

7. Keywords

7.1 corrosion; rusting

¹ This test method 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.

This test method has been jointly approved by ASTM and the Steel Structures Painting Council.

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² The colored photographic reference standards are available at a nominal cost from ASTM Headquarters (order Adjunct ADJD0610), and from the Steel Structures Painting Council, 4518 Henry St., Suite 301, Pittsburgh, PA 15213.

³ Original source is *Steel Structures Painting Manual*, Vol 2, Steel Structures Painting Council, Pittsburgh, PA.

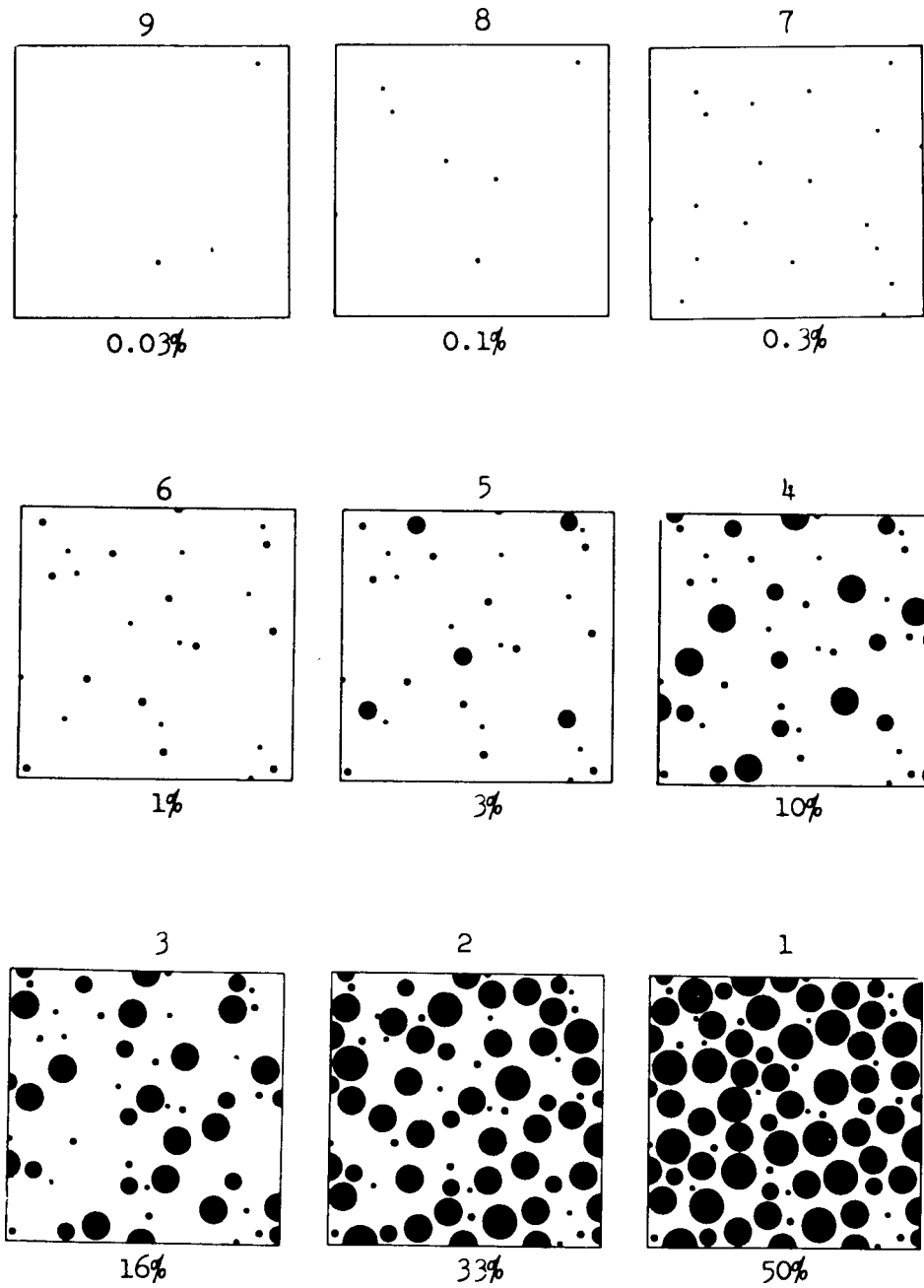


FIG. 1 Examples of Area Percentages

TABLE 1 Scale and Description of Rust Grades

NOTE 1—SSPC Initial Surface Conditions E, F, G, and H are described in “Systems and Specifications, Surface Preparation Commentary,” Vol 2 of the *Steel Structures Painting Manual*, 6th Edition, 1991.

Rust Grades ^A	Description	ASTM-SSPC Colored Photographic Standard
10	no rusting or less than 0.01 % of surface rusted	unnecessary
9	minute rusting, less than 0.03 % of surface rusted	No. 9
8 ^B	few isolated rust spots, less than 0.1 % of surface rusted	No. 8
7	less than 0.3 % of surface rusted	none
6 ^C	extensive rust spots but less than 1 % of surface rusted	No. 6
5	rusting to the extent of 3 % of surface rusted	none
4 ^D	rusting to the extent of 10 % of surface rusted	No. 4
3 ^E	approximately one sixth of the surface rusted	none
2	approximately one third of the surface rusted	none
1	approximately one half of the surface rusted	none
0 ^F	approximately 100 % of surface rusted	unnecessary

^ACorrespond to Swedish Pictorial Standards for Rusting (1955) (black and white).

^BCorresponds to SSPC Initial Surface Conditions E and British Iron and Steel Research Assn (BISRA) 0.1 %.

^CCorresponds to SSPC Initial Surface Conditions F and BISRA 1.0 %.

^DCorresponds to SSPC Initial Surface Condition G.

^ERust grades below 4 are of no practical importance in grading performances of paints.

^FCorresponds to SSPC Initial Surface Condition H.

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