Uniform & Intergranular Corrosion [1]

Uniform corrosion is the destruction of a metal, relatively uniformly over the entire surface. Intergranular corrosion is the destruction of metal at the grain boundaries, usually on a microscopic scale.

Both types of corrosion can result in loss of structural integrity of the affected metal and potential loss of the use of the metal item. In the case of corrosion to aircraft, the loss can result in catastrophic failure.

The Forest Service requires corrosion tests throughout the evaluation period to minimize the risk of corrosion-caused equipment failure in the field.

Proper maintenance and cleaning of the equipment will also help to minimize these potential failures.

Product Performance Data on next page

1	Standard Test Procedure 5.1, provides instructions for the uniform corrosion test. Standard Test Procedure 5.2, provides instructions for the intergranular corrosion test.

Uniform Corrosion [1]

Phos-Chek MVP-Fx

Temperature: °F	2024-T3 Aluminum				4130 Steel				Yellow Brass	Az31B Magnesium			
	Total		Partial		Total		Partial		Partial	Total		Partial	
	70	120	70	120	70	120	70	120	120	70	120	70	120
	mils-per-year												
Concentrate [3]													
Fresh													
Mixed Retardant – 0.96 lb/gal													
Fresh [5]	0.1	0.3	0.1	0.4	0.8	2.2	0.6	2.6	0.1	10.4	17.2	5.2	7.8
1 Year – Missoula [5]	0.1	0.3	0.1	0.5	1.2	3.4	0.8	3.0	0.1	10.2	14.7	6.4	6.3
1 Year - San Dimas [5]	0.1	0.5	0.1	0.4	1.8	3.5	1.3	3.4	0.1	10.3	13.5	6.2	6.1

Notes: Results shown are for all approved formulations; most corrosive rate listed. (0439-014A & B, 0502-008A)

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.

Uniform Corrosion [1]

Phos-Chek MVP-F

Temperature: °F	2024-T3 Aluminum Total 70	2024-T3 Aluminum Total 120	2024-T3 Aluminum Partial 70	2024-T3 Aluminum Partial 120	4130 Steel Total 70	4130 Steel Total 120	4130 Steel Partial 70	4130 Steel Partial 120	Yellow Brass Partial 120	Az31B Magnesium Total 70	Az31B Magnesium Total 120	Az31B Magnesium Partial 70	Az31B Magnesium Partial 120
	mils-per-year												
Concentrate [3]													
Fresh													
Mixed Retardant – 0.95 lb/gal													
Fresh [5]	0.1	0.3	0.1	0.3	0.8	0.4	0.6	2.1	0.1	9.0	9.9	4.8	5.0
1 Year – Missoula [5]	0.1	0.3	0.1	0.3	0.7	1.0	0.6	2.8	0.1	10.3	12.8	6.2	5.9
1 Year - San Dimas [5]	0.1	0.5	0.1	0.6	1.4	2.8	1.0	3.9	0.1	9.3	13.6	5.0	6.6

Notes: Results shown are for all approved formulations; most corrosive rate listed. (0403-14A & B)

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.

Uniform Corrosion [1]

Phos-Chek 259-Fx

Temperature: °F	2024-T3 Aluminum Total 70	2024-T3 Aluminum Total 120	2024-T3 Aluminum Partial 70	2024-T3 Aluminum Partial 120	4130 Steel Total 70	4130 Steel Total 120	4130 Steel Partial 70	4130 Steel Partial 120	Yellow Brass Partial 120	Az31B Magnesium Total 70	Az31B Magnesium Total 120	Az31B Magnesium Partial 70	Az31B Magnesium Partial 120
	mils-per-year												
Concentrate [3]													
Fresh													
Mixed Retardant – 1.01 lb/gal													
Fresh [5,6]	0.1	0.8	0.1	1.3	0.3	1.0	0.3	0.8	1.1	0.6	2.1	0.4	1.1
1 Year – Missoula [5,6]	0.1	0.9	0.2	1.3	0.3	1.0	0.3	0.7	1.1	0.7	2.1	0.5	1.8
1 Year - San Dimas [5,6]	0.1	1.0	0.2	1.4	0.3	1.0	0.3	0.7	1.3	0.8	2.1	0.4	1.9

Notes: Results shown are for all approved formulations; most corrosive rate listed. (0439-091B & 0502-008B)

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.
6	Meets the intergranular corrosion requirements for magnesium.

