SOUTHWEST RESEARCH INSTITUTE
P. O. DRAWER 28510
SAN ANTONIO, TEXAS 78228-0510

IWPE LAB NOTEBOOK 019

LOCALIZED CORROSION EXPTS.

11/90 - 3/92

SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA ROAD
POSTAL DRAWER 28510
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MAGNETIC STORAGE
MEDIA INSIDE

SAN ANTONIO

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IWPE - 5

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Potentiostats / Galvanostats used in these experiments are PARC Model 273 Potentiostat, S/N
Also, PARC 173 Potentiostat w/ 276 interface, SN 62101 calibrated 25 Oct 90, due 25 Oct 91.

For reference voltage checks + other electronic measurements a Keithley 602 electrometer (S/N 19831), cal'd 11/21/89 due 11/21/90 was used. Also a Keithly 614 electrometer (S/N 467374) cal'd 6/6/90 due 12/6/90. Two fluke DVM's, Model 8050A S/N 5005110 cal'd 30 May 90, due 30 May 91, and S/N 5005078 cal'd 29 May 90, due 29 May 91.

For pH + specific ion measurements: Orion EA 920 meter S/N TV64A, cal'd vs standards prior to each use.

For weights: Mettler AE 240 electronic balance S/N 10237 cal'd 7/15/90, due 1/91.

Also for pH/ion: Orion 720A S/N 003368

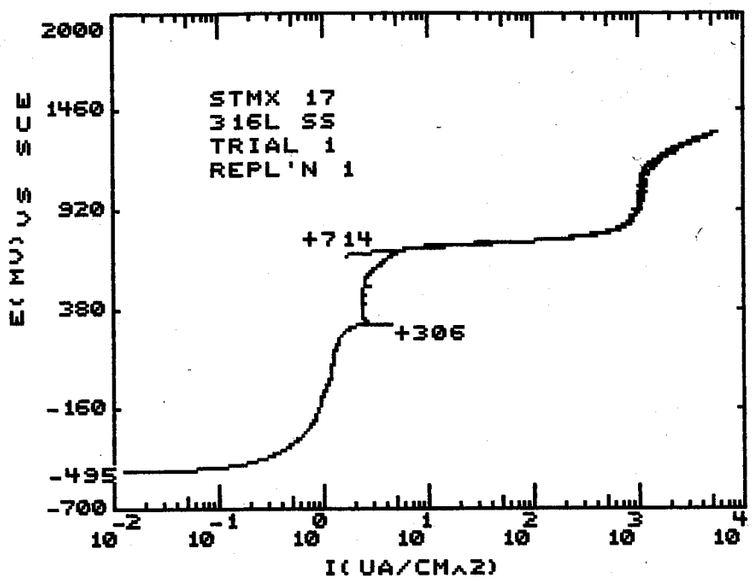
Calomel Reference Electrodes: Fisher #13-620-51
pH electrode combo-Ag/AgCl: " #13-620-90
" " Orion 8103 Ross: Fisher #13-641-817
Orion chloride electrode : Fisher # 13-641-875
Orion double JCT reference : " # 13-641-900

Dimensional checks: Fisher micrometer S/N 20-M-1 cal'd 10/19/90, due 4/19/91. Fowler caliper S/N 20-8C-1, cal'd 5/30/90, due 11/30/90.

Fisher Buffer Solutions NBS traceable - certified

pH 1	lot #	890199-18
pH 7	"	89,429-24
pH 10	"	890043-24
pH 4	"	890124-24

STMX 17
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 17
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.059
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-495
MV/PT	4
DATA MAX	5592.51
DATA MIN	.0123183
ABS MIN	.0123183
ABS MAX	5592.51

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN 95C 1ST REP'N
CL=1000;NO3=10000;F=2;SO4=20
DE-AERATE W/ARGON
DONE ON PARC 173/276

21 NOV 1990

Cyclic Polarization of 316L SS
Model Solution: Cl = 1000; NO_3 = 10,000; F = 2; SO_4 = 20
STMX 17

Purpose: To collect data for evaluation of effects of various selected ionic species on the corrosion of 316L SS using a factorial experiment.

The test specimen was a cylindrical one fabricated from 316L SS (heat no: P 80746) at SwRI machine shop. Procedures generally followed ASTM G-61 for these cyclic polarization tests. The specimen was wet polished w/320 grit followed by 600 grit. It was then degreased & cleaned according to G-61. The test cell was as described in TOP-009. A long salt bridge filled with 0.5 N NaCl & having a vycor tip was used to connect the SCE reference electrode which was in a separate beaker. All surfaces of the specimen were polished to get a uniform surface in an attempt to minimize crevice corrosion. Test follows TOP-008 guidelines.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1324 g $NaHCO_3$, 1.6464 g NaCl, 1.4789 g Na_2SO_4, and 13.7927 g $NaNO_3$ (Fisher lot #'s 886728, 885407, 901213, & 897183 respectively). Pipet 2.0 ml of F stock solution #013-107. Dilute to the mark.

Reference SCE #4 was used & checked vs. another before & after the test, difference was less than 1.0 mV.

Spec. Dim: ϕ = 0.627 cm l = 1.904 cm A = 4.059 cm^2

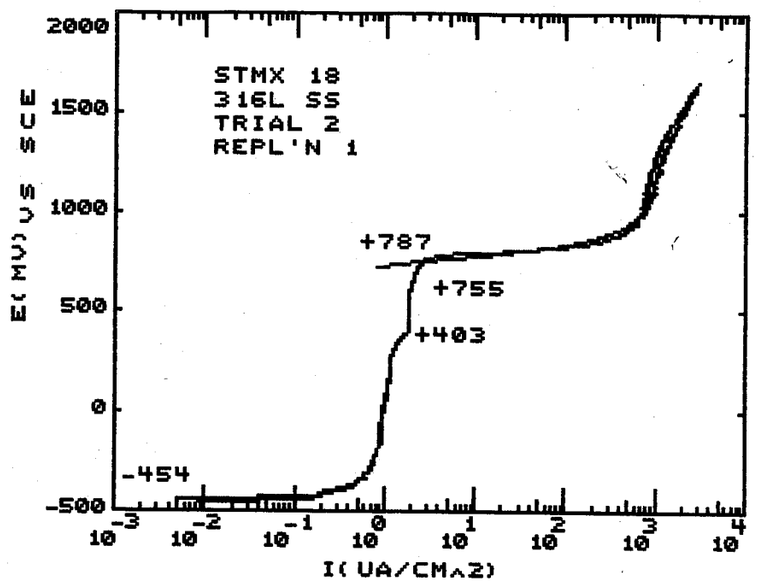
1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start.
3. E corr at start −495 mV vs SCE
4. E Pt 10 min. before start −300 mV
5. Initial Temp. 95.4°C Final Temp 95.0°C
6. Initial pH 7.94 @ 25°C Final pH 9.68 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge (99.999%)
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had no pitting or crevice corrosion – still retained its metallic luster. Solution remained water clear.

Stored on disk EDAC #3.

Walter J. Machowski
11/21/90

STMX 18
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 18
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.114
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-454
MV/PT	4
DATA MAX	2887.701
DATA MIN	-1.458435E-02
ABS MIN	4.861449E-03
ABS MAX	2887.701

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN 95C 1ST REP'N
CL=6;NO3=10;F=2;SO4=20
DE-AERATE W/ARGON
DONE ON PARC 173/276

Cl = 3.6 ← actual conc. due to pipetting error 4/17/91 WJM

26 NOV 1990

Cyclic Polarization of 316L SS
Model Solution: ~~Cl=6~~; NO_3=10; F=2; SO_4=20
STMX 18 Cl = 3.6 WJM 4/17/91

Purpose: Same as STMX 17 (p. 9)

The test specimen, procedures, etc were as described on p. 9 in STMX 17. Ref SCE #4 was used and checked before + after the test, difference was less than 10 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1251 g of $NaHCO_3$ (lot # 886728 - Fisher). Also pipet 6.0 ml of Cl stock, 10.0 ml of NO_3 stock, and 2.0 ml of F stock solutions #013-107. Pipet 20.0 ml of SO_4 stock solution #013-269. Dilute to the mark.

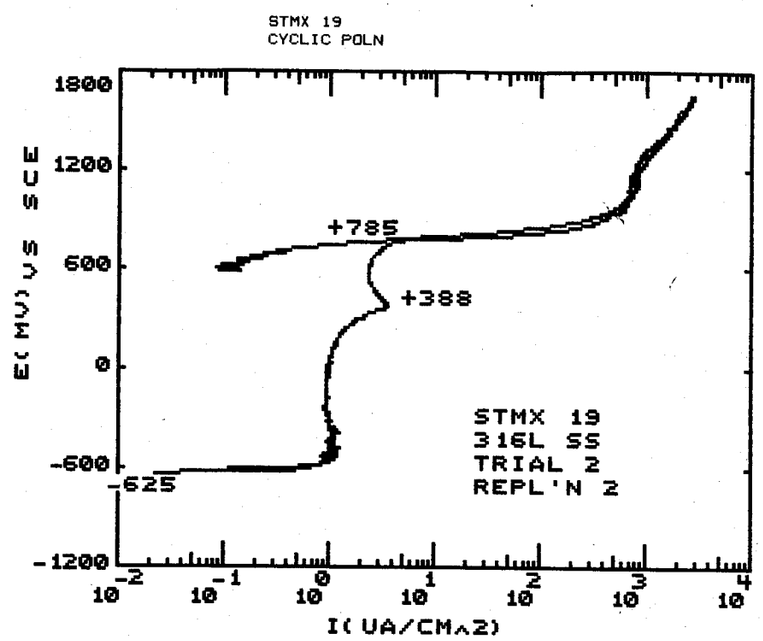
Spec. Dim: ϕ = 0.634 cm l = 1.907 cm A = 4.114 cm^2

0. Spec pre-passivated per 100-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start
3. E corr at start −456 mV vs SCE
4. E Pt 10 min before start −155 mV.
5. Initial Temp. 95.2°C Final Temp. 95.0°C
6. Initial pH 8.42 @ 25°C Final pH 10.10 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Manual reverse @ 11,350 μA/+1652 mV

Specimen was not pitted or discolored. Still retained its metallic luster. Solution remained water clear.

Stored on disk EC+C #3.

Walter J. Machowski
11/26/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 19
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.091
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-625
MV/PT	4
DATA MAX	2813.493
DATA MIN	-50.06111
ABS MIN	2.199951E-02
ABS MAX	2813.493

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN 95 C 2ND REP'N
CL=6;NO3=10;F=2;SO4=20
DE-AERATE W/ARGON
DONE ON PARC 173/276

Cl = 3.6 ← (see STMX 18)

27 NOV 1990

Cyclic Polarization of 316L SS
Model Solution: ~~Cl=6~~; NO_3=10; F=2; SO_4=20
STMX 19 Cl = 3.6 WJM 4/17/91

Purpose: Same as STMX 17 (p. 9)

The test specimen, procedures, etc were as described in STMX 17 (p. 9) Ref SCE #4 was used and checked vs. another before + after test, difference was less than 1.0 mV.

Test Solution Prep: Prep was as described in STMX 18 (p. 11) except weight of $NaHCO_3$ was 0.1225 g.

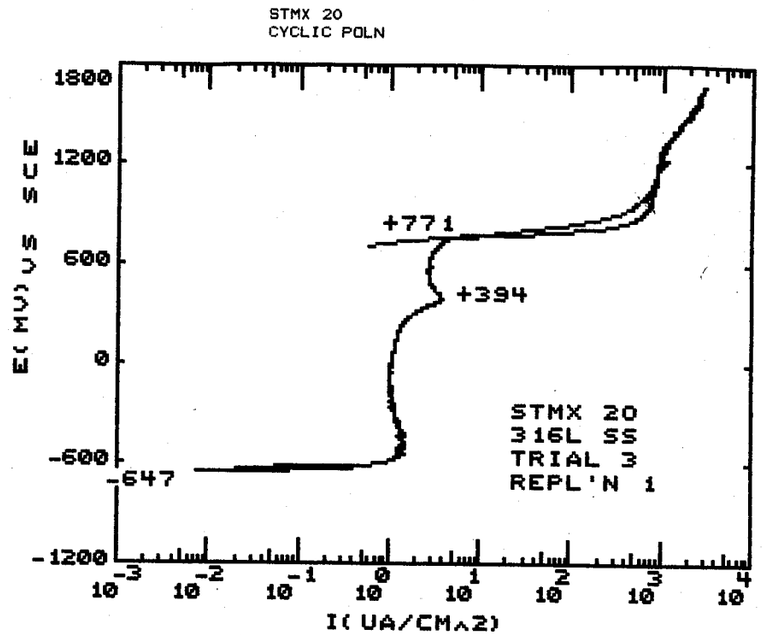
Spec. Dim: ϕ = 0.633 cm l = 1.899 cm A = 4.091 cm^2

1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start
3. E corr at start -626 mV vs SCE
4. E Pt 10 min before start -192 mV
5. Initial Temp. 95.0°C Final Temp 95.2°C
6. Initial pH 8.24 @ 25°C Final pH 9.90 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Manually reversed @ 11,100 μA / +1653 mV

Specimen was not pitted or discolored. Still retained its metallic luster. Solution remained water clear.

Stored on disk EC+C #3.

Walter J. Machowski
11/27/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 20
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.081
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-647
MV/PT	4
DATA MAX	2984.563
DATA MIN	-3.185494E-02
ABS MIN	7.35114E-03
ABS MAX	2984.563

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #3;REP'N #1
CL=20;NO3=10;F=2;SO4=20;T=95C
DE-AERATE W/ARGON
DONE ON PARC 173/276

28 NOV 1990

Cyclic Polarization of 316L SS
Model Solution: Cl = 20; NO_3 = 10; F = 2; SO_4 = 20
STMX 20

Purpose: Same as STMX 17 (p.9)

The test specimen, procedures, etc. were as described in STMX 17 (p.9). Ref SCE #4 was used and checked before & after test, difference was less than 1.5 mV.

Test Solution Prep: Prep was as in STMX 18 (p.11) except that 20.0 ml of Cl stock was used, and the actual wt. of $NaHCO_3$ was 0.1222 g.

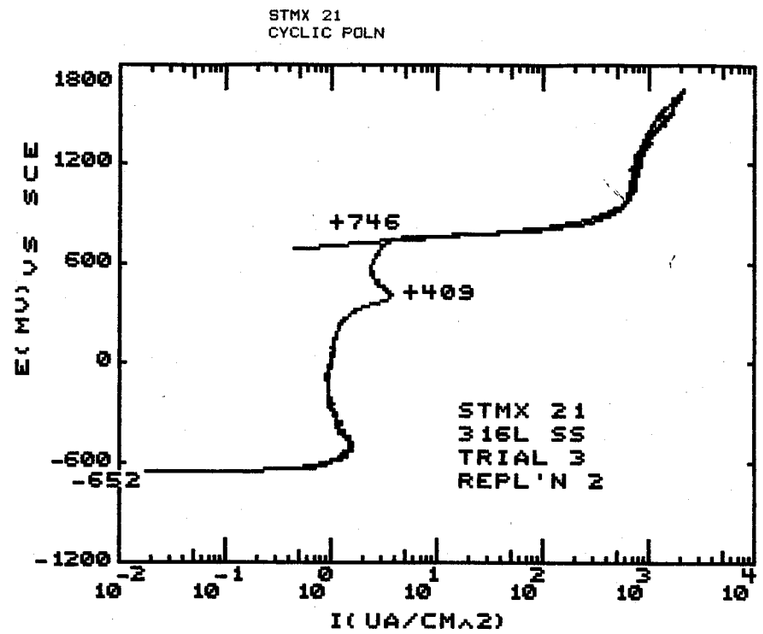
Spec. Dim: ϕ = 0.633 cm l = 1.894 cm A = 4.081 cm^2

1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start
3. E corr at start −647 mV vs SCE
4. E Pt 10 min before start −123 mV
5. Initial Temp. 95°C Final Temp. 95.0°C
6. Initial pH 8.42 @ 35°C Final pH 9.84 @ 35°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Manually Reversed 12,180 μA / +1677 mV

Specimen was not pitted or discolored – still retained its metallic luster. Solution remained water clear.

Stored on disk EC+C #3.

Walter J. Machowski
11/28/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 21
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.099
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-652
MV/PT	4
DATA MAX	2173.701
DATA MIN	-1.463772E-02
ABS MIN	1.463772E-02
ABS MAX	2173.701

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #3;REP'N #2
CL=20;NO3=10;F=2;SO4=20;T=95C
DE-AERATE W/ARGON
DONE ON PARC 173/276

29 NOV 1990

Cyclic Polarization of 316L SS
Model Solution: Cl = 20; NO_3 = 10; F = 2; SO_4 = 20
STMX 21

Purpose: Same as STMX 17 (p. 9)

The test specimen, procedures, etc. were as described in STMX 17 (p. 9). Ref SCE #4 was used, a check vs another both before + after test showed a difference less than 1.0 mV.

Test Solution Prep: Solution was prepared as in STMX 20, except actual wt. of $NaNO_3$ added was 0.1320 g.

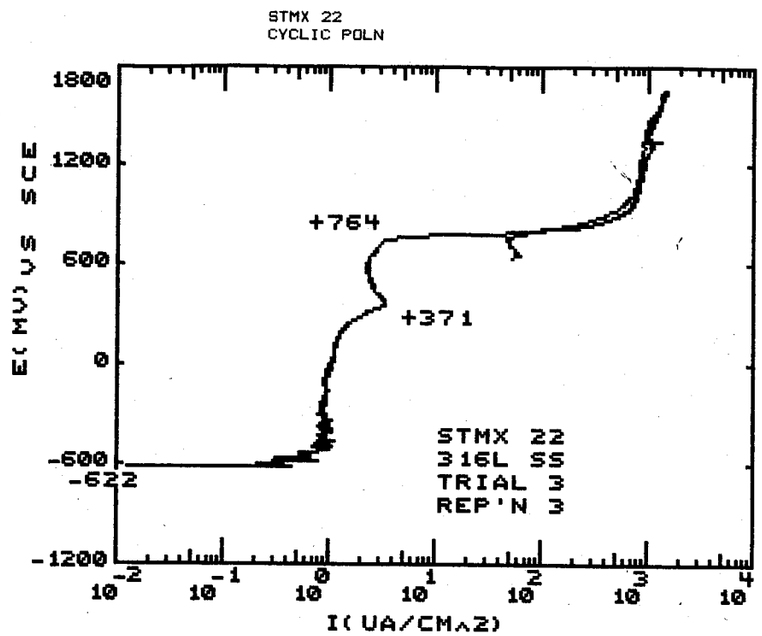
Spec. Dim: ϕ = 0.633 cm l = 1.903 cm A = 4.099 cm^2

1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before starting
3. E corr at start −650 mV vs SCE
4. E Pt 10 min. before start −150 mV.
5. Initial Temp. 95.5°C Final Temp. 95.2°C
6. Initial pH 8.24 @ 25°C Final pH 9.72 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Manually reversed @ 8400 μA / +1650 mV

Specimen was not pitted + had only very slight coloration. Solution remained water clear.

Stored on disk EB+O #5.

Walter J. Machowski
11/29/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 22
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.086
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-622
MV/PT	4
DATA MAX	1529.613
DATA MIN	-.1468429
ABS MIN	1.223691E-02
ABS MAX	1529.613

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #3;REP'N #3
CL=20;NO3=10;F=2;SO4=20;T=95C
DE-AERATE W/ARGON
DONE ON PARC 173/276

3 DEC 1990

Cyclic Polarization of 316L SS
Model Solution: Cl = 20; NO_3 = 10; F = 2; SO_4 = 20
STMX 22

Purpose: Same as STMX 17 (p.9).

The test specimens, procedures, etc were as described in STMX 17 (p.9). Ref SCE #4 was used, and checked against another before + after test; difference was less than 1.0 mV.

Test Solution Prep: Solution was prepared as in STMX 20, except actual wt. of $NaHCO_3$ added was 0.1231 g.

Spec Dim: ϕ = 0.632 cm l = 1.900 cm A = 4.086 cm^2

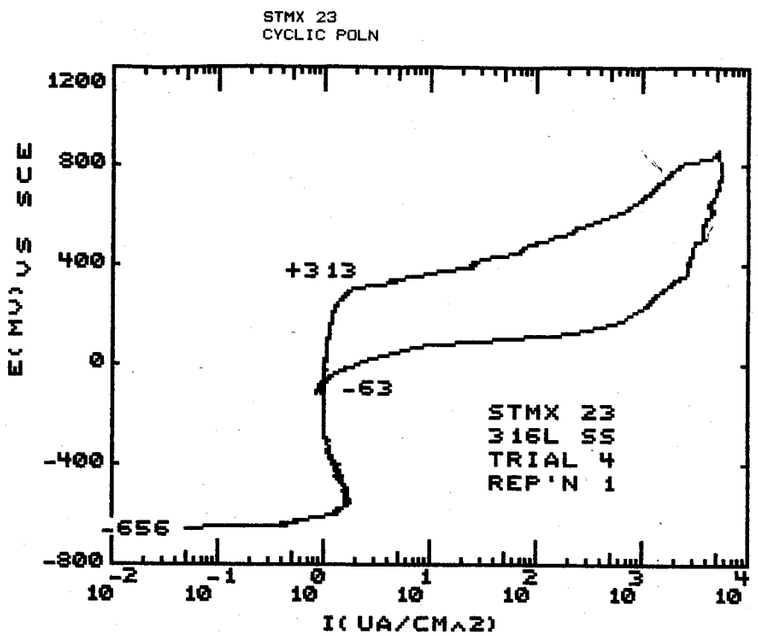
① Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
② Spec held at open circuit for one hour before starting
③ E corr at start −620 mV vs SCE
④ E Pt 10 min before start −193 mV
⑤ Initial Temp 95.2°C Final Temp 95.2°C
⑥ Initial pH 8.27 @ 25°C Final pH 10.02
⑦ Scan rate 0.17 mV/sec (600 mV/hr)
⑧ Argon purge
⑨ Done on PARC 173/276
⑩ Manually reversed @ +1650 mV / current unknown - display went out

Reverse scan cut off too soon - no intersection obtained.

