



273 Industrial Dr. ♦ Hillsdale, MI 49242 ♦ Phone: (517) 439-1485 ♦ Fax: (517) 439-1652

AMERICAN IRON AND STEEL INSTITUTE

JL SPECIALTY STEEL INCORPORATED

1200 Midland Avenue
Midland, PA 15059

ATTN: Brett Christman

Neutral Salt Spray Test
(ASTM B117-97)

ACT Quote Number: AQT 37386
ACT Project Number: AIN 124658E (Rev. 2)

Material: Customer Supplied and Prepared Fuel Tank Samples
Austenitic 304L + pre-paint (Neukote)

Prepared By: AEL
Date Prepared: 08/04/03
Logbook: RTC-16 p. 40

APPROVED BY:

A handwritten signature in black ink, which appears to read "Kevin Wendt". The signature is written over a faint, red, stylized "ACT" logo background.

(For) Kevin Wendt
Technical Manager



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LABORATORY TEST REPORT

ACT PROJECT AIN124658E (Rev. 2)

Material ID: 11 = Austenitic 304L + pre-paint (Neukote)

Evaluation #1: Neutral Salt Spray Resistance Test

AQT 37386: Per Line Items #8-#12 of Quotation

Material Received: 01/29/02, 01/31/02, 02/01/02, 02/04/02, 02/05/02, 02/11/02, 02/13/02, 02/14/02, 02/19/02, 02/25/02

Test Start Date: 03/05/02

Test End Date: 06/11/02

Test Methods: ASTM D1654-00
ASTM B117-97

Scribing Tool: Straight-shank Type E Lathe Tool

Exposure: 2000 Hours

Exposure Chamber: Singleton Model 24 (ACT #874)

Digital Calipers: Mitutoyo Digital Calipers (ACT #114)

Micrometer: Digitrix-Mark II Micrometer (ACT #413)

Scale: Mettler 3MPT-K (ACT #95)

Procedure: Samples are scribed per customer instructions. Samples are graveled per Evaluation #2 prior to exposure. At 500 hour intervals, samples are removed from test, rated for corrosion, digitally photographed, graveled per Evaluation #2, digitally photographed and returned to test. Pure zinc and steel weight loss coupons are run and evaluated at 500, 1000, 1500 and 2000 hours of exposure



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- Evaluations: Visual examination for corrosion and loss of adhesion at scribe, chipped area, Olsen dome, flange (including weld and clip locations), and field (area above and around dome) per Degree of Change at 2000 hours after air blow-off.
Initial and final panel weight at 2000 hours.
Zinc and steel weight loss coupons at 500, 1000, 1500 and 2000 hours.
Creepback from Scribe at 2000 hours.
Report Maximum Pit Depth (if greater than 0.1 mm) of each sample at 2000 hours
Chip Rating at 500, 1000, 1500, and 2000 hours per Evaluation #2.
- Degree of Change: N = None: No corrosion
S = Slight: Approximately less than 15% corrosion
M = Moderate: Approximately 15-30% corrosion
P = Pronounced: Approximately greater than 30% corrosion
- Air Blow-Off Procedure: Holding the nozzle at approximately a 45° angle, blow along the entire panel surface at 80 psi, disturbing the surface mechanically by the air nozzle to ensure an opening for the air blast.
- Creepback from Scribe: The distance of the affected paint film between the scribed line and the unaffected paint film.
- Average: The mean of 6 measurements of creepback from the scribe, at points 10 mm apart centered on the scribed line. Each measurement is an average of the creepback on two sides of the scribed line.
- Maximum: A measurement of the creepback from the scribe, at the point with the most extensive amount of affected paint, discounting the areas less than one centimeter from the ends of the scribed line.
- Minimum: A measurement of the creepback from the scribe, at the point with the least extensive amount of affected paint, discounting the areas less than one centimeter from the ends of the scribed line.
- g: Grams
- mm: Millimeter



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Evaluation #2: Gravelometer Test
 AQT 37386: Per Line Item #10 of Quotation
 Material Received: 01/29/02, 01/31/02, 02/01/02, 02/04/02, 02/05/02, 02/11/02, 02/13/02, 02/14/02, 02/19/02, 02/25/02
 Test Dates: 03/04/02, 03/26/02, 04/16/02, 05/06/02
 Test Method: SAE J400 (JAN85) Method II
 Test Apparatus: QGR Gravelometer (ACT #98)
 Test Conditions: Room Temperature , Air Pressure 70 ± 3 psi
 Gravel: 1 pint water worn road gravel that passes through a 16 mm (5/8 in.) space screen, but is retained on a 9.5 mm (3/8 in.) space screen.
 Evaluation: Visual comparison of samples with SAE J400 pictorial standards
 Chip Ratings: A number-letter combination in which rating numbers 10-0 indicate the number of chips of each size and rating letter A-D designate the sizes of the corresponding chips. Level of failure notation is included to further refine the description.
 Number Ratings:

Rating Number	Number of Chips	Rating Number	Number of Chips
10	0	4	50-74
9	1	3	75-99
8	2-4	2	100-149
7	5-9	1	150-250
6	10-24	0	>250
5	25-49		

Size Ratings:

Rating Letter	Size of Chips
A	<1mm (approximately 0.03 in)
B	1-3 mm (approximately 0.03-0.12 in)
C	3-6 mm (approximately 0.12-0.25 in)
D	>6 mm (>approximately 0.25)



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ACT Laboratories, Inc.

LABORATORY TEST REPORT

ACT PROJECT AIN124658E (Rev. 1)

Neutral Salt Spray Resistance Test Data: **2000 Hours**

ID	Dome		Scribe		Chip		Field		Flange		Flange (Under Clip)		Weld		Weld (Under Clip)		Loss of Adhesion
	White	Red	White	Red	White	Red	White	Red	White	Red	White	Red	White	Red	White	Red	
11-7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	None
11-8	N	N	N	N	N	N	N	N	N	N	N	N	N	N	S	N	None
11-9	N	N	N	N	N	N	N	N	N	N	N	N	S	N	N	N	None

(Rust staining not included in ratings)



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LABORATORY TEST REPORT

ACT PROJECT AIN124658E (Rev. 1)

Weight Change Test Data: 2000 Hours Neutral Salt Spray

<u>ID</u>	<u>Initial Weight</u>	<u>Final Weight</u>	<u>Change</u>
11-7	294.4 g	292.8 g	-1.6 g
11-8	297.3	295.6	-1.7
11-9	298.2	296.3	-1.9

Weight Loss Coupon Data: Neutral Salt Spray

<u>Coupon</u>	<u>500 Hours</u>	<u>1000 Hours</u>	<u>1500 Hours</u>	<u>2000 Hours</u>
Steel 1	0.9000 g	1.9058 g	2.8908 g	3.8758 g
Steel 2	0.8197	1.9323	2.9708	4.0157
Zinc 1	2.1446	2.2287	3.3118	*
Zinc 2	3.2567	3.3146	3.6249	*

* Complete loss of coupon

Creepback from Scribe and Pit Depth Test Data: 2000 Hours Neutral Salt Spray

<u>ID</u>	<u>Creepback from Scribe</u>			<u>Maximum Pit Depth</u>
	<u>Average</u>	<u>Minimum</u>	<u>Maximum</u>	
11-7	0.0 mm	0.0 mm	0.0 mm	** mm
11-8	0.0	0.0	0.0	**
11-9	0.0	0.0	0.0	**

** No Measurable Pit Depth (< 0.1 mm)

Gravelometer Test Data: Neutral Salt Spray

<u>ID</u>	<u>500 Hours</u>		<u>1000 Hours</u>		<u>1500 Hours</u>		<u>2000 Hours</u>	
	<u>Rating</u>	<u>Level of Failure</u>	<u>Rating</u>	<u>Level of Failure</u>	<u>Rating</u>	<u>Level of Failure</u>	<u>Rating</u>	<u>Level of Failure</u>
11-7	10	None	10	None	10	None	10	None
11-8	10	None	10	None	10	None	10	None
11-9	10	None	10	None	10	None	10	None



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LABORATORY TEST REPORT

ACT PROJECT AIN124658E (Rev. 2)

Evaluation #3: Film Thickness
AQT 37386: Per Line Item #5 of AIN 140749 (AQT 43486)
Material Received: 01/29/02, 01/31/02, 02/01/02, 02/04/02, 02/05/02, 02/11/02, 02/13/02, 02/14/02, 02/19/02, 02/25/02

Test Date: 08/01/03

Test Method: ASTM D 1186-01

Instrument: Fischerscope MULTI 650 C (ACT #14)

Number of Readings: Five per Sample; Average Recorded

Total Film: All Coatings are Included (Including applicable non-ferrous metallic coatings)
mil: 0.001 Inch

Film Thickness Test Data:

<u>ID</u>	<u>Film Thickness</u>
11-7	1.7 mils
11-8	1.9
11-9	2.0