Uniform Corrosion [1]

Phos-Chek LC-95A-R

Temperature: °F	2024-T3 Aluminum Total 70	2024-T3 Aluminum Total 120	2024-T3 Aluminum Partial 70	2024-T3 Aluminum Partial 120	4130 Steel Total 70	4130 Steel Total 120	4130 Steel Partial 70	4130 Steel Partial 120	Yellow Brass Partial 120	Az31B Magnesium Total 70	Az31B Magnesium Total 120	Az31B Magnesium Partial 70	Az31B Magnesium Partial 120
	mils-per-year												
Concentrate [3]													
Fresh	0.6	0.8	0.5	0.6	0.4	0.5	0.3	0.4	1.0	19	23	10	12
Mixed Retardant – 5.5:1													
Fresh [5]	0.5	2.0	1.2	1.9	0.9	1.2	1.1	1.0	0.3	16	8	17	15
1 Year – Missoula [5]	0.8	1.1	1.4	1.8	1.3	1.3	1.1	1.1	0.4	N/A	N/A	N/A	N/A
1 Year - San Dimas [5]	0.8	1.0	1.2	1.5	1.4	1.8	1.2	1.1	0.5	N/A	N/A	N/A	N/A

Notes: Results shown are for all approved formulations; most corrosive rate listed. (1051695-A & C, 0463-035A)

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.

Uniform Corrosion [1]

Phos-Chek LC-95A-Fx

Temperature: °F	2024-T3 Aluminum Total 70	2024-T3 Aluminum Total 120	2024-T3 Aluminum Partial 70	2024-T3 Aluminum Partial 120	4130 Steel Total 70	4130 Steel Total 120	4130 Steel Partial 70	4130 Steel Partial 120	Yellow Brass Partial 120	Az31B Magnesium Total 70	Az31B Magnesium Total 120	Az31B Magnesium Partial 70	Az31B Magnesium Partial 120
	mils-per-year												
Concentrate [3]													
Fresh	1.7	0.6	0.9	0.3	0.3	0.5	0.2	0.1	0.5	21.6	24.2	7.0	7.5
Mixed Retardant – 5.5:1													
Fresh [5]	0.7	0.7	1.2	1.6	0.7	1.0	0.9	1.1	0.1	11.0	10.0	19.2	9.7
1 Year – Missoula [5]	0.5	0.6	0.9	1.7	1.0	1.2	0.8	1.1	0.8	15.7	7.0	13.5	6.0
1 Year - San Dimas [5]	0.4	0.6	1.0	2.0	1.1	1.7	0.8	1.2	0.9	9.1	8.2	10.1	11.6

Notes: 0439-076B

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.

Uniform Corrosion [1]

Phos-Chek LC-95A-F

Temperature: °F	2024-T3 Aluminum Total 70	2024-T3 Aluminum Total 120	2024-T3 Aluminum Partial 70	2024-T3 Aluminum Partial 120	4130 Steel Total 70	4130 Steel Total 120	4130 Steel Partial 70	4130 Steel Partial 120	Yellow Brass Partial 120	Az31B Magnesium Total 70	Az31B Magnesium Total 120	Az31B Magnesium Partial 70	Az31B Magnesium Partial 120
	mils-per-year												
Concentrate [3]													
Fresh	2.5	4.5	1.3	2.4	0.4	0.5	0.2	0.3	0.6	18.2	46.6	6.5	16.4
Mixed Retardant – 5.5:1													
Fresh [5]	1.2	0.7	2.0	1.8	0.6	0.5	0.9	0.8	0.1	27.4	4.8	18.1	24.5
1 Year – Missoula [5]	0.8	0.6	1.6	1.3	0.7	0.9	0.9	1.1	0.4	20.6	6.2	21.4	26.7
1 Year - San Dimas [5]	0.6	0.6	1.4	1.2	0.6	1.1	0.7	0.9	0.1	16.4	5.4	19.9	24.7

Notes: Results shown are for both 0381-045C and 0381-045D formulations; most corrosive rate listed.