Specimen had two pits - one at each edge (bottom + top)
Solution was essentially water clear.

Stored on disk EC+C # 3.

Walter J. Machowska
12/3/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 23
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.083
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-656
MV/PT	4
DATA MAX	5682.096
DATA MIN	-4.898359E-02
ABS MIN	4.898359E-02
ABS MAX	5682.096

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #4;REP'N #1
CL=100;NO3=10;F=2;SO4=20;95 C
DE-AERATE W/ARGON
DONE ON PARC 173/276

4 DEC 1990

Cyclic Polarization of 316L SS
Model Solution: Cl = 100; NO_3 = 10; F = 2; SO_4 = 20

STMX 23

Purpose: Same as STMX 17 (p.9).

The test specimen, procedures, etc were as described in STMX 17 (p.9). Ref SCE #4 was used & checked vs another before & after test, difference was less than 0.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1220 g $NaHCO_3$ and 0.1646 g NaCl (Fisher lot #'s 886728 + 885407) Pipet 10.0 ml of NO_3 stock + 20 ml of F stock solutions #013-107. Pipet 20.0 ml of SO_4 stock solution #013-269. Dilute to the mark.

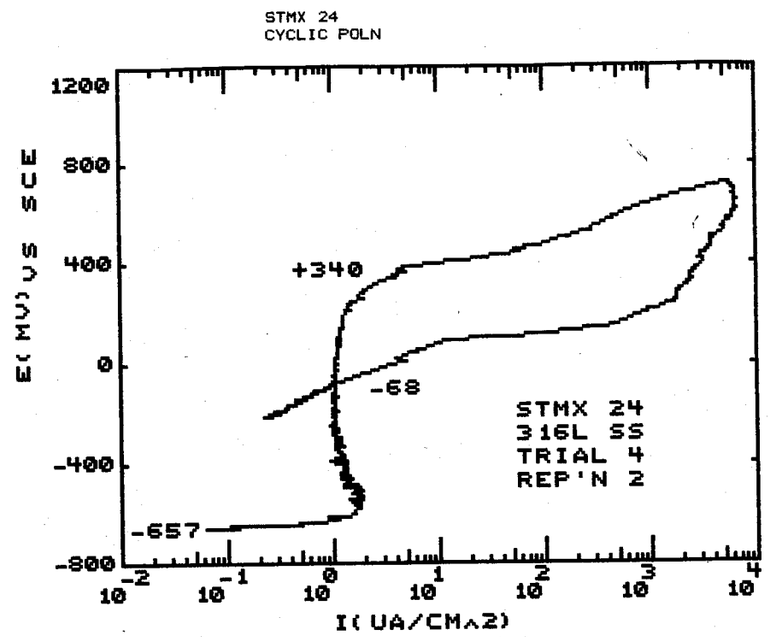
Spec. Dim: ϕ = 0.653 cm l = 1.895 cm A = 4.083 cm^2

1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before starting
3. E corr at start −659 mV vs SCE
4. E Pt 10 min. before start −122 mV
5. Initial Temp 95.2°C Final Temp. 94.8°C
6. Initial pH 8.29 @ 25°C Final pH 9.22 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had shallow, small pits (evident when probed) and some crevice corrosion. During test, specimen was covered w/ green fuzzy material. Solution had a hazy greenish cast.

Stored on disk EC&D #3

Walter J. Machowski
12/4/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 24
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.006
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-657
MV/PT	4
DATA MAX	6590.115
DATA MIN	-.127309
ABS MIN	6.490265E-02
ABS MAX	6590.115

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #4;REP'N #2
CL=100;NO3=10;F=2;SO4=20;95 C
DE-AERATE W/ARGON
DONE ON PARC 173/276

5 DEC 1990

Cyclic Polarization of 316L SS
Model Solution: Cl = 100; NO_3 = 10; F = 2; SO_4 = 20
STMX 24

Purpose: Same as STMX 17 (p. 9).

The test specimen, procedures, etc were as described in STMX 17 (p. 9). Ref SCE #4 was used; a check before & after test vs. another SCE showed a difference less than 0.5 mV.

Test Solution Prep: The test solution was prepared as described in STMX 23 (p. 21), except actual weights were 0.1233 g $NaHCO_3$ and 0.1648 g NaCl. The same lot #'s were used.

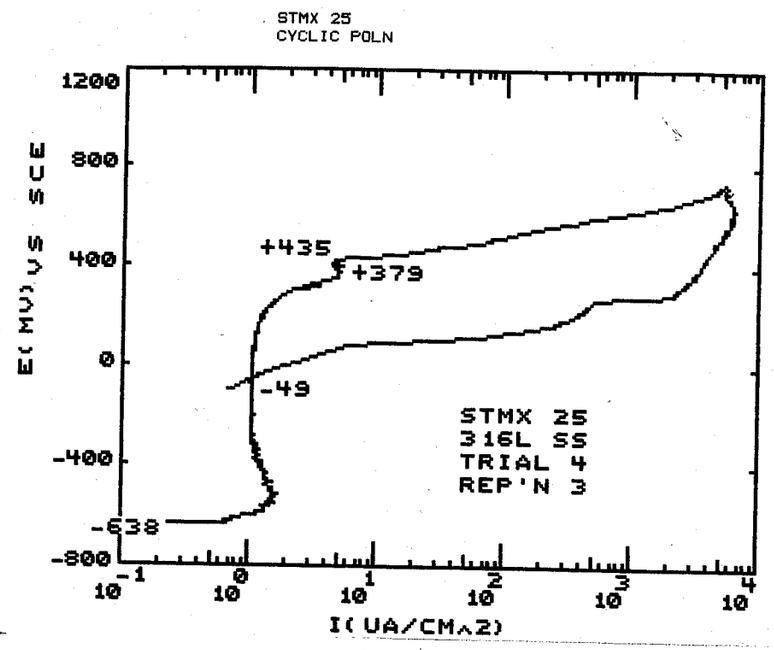
Spec. Dim: ϕ = 0.637 cm l = 1.891 cm A = 4.006 cm^2

1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before starting.
3. E corr at start −659 mV vs SCE
4. E Pt 10 min before start −115 mV
5. Initial Temp. 95.2°C Final Temp 95.0°C
6. Initial pH 8.27 @ 35°C Final ~~Temp~~ pH 9.79 @ 35°C
7. Scan rate 0.17 mV/sec (600 mV/hr) 12/5/90 WJM
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen and solution were exactly like STMX 23 (p. 21)

Stored on disk EB+C #3.

Walter J. Machowski
12/5/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 25
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.078
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-638
MV/PT	4
DATA MAX	6375.674
DATA MIN	.2403139
ABS MIN	.2403139
ABS MAX	6375.674

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #4;REP'N #3
CL=100;NO3=10;F=2;SO4=20;95 C
DE-AERATE W/ARGON
DONE ON PARC 173/276

Cyclic Polarization of 316L SS
Model Solution: Cl = 100; NO_3 = 10; F = 2; SO_4 = 20

STMX 25

Purpose: Same as STMX 17 (p.9).

The test specimen, procedures, etc were as described in STMX 17 (p.9). Ref SCE #4 was used; a check vs another before + after the test showed a difference of less than 0.5 mV.

Test Solution Prep: The test solution was prepared as described in STMX 23 (p.21) using the same chemicals + solutions. Actual weight of $NaNO_3$ was 0.1222 g and of NaCl was 0.1649 g.

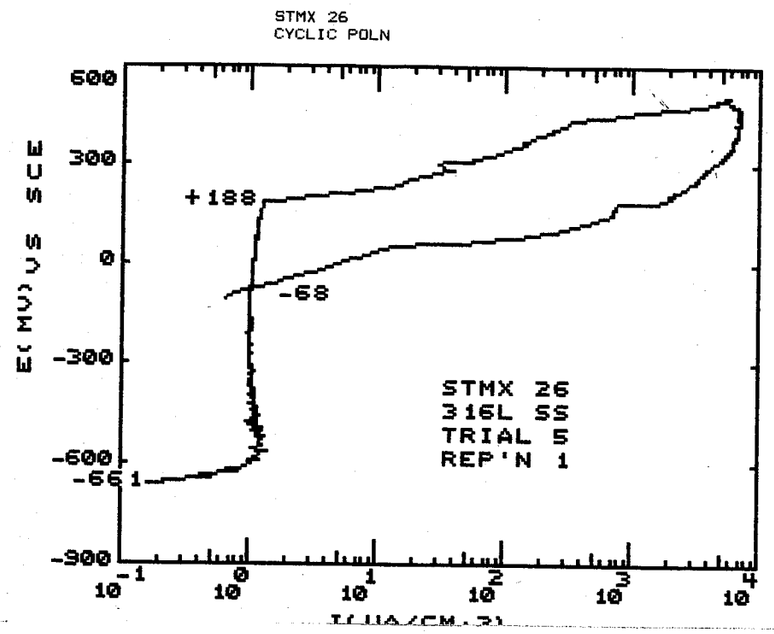
Spec. dim: ϕ = 0.632 cm l = 1.896 cm A = 4.078 cm^2

1. Spec. pre-passivated per TOP-009; all surfaces polished to 600 grit.
2. Spec. held at open circuit for one hour before starting
3. E corr at start −639 mV vs SCE
4. E Pt 10 min. before start −214 mV
5. Initial Temp. 95.2°C Final Temp. 95.2°C
6. Initial pH 8.14 @ 25°C Final pH 9.76 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen and solution appeared similar to STMX 23 (p.21).

Stored on disk EC46 #3.

Walter J. Mackowski
12/6/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 26
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.103
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-661
MV/PT	4
DATA MAX	7214.233
DATA MIN	-499.1469
ABS MIN	.131611
ABS MAX	7214.233

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #5;REP'N #1
CL=300;NO3=10;F=2;SO4=20;95 C
DE-AERATE W/ARGON
DONE ON PARC 173/276

Cyclic Polarization of 316L SS
Model Solution: Cl = 300; NO_3 = 10; F = 2; SO_4 = 20
STMX 26

Purpose: Same as STMX 17 (p.9).

The test specimen, procedures, etc. were as described in STMX 17 (p.9). Ref SCE #4 was used, a check vs another before + after the test showed a difference of 0.5 mV.

Test Solution Prep: The test solution was prepared as described in STMX 23 (p.21) except that 0.4947 g of NaCl was added to achieve a 300 ppm $Cl^{\ominus}$ concentration. 0.1233 g of $NaHCO_3$ were used. Same chemical and solution lot #'s and solution #'s were used.

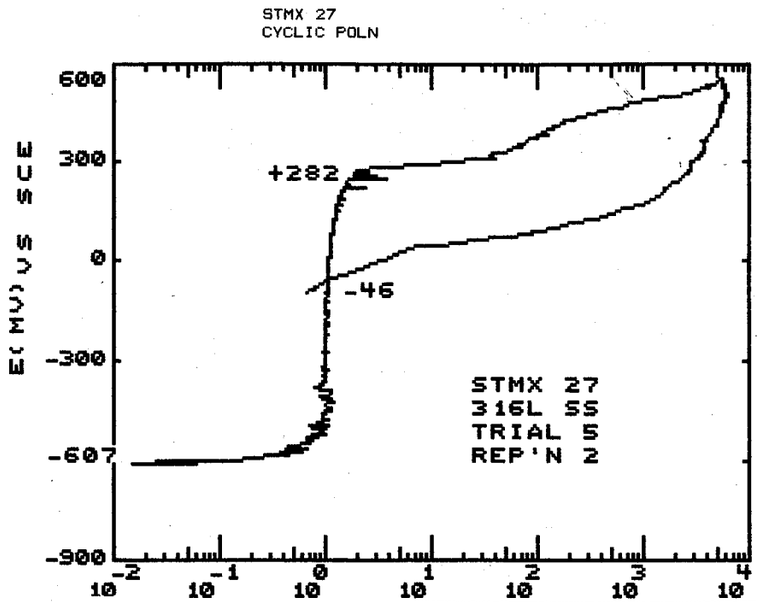
Spec. Dim: ϕ = 0.633 cm l = 1.905 cm A = 4.103 cm^2

1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start
3. E corr at start −660 mV vs SCE
4. E Pt 10 min before start −116 mV
5. Initial Temp. 95.0°C Final Temp 95.0°C
6. Initial pH 8.12 @ 25°C Final pH 9.70 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had some shallow, small pits which were made evident by probing. Some crevice corrosion had occurred. Solution was tinged green w/a greenish gelatinous precipitate.

Stored on disk EO+A #3.

Walter J. Machowski
12/7/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 27
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.072
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-607
MV/PT	4
DATA MAX	6213.163
DATA MIN	-5.029469
ABS MIN	1.473477E-02
ABS MAX	6213.163

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #5;REP'N #2
CL=300;NO3=10;F=2;SO4=20;95 C
DE-AERATE W/ARGON
DONE ON PARC 173/276

Cyclic Polarization of 316L SS
Model Solution: Cl = 300; NO_3 = 10; F = 2; SO_4 = 20
STMX 27

Purpose: Same as STMX 17 (p.9).

The test specimen, procedures, etc were as described in STMX 17 (p.9). Ref SCE #4 was used & checked before & after test, difference vs. another SCE was less than 1.0 mV.

Test Solution Prep: The test solution was prepared as described in STMX 26 (p.27). Actual salt weights were 0.1226 g $NaHCO_3$ and 0.4944 g NaCl. Same lot #'s and solution #'s used.

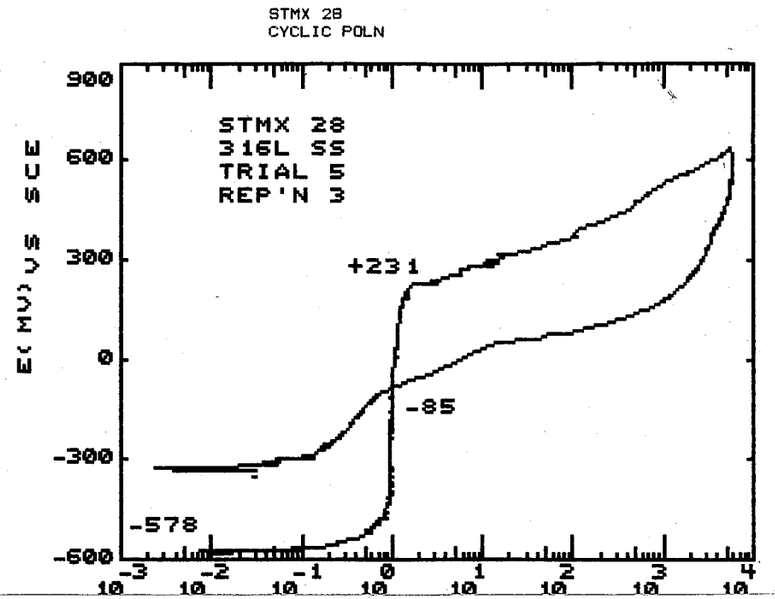
Spec. Dim: ϕ = 0.630 cm l = 1.900 cm A = 4.072 cm^2

1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start
3. E corr at start −608 mV vs SCE
4. E Pt 10 min before start −180 mV
5. Initial Temp 95.5°C Final Temp 95.0°C
6. Initial pH 8.20 @ 25°C Final pH 9.73 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had small, shallow pits as in STMX 26. Some crevice corrosion had occurred. Solution had a greenish tinge with a small amount of greenish precipitate.

Stored on disk ER+D #3.

Walter J. Machowski
12/10/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 28
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.061
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-578
MV/PT	4
DATA MAX	6008.373
DATA MIN	-.1674464
ABS MIN	2.462448E-03
ABS MAX	6008.373

LEGEND

STATISTICAL MATRIX ON 316L SS
INTERMEDIATE RUN;TRIAL #5;RUN #3
CL=300;NO3=10;F=2;SO4=20;95 C
DE-AERATE W/ARGON
DONE ON PARC 173/276

Cyclic Polarization of 316L SS
Model Solution: Cl = 300; NO_3 = 10; F = 2; SO_4 = 20
STMX 28

Purpose: Same as STMX 17 (p.9).

The test specimen, procedures, etc. were as described in STMX 17 (p.9). Ref SCE #4 was used + checked vs. another before + after test; difference was less than 1.0 mV.

Test Solution Prep: The test solution was prepared as described in STMX 26 (p.27). Actual salt weights were 0.1330 g $NaNO_3$ and 0.4944 g NaCl. Same lot #'s and solution #'s were used.

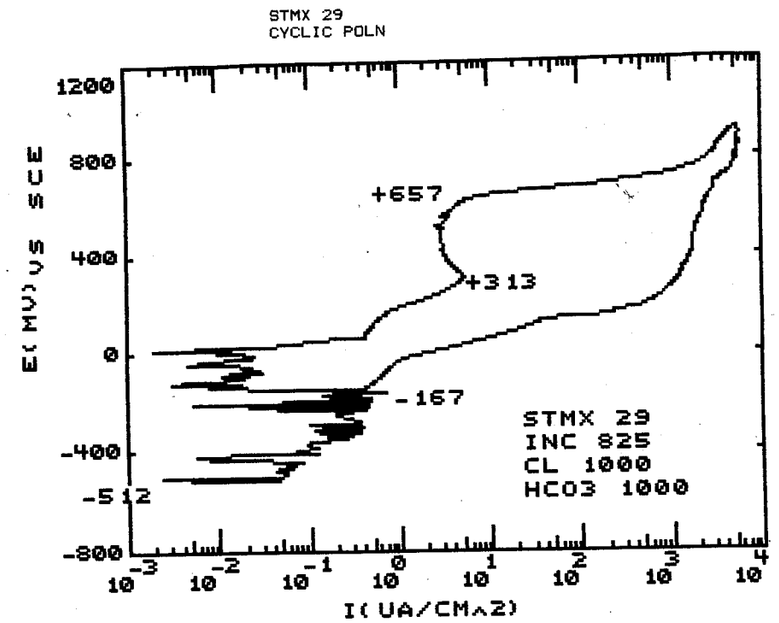
Spec. Dim: ϕ = 0.629 cm l = 1.898 cm A = 4.061 cm^2

1. Spec. pre-passivated per TOP 009; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start
3. E corr at start −578 mV vs SCE
4. E Pt 10 min before start −198 mV
5. Initial Temp 95.0°C Final Temp 95.0°C
6. Initial pH 8.13 @ 25°C Final pH 9.65 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen + solution were similar to STMX 27.

Stored on disk EC+C #3.

Walter J. Machrowicz
12/12/90



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 29
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.144
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-512
MV/PT	4
DATA MAX	6008.687
DATA MIN	-.2775097
ABS MIN	1.930502E-03
ABS MAX	6008.687

LEGEND

STATISTICAL MATRIX ON INC 825
NO3=10;F=2;SO4=20;T=95 C
CL=1000;HCO3=1000
DE-AERATE W/ARGON
DONE ON PARC 273

27 FEB 1991

Cyclic Polarization of ~~316L~~ 825 2/26/91 wj Moskowski
Model Solution: Cl = 1000 ; HCO_3 = ~~2000~~ 1000, NO_3 = 10 ; SO_4 = 20, F = 2

STMX 29

Purpose: To collect data for evaluation of effects of various selected ionic species on the corrosion of Inc 825.

The test specimen was a cylindrical specimen from heat # HH437IFC of Incoloy 825 fabricated at SwRI. Procedure generally followed ASTM G-61 for cyclic polarization test. Specimen was wet polished w/220 grit followed by 600 grit. It was then cleaned + degreased per ASTM G-61. Test cell was as described in STMX 12 on p. 9. Test follows TOP-008 guidelines. Ref difference less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6484 g NaCl and 1.3771 g of $NaHCO_3$ (same lot #'s as ~~as~~ used previously). Pipet 20.0 ml of SO_4 stock, 2.0 ml of F stock, and 10.0 ml of NO_3 stock solution of same # as used in STMX 23 (p. 21), dilute to volume. Lot #'s on p. 9

Spec. Dim: ϕ = 6.38 cm l = 1.908 cm A = 4.144 cm^2

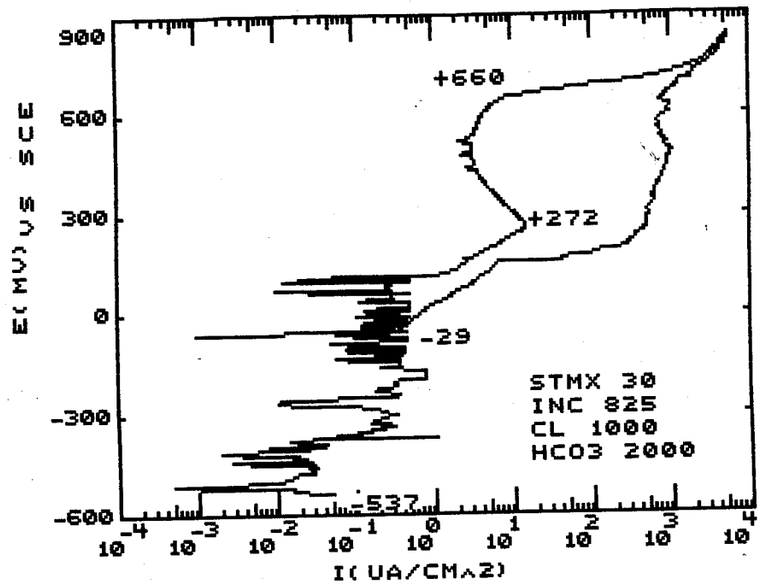
1. Spec. pre-passivated per TOP-009; all surface polished to 600 grit.
2. Spec held at open circuit for one hour before start
3. E corr at start −512 mV vs SCE
4. E Pt 10 min. before start −210 mV
5. Initial Temp 95.2°C Final Temp: 94.5°C
6. Initial pH 8.27 @ 25°C Final pH 10.16 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 273
10. Auto reverse @ 5000 μA/cm^2
11. Conductivity @ 25°C 412 mmho

Specimen had pits + some crevice corrosion; solution had a hazy greenish cast to it.

