

Freeze - Thaw Resistance

1. SCOPE

To determine the resistance of paint films to cold cracking or checking when subjected to thermal stress at various film thicknesses.

2. REFERENCE STANDARDS

86507636 (FNHA-2-J-001.01)—Panel or Part Preparation

86507641 (FNHA-2-J-001.06)—Dry Film Thickness

3. MATERIALS AND EQUIPMENT

3.1 A combination convection oven and cold box or individual components capable of maintaining the following:

Oven, 100° ± 3°F (38° ± 5°C)
Cold Box, -90° ± 2°F (-68° ± 4°C)

3.2 Film thickness gage meeting the requirements of 86507641 (FNHA-2-J-001.06).

3.3 Bonderite 1000 (4" X 12") panels with panel thickness of 0.032" or 0.8 mm.

4. PROCEDURE

4.1 Prepare Bonderite 1000 (4 X 12) panels using primer and topcoat according to 86507636 (FNHA-2-J-001.01). Apply primer allow to flash for 15 minutes. Apply topcoat allow to flash for 15 minutes. Bake panels at 180°F for 30 minutes.

4.1.1 Typical film thickness should consist of the following:

	<u>Primer (mils)</u>	<u>Topcoat (mils)</u>
1	1.0	1.0
2	1.0	3.0
3	1.0	5.0
4	1.0	7.0

4.2 After the 180°F bake cycle the panels are allowed to age at room temperature. This would be followed by a 16 hour aging process at 150° and finally 1 hour to cool to room temperature. The freeze tests shall be performed within 24 hours of painting. Both the 16 hour at 150°F and the room temperature aging should be within this time frame.

4.3 Place the panels in a rack designed to allow for air circulation between panels

4.3.1 The "Ramp Test" is run by placing the panels into the freezer and turning on to -10°F. The panels should be allowed to stabilize at this temperature for 20 minutes before "ramping" down. After the 20 minute stabilization period the temperature should be dropped by 10°F. Again allow the temperature to stabilize as before. This process should be continued to -90°F or until all of the panels have cracked. The panels should be visually checked at each temperature for cracking or checking and removed when either is observed.

4.3.2 The "Cycle Test" is begun by placing the panels into the freezer and turning on to -40°F. The cycle should be set for one hour at each temperature. The temperatures are -40°F for cold and 100°F for warm. The test is run for a total of 20 cycles (40 hours) or until all of the panels fail. The panels should be visually checked following

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ALL	F	TD	121458	30APR03	 NEW HOLLAND	ENGINEERING SPECIFICATION	
ALL	E	JDF	111468	2/17/98			
ALL	D	RLF	110274	JUL 97			
ALL	C	TH	104739	940216			
ALL	A	RE	104739	940216			
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KHH FEB 94	CHECKED						

each cycle to inspect for cracking or checking and removed when either is observed.

5. REPORT

5.1 Report the condition of each test specimen following each cycle or temperature level. A crack on the panel is considered a failure.

5.2 Plot the temperature versus coating thickness (note where the plot crosses the -60°F

line Linear Regression - Slope, y Intercept and then solve for Y where X = -60°F). Plot cycles versus coating thickness.

5.3 A paint that passes 20 cycles, or a temperature of -90°F is acceptable

6. REFERENCE

6.1 None to ASTM.

	NAME			PART NUMBER	
	STD FREEZE/THAW			86507666	
ENGINEERING SPECIFICATION			REV. F	FRAME 2	OF 2