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.

Uniform Corrosion [1]

Phos-Chek LC-95-W

Temperature: °F	2024-T3 Aluminum Total 70	2024-T3 Aluminum Total 120	2024-T3 Aluminum Partial 70	2024-T3 Aluminum Partial 120	4130 Steel Total 70	4130 Steel Total 120	4130 Steel Partial 70	4130 Steel Partial 120	Yellow Brass Partial 120	Az31B Magnesium Total 70	Az31B Magnesium Total 120	Az31B Magnesium Partial 70	Az31B Magnesium Partial 120
	mils-per-year												
Concentrate [3]													
Fresh	0.9	0.6	0.4	0.5	0.4	0.5	0.2	0.1	0.6	17.1	53.5	7.8	36.5
Mixed Retardant – 5.5:1													
Fresh [5]	0.8	0.5	1.3	1.5	0.6	0.6	0.9	0.8	0.1	24.9	5.6	15.8	17.5
1 Year – Missoula [5]	0.6	0.5	1.2	1.2	0.7	0.7	0.8	0.8	0.1	17.9	6.9	17.6	16.8
1 Year - San Dimas [5]	0.5	0.8	1.0	1.0	0.7	1.0	0.7	0.8	<0.1	11.3	8.4	16.2	18.4

Notes: 0381-090B

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.

Uniform Corrosion [1]

Phos-Chek LCE20-Fx

Temperature: °F	2024-T3 Aluminum				4130 Steel				Yellow Brass	Az31B Magnesium			
	Total		Partial		Total		Partial		Partial	Total		Partial	
	70	120	70	120	70	120	70	120	120	70	120	70	120
	mils-per-year												
Concentrate [3]													
Fresh	1.3	4.8	0.6	2.4	0.5	0.1	0.4	0.2	2.2	66.6	212.2	48.6	131.4
Mixed Retardant – 5.2:1													
Fresh [5]	0.1	0.6	0.1	0.5	0.1	0.3	0.1	0.2	0.2	0.6	1.4	0.4	1.1
1 Year – Missoula [5]	0.1	0.7	0.1	0.6	0.1	0.5	0.2	0.3	0.8	0.7	1.1	0.5	1.5
1 Year - San Dimas [5]	0.1	0.5	0.4	0.6	0.1	0.4	0.1	0.3	1.0	0.8	1.2	0.8	1.5

Notes: 0381-090B

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.

Uniform Corrosion [1]

Fortress FR-100

Temperature: °F	2024-T3 Aluminum				4130 Steel				Yellow Brass	Az31B Magnesium			
	Total		Partial		Total		Partial		Partial	Total		Partial	
	70	120	70	120	70	120	70	120	120	70	120	70	120
	mils-per-year												
Concentrate [3]													
Fresh													
Mixed Retardant – 1.68 lb/gal													
Fresh [5]	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.1	2.1	224	1.0	121
1 Year – Missoula [5]	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.1	N/A	N/A	N/A	N/A
1 Year - San Dimas [5]	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.1	N/A	N/A	N/A	N/A

Notes:

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.
6	Meets the intergranular corrosion requirements for magnesium.

Uniform Corrosion [1]

Fortress FR-200

Temperature: °F	2024-T3 Aluminum Total 70	2024-T3 Aluminum Total 120	2024-T3 Aluminum Partial 70	2024-T3 Aluminum Partial 120	4130 Steel Total 70	4130 Steel Total 120	4130 Steel Partial 70	4130 Steel Partial 120	Yellow Brass Partial 120	Az31B Magnesium Total 70	Az31B Magnesium Total 120	Az31B Magnesium Partial 70	Az31B Magnesium Partial 120
	---mils-per-year---												
Concentrate [3]													
Fresh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2.3	3.0	1.2	1.4
Mixed Retardant – 1.68 lb/gal													
Fresh [5]	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.5	0.1	38	36	21	20
1 Year – Missoula [5]	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.5	0.1	N/A	N/A	N/A	N/A
1 Year - San Dimas [5]	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.4	0.1	N/A	N/A	N/A	N/A

Notes:

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.
6	Meets the intergranular corrosion requirements for magnesium.