Stored on disk EG&G #3

Walter J. Moskowski
2/27/91

STMX 30
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 30
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	2760 S — NOTE: SPEC HELD FOR 3600 S AUTO START WAS MODIFIED DUE TO DELAY IN STARTING PROGRAM AFTER SPECIMEN WAS IMMERSED

SAMPLE PARAMETERS

AREA(CMS^2)	4.125
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-537
MV/PT	4
DATA MAX	5430.303
DATA MIN	-1.044848
ABS MIN	4.848485E-04
ABS MAX	5430.303

LEGEND

STATISTICAL MATRIX ON INC 825
NO3=10;F=2;SO4=20;T=95 C
CL=1000;HCO3=2000
DE-AERATE W/ARGON
DONE ON PARC 273

28 FEB 1991

Cyclic Polarization of Inc 825
Model Solution: Cl = 1000; HCO_3 = 2000; NO_3 = 10; F = 2; SO_4 = 20

STMX 30

Purpose: Same as STMX 29.

The Inc 825 specimen, procedures, test cell were as described in STMX 29 (p. 33). Reference SCE #4 was used & checked vs. another, before & after test, difference was less than 10 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6486 g NaCl and 2.7540 g of $NaHCO_3$ (lot #'s on p. 9). Pipet 20.0 ml of SO_4 stock, 2.0 ml of F stock, and 10.0 ml of NO_3 stock solutions #013-107. dilute to the mark. note: SO_4 stock solution #013-269 was used.

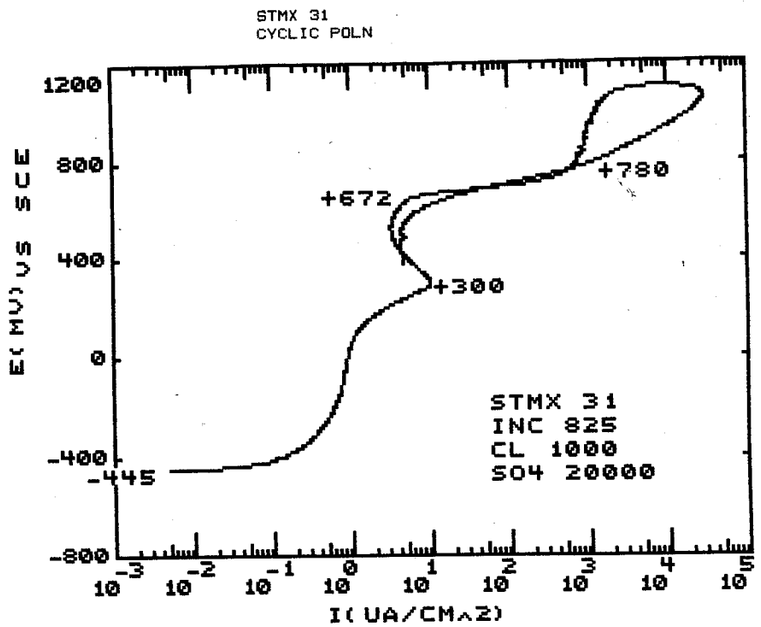
Spec. Dim: ϕ = 0.638 cm l = 1.909 cm A = 4.125 cm^2

1. Spec pre-passivated per TOP-009; all surfaces polished to 600 grit.
2. Spec held at open circuit for one hour before polarizing
3. E corr at start −537 mV vs SCE
4. E Pt 10 min before start −245 mV
5. Initial Temp. 94.8°C Final Temp. 95.0°C
6. Initial pH 8.25 @ 25°C Final pH 10.05 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Auto reverse @ 5000 μA/cm^2
10. Done on PARC 273
11. Conductivity @ 25°C 4.94 mmho

Specimen had pitting + some crevice corrosion. Solution was fairly clear, only slightly hazy.

Stored on disk EG&G #3.

Walter J. Mackowski
2/28/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 31
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.136
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-445
MV/PT	4
DATA MAX	28844.29
DATA MIN	-49.51644
ABS MIN	4.83559E-03
ABS MAX	28844.29

LEGEND

STATISTICAL MATRIX ON INC 825
NO3=10;F=2;HCO3=85;T=95 C
CL=1000;SO4=20000
DE-AERATE W/ARGON
DONE ON PARC 173/276

1 MAR 1991

Cyclic Polarization of Inc 825
Model Solution: Cl = 1000; SO_4 = 20,000; NO_3 = 10; F = 2, HCO_3 = 85
STMX 31
Purpose: Same as STMX 29

The Inc 825 specimen, procedures, test cell were as described in STMX 29 (p. 33). Ref SCE #4 was used & checked vs. another before & after test; difference less than 1.0 mV

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6486 g NaCl, 0.1226 g $NaHCO_3$ and 29.5729 g of Na_2SO_4 (same lot #'s as p. 9). Pipet 10.0 ml of NO_3 stock and 2.0 ml of F stock solutions # 013-107, dilute to the mark.

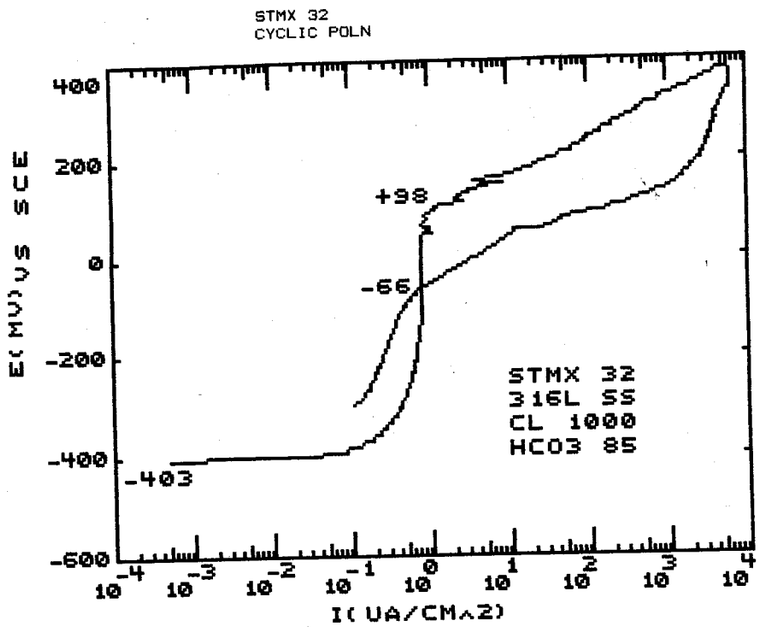
Spec. dim ϕ = 0.636 cm l = 1.911 cm A = 4.136 cm^2

1. Spec pre-passivated per 008-009; all surfaces polished to 600 grit.
2. Spec held at open circuit for one hour before start
3. E corr at start −445 mV vs SCE
4. E Pt 10 min before start −295 mV
5. Initial Temp. 95.0°C Final Temp. 95.0°C
6. Initial pH 7.55 @ 25°C Final ~~Temp.~~ pH 9.51 @ 25°C 3/6/91 WJMacknowski
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. Cond'y = 27.1 mmho @ 25°C

Specimen covered w/a "red-rust" product & had some shallow large pitting. Test solution was yellow w/some orange-brown gelatinous precipitate.

Stored on disk EC-V-C #3.

Walter J. Mackowski
3/1/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 32
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.133
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-403
MV/PT	4
DATA MAX	6532.785
DATA MIN	-4.955238
ABS MIN	4.8391E-04
ABS MAX	6532.785

LEGEND

STATISTICAL MATRIX ON 316L SS
NO3=10;SO4=20;F=2;T=60 C
CL=1000;HCO3=85
DE-AERATE W/ARGON
DONE ON PARC 173/276

6 MAR 1991

Cyclic Polarization of 316L SS
Model Solution: Cl = 1000; NO_3 = 10; SO_4 = 20; F = 2; HCO_3 = 85
STMX 32

Purpose: To collect data for evaluation of effects of various selected ionic species on the corrosion of 316L SS.

The cylindrical specimen was 316L SS from heat #P80746. The specimen preparation, test procedures, test cell were as described in STMX 29 (p.33). Ref SCE #4 was used & checked vs. another before & after test, difference was less than 1.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6487 g NaCl and 0.1319 g $NaHCO_3$ (same lot #'s as p.9). Pipet 10.0 ml of NO_3 stock, 2.0 ml of F stock solution #013-107. Pipet 20.0 ml of SO_4 stock solution #013-269. Dilute to the mark.

Spec. dim: ϕ = 0.635 cm l = 1.913 cm A = 4.133 cm^2

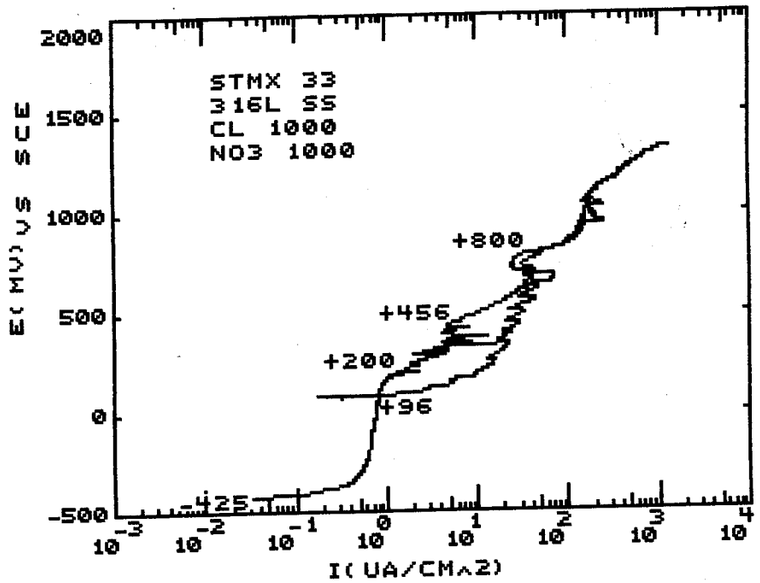
① Spec pre-passivated per TOP-009; all surfaces polished to 600 grit
② Spec held at open circuit for one hour before start.
③ E corr at start −403 mV vs SCE
④ E pt 10 min before start +96 mV
⑤ Initial Temp. 60.0°C Final Temp 59.0°C
⑥ Initial pH 8.23 @25°C Final pH 9.09 @25°C
⑦ Scan rate 0.17 mV/sec (600 mV/hr)
⑧ Argon purge
⑨ Done on PARC 173/276
⑩ Auto reverse @ 5000 μA/cm^2
⑪ K = 3.19 mmho @25°C

Specimen had some discoloration and many small pits; also had some crevice corrosion. Solution was slightly hazy and slightly yellowish.

Stored on disk EG+G #3.

Walter J. Machowski
3/6/91

STMX 33
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 33
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.163
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-429
MV/PT	4
DATA MAX	1309.152
DATA MIN	-.3242854
ABS MIN	0
ABS MAX	1309.152

LEGEND

STATISTICAL MATRIX ON 316L SS
SO4=20;F=2;HCO3=85;T=60 C
CL=1000;NO3=1000
DE-AERATE W/ARGON
DONE ON PARC 173/276

7 MAR 1991

Cyclic Potentiation of 316L SS
Model Solution: Cl=1000; NO_3=1000; SO_4=20; F=2; HCO_3=85 60°C

STMX 33

Purpose same as STMX 32.

The test specimen, heat #, procedures, preparation, etc, were as described in STMX 32 (p.39). Ref SCE #4 was used + checked before + after test, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17MΩ water in a 1-liter volumetric add 1.6477 g NaCl and 1.3794 g $NaNO_3$ and 0.1221 g $NaHCO_3$ (same lot #'s as p.9). Pipet 20.0 ml of SO_4 stock solution #013-269 and 2.0 ml of F stock solution #013-107. Dilute to the mark.

Spec Dim: ϕ = 0.635 cm l = 1.928 cm A = 4.163 cm^2

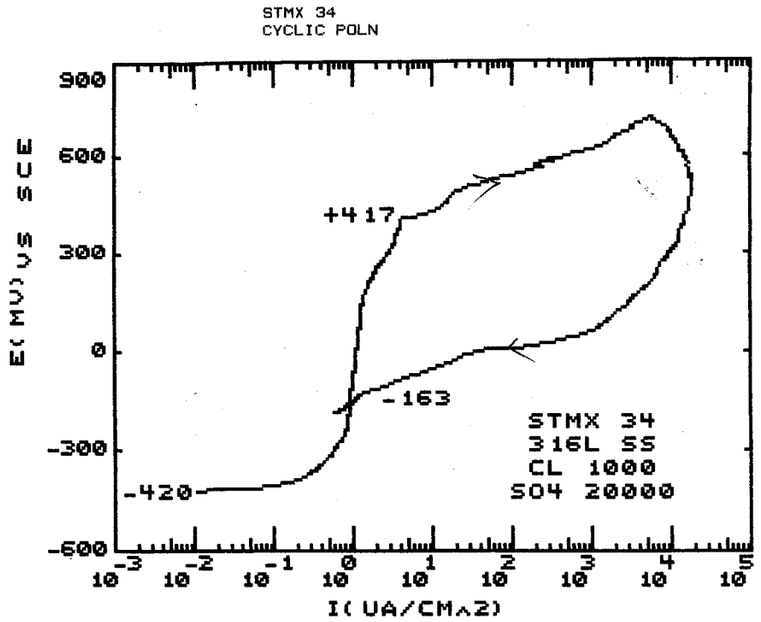
1. Spec. pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec. held at open circuit for one hour before start
3. E corr at start −429 mV vs SCE
4. E Pt 10 min before start −45 mV
5. ⊛ Initial Temp 61.0°C Final Temp. 59.0°C
6. Initial pH 8.16 @ 25°C Final pH 9.45 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Manual reverse @ 4610 μA / +1332 mV
11. K = 4.33 mmho @ 25°C

⊛ NOTE: Temperature overshot to 90°C; increased Ar flow + allowed to cool down before immersing specimen.

Specimen mostly pit free, small pit and some crevice corrosion at mounted end. The rest free + clear of pits. Solution fairly clear, only a tint of yellowish color.

Stored on disk EC&C #3

Walter J. Mrochoski
3/7/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 34
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.092
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-420
MV/PT	4
DATA MAX	18841.64
DATA MIN	-5.004888
ABS MIN	9.775171E-03
ABS MAX	18841.64

LEGEND

STATISTICAL MATRIX ON 316L SS
NO3=10;F=2;HCO3=85;T=95 C
CL=1000;SO4=20000
DE-AERATE W/ARGON
DONE ON PARC 173/276

8 MAR 1991

Cyclic Polarization of 316L SS
Model Solution: Cl=1000, SO_4=20,000, NO_3=10, F=2, HCO_3=85

STMX 34

Purpose: Same as STMX 32.

The test specimen, heat #, preparation, procedures, etc were as described in STMX 32 (p. 39). Ref SCE #4 was used and checked vs. another before & after test, difference less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6487 g NaCl, 0.1226 g $NaHCO_3$, and 29.5730 g Na_2SO_4 (same lot #'s as p. 9). Pipet 10.0 ml of NO_3 stock + 20 ml of F stock solutions, both #013-107. Dilute to the mark.

Spec. Dim: ϕ = 0.632 cm l = 1.903 cm A = 4.092 cm^2

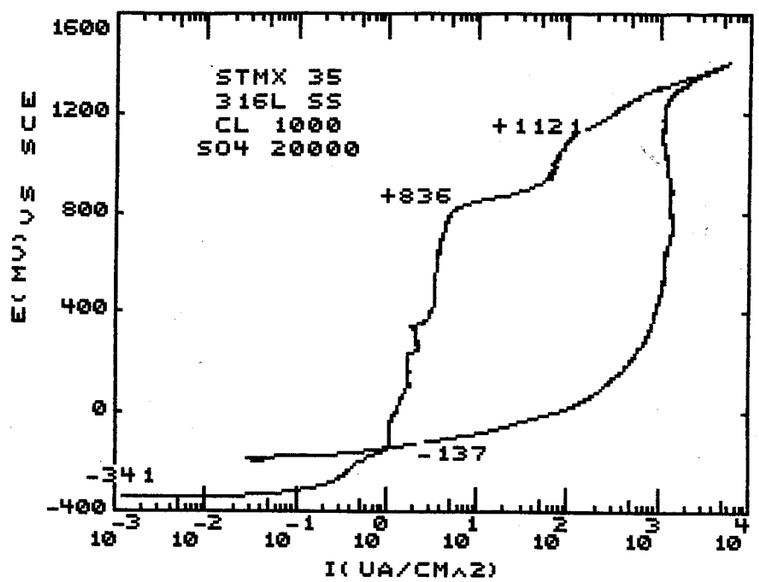
1. Spec. pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec. held at open circuit for one hour before start
3. E corr at start -420 mV vs. SCE
4. E Pt 10 min. before start
5. Initial Temp. 95.0°C Final Temp. 94.8°C
6. Initial pH 7.94 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. k = 27.3 mmho @ 25°C

Specimen discolored with areas of localized corrosion + pits. Also had some crevice attack. Solution was a hazy greenish color.

Stored on disk EC+C #3.

Walter J. Mackowski
3/8/91

STMX 35
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 35
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.098
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-341
MV/PT	4
DATA MAX	5905.32
DATA MIN	-4.392387E-02
ABS MIN	1.220107E-03
ABS MAX	5905.32

LEGEND

STATISTICAL MATRIX ON 316L SS
NO3=10;F=2;HCO3=85;T=60 C
CL=1000;SO4=20000
DE-AERATE W/ARGON
DONE ON PARC 173/276

11 MAR 1991

Cyclic Polarization of 316L SS
Model Solution: Cl = 1000, SO_4 = 20,000, NO_3 = 10, F = 2; HCO_3 = 85 60°C

STMX 35

Purpose: Same as STMX 32.

The test specimen, heat #, procedures, preparation, etc were as in STMX 32 (p.39). Ref SCE #4 was checked as in STMX 32, difference was less than 1.0 mV

Test Solution Prep: The same as STMX 34, with same lots. Actual salt weights were 1.6485 g NaCl, 29.5728 g Na_2SO_4, and 0.1321 g $NaHCO_3$.

Spec. Dim: ϕ = 0.634 cm l = 1.899 cm A = 4.098 cm^2

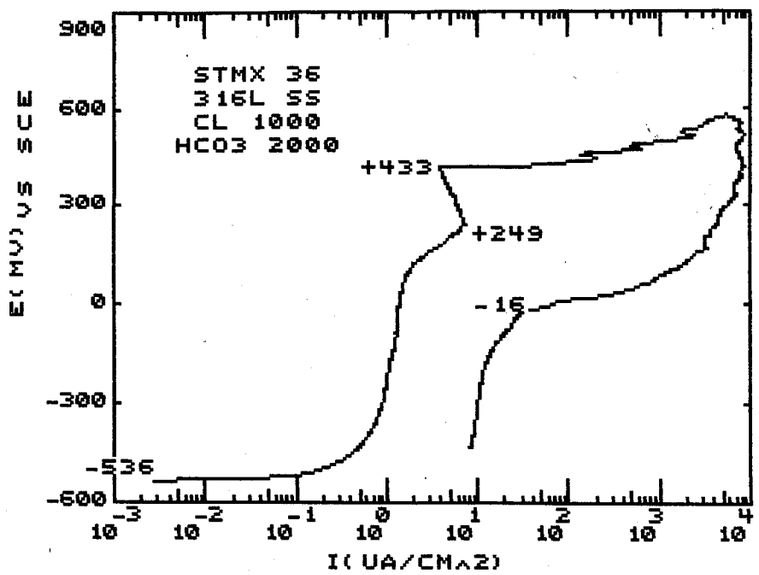
1. Spec. pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Spec. held at open circuit for one hour before start
3. E corr at start −341 mV vs SCE
4. E Pt 10 min before start −130 mV
5. Initial Temp. 61.0°C Final Temp. 59.2°C
6. Initial pH 7.99 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. K = 26.8 mmho @ 25°C

Specimen was discolored & had several small pits in various places. Also had quite a bit of crevice corrosion. Solution was slightly hazy w/a small amount of gelatinous precipitate.

Stored on disk EB+C #3.

Walter J. Machowski
3/12/91

STMX 36
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 36
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.092
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-536
MV/PT	4
DATA MAX	8699.902
DATA MIN	-50.04887
ABS MIN	2.688172E-03
ABS MAX	8699.902

LEGEND

STATISTICAL MATRIX ON 316L SS
NO3=10;SO4=20;F=2;T=95 C
CL=1000;HCO3=2000
DE-AERATE W/ARGON
DONE ON PARC 173/276

12 MAR 1991

Cyclic Voltammetry of 316L SS
Model Solution: Cl=1000, HCO_3=2000; SO_4=20, NO_3=10, F=2

STMX 36

Purpose: Same as STMX 32.

