Comparison of Scribe Creepage Assessment

WG Enclosure Integrity
C57.12.28, C57.12.29, C57.12.30, C57.12.31, C57.12.32

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Comparison of ASTM D1654 Evaluation of Scribe Creepage

(2005 Revision vs. 2008 Revision)

Background

Two major differences between revisions:

- The evaluation procedures are not consistent between the revisions – a reference to a specific evaluation method, without referencing the year of document revision, may lead to misinterpretation of the method used, which could result in misidentification of scribe creepage.
- The evaluation criteria in the 2005 revision explicitly considers both corrosion and loss of paint extending from the scribe when determining a rating for scribe creepage, while the 2008 revision only considers areas discolored due to corrosion (***the language referring to loss of paint has been removed and does not appear anywhere else in the document***). This is especially problematic on passivated substrates where a catastrophic loss of adhesion may occur (*i.e.,* complete paint film delamination) but no discoloration from corrosion exists. This can occur on other substrates, but the effect is most pronounced on stainless steel and similar substrates.

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Excerpt from ASTM Standards

	ASTM D1654-05	ASTM D1654-08
Evaluation Procedures	Method 1 (Air Blow-Off) Method 2 (Scraping)	Method 1 (Scraping) Method 2 (Knife) Method 3 (Paint Stripper) Method 4 (Air Blow-Off) Method 5 (Power Washer)
Evaluation Criteria (Rating)	7.3 *Rating*—Rate the corrosion or loss of paint extending from a scribe mark as prescribed in Table 1. Record the representative mean, maximum, and minimum creepage from the scribe, and note whether or not the maximum is an isolated spot. Record creep values in millimeters, inches, or rating numbers, as agreed upon between producer and user 7.3.1 Unless otherwise agreed upon by the producer and user, scribe creepage is defined as "one sided," that is, from the original scribe line to the creepage front. Also, rate in accordance with Table 2 the prevalence of corrosion on areas removed from the scribe	8.2 *Rating*—Only areas of the substrate that are discolored due to corrosion should be considered. Record the maximum and minimum creepage from the scribe, and note whether or not the maximum is an isolated spot. The mean can be determined by making at least 6 measurements of the width of the zone of corrosion uniformly distributed along the scribe, ignoring 3 mm (0.125 in.) of each end of the scribe. Determine the arithmetic mean, and use the following equation to determine rust creepage (c): $c = \frac{w_c - w}{2}$ (1) where: w_c = mean overall width of the corrosion zone and w = width of the original scribe.

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Case Study #1

Case Study Evaluation of Scribe Creepage per ASTM D1654 (2005 vs. 2008 Revision)		
	ASTM D1654-05	**ASTM D1654-08**
Evaluation Method	Method 2 (Scraping)	Method 1 (Scraping)
Mean Scribe Creepage (rating):	4 | 3 | 4 (**Avg. 4**)	7 | 7 | 6 (**Avg. 7**)
Result	**FAIL**	**PASS**

* Panels were evaluated for scribe creepage per enclosure integrity standards.

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Case Study #1

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Case Study #1

Part Test Information

PART NUMBER	LOT NUMBER	S#	SAMPLE DESCRIPTION

TEST SPECIFICATION NAME	TEST PROCEDURE NAME	HOURS	CYCLES

TEST RESULTS	INDATE	OUTDATE	TESTCNT	RETCNT	REQ	COMP	REQ	HOURS	COMP
IEEE C57.12.31 Section 4.5.6									
Simulated Corrosive Atmospheric Breakdown (SCAB) IEEE C57.12.31-2010	15-Mar-17	24-Apr-17	10	10			10		10

Results: All 3" x 6" panels PASS. All 4" x 8" panels FAIL for blistering. See below.

	Scribe Rating IAW ASTM D1654	Blisters (Yes/No)
(6) 3" x 6" Panels		
3-3	*7*	*No*
3-4	*7*	*No*
3-5	*6*	*No*
5-3	*9*	*No*
5-4	*9*	*No*
5-5	*8*	*No*
(4) 4" x 8" Panels		
B1000 P60-3	*8*	*Yes*
B1000 P60-4	*8*	*Yes*
B958-3	*7*	*Yes*
B958-4	*7*	*Yes*

Requirements: The scribe shall be divided into fourteen (14) 6.4 mm (0.25 in) zones and the worst spot in each zone will be evaluated (except the first 6.4 mm (0.25 in) of the scribe at each end of the scribe line). The average of the 14 readings shall be rated as given in Table 1 of ASTM D 1654. After a rating has been set for each of the three panels, the average rating of the three panels shall not be less than a 6 rating. The area away from the scribe shall have no blisters.

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Case Study #2

Case Study Evaluation of Scribe Creepage per ASTM D1654 (2005 vs. 2008 Revision)		
	ASTM D1654-05	**ASTM D1654-08**
Evaluation Method	Method 2 (Scraping)	Method 1 (Scraping)
Mean Scribe Creepage (rating):	1 | 5 | 0 (**Avg. 2**)	5 | 6 | 6 (**Avg. 6**)
Result	**FAIL**	**PASS**

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(2005 Revision vs. 2008 Revision)

Case Study #2