Uniform Corrosion [1]

Phos-Chek Fortify

Temperature: °F	2024-T3 Aluminum				4130 Steel				Yellow Brass	Az31B Magnesium			
	Total		Partial		Total		Partial		Partial	Total		Partial	
	70	120	70	120	70	120	70	120	120	70	120	70	120
	mils-per-year												
Mixed Retardant – 5.0:1													
Fresh [5]	0.1	0.5	0.2	0.5	0.2	0.5	0.2	0.3	0.1	0.6	2.0	0.3	1.0
1 Year – Missoula [7]	-	-	-	-	-	-	-	-	-	-	-	-	-
1 Year - San Dimas [7]	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.
6	Meets the intergranular corrosion requirements for magnesium.
7	Pre-treatment retardants are not evaluated for 1-year stability.

Uniform Corrosion [1]

Phos-Chek LCE20W

Temperature: °F	2024-T3 Aluminum				4130 Steel				Yellow Brass	Az31B Magnesium			
	Total		Partial		Total		Partial		Partial	Total		Partial	
	70	120	70	120	70	120	70	120	120	70	120	70	120
	mils-per-year												
Mixed Retardant – 5.4:1													
Fresh [5]	0.1	0.3	0.1	0.4	0.2	0.2	0.1	0.2	0.1	0.7	2.6	0.4	1.4
1 Year – Missoula [7]	-	-	-	-	-	-	-	-	-	-	-	-	-
1 Year - San Dimas [7]	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.
6	Meets the intergranular corrosion requirements for magnesium.
7	Pre-treatment retardants are not evaluated for 1-year stability.

Uniform Corrosion [1]

Fortress FR-600

Temperature: °F	2024-T3 Aluminum				4130 Steel				Yellow Brass	Az31B Magnesium			
	Total		Partial		Total		Partial		Partial	Total		Partial	
	70	120	70	120	70	120	70	120	120	70	120	70	120
	mils-per-year												
Mixed Retardant – 1.3:1													
Fresh	0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.3	0.2	23	41	8.6	25
1 Year – Missoula [7]	-	-	-	-	-	-	-	-	-	-	-	-	-
1 Year - San Dimas [7]	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.
6	Meets the intergranular corrosion requirements for magnesium.
7	Pre-treatment retardants are not evaluated for 1-year stability.

Uniform Corrosion [1]

Komodo

Temperature: °F	2024-T3 Aluminum Total 70	2024-T3 Aluminum Total 120	2024-T3 Aluminum Partial 70	2024-T3 Aluminum Partial 120	4130 Steel Total 70	4130 Steel Total 120	4130 Steel Partial 70	4130 Steel Partial 120	Yellow Brass Partial 120	Az31B Magnesium Total 70	Az31B Magnesium Total 120	Az31B Magnesium Partial 70	Az31B Magnesium Partial 120
	mils-per-year												
Mixed Retardant – 3.5:1													
Fresh	0.3	0.3	0.2	0.2	0.7	0.2	0.3	0.1	0.1	0.5	1.2	0.2	1.0
1 Year – Missoula [7]	-	-	-	-	-	-	-	-	-	-	-	-	-
1 Year - San Dimas [7]	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

1	Uniform corrosion rates (expressed in mils-per-year) were determined by 90-day weight loss tests. Values shown are the average of all replicates.
2	Results up to 0.1 mils-per-year are recorded as 0.1 mils-per-year.
3	Uniform corrosion tests are performed on wet concentrates. Uniform corrosion tests are not performed on dry concentrates.
4	Products for use only at portable or temporary bases do not require 1-year stability and corrosion tests.
5	Meets the intergranular corrosion requirements for aluminum.
6	Meets the intergranular corrosion requirements for magnesium.
7	Pre-treatment retardants are not evaluated for 1-year stability.