The test specimen, heat #, preparation, procedures, test cell, etc were as in STMX 32 (p. 39). Ref SCE #4 was used & checked as in STMX 32. Difference less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6485 g NaCl and 2.7551 g $NaHCO_3$ (same lot #'s as p. 9). Pipet 10.0 ml of NO_3 stock + 2.0 ml of F stock solutions both ~~#10~~ #013-107. Pipet 20.0 ml of SO_4 stock solution #013-269. Dilute to the mark.
3/12/91 WJ Machowski

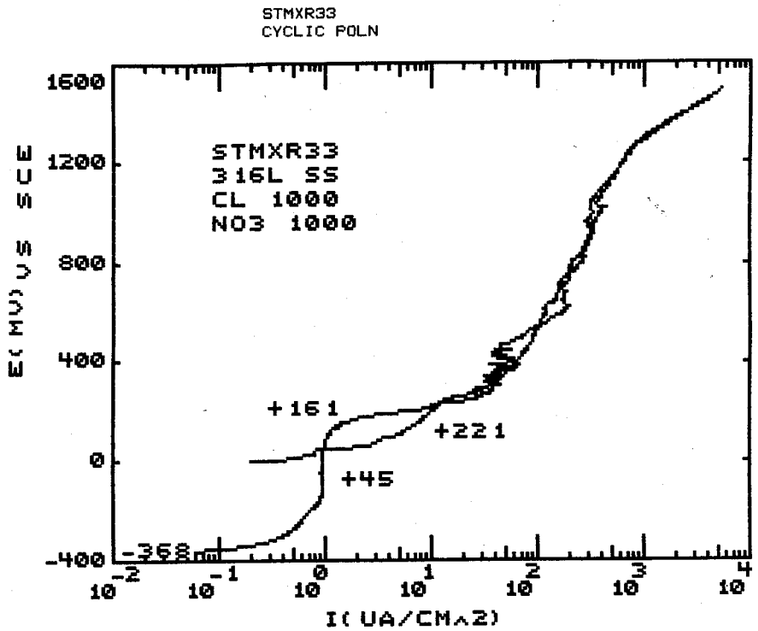
Spec Dim: ϕ = 0.634 cm l = 1.896 cm A = 4.092 cm^2

1. Spec. pre-passivated per TOP-009; all surfaces polished to 600 grit.
2. Spec held at open circuit for one hour before start
3. E corr at start −536 mV vs SCE
4. E PT 10 min before start −460 mV
5. Initial Temp. 94.5°C Final Temp. 96.0°C
6. Initial pH
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. K = 4.82 mmho @ 25°C

Specimen pitted and some crevice corrosion. Large green bubbles were on specimen during the test. Solution had a yellowish haze.

Stored on disk EC&C #3.

Walter J. Machowski
3/12/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMXR33
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.117
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-368
MV/PT	4
DATA MAX	5319.407
DATA MIN	-.4104931
ABS MIN	1.457372E-02
ABS MAX	5319.407

LEGEND

STATISTICAL MATRIX ON 316L SS
SO4=20;F=2;HCO3=85;T=60 C
CL=1000;NO3=1000
DE-AERATE W/ARGON
DONE ON PARC 173/276

THIS IS A RE-RUN OF STMX 33
13 MAR 1991

Cyclic Polarization of 316L SS
Model Solution: Cl = 1000; NO_3 = 1000, SO_4 = 20, F = 2, HCO_3 = 85 60°C

STMX R33

Purpose: This a re-run of STMX 33, due to odd curve maybe because of overtemp.

Specimen, heat #, preparation, etc were as in STMX 33. Ref SCE #4 was used & checked as before. Difference between 1.0 mV

Test solution prep was the same as in STMX 33. Actual salt weights were 0.1217 g $NaHCO_3$, 1.6486 g NaCl, and 1.3794 g $NaNO_3$.

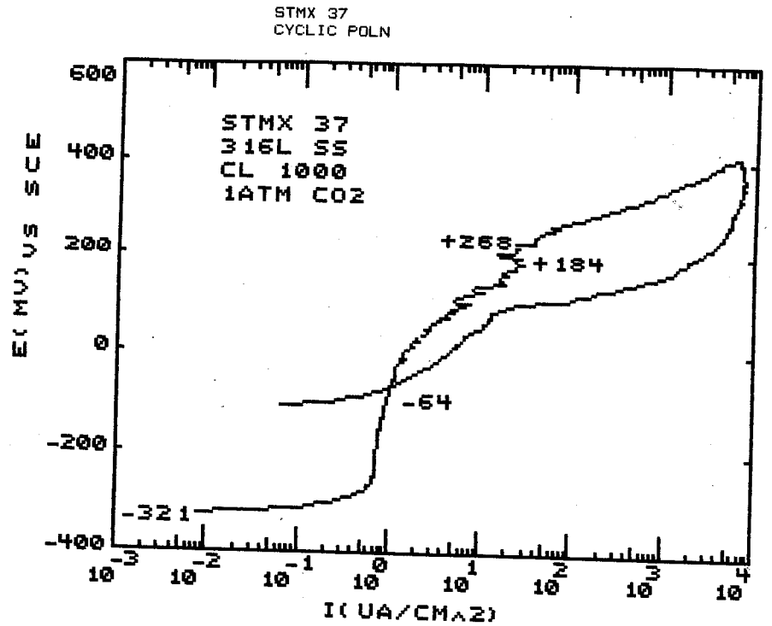
Spec. Dim: ϕ = 0.635 cm l = 1.905 cm A = 4.117 cm^2

1. Specimen pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start −368 mV vs SCE
4. E Pt 10 min before start +78 mV
5. Initial Temp 60.4°C Final Temp. 59.5°C
6. Initial pH 8.41 @ 25°C Final pH 9.22 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. K = 4.20 mmho @ 25°C

Specimen similar to STMX 33. Solution also.

Stored on disk EVTR #3.

Walter J. Machowski
3/13/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 37
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.113
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-321
MV/PT	4
DATA MAX	7585.704
DATA MIN	-.4254802
ABS MIN	0
ABS MAX	7585.704

LEGEND

STATISTICAL MATRIX ON 316L SS
NO3=10;SO4=20;HCO3=85;T=60 C
CL=1000
SPARGE CO2 AT 1 ATM
DONE ON PARC 173/276

14 MAR 1991

Cyclic Polarization of 316L SS
Model Solution; Cl=1000, NO_3=10, SO_4=20, F=2, HCO_3=85, CO_2 60°C
STMX 37

Purpose: Same as STMX 32.

The specimen, heat #, preparation, procedures, etc were as in STMX 32. Ref SCE #4 was used + checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6482 g of NaCl and 0.1255 g $NaHCO_3$ (same lot#'s as p.9) Pipet 10.0 ml of NO_3 stock and 2.0 ml of F stock solutions #013-107. Pipet 20.0 ml of SO_4 stock solution # 013-269. Dilute to the mark.

Spec. Dim: ϕ = 0.635 cm l = 1.903 cm A = 4.113 cm^2

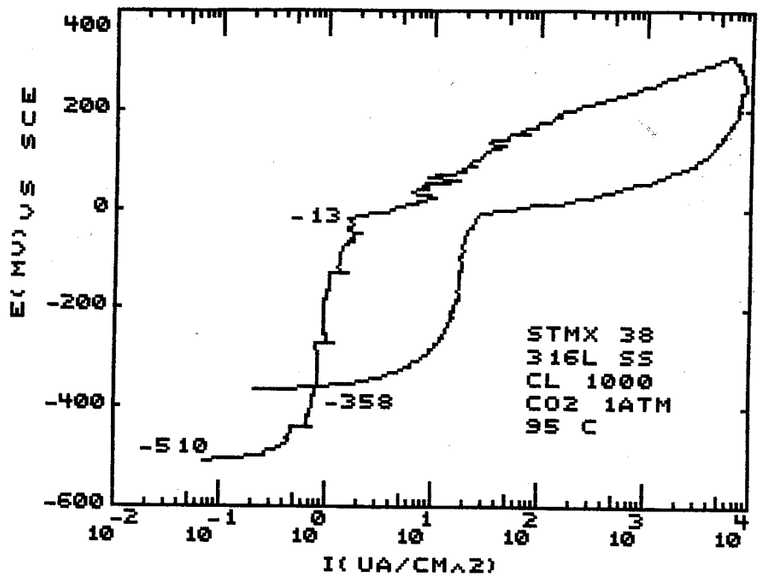
1. Specimen pre-passivated per TOP-009; all surfaces polished 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −320 mV vs SCE
4. E Pt 10 min before start +290 mV
5. Initial Temp. 60.5°C Final Temp. 59.8°C
6. Initial pH 5.46 @ 25°C Final pH 5.49 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. CO_2 purge gas (99.99%)
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. K = 2.89 mmho @ 25°C

Specimen retained its' silvery color, but revealed a few small pits especially when probed. Also had a small amount of crevice corrosion. Test solution remained water clear.

Stored on disk EC+C #3.

Walter J. Machowski
3/14/91

STMX 38
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 38
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.102
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-510
MV/PT	4
DATA MAX	8824.963
DATA MIN	-4.992686
ABS MIN	6.899073E-02
ABS MAX	8824.963

LEGEND

STATISTICAL MATRIX ON 316L SS
NO3=10;SO4=20;F=2;HCO3=85;T=95 C
CL=1000
SPARGE CO2 AT 1 ATM
DONE ON PARC 173/276

15 MAR 1991

Cyclic Polarization of 316L SS
Model Sol'n: Cl = 1000, NO_3 = 10, SO_4 = 20, F = 2, HCO_3 = 85 95°C CO_2

STMX 38

Purpose: Same as STMX 32.

The test specimen, heat #, preparation, procedures, etc were as in STMX 32. Ref SCE #4 was used and checked as before; difference was less than 1.0 mV.

The test solution was prepared as in STMX 37 from the same lot #'s. Actual salt weights were 1.6485 g NaCl and 0.1327 g $NaHCO_3$.

Specimen Dimension: ϕ = 0.634 cm ℓ = 1.901 cm A = 4.102 cm^2

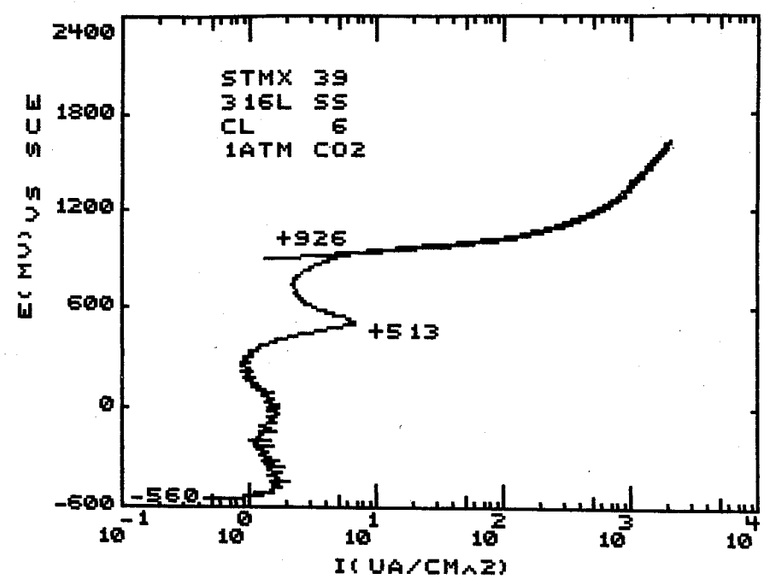
0. Specimen pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start −510 mV vs SCE
4. E Pt 10 min before start −284 mV
5. Initial Temp 94.8°C Final Temp 95.0°C
6. Initial pH 5.37 @ 25°C Final pH 5.46 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. CO_2 purge (99.99%)
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. K = 2.79 mmho @ 25°C

Specimen discolored a reddish-brown with many small pits. Small amount of crevice corrosion. Solution had a yellowish haze.

Stored on disk EG+G #3

Walter J. Mlechowski
3/15/91

STMX 39
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 39
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.085
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-560
MV/PT	4
DATA MAX	2073.439
DATA MIN	.2643819
ABS MIN	.2643819
ABS MAX	2073.439

LEGEND

STATISTICAL MATRIX ON 316L SS
NO3=10;SO4=20;F=2;HCO3=85;T=95 C
CL=6
SPARGE CO2 AT 1 ATM
DONE ON PARC 173/276

Cl = 3.6 ← (see STMX 18)

18 MAR 1991

Cyclic Polarization of 316L SS
Model Solution: ~~Cl=6~~, NO_3=10, F=2, SO_4=20, HCO_3=85 CO_2 95°C
STMX 39 Cl = 3.6 wt% 4/17/91

Purpose: Same as STMX 32.

The test specimen, heat #, preparation, procedure, etc were as in STMX 32. Ref SCE #4 was used and checked as before. Difference was less than 1.0 mV.

Test solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1331 g of $NaHCO_3$ (same lot # as p. 9). Pipet 6.0 ml of Cl stock, 2.0 ml of F stock and 8.0 ml of NO_3 stock solution # 013-107. Pipet 20.0 ml of SO_4 stock solution # 013-269. Dilute to the mark.

Spec. dim: Φ = 0.633 cm l = 1.896 cm A = 4.085 cm²

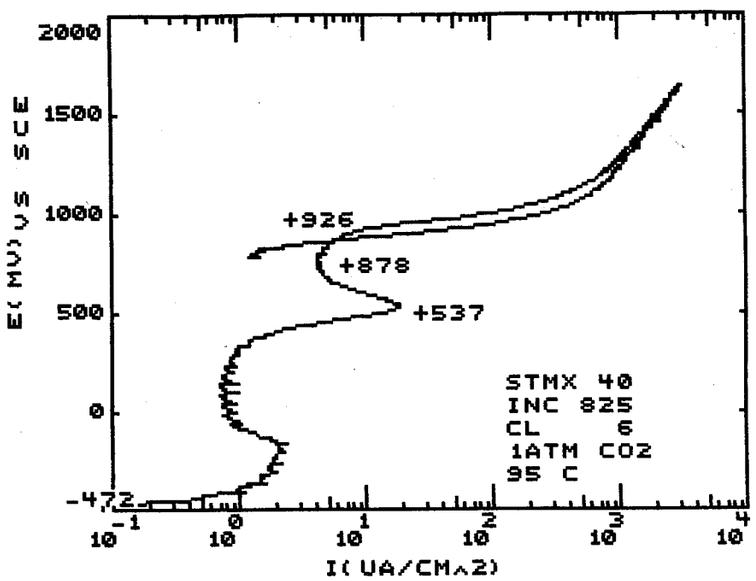
1. Specimen pre-passivated per TOP-009; all surface polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start −560 mV vs SCE
4. E Pt 10 min before start −70 mV
5. Initial Temp. 95.5°C Final Temp. 95.5°C
6. Initial pH 5.43 @ 25°C Final pH 5.43 @ 25°C
7. Scan rate 0.17 mV/sec
8. CO_2 purge (99.99%)
9. Done on PARC 173/276
10. Manual reverse @ 8380 μA/+1650 mV
11. K = 0.21 mmho @ 25°C

The specimen retained its metallic luster and was free of both pitting and crevice corrosion. The test solution remained water clear.

Stored on disk EC&C #3

Walter J. Mackowski
3/18/91

STMX 40
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 40
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.287
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-472
MV/PT	4
DATA MAX	3097.737
DATA MIN	.1049685
ABS MIN	.1049685
ABS MAX	3097.737

LEGEND

STATISTICAL MATRIX IN INC 825
NO3=10;SO4=20;F=2;HCO3=85;T=95 C
CL=6
SPARGE CO2 AT 1 ATM
DONE ON PARC 173/276

cl=3.6 ← (see STMX 18)

19 MAR 1991

Cyclic Polarization of Inc 825
Model Solution: ~~cl=6~~, NO_3=10, F=2, SO_4=20, HCO_3=85 CO_2 95°C
STMX 40 cl=3.6

Purpose: Same as STMX 29 (p. 33).

The test specimen①, heat #, preparation, procedure, etc was as described in STMX 29. Ref SCE #4 was used + checked as before. Difference was less than 1.0 mV.

Test Solution Prep: The solution was prepared as in STMX 39 with the same chemical + solution lot #'s. Actual salt weight used was 0.1324 g $NaHCO_3$.

Specimen Dim: ϕ = 0.632 cm l = 2.001 cm A = 4.287 cm^2

① Specimen pre-passivated per TOP-009; all surfaces polished to 600 grit.
② Specimen held at open circuit for one hour before start.
③ E corr at start -472 mV vs SCE
④ E Pt 10 min before start -65 mV
⑤ Initial Temp. 95.2°C Final Temp. 95.2°C
⑥ Initial pH 5.27 @ 25°C Final pH 5.32 @ 25°C
⑦ Scan rate 0.17 mV/sec (600 mV/hr)
⑧ CO_2 purge (99.99%)
⑨ Done on PARC 173/276
⑩ Manual reverse @ 12,960 μA/+1650 mV
⑪ K = not taken; sample spilled

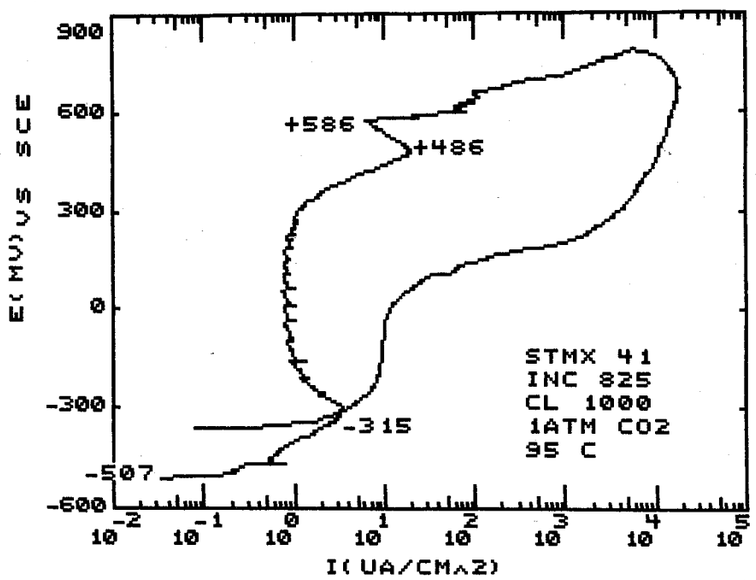
Specimen has slight brownish color, but no pits nor crevice corrosion. Test solution remained water clear.

Stored on disk EC+C #3.

① The specimens were the "long" ones from metal samples, they were cut to the shorter length on a cut-off wheel at SwRI.

Walter J. Macknowski
3/19/91

STMX 41
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 41
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.425
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-507
MV/PT	4
DATA MAX	18124.29
DATA MIN	3.322034E-02
ABS MIN	3.322034E-02
ABS MAX	18124.29

LEGEND

STATISTICAL MATRIX IN INC 825
NO3=10;SO4=20;F=2;HCO3=85;T=95 C
CL=1000
SPARGE CO2 AT 1 ATM
DONE ON PARC 173/276

20 MAR 1991

Cyclic Polarization of Inc 825
Model Solution: Cl=1000, NO_3=10, F=2, SO_4=20, HCO_3=85 95C CO_2
STMX 41

Purpose: Same as STMX 39 (p.33).

The test specimen, heat #, preparation, procedures, etc were as described in STMX 40. Ref SCE #4 was used and checked as before. Difference was less than 1.0 mV.

Test Solution Prep: The test solution was prepared as in STMX 37 (p.51) with the same chemical + solution lot #'s. The actual salt weights used were 1.6478 g NaCl and 0.1326 g of $NaHCO_3$.

Specimen Dimensions: ϕ = 0.634 cm l = 2.063 cm A = 4.425 cm^2

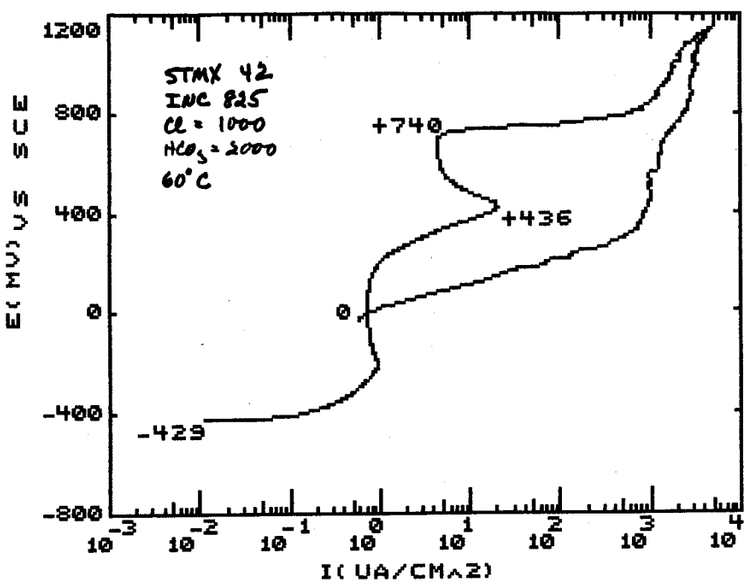
1. Specimen pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start.
3. E corr at start −507 mV vs SCE
4. E Pt 10 min before start −71 mV
5. Initial Temp. 95.0°C Final Temp. 95.0°C
6. Initial pH 4.94 @ 25°C Final pH 5.32 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. CO_2 purge (99.99%)
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. K = 3.13 mmhos @ 25°C

Specimen was discolored and had many small pits which were made evident by probing. Also had quite a bit of crevice corrosion. Test solution was a murky greenish color.

Stored on disk EC&C #5.

Walter J. Machowski
3/20/91

STMX 42
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 42
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.289
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-429
MV/PT	4
DATA MAX	5152.716
DATA MIN	-47.75006
ABS MIN	6.994637E-03
ABS MAX	5152.716

LEGEND

STATISTICAL MATRIX IN INC 825
NO3=10;SO4=20;F=2;T=60 C
CL=1000;HCO3=2000
DE-AERATE W/ARGON
DONE ON PARC 173/276

21 MAR 1991

Cyclic Polarization of Inc 825
Model Solution: Cl = 1000, HCO_3 = 2000, SO_4 = 20, NO_3 = 10, F = 2

STMX 42

Purpose: Same as STMX 29 (p. 33).

The test specimen, heat #, preparation, procedures, etc were as described in STMX 40. Ref SCE #4 was used and checked as before. Difference was less than 1.0 mV.

Test Solution Prep: To 500 ml. of 17 MΩ water in a 1-liter volumetric add 1.6484 g NaCl and 2.7537 g $NaHCO_3$ (same lot # 5 on p. 9). Pipet 20.0 ml of SO_4 stock solution # 013-269. Pipet 10.0 ml of NO_3 stock solution and 2.0 ml of F stock solution # 013-107. Dilute to the mark.

Specimen Dimensions: ϕ = 0.631 cm l = 2.006 cm A = 4.289 cm^2

1. Specimen pre-passivated per TOP-009; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start −429 mV vs SCE
4. E Pt 10 min. before start −35 mV
5. Initial Temp. ~~95.0°C~~ 60°C Final Temp. 60.0°C
6. Initial pH 8.52 @ 25°C (Wm Machowski) Final pH 9.51 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge (99.99%)
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2
11. K = 4.62 mm hos @ 25°C

Specimen was discolored + pitted – only at "top" end where Ar bubbler tended to collect. Also had moderate crevice corrosion. Solution had a hazy yellowish tinge.

Stored on disk EG+G #3.

Walter J. Machowski
3/21/91

Preparation of NO_3 Stock Solution 1000 ppm

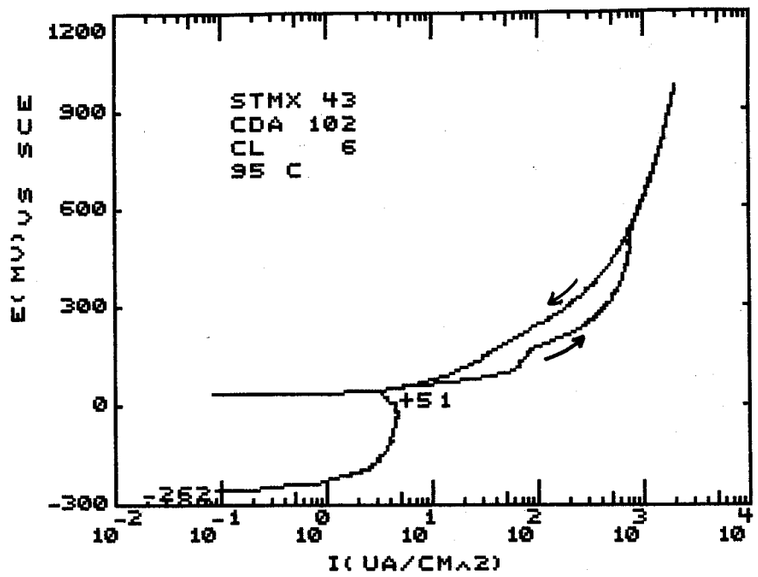
Purpose: Stock solution used in preparation of test solutions.

Weigh out 1.3793 g of $NaNO_3$ (Fisher Stock# S343-500 lot# 897183. dissolve in 500 ml of 17 MΩ water in a 1-liter volumetric + dilute to the mark.

Label as SW CNWRA 019-63

Walter J. Machowski
3/21/91

STMX 43
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 43
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.308
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-262
MV/PT	4
DATA MAX	2000.928
DATA MIN	-4.753946
ABS MIN	7.149489E-02
ABS MAX	2000.928

LEGEND

STATISTICAL MATRIX ON CDA 102
NO3=10;SO4=20;F=2;T=60 C
CL=6;HCO3=85
DE-AERATE W/ARGON
DONE ON PARC 173/276

22 MAR 1991

Cyclic Polarization of CDA-102
Model Solution: Cl = 6, NO_3 = 10, F = 2, SO_4 = 20; HCO_3 = 85 60°C
STMX ~~42~~ 43 w/Macharski 3/22/91

Purpose: To collect data for evaluation of effects of various selected ionic species on the corrosion of CDA-102 using a factorial experiment.

A cylindrical specimen of CDA-102 (heat # 6681) fabricated at SwRI was used. The preparation, procedures, cell, etc were as described on p. 9 (STMX 17). Ref SCE #4 was used and checked as before. Difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric flask add 0.1222 g of $NaHCO_3$ (same lot # as p. 9). Pipet 10.0 ml of Cl stock, 2.0 ml of F stock solution #013-107. Pipet 10.0 ml of NO_3 stock solution #019-63. Pipet 20.0 ml of SO_4 stock solution #013-269. Dilute to the mark.

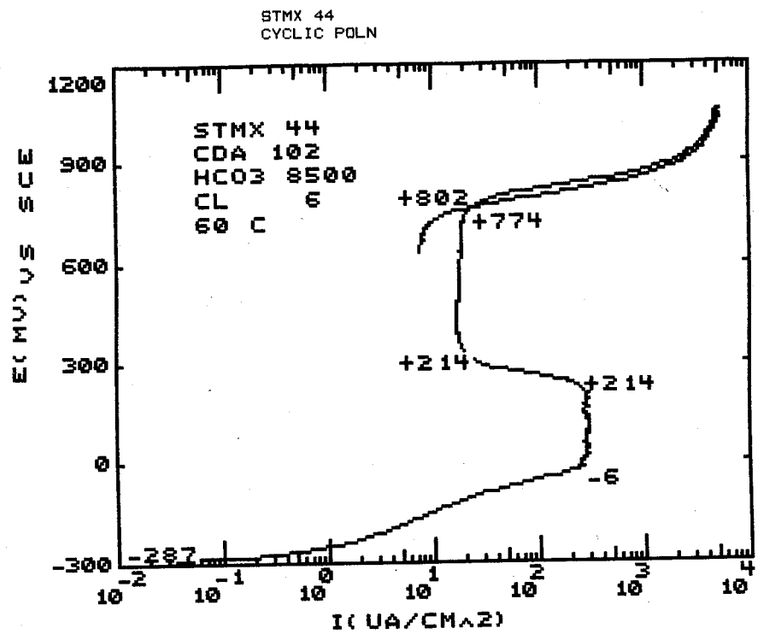
Spec. Dimension: ϕ = 0.638 cm l = 1.990 cm A = 4.308 cm^2

1. Specimen not pre-passivated; polished to 600 grit on all surfaces
2. Specimen held at open circuit for one hour before start
3. E corr at start −263 mV vs SCE
4. E Pt 10 min. before start +5 mV
5. Initial Temp. 60.2°C Final Temp. 60.0°C
6. Initial pH 8.38 @ 25°C Final pH 9.50 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PARC 173/276
10. Manual reverse @ 8540 μA / +975 mV

Specimen was covered w/a dark scale which easily fell off when dried. Specimen showed that general corrosion had occurred all over; grains could be observed. No attack on mounted end. Solution was slightly murky until corrosion product settled—then it was clear.

Stored on disk EC&C # 3.

Walter J. Macharski
3/22/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 44
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.288
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-287
MV/PT	4
DATA MAX	5340.485
DATA MIN	3.521455E-02
ABS MIN	3.521455E-02
ABS MAX	5340.485

LEGEND

STATISTICAL MATRIX ON CDA 102
NO3=10;SO4=20;F=2;T=60 C
CL=6;HCO3=8500
DE-AERATE W/ARGON
DONE ON PARC 173/276

25 MAR 1991

Cyclic Polarization of CDA-102
Model Solution: HCO_3 = 8500, Cl = 6, NO_3 = 10, F = 2, SO_4 = 20 60°C

STMX 44

Purpose: Same as STMX 43.

The specimen, heat #, preparation, procedures, etc were as described in STMX 43 (p.65). Ref SCE #4 was used and checked as before. Difference was less than 1.0 mV.

Test Solution Prep: The test solution was prepared as in STMX 43 w/ the same lot #'s, except that 12.201 g of $NaHCO_3$ were added.

Specimen Dimension: ϕ = 0.633 cm l = 1.998 cm A = 4.288 cm^2

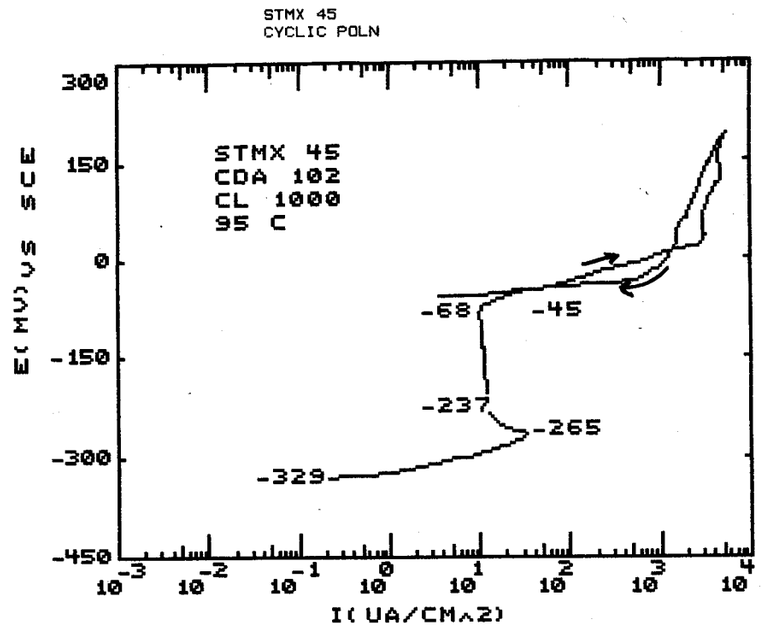
1. Specimen not pre-passivated; all surface polished to 600 grit
2. Specimen held at open circuit for one hour before starting
3. E corr at start −288 mV vs SCE
4. E pt 10 min before start −71 mV
5. Initial Temp. 60.5°C Final Temp. 60.0°C
6. Initial pH 8.39 @ 25°C Final pH 9.35 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge (99.999%)
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had a brownish-purple color. No corrosion appeared to have taken place. Test solution was water clear.

Comparison to Thomas & Tiller indicates the film may be a combination of Cu_2O, malachite & cupric hydroxide.

Stored on disk EB+G #3

Walter J. Machowski
3/25/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 45
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.099
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-329
MV/PT	4
DATA MAX	5318.371
DATA MIN	-499.6341
ABS MIN	2.43962E-03
ABS MAX	5318.371

LEGEND

STATISTICAL MATRIX ON CDA 102
NO3=10;SO4=20;F=2;T=95 C
CL=1000;HCO3=85
DE-AERATE W/ARGON
DONE ON PARC 173/276

27 MAR 1991

Cyclic Polarization of CDA 102
Model Solution: $Cl = 1000$, $HCO_3 = 85$, $NO_3 = 10$, $SO_4 = 20$, $F = 2$ 95°C

STMX 45

Purpose: Same as STMX 43

The specimen, heat #, preparation, procedures, etc were as described in STMX 43. Ref SCE #4 was used and checked as before, difference was less than 10 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6486 g NaCl and 0.1321 g of $NaHCO_3$ (lot #'s on p. 9). Pipet 20.0 ml of SO_4 stock sol'n # 013-269; pipet 10.0 ml of NO_3 stock sol'n #019-63; pipet 2.0 ml of F stock sol'n #013-107. dilute to the mark.

Specimen Dimensions: $\phi = 0.633$ cm $l = 1.903$ cm $A = 4.099\ cm^2$

1. Specimen not pre-passivated, all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −329 mV vs SCE
4. E Pt 10 min before start − 158 mV
5. Initial Temp. 95.4°C Final Temp. 94.0°C
6. Initial pH 8.13 @ 25°C Final pH 9.69 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm²

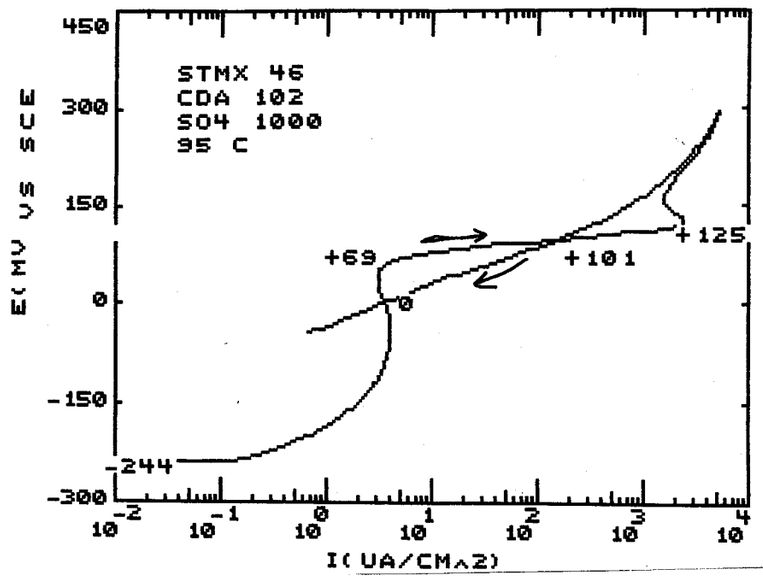
Specimen had a very, loose, scaly reddish-brown coating which flaked off when dried. Specimen was uniformly corroded all over, grains were easily visible. Test solution was a golden-yellow color

The curve corresponds reasonably well to that in Thomas & Tiller. The surface film formed is possible CuCl.

Stored on disk EC&C #4

Walter J. Machowski
3/27/91

STMX 46
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 46
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.108
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-244
MV/PT	4
DATA MAX	5355.404
DATA MIN	-498.5395
ABS MIN	2.434275E-02
ABS MAX	5355.404

LEGEND

STATISTICAL MATRIX ON CDA 102
CL=6;NO3=10;F=2;HCO3=85;T=60 C
SO4=1000
DE-AERATE W/ARGON
DONE ON PARC 173/276

28 MAR 1991

Cyclic Polarization of CDA 102
Model Solution: Cl=6, NO_3=10, F=2, HCO_3=85, SO_4=1000 60°C
STMX 46

Purpose: Same as STMX 43.

The test specimen, heat #, preparation, procedures, etc were as described in STMX 43. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1558 g of $NaHCO_3$ and 1.4787 g of Na_2SO_4 (Lot #'s on p. 9). Pipet 10.0 ml of Cl stock and 2.0 ml of F stock solutions #013-107. Pipet 10.0 ml of NO_3 stock solution #019-63. dilute to the mark.

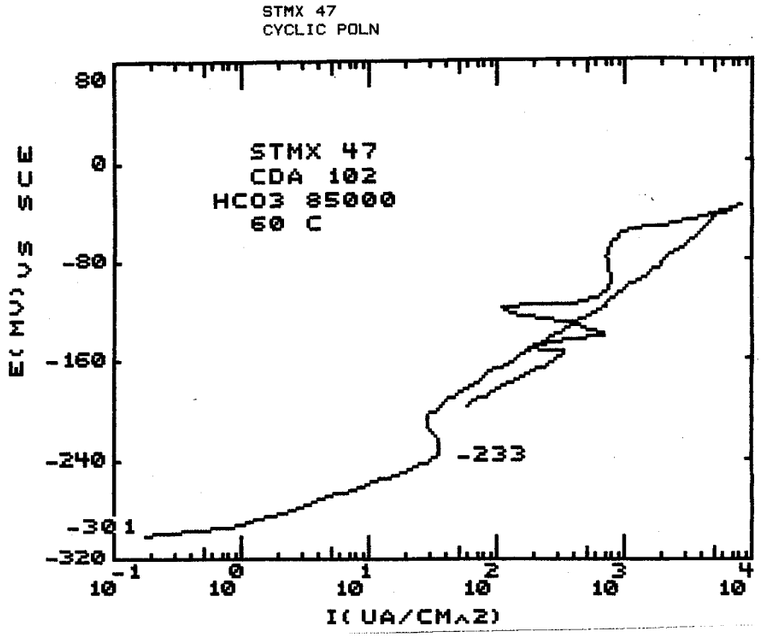
Specimen Dimensions: ϕ = 0.634 cm l = 1.904 cm A = 4.108 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before starting
3. E corr at start -244 ~~-324~~ mV vs SCE
4. E Pt 10 min before start +11 mV
5. Initial Temp. 60.0°C Final Temp. 59.4°C
6. Initial pH 8.24 @ 25°C Final pH 9.39 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen covered w/ flaky reddish-brown deposit. General corrosion with grains visible on specimen. Solution mostly clear w/ some of the reddish-brown material present

Stored on disk EC&C #4.

Walter J. Moehowski
3/28/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 47
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.115
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-301
MV/PT	4
DATA MAX	8311.058
DATA MIN	-687.7278
ABS MIN	.1793439
ABS MAX	8311.058

LEGEND

STATISTICAL MATRIX ON CDA 102
CL=6;SO4=20;NO3=10;F=2
HCO3=85000;T=60 C
DE-AERATE W/ARGON
DONE ON PARC 173/276

SOL'N SATURATED W/NAHCO3--SOME
SALT REMAINED UNDISSOLVED
29 MAR 1991

Cyclic Polarization of CDA-102
Model Solution: Cl = 6, SO_4 = 20, NO_3 = 10, F = 2 60°C
HCO_3 = 85,000

STMX 47

Purpose: Same as STMX 43.

The test specimen, heat #, preparation, procedure, etc. were as in STMX 43. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 122.00 g of $NaHCO_3$ (lot # on p. 9). Pipet 10.0 ml of Cl stock and 2.0 ml of F stock solutions #013-107. Pipet 20.0 ml of SO_4 stock solution #013-369, and 10.0 ml of NO_3 stock solution #019-63. dilute to the mark. Note this was a saturated sol'n w/respect to $NaHCO_3$; some considerable amount of salt remained undissolved.

Specimen Dimensions: ϕ = 0.635 cm l = 1.904 cm A = 4.115 cm^2

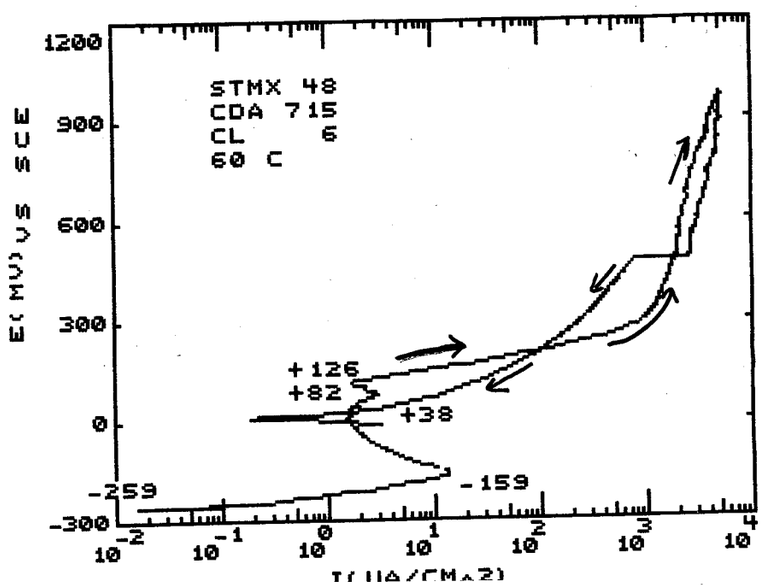
1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start −301 mV vs SCE
4. E Pt 10 min. before start −125 mV
5. Initial Temp. 60.0°C Final Temp. 59.0°C
6. Initial pH 8.12 @ 25°C Final pH 8.59 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had a dark, very adherent coating & appeared not to have corroded. Test solution was water clear & undissolved $NaHCO_3$ had dissolved at end of test period.

Stored on disk EC+G #4.

Walter J. Mochowski
3/29/91

STMX 48
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 48
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.142
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-259
MV/PT	4
DATA MAX	5287.301
DATA MIN	-32.61709
ABS MIN	1.617576E-02
ABS MAX	5287.301

LEGEND

STATISTICAL MATRIX ON CDA 715
CL=6;SO4=20;NO3=10;F=2
HCO3=85;T=60 C
DE-AERATE W/ARGON
DONE ON PARC 273

29 MAR 1991

Cyclic Polarization of CDA-715
Model Solution: Cl = 6, SO_4 = 20, NO_3 = 10, F = 2, HCO_3 = 85 60°C

STMX 48

Purpose: Same as STMX 45, except using CDA 715.

The test specimen was CDA-715, heat # 7037, fabricated at SwRI. Preparation, procedures, test cell were as described on p. 9, except the salt bridge was filled with saturated NaCl solution. Ref SCE #1 was used and checked vs. another, difference was less than 1.0 mV

Test solution Prep: Test solution was prepared as in STMX 43 with same lot # chemicals and solution. Actual salt weight used was 0.1222 g of $NaHCO_3$.

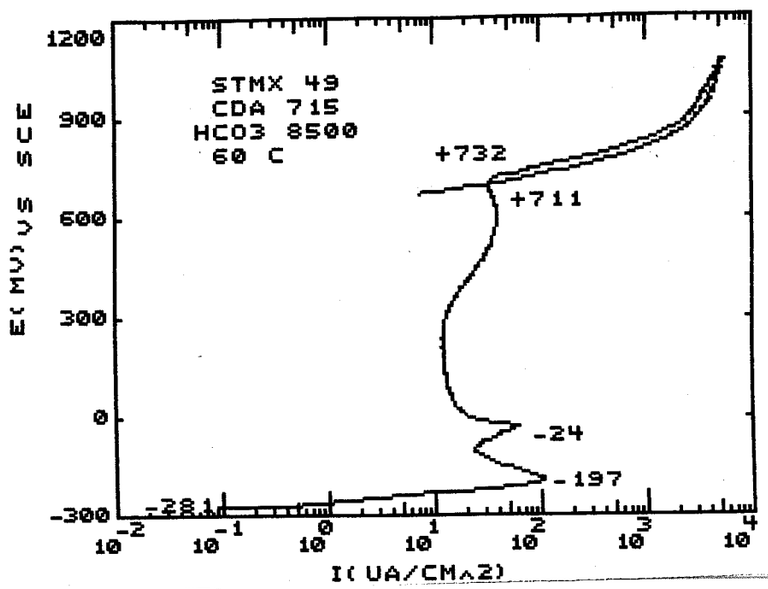
Specimen Dimensions: ϕ = 0.638 cm l = 1.907 cm A = 4.142 cm^2

① Specimen not pre-passivated; all surfaces polished to 600 grit.
② Specimen held at open circuit for one hour before start.
③ E corr at start −259 mV vs SCE
④ E Pt 10 min before start −58 mV
⑤ Initial Temp. 60.5°C Final Temp. 59.5°C
⑥ Initial pH 8.42 @ 25°C Final pH 9.58 @ 25°C
⑦ Scan rate 0.17 mV/sec
⑧ Argon purge
⑨ Done on PARC 273
⑩ Auto reverse @ 5000 μA/cm^2

Specimen was covered with a flaky brown film. Some general attack appeared to have occurred all over the specimen. Test solution was slightly murky with a greenish tinge. Some gelatinous precipitate was evident.

Saved on disk EG&G #4.

STMX 49
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 49
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.104
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-281
MV/PT	4
DATA MAX	5506.822
DATA MIN	-17.37329
ABS MIN	5.847953E-02
ABS MAX	5506.822

LEGEND

STATISTICAL MATRIX ON CDA 715
CL=6;NO3=10;SO4=20;F=2
HCO3=8500;T=60 C
DE-AERATE W/ARGON
DONE ON 273

1 APR 1991

Cyclic Polarization of CDA 715
Model Solution: HCO_3 = 8500, Cl=6, NO_3=10, SO_4=20, F=2 60°C
STMX 49

Purpose: Same as STMX 48.

The test specimen, heat #, procedures, cell, etc were as described in STMX 48. Ref. SCE #1 was used and checked as before, difference was less than 0.5 mV.

Test solution Prep: Solution was prepared as in STMX 44 with same lot #s. Actual salt weight added was 12.221g $NaHCO_3$

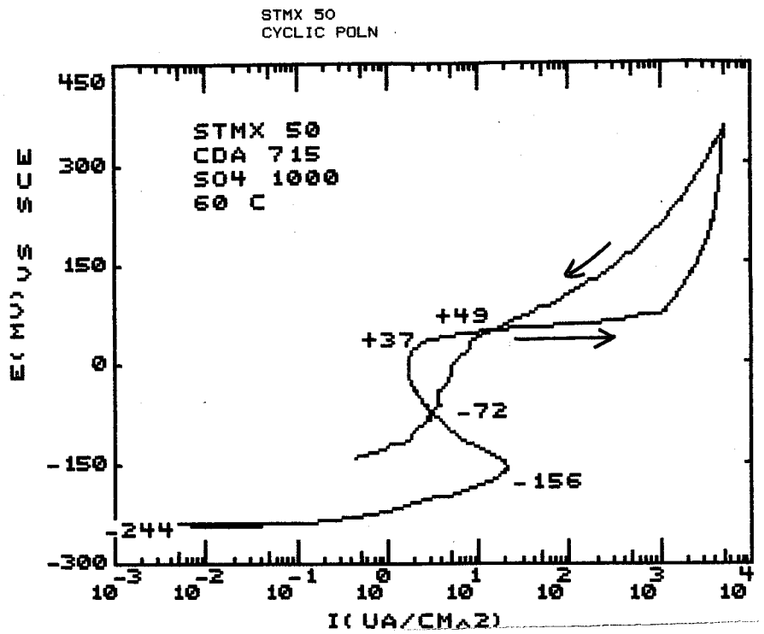
Specimen Dimensions: ϕ = 0.634 cm l = 1.902 cm A = 4.104 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour prior to start
3. E corr at start -281 mV vs SCE
4. E Pt 10 min before start -65 mV
5. Initial Temp. 59.2°C Final Temp. 59.5°C
6. Initial pH 8.47 @ 25°C Final pH 9.20 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 273
10. Auto reverse @ 5000 $\mu A/cm^2$

Specimen had a thin, black, adherent coating. No corrosion was evident. Test solution remained water clear.

Stored on disk EC&A #4.

Walter J. Machowski
4/1/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 50
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.101
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-244
MV/PT	4
DATA MAX	5120.703
DATA MIN	3.901488E-03
ABS MIN	3.901488E-03
ABS MAX	5120.703

LEGEND

STATISTICAL MATRIX ON CDA 715
CL=6;NO3=10;F=2;T=60 C
SO4=1000;HCO3=85
DE-AERATE W/ARGON
DONE ON 273

2 APR 1991

Cyclic Polarization of CDA 715
Model Solution: $Cl^- = 6$, $NO_3^- = 10$, $F^- = 2$, $SO_4^{=} = 1000$, $HCO_3^- = 85$ 60°C
STMX 50

Purpose: Same as STMX 48.

The test specimen was CDA 715 (Lot #7037) fabricated at SwRI. Preparation, procedures, test cell, etc were as described in STMX 48. Ref SCE #1 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: The test solution was prepared as in STMX 46 from the same lot no. chemicals. Actual salt weights used were 0.1219 g $NaHCO_3$ and 1.4789 g Na_2SO_4.

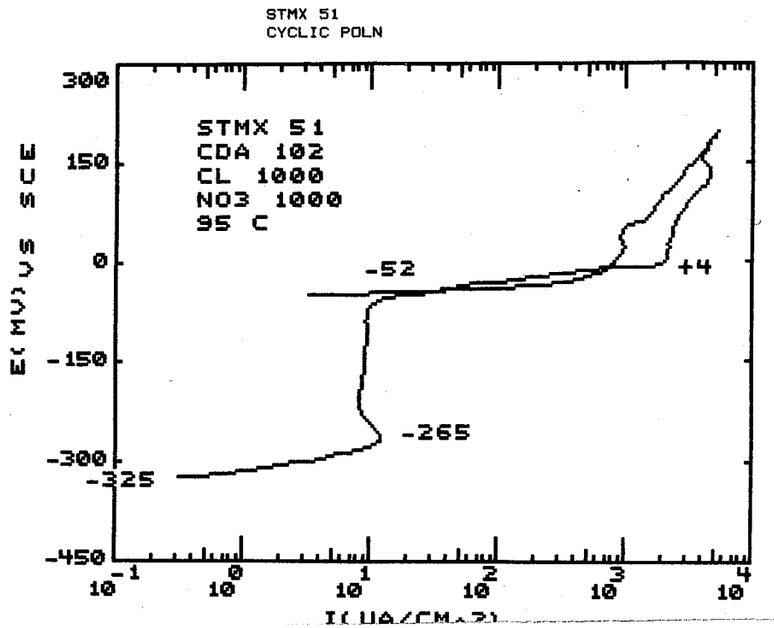
Specimen Dimensions: $\phi = 0.635$ cm $l = 1.897$ cm $A = 4.101\ cm^2$

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour prior to start
3. E corr at start -244 mV vs SCE
4. E Pt 10 min before start -15 mV
5. Initial Temp 59.5°C Final Temp 59.5°C
6. Initial pH 8.18 @ 35°C Final pH 8.99 @ 35°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PORC 273
10. Auto reverse @ 5000 μA/cm²

Specimen covered with a dark deposit which easily flaked off. Specimen was uniformly etched all over, except for one circular spot which remained polished. Solution was fairly clear, with a small amount of greenish gelatinous precipitate.

Stored on EC&C #4

Walter J. Machoaski
4/2/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 51
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.118
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-325
MV/PT	4
DATA MAX	5318.116
DATA MIN	-497.3288
ABS MIN	.1743565
ABS MAX	5318.116

LEGEND

STATISTICAL MATRIX ON CDA 102
SO4=20;F=2;HCO3=85;T=95 C
CL=1000;NO3=1000
DE-AERATE W/ARGON
DONE ON PARC 173/276

2 APR 1991

Cyclic Polarization of CDA 102
Model solution: Cl=1000, NO_3=1000, SO_4=20, F=2, HCO_3=85 95°C
STMX 51
Purpose: Same as STMX 43.

The test specimen was CDA 102 (heat #6681), fabricated at SwRI. Preparation, procedures, cell, etc were as described in STMX 43. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: The test solution was prepared as in STMX 45 except 1.3793 g of $NaNO_3$ was added instead of the 10.0 ml of NO_3 stock solution. The same chemical + solution lot no's were used. Actual salt weights were 0.1320 g of $NaHCO_3$ and 1.653 g of NaCl

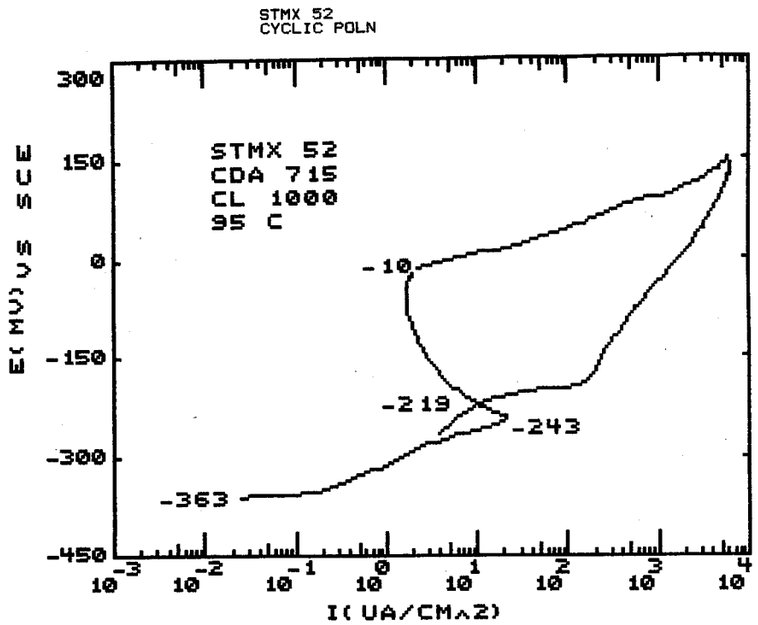
Specimen dimensions: ϕ = 0.634 cm l = 1.909 cm A = 4.118 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before starting
3. E corr at start −325 mV vs SCE
4. E Pt 10 min before start −130 mV
5. Initial Temp. 95.5°C Final Temp. 94.0°C
6. Initial pH 8.06 @ 25°C Final pH 9.83 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had a reddish brown, flaky deposit which came off easily. Grains were visible, as uniform dissolution occurred all over the specimen. Test solution was a golden yellow color.

Saved on disk EC+C #5.

Walter J. Machowski
4/2/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 52
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.113
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-367
MV/PT	4
DATA MAX	6272.794
DATA MIN	0
ABS MIN	0
ABS MAX	6272.794

LEGEND

STATISTICAL MATRIX ON CDA 715
SO4=20;NO3=10;F=2;HCO3=85;T=95 C
CL=1000
DE-AERATE W/ARGON
DONE ON 273

3 APR 1991

Cyclic Polarization of CDA 715
Model Solution: Cl=1000, SO_4=20, NO_3=10, F=2, HCO_3=85 95°C
STMX 52

Purpose: Same as STMX 48.

Test specimen was CDA 715 (heat 70372) fabricated at SwRI. Preparation, procedure, cell, etc were as described in STMX 48. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: Solution was prepared as in STMX 45 with the same lot # chemicals + solution. Actual salt weights were 0.1333 g $NaHCO_3$ and 1.6488 g NaCl.

Specimen Dimension: ϕ = 0.635 cm l = 1.903 cm A = 4.113 cm^2

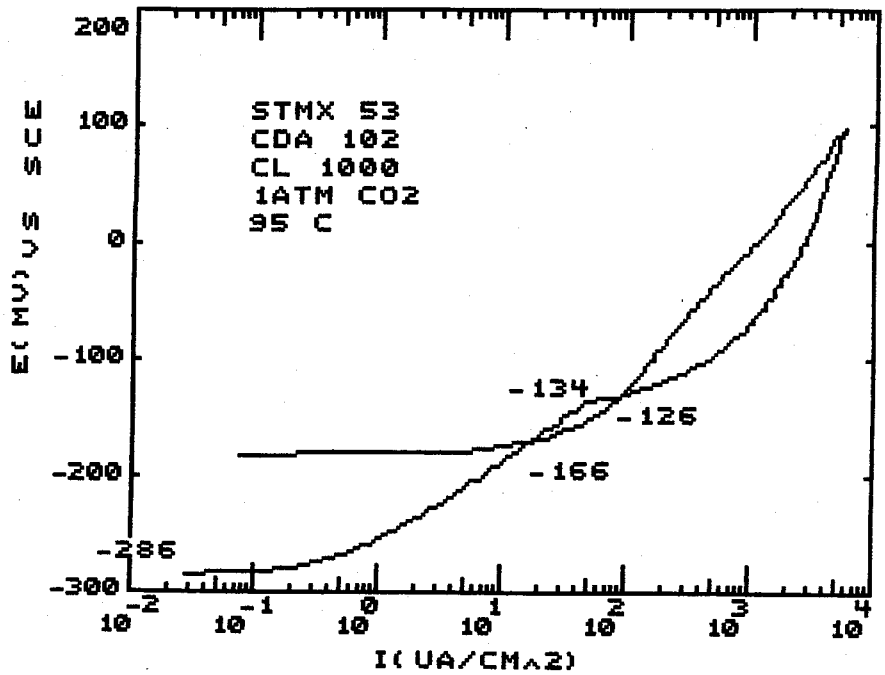
1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −367 mV vs SCE
4. E Pt 10 min before start −85 mV
5. Initial Temp. 95.0°C Final Temp 94.5°C
6. Initial pH 8.12 @ 35°C Final pH 9.83 @ 35°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 273
10. Auto-reverse @ 5000 μA/cm^2

Specimen was covered with a copper colored, loose, flaky, film. Underneath there was general corrosion all over the specimen, except for a few round spots (probably where gas bubbles hung). Solution had a yellowish tinge with some orange-brown gelatinous precipitate.

Stored on disk EG&G #4.

Walter J. Mackowski

STMX 53
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 53
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.106
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

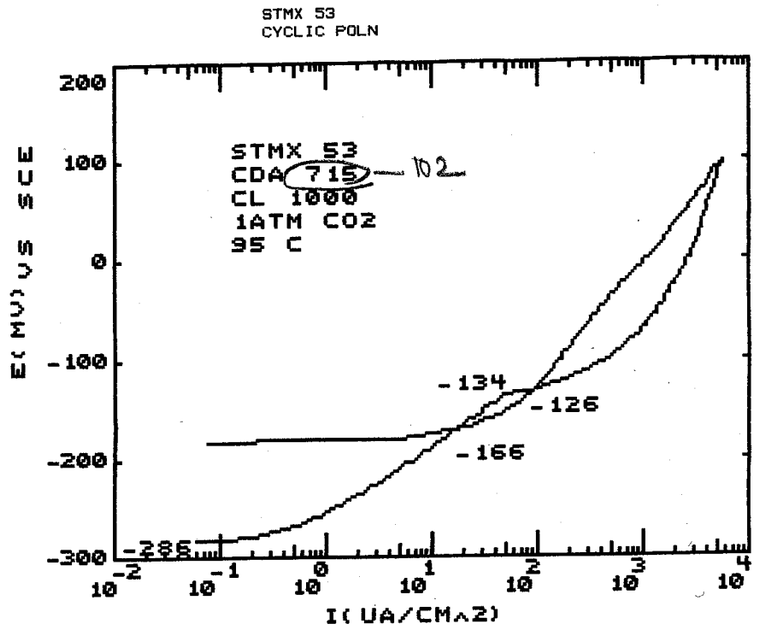
DATA SCALE

ECORR	-286
MV/PT	4
DATA MAX	5577.204
DATA MIN	-49.87823
ABS MIN	2.873843E-02
ABS MAX	5577.204

LEGEND

STATISTICAL MATRIX ON CDA 102
SO4=20;NO3=10;F=2;HCO3=85;T=95 C
CL=1000
PURGE W/1ATM CO2
DONE ON PARC 173/276

4 APR 1991



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 53
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.106
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-286
MV/PT	4
DATA MAX	5577.204
DATA MIN	-49.87823
ABS MIN	2.873843E-02
ABS MAX	5577.204

LEGEND

STATISTICAL MATRIX ON CDA 102
SO4=20;NO3=10;F=2;HCO3=85;T=95 C
CL=1000
DE-AERATE W/ARGON
DONE ON PARC 173/276

4 APR 1991

Cyclic Polarization of CDA 102
Model Solution: Cl = 1000, SO_4 = 20, NO_3 = 10, F = 2, HCO_3 = 85 95°C CO_2
STMX 53
Purpose: Same as STMX 43.

The specimen was CDA 102 (heat #6681). Preparation, procedures, cell, etc were as described in STMX 17 (p.9). Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: The test solution was prepared as in STMX 45 with the same lot # chemicals & solutions. Actual salt weights were 0.1335 g $NaHCO_3$ and 1.6477 g NaCl.

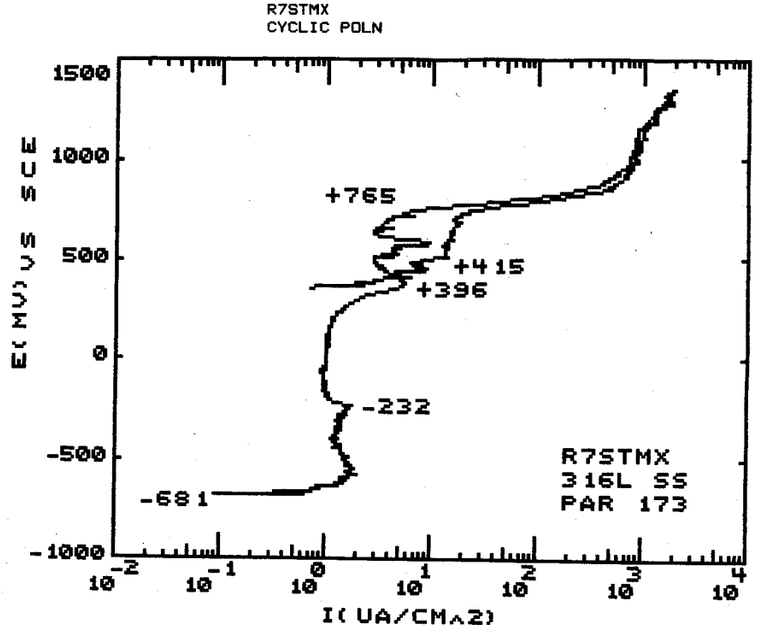
Specimen Dimensions: ϕ = 0.634 cm l = 1.903 cm A = 4.106 cm^2

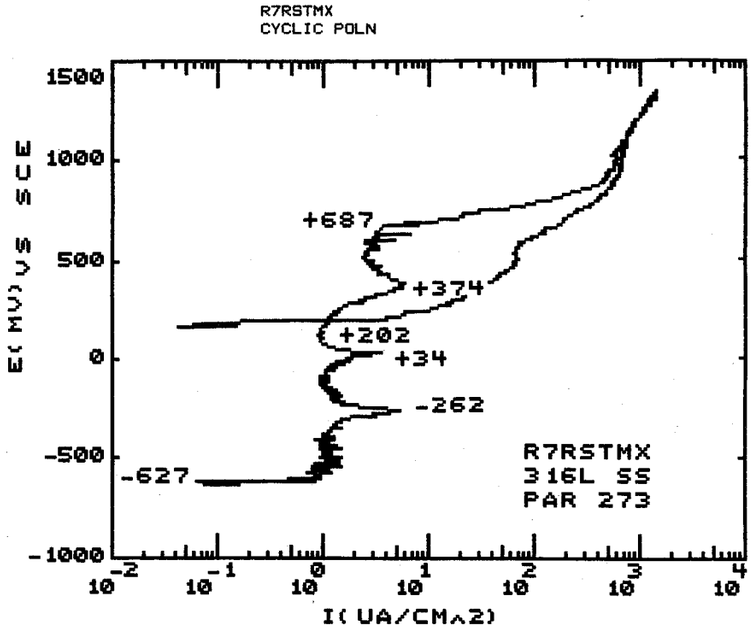
1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start −288 mV vs SCE
4. E Pt 10 min before start +82 mV
5. Initial Temp. 95.0°C Final Temp. 95.0°C
6. Initial pH 5.12 @ 25°C Final pH 5.20 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PARC 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had flaky, reddish brown deposit. Many visible all over sample as corrosion occurred. Solution remained water clear.

Saved on disk EC&C #4

Walter J. Mackowski
4/4/91





Cyclic Polarization of 316L SS
R7STMX (173/276)
R7RSTMX (273)

Purpose: To run a low chloride solution of J-13 simulated water on both potentiostats to evaluate differences in polarization curves which might be influenced by instrumentation

Two specimens of 316L SS (heat # P80746) were prepared as in STMX 17. Procedures, etc, were same as in STMX 17. One specimen was run on PARC 273, the other on PARC 173/276. The only difference in set-up was the 273 used a saturated NaCl bridge, and the 173 used a 0.5N NaCl bridge.

One batch of test solution was prepared and used in both test cells. It was prepared as follows: Add 0.2446g of $NaHCO_3$ (Fisher lot # 886738) to one liter of 17MΩ water in a 2L volumetric flask. Pipet 20.0ml of Cl stock and 4.0ml of F stock solutions #013-107. Pipet 20.0ml of NO_3 stock solution #019-63 and 40.0ml of SO_4 stock solution from # 013-269. Dilute to the mark.

① Neither specimen pre-passivated; all surfaces polished to 600 grit
② Both held at open circuit for one hour before start
③ Argon purge ④ Scan rate 0.17 mV/sec

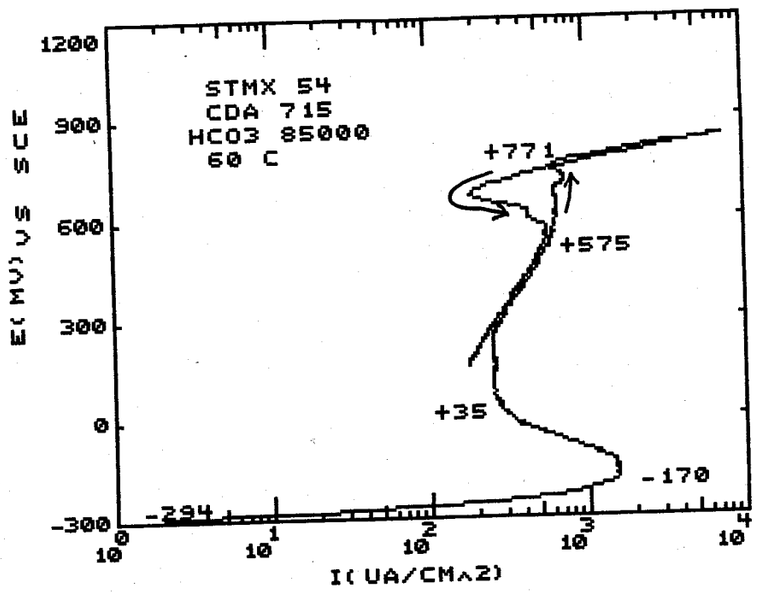
	R7STMX (173/276)	R7RSTMX
① dim.	$\phi = .634$ cm $l = 1.905$ cm $A = 4.110$ cm^2	$\phi = .636$ $l = 1.905$ $A = 4.118$ cm^2
② E_{corr}	−680 mV	−628 mV
③ E_{Pt}	−304 mV	−78 mV
④ Temp	$T_i = 95.0°C$ $T_f = 95.0°C$	$T_i = 95.0$ $T_f = 95.0°C$
⑤ pH 8.25	$I_{pH} = 8.25$ $F_{pH} = 10.1$ disk EC+C #5	$I_{pH} = 8.25$ $F_{pH} = 9.91$ EC+C #4

R7 solution was water clear; R7R solution had a slight yellowish tinge.

Stored on: R7 → EC+C #5
R7R → EC+C #4

Walter J. Machowski
4/5/91

STMX 54
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 54
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	10 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.097
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-294
MV/PT	4
DATA MAX	7322.431
DATA MIN	2.050281
ABS MIN	2.050281
ABS MAX	7322.431

LEGEND

STATISTICAL MATRIX ON CDA 715
CL=6;SO4=20;NO3=10;F=2;T=60 C
CL=85000
DE-AERATE W/ARGON
DONE ON 273
NAHCO3 SOLUTION VIRTUALLY COMPLETE
DUE TO HEATING THE SOL'N WHILE
MIXING
8 APR 1991

Cyclic Polarization of CDA 715
Model Solution: HCO_3=85,000, Cl=6, SO_4=20, NO_3=10, F=2 60°C

STMX 54

Purpose: Same as STMX 48.

Test specimen was CDA 715 (heat 7037). Preparation, procedures, cell, etc. were as described in STMX 48. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water add 122.12 g of $NaHCO_3$ (Fisher lot# 897789). Pipet 10.0 ml of Cl stock and 20 ml of F stock solutions #013-107. Pipet 10.0 ml of NO_3 stock solution #019-63 and 20.0 ml of SO_4 stock solution number 013-269. dilute to the mark. Note: This solution was stirred and heated to about 50°C to effect dissolution of the $NaHCO_3$, before transferring to the test cell.

Spec. dim: ϕ = 0.635 cm l = 1.895 cm A = 4.097 cm^2

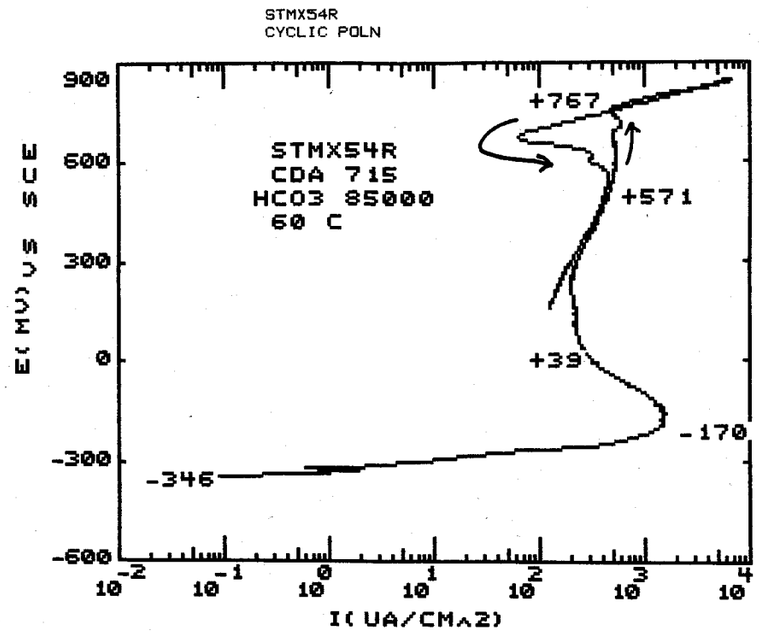
1. Specimen not pre passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start -294 mV vs SCE
4. E PT 10 min before start - not taken
5. Initial Temp 60.0°C Final Temp. 59.2°C
6. Initial pH 8.62 @ 25°C Final pH 9.01 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Note: specimen holder had leaked - will re-run this test

Specimen had darkened slightly + had general corrosion all over. Solution was clear w/a slight blue tinge.

Stored on disk EC+C #4

Walter J. Mecherchin
4/8/91




```
RUN PARAMETERS
      TECHNIQUE                    CYCLIC POLN
      ORIGINAL NAME                STMX54R
      INITIAL E(MV)                0 VS E
      VERTEX E(MV)                 100 VS E
      FINAL E(MV)                  10 VS E
      SCAN RATE(MV/S)              .17
      THRESHOLD I(UA/CM^2)         5000
      CONDITION E(MV)              PASS
      CONDITION T(S)               PASS
      INIT DELAY(MV/S OR S)        3600  S

SAMPLE PARAMETERS
      AREA(CMS^2)                  4.091
      EQ WT(GM)                    PASS
      DENSITY(GM/CM^3)             PASS
      CATHODIC TAFEL(MV)           PASS
      ANODIC TAFEL(MV)             PASS

DATA SCALE
      ECORR                        -346
      MV/PT                        4
      DATA MAX                     6770.96
      DATA MIN                     .0488878
      ABS MIN                      .0488878
      ABS MAX                      6770.96

LEGEND
      STATISTICAL MATRIX ON CDA 715
      CL=6;SO4=20;NO3=10;F=2;T=60 C
      CL=85000
      DE-AERATE W/ARGON
      DONE ON 273:THIS IS A RE-RUN OF 54
      NAHCO3 SOLUTION VIRTUALLY COMPLETE
      DUE TO HEATING THE SOL'N WHILE
      MIXING
      9 APR 1991
```


Cyclic Polarization of CDA 715
Solution same as STMX54

STMX54 R

Purpose: Re-run of STMX54 due to leak in specimen holder.

Test specimen, etc were as described in STMX54. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: Same as in STMX54, using same lot # chemicals and solutions. Actual salt weight: 122.03 g $NaHCO_3$.

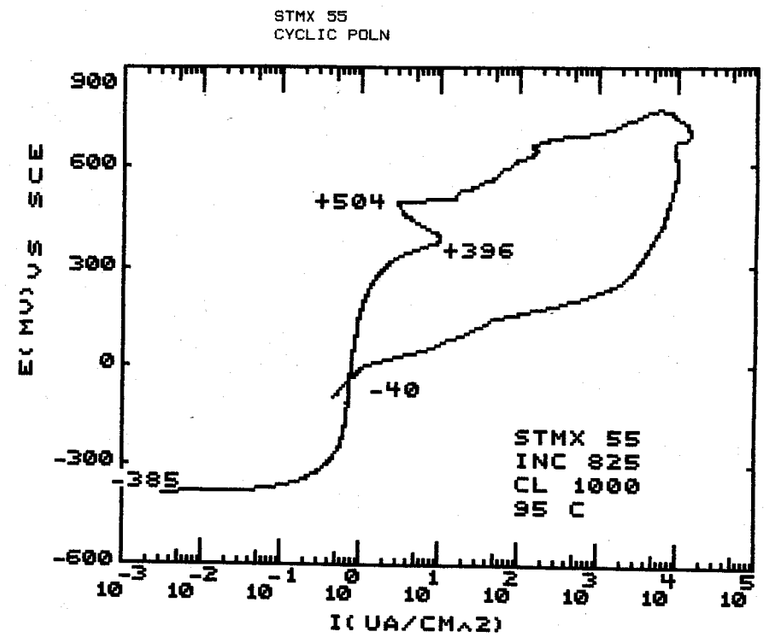
Specimen Dim: $\phi = 0.655$ cm $l = 1.899$ cm $A = 4.091$ cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start −346 mV vs SCE
4. E Pt 10 min before start - not taken
5. Initial Temp. 59.5°C Final Temp. 60.0°C
6. Initial pH 8.27 @ 25°C Final pH 9.06 @ 25°C
7. Scan rate 0.17 mV/sec (600 mV/hr)
8. Argon purge
9. Done on POR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen was slightly darkened with general corrosion all over. Solution was clear.

Stored on disk EC+C #4.

Walter J. Mochowski
4/9/91




```
RUN PARAMETERS
      TECHNIQUE                    CYCLIC POLN
      ORIGINAL NAME                STMX 55
      INITIAL E(MV)                0 VS E
      VERTEX E(MV)                 100 VS E
      FINAL E(MV)                  100 VS E
      SCAN RATE(MV/S)              .17
      THRESHOLD I(UA/CM^2)         5000
      CONDITION E(MV)              PASS
      CONDITION T(S)               PASS
      INIT DELAY(MV/S OR S)        3600  S

SAMPLE PARAMETERS
      AREA(CMS^2)                  4.24
      EQ WT(GM)                    PASS
      DENSITY(GM/CM^3)             PASS
      CATHODIC TAFEL(MV)           PASS
      ANODIC TAFEL(MV)             PASS

DATA SCALE
      ECORR                        -385
      MV/PT                        4
      DATA MAX                     14433.96
      DATA MIN                     -4.830189
      ABS MIN                      3.066038E-03
      ABS MAX                      14433.96

LEGEND
      STATISTICAL MATRIX ON INC 825
      REPEAT OF PREVIOUS CONDITIONS
      NO3=10;SO4=20;F=2;HCO3=85
      CL=1000;T=95 C
      DONE ON PARC 173/276

      10 APR 1991
```


Cyclic Polarization of Inc 825
Model Solution: Cl = 1000, NO_3 = 10, SO_4 = 20, F = 2, HCO_3 = 85 95°C

STMX 55

Purpose: To gathe additional data on this condition for purpose of determining variability of the data.

A cylindrical Inc 825 (heat # HH4371FC) was used. Preparation, procedures, cell, etc were as in STMX 17 (p. 9). Ref SCE #1 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1325 g $NaHCO_3$ (Fisher lot # 897789) and 1.6487 g of NaCl (Fisher lot # 885407). Pipet 2.0 ml of F stock #013-107; 10.0 ml of NO_3 stock #019-63; and 20.0 ml of SO_4 stock #013-269. dilute to the mark.

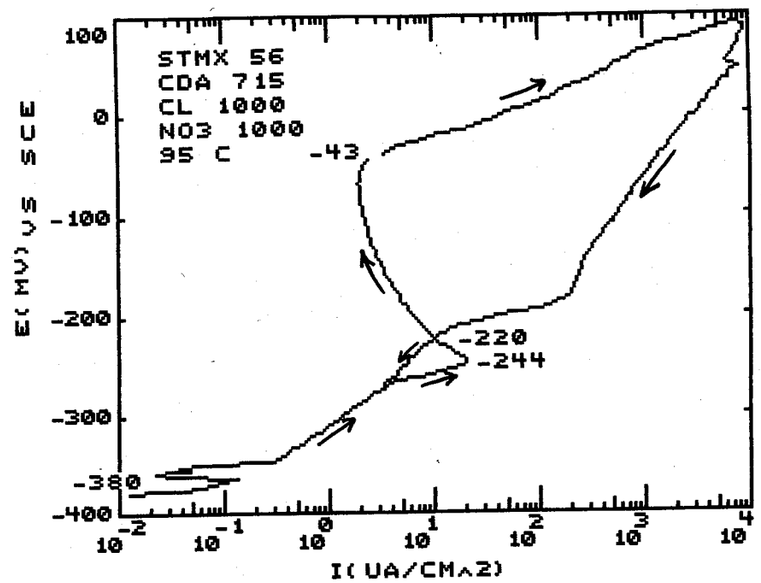
Spec. Dim: ϕ = 0.631 cm l = 1.981 cm A = 4.240 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start.
3. E corr at start −385 mV vs SCE
4. E RP 10 min before start −308 mV.
5. Initial Temp. 95.0°C Final Temp. 94.8°C
6. Initial pH 7.88 @ 25°C Final pH 9.67 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had many pits, especially evident when probed. Also had moderate crevice attack. Solution was grayish with gelatinous precipitate.

Stored on disk EC+C #5

Walter J. Mochowski
4/10/91




```
RUN PARAMETERS
                    CYCLIC POLN
   TECHNIQUE        STMX 56
   ORIGINAL NAME    0 VS E
   INITIAL E(MV)    100 VS E
   VERTEX E(MV)     100 VS E
   FINAL E(MV)      .17
   SCAN RATE(MV/S)  5000
   THRESHOLD I(UA/CM^2)  PASS
   CONDITION E(MV)  PASS
   CONDITION T(S)   3600  S
   INIT DELAY(MV/S OR S)

SAMPLE PARAMETERS
   AREA(CMS^2)      4.086
   EQ WT(GM)        PASS
   DENSITY(GM/CM^3) PASS
   CATHODIC TAFEL(MV)  PASS
   ANODIC TAFEL(MV)    PASS

DATA SCALE
   ECORR            -380
   MV/PT            4
   DATA MAX         8883.994
   DATA MIN         1.223691E-02
   ABS MIN          1.223691E-02
   ABS MAX          8883.994

LEGEND
   STATISTICAL MATRIX ON CDA 715
   SO4=20;F=2;HCO3=85;T=95 C
   CL=1000;NO3=1000
   DE-AERATE W/ARGON
   DONE ON 273

   10 APR 1991
```


Cyclic Polarization of CDA 715
Model Solution: Cl=1000, NO_3=1000, SO_4=20, F=2, HCO_3=85 95°C

STMX 56

Purpose: Same as STMX 48.

Specimen, preparation, procedures, etc were as in STMX 48. Ref SCE #1 was used & checked as before, difference was less than 0.5 mV.

Test Solution: Add 0.1225 g $NaHCO_3$ (lot #897789), 1.6486 g NaCl and 1.3798 g $NaNO_3$ (same lot #'s as p. 9). Pipet ~~10.0 ml of Cl~~ w/m ~~stock and~~ 20 ml of F stock solution #013-107, also 20.0 ml of SO_4 stock #013-269. ~~These~~ w/m Add these to 500 ml of 15 MΩ water in a 1-liter volumetric & dilute to the mark.

Spec Dim: Φ = 0.634 cm l = 1.893 cm A = 4.086 cm²

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −380 mV vs SCE
4. E Pt 10 min. before start −190 mV
5. Initial Temp. 95.0°C Final Temp. 95.0°C
6. Initial pH 8.10 @ 35°C Final pH 9.34 @ 35°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm²

Specimen had reddish-brown, flaky film. General corrosion underneath film. Solution had slight yellowish tinge.

Stored on disk EG&G #4.

Walter J. Mochowski
4/10/91

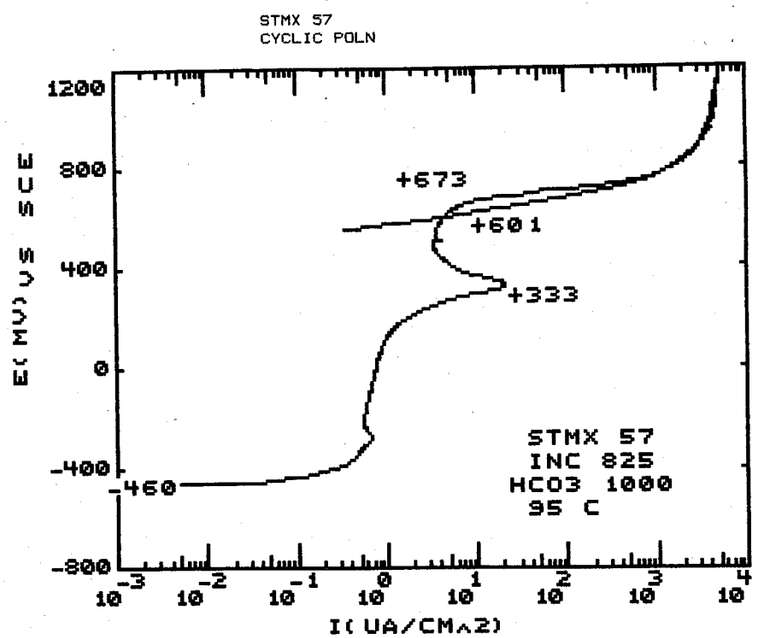
Preparation of SO_4 Stock Solution 1000 ppm

Purpose: Stock solution used in preparation of test solutions.

Weigh out 1.4788 g of Na_2SO_4 (Fisher lot # 901213). Dissolve in 500 ml of 17 MΩ water in a 1-liter volumetric flask + dilute to the mark.

Label as SN CNWRA 019-97

Walter J. Machowski
4/11/91




```
RUN PARAMETERS
      TECHNIQUE                    CYCLIC POLN
      ORIGINAL NAME                STMX 57
      INITIAL E(MV)                0 VS E
      VERTEX E(MV)                 100 VS E
      FINAL E(MV)                  100 VS E
      SCAN RATE(MV/S)              .17
      THRESHOLD I(UA/CM^2)         5000
      CONDITION E(MV)              PASS
      CONDITION T(S)               PASS
      INIT DELAY(MV/S OR S)        3600  S

SAMPLE PARAMETERS
      AREA(CMS^2)                  4.389
      EQ WT(GM)                    PASS
      DENSITY(GM/CM^3)             PASS
      CATHODIC TAFEL(MV)           PASS
      ANODIC TAFEL(MV)             PASS

DATA SCALE
      ECORR                        -460
      MV/PT                        4
      DATA MAX                     5035.315
      DATA MIN                     -46.66211
      ABS MIN                      4.556847E-03
      ABS MAX                      5035.315

LEGEND
      STATISTICAL MATRIX ON INC 825
      REPEAT OF PREVIOUS CONDITIONS
      CL=6;NO3=10;SO4=20;F=2
      HCO3=1000;T=95 C
      DONE ON PARC 173/276

      11 APR 1991
```


Cyclic Polarization on Inc 825
Model Solution: HCO_3 = 1000, Cl = 6, NO_3 = 10, SO_4 = 20, F = 2 95°C

STMX 57

Purpose: Same as STMX 55.

The test specimen, preparation, procedures, test cell, etc. were as described in STMX 55. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Lyt: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.4354 g $NaHCO_3$ (lot # 897789). Pipet 10.0 ml of Cl stock & 20 ml of F stock solution #013-107, also 10.0 ml of NO_3 stock solution #019-63, and 20.0 ml of SO_4 stock solution #019-97, dilute to the mark.

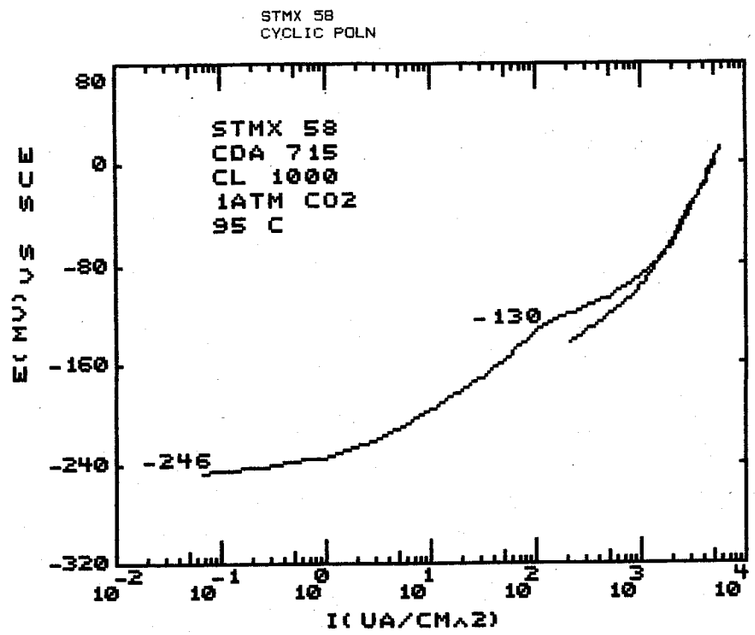
Specimen Dimensions: ϕ = 0.633 cm l = 2.049 cm A = 4.389 cm^2

1. Specimen not pre-passivated; all surface polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. Ecorr at start −460 mV vs SCE
4. E Pt 10 min before start −186 mV
5. Initial Temp. 95.0°C Final Temp. 94.8°C
6. Initial pH — not taken Final pH — not taken
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen had no pits & retained its metallic luster. Solution was water clear

Stored on EG&G #5

Walter J. Machowski
4/11/91




```
                                                                  NN
                                                                  CYCLIC POLN
                                                                  STMX 58
                                                                  0 VS E
                                                                  100 VS E
                                                                  100 VS E
                                                                  .17
                                                                  5000
                                                                  PASS
                                                                  PASS
                                                                  3600  S
RUN PARAMETERS
     TECHNIQUE
     ORIGINAL NAME
     INITIAL E(MV)
     VERTEX E(MV)
     FINAL E(MV)
     SCAN RATE(MV/S)
     THRESHOLD I(UA/CM^2)
     CONDITION E(MV)
     CONDITION T(S)
     INIT DELAY(MV/S OR S)

SAMPLE PARAMETERS                                                 4.111
     AREA(CMS^2)                                                  PASS
     EQ WT(GM)                                                    PASS
     DENSITY(GM/CM^3)                                             PASS
     CATHODIC TAFEL(MV)                                           PASS
     ANODIC TAFEL(MV)

DATA SCALE                                                        -246
     ECORR                                                        4
     MV/PT                                                        5546.096
     DATA MAX                                                     6.810994E-02
     DATA MIN                                                     6.810994E-02
     ABS MIN                                                      5546.096
     ABS MAX

LEGEND
     STATISTICAL MATRIX ON CDA 715
     SO4=20;NO3=10;F=2;HCO3=85
     CL=1000;T=95 C
     PURGE W/1ATM CO2
     DONE ON 273

                                                                  11 APR 1991
```


Cyclic Polarization on CDA 715
Model solution: Cl = 1000, NO_3 = 10, SO_4 = 20, F = 2, HCO_3 = 85 95°C CO_2
STMX 58

Purpose: Same as STMX 48

The specimen, preparation, procedure, etc were as in STMX 48. Ref SCE #1 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: Solution was prepared as in STMX 52. with the ~~same lot # chemicals + solutions~~ WJM same lot # Chemicals + solutions, except $NaHCO_3$ (new lot # 897589) and SO_4 stock sol'n (new # 019-97) Actual weights were 0.1326 g $NaHCO_3$ and 1.6481 g NaCl.

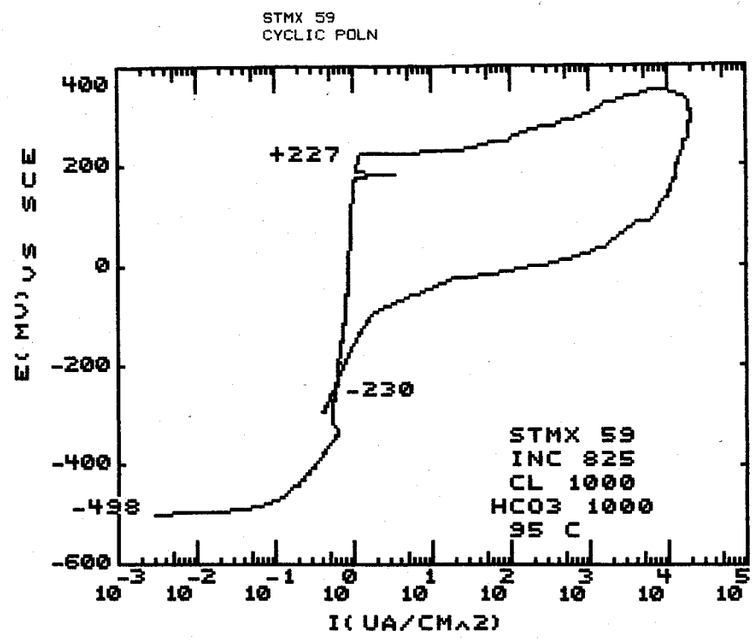
Spec. Dim: ϕ = 0.635 cm l = 1.902 cm A = 4.111 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start.
3. E corr at start −246 mV vs SCE
4. E Pt 10 min. before start +181 mV
5. Initial Temp. 95.0°C Final Temp. 95.0°C
6. Scan rate 0.17 mV/sec
7. Initial pH 5.12 @ 25°C Final pH 5.08 @ 25°C
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen had a reddish-brown flaky film. General corrosion evident beneath the film. Solution was water clear.

Stored on disk EG&G #4

Walter J. Moiborski
4/11/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 59
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.356
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-498
MV/PT	4
DATA MAX	20684.11
DATA MIN	-470.1561
ABS MIN	2.984389E-03
ABS MAX	20684.11

LEGEND

STATISTICAL MATRIX ON INC 825
NO3=10;SO4=20;F=2;T=95 C
CL=1000;HCO3=1000
DE-AERATE W/ARGON
DONE ON PAR 173/276

12 APR 1991

Cyclic Polarization of Inc 825
Model Solution: Cl⁻=1000, HCO_3^-=1000, NO_3^-=10, $SO_4^=$=20, F⁻=2 95°C
STMX 59
Purpose: Same as STMX 55.

The test specimen, preparation, procedures, test cell, etc were as described in STMX 55. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.4359 g $NaHCO_3$ (Fisher lot # 897789) and 1.6487 g NaCl (Fisher lot # 885407). Pipet 20 ml of F stock solution #013-107, 10.0 ml of NO_3^- stock solution #019-63, and 20.0 ml of $SO_4^=$ stock solution #019-97. Dilute to the mark.

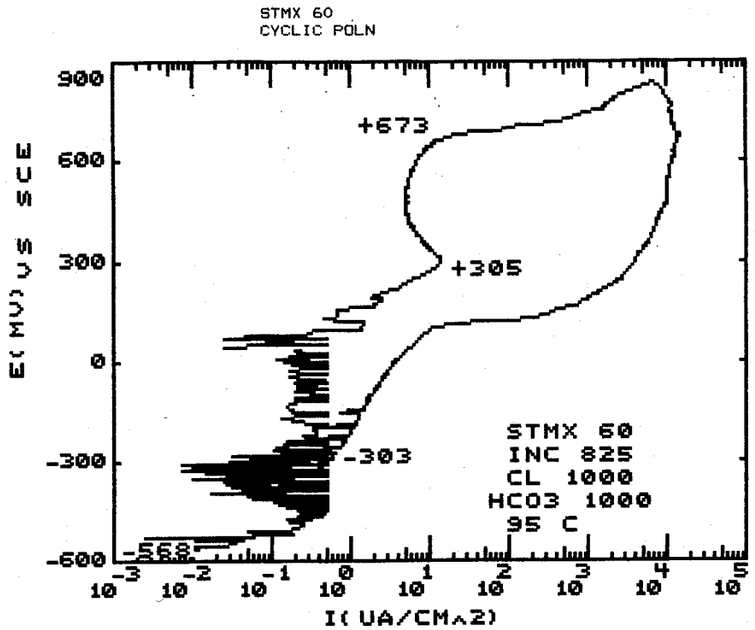
Specimen Dimensions: ϕ=0.652 cm l=2.036 cm A=4.356 cm²

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −498 mV vs SCE
4. E Pt 10 min before start −241 mV
5. Initial Temp. 95.0°C — Final Temp. 94.0°C
6. Initial pH — not taken — Final pH — not taken
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 173/276
10. Auto-reverse @ 5000 μA/cm²

Specimen dissolved + had many pits, especially evident when probed. Small amount of crevice attack. Solution murky w/ grayish-green gelatinous precipitate.

Stored on disk EC+C #5

Walter J. Mochowski
4/15/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 60
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.132
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-568
MV/PT	4
DATA MAX	14569.22
DATA MIN	-.3775412
ABS MIN	0
ABS MAX	14569.22

LEGEND

STATISTICAL MATRIX ON INC 825
NO3=10;SO4=20;F=2;T=95 C
CL=1000;HCO3=1000
DE-AERATE W/ARGON
DONE ON PAR 273
RE-RUN OF CONDITION STMX 59

18 APR 1991

Cyclic Polarization of Inc 825
Model Solution: Cl=1000, HCO_3=1000, NO_3=10, F=2, SO_4=20 95°C

STMX 60

Purpose: Same as STMX 55.

The test specimen, heat #, preparation, procedures, etc were as described in STMX 55. Ref SE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6484 g NaCl and 1.4358 g $NaHCO_3$ (Fisher lot #'s 885407 and 897789). Pipet 20.0 ml of SO_4 stock, 2.0 ml of F stock, and 10.0 ml of NO_3 stock solutions, same lot #'s as p. 103. Dilute to the mark.

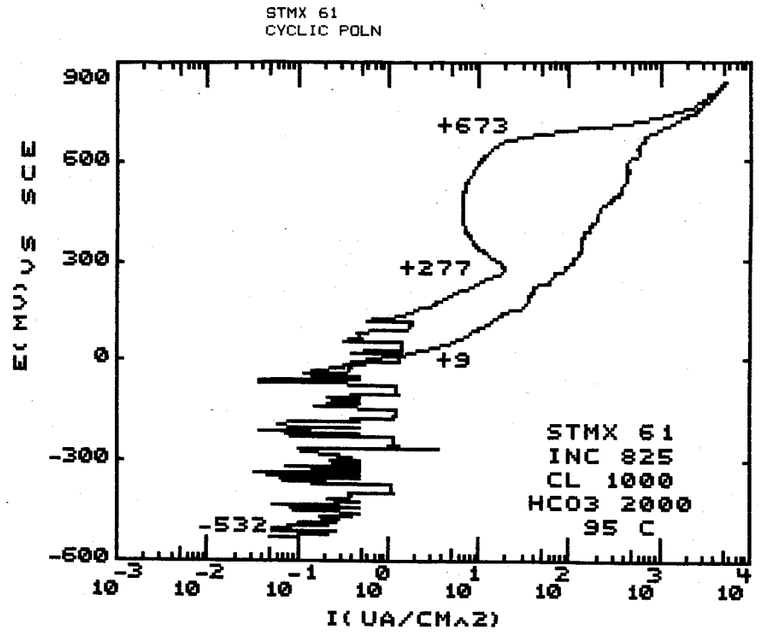
Specimen Dimensions: ϕ = 0.638 cm l = 1.902 cm A = 4.132 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start −568 mV vs SCE
4. E Pt 10 min. before start −177 mV
5. Initial Temp. 95.0°C Final Temp. 94.5°C
6. Initial pH 8.55 @ 25°C Final pH 9.91 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273.
10. Auto reverse @ 5000 μA/cm^2

Specimen had brownish deposits and many pits. Moderate amount of crevice corrosion had occurred. Solution had a slight yellow tinge + some gelatinous precipitate.

Stored on disk EC&C #5.

Walter J. Machowski
4/18/91




```
RUN PARAMETERS
                    CYCLIC POLN
   TECHNIQUE        STMX 61
   ORIGINAL NAME    0 VS E
   INITIAL E(MV)    100 VS E
   VERTEX E(MV)     100 VS E
   FINAL E(MV)      .17
   SCAN RATE(MV/S)  5000
   THRESHOLD I(UA/CM^2)  PASS
   CONDITION E(MV)  PASS
   CONDITION T(S)   PASS
   INIT DELAY(MV/S OR S)  3600  S

SAMPLE PARAMETERS
   AREA(CMS^2)      4.121
   EQ WT(GM)        PASS
   DENSITY(GM/CM^3) PASS
   CATHODIC TAFEL(MV)  PASS
   ANODIC TAFEL(MV)  PASS

DATA SCALE
   ECORR            -540
   MV/PT            4
   DATA MAX         5338.51
   DATA MIN         -.4149478
   ABS MIN          0
   ABS MAX          5338.51

LEGEND
   STATISTICAL MATRIX ON INC 825
   NO3=10;SO4=20;F=2;T=95 C
   CL=1000;HCO3=2000
   DE-AERATE W/ARGON
   DONE ON PAR 273

22 APR 1991
```


Cyclic Polarization of Inc 825
Model Solution: Cl=1000, HCO_3=2000, NO_3=10, F=2, SO_4=20 95°C
STMX 61
Purpose: Same as STMX 55.

The test specimen, heat #, preparation, procedures, etc were as described in STMX 55. Ref SCE #24 was used and checked as before, difference was less than 0.5 mV.

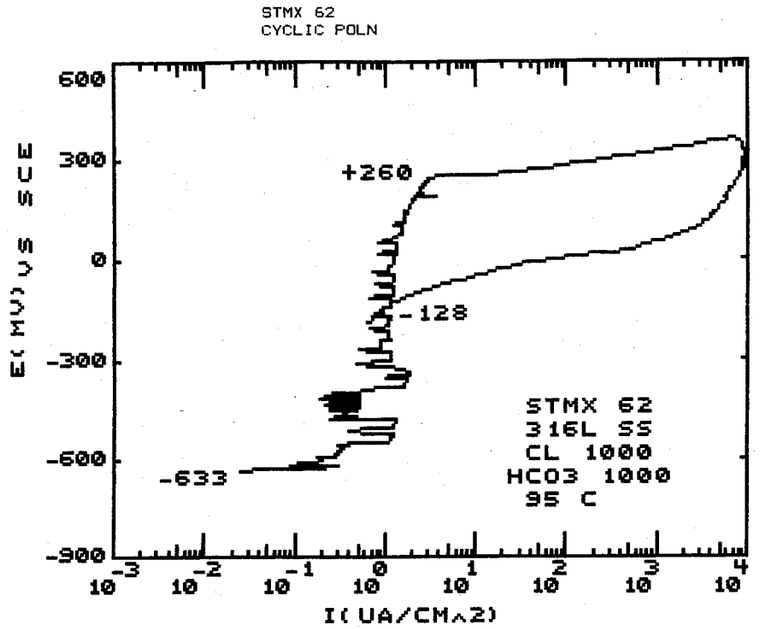
Test Solution Prep: Test solution was made as in STMX 60 using the same lot # chemicals and solutions, except 2.8708 g of $NaHCO_3$ were added. Actual NaCl weight was 1.6481 g.

Specimen Dim: ϕ=0.6377 cm l=1.900 cm A=4.121 cm^2
(1) Specimen not pre-passivated; all surfaces polished to 600 grit.
(2) Specimen held at open circuit for one hour before start.
(3) E corr at start −540 mV vs SCE
(4) E Pt 10 min before start −212 mV.
(5) Initial Temp. 95.2°C Final Temp. 95.0°C
(6) Initial pH 8.55 @25°C Final pH 9.91 @25°C
(7) Scan rate 0.17 mV/sec
(8) Argon purge
(9) Done on PAR 273
(10) Auto reverse @ 5000 μA/cm^2

Specimen had only a few pits + brownish deposits. These were at the bottom flat surface + around the upper edge near the TFE mounting gasket. This is where bubbles tend to cling. Small amount of crevice corrosion occurred. Solution remained water clear.

Stored on disk EC+C #5.

Walter J. Mochowski
4/22/91




```
RUN PARAMETERS

        TECHNIQUE                    CYCLIC POLN
        ORIGINAL NAME                STMX 62
        INITIAL E(MV)                0 VS E
        VERTEX E(MV)                 100 VS E
        FINAL E(MV)                  100 VS E
        SCAN RATE(MV/S)              .17
        THRESHOLD I(UA/CM^2)         5000
        CONDITION E(MV)              PASS
        CONDITION T(S)               PASS
        INIT DELAY(MV/S OR S)        3600  S

SAMPLE PARAMETERS

        AREA(CMS^2)                  4.049
        EQ WT(GM)                    PASS
        DENSITY(GM/CM^3)             PASS
        CATHODIC TAFEL(MV)           PASS
        ANODIC TAFEL(MV)             PASS

DATA SCALE

        ECORR                        -637
        MV/PT                        4
        DATA MAX                     9656.706
        DATA MIN                     0
        ABS MIN                      0
        ABS MAX                      9656.706

LEGEND

        STATISTICAL MATRIX ON 316L SS
        NO3=10;SO4=20;F=2;T=95 C
        CL=1000;HCO3=1000
        DE-AERATE W/ARGON
        DONE ON PAR 273

        23 APR 1991
```


Cyclic Polarization of 316L SS
Model Solution: Cl = 1000, HCO_3 = 1000, SO_4 = 20, F = 2, NO_3 = 10 95°C

STMX 62

Purpose: Same as STMX 17 (p.9)

The test specimen, heat #, preparation, procedure, etc were as described in STMX 17. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: Test solution was as in STMX 60 using same lot # chemicals and solutions. Actual salt weights were 1.6488 g NaCl and 1.4358 g $NaHCO_3$

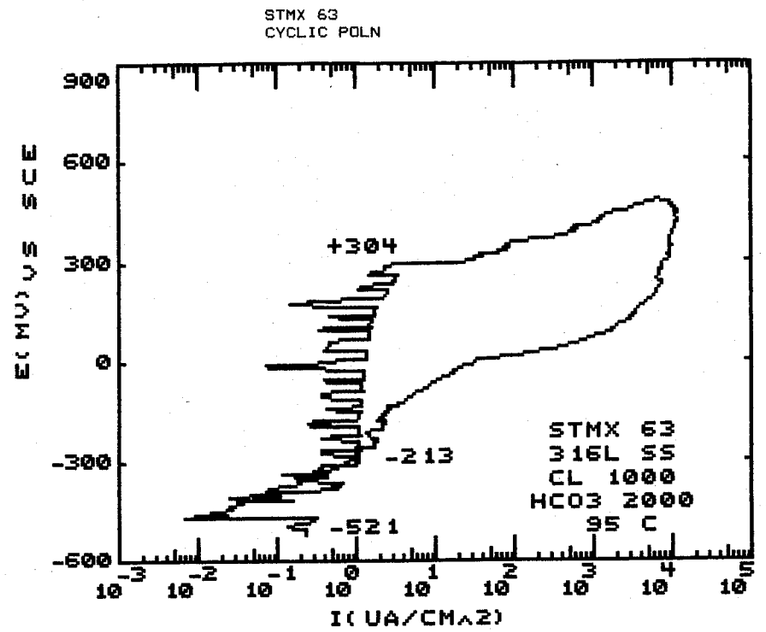
Spec. Dim: ϕ = 0.639 cm l = 1.893 cm A = 4.049 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start −638 mV vs SCE
4. E Pt 10 min before start −170 mV
5. Initial Temp. 95.5°C Final Temp. 94.8°C
6. Initial pH 8.44 @ 25°C Final pH 9.85 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen was discolored with many pits. Moderate amount of crevice corrosion. Solution was tinged yellow w/ gelatinous precipitate.

Stored on disk 20+C #5.

Walter J. Mackowski
4/23/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 63
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.311
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-521
MV/PT	4
DATA MAX	11575.04
DATA MIN	-.5219207
ABS MIN	6.958942E-03
ABS MAX	11575.04

LEGEND

STAISTICAL MATRIX ON 316L SS
NO3=10;SO4=20;F=2;T=95 C
CL=1000;HCO3=2000
DE-AERATE W/ARGON
DONE ON PAR 273

25 APR 1991

Cyclic Polarization of 316L SS
Model Solution: Cl = 1000, HCO_3 = 2000, NO_3 = 10, F = 2, SO_4 = 20 95°C

STMX 63

Purpose: Same as STMX 17.

The test specimen, heat #, preparation, procedure, etc were as described in STMX 17. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: Solution was made as in STMX 61 from the same lot # chemicals and solutions. Actual salt weights were 1.6483 g NaCl and 2.8704 g $NaHCO_3$.

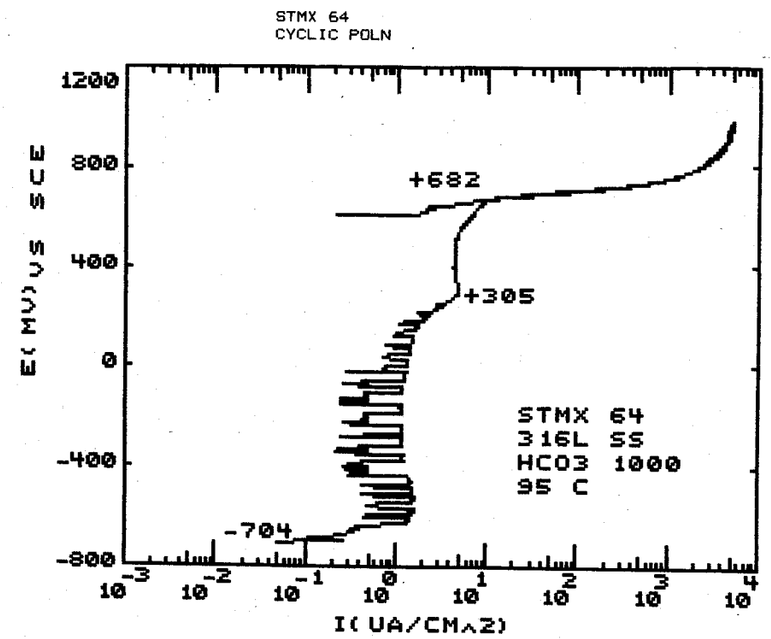
Specimen Dimensions: ϕ = 0.635 cm l = 2.002 cm A = 4.311 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start −521 mV vs SCE
4. E PZ 10 min before start −207 mV
5. Initial Temp. 95.0°C Final Temp 95.0°C
6. Initial pH 8.53 @ 35°C Final pH 9.71 @ 35°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen was discolored with many pits. A moderate amount of crevice corrosion occurred. Solution was tinged yellow w/ gelatinous precipitate.

Stored on disk EC40 #5.

Walter J. Machowski
4/25/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 64
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.109
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-704
MV/PT	4
DATA MAX	5135.069
DATA MIN	-4.867364E-02
ABS MIN	0
ABS MAX	5135.069

LEGEND

STAISTICAL MATRIX ON 316L SS
NO3=10;SO4=20;F=2;T=95 C
CL=6;HCO3=1000
DE-AERATE W/ARGON
DONE ON PAR 273

26 APR 1991

Cyclic Polarization of 316L SS
Model Solution: ~~Cl=6, HCO3=85, NO3=10, F=2, SO4=20~~ 95°C
~~Cl=1000 w/m~~ Cl=6, HCO3 = 1000 w/m
STMX 64

Purpose: Same as STMX 17.

The test specimen, heat #, preparation, etc were as described in STMX 17. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric flask add 1.4358 g of $NaHCO_3$ (lot # on p. 105). Pipet 10.0 ml of Cl stock, 2.0 ml of F stock, 10.0 ml of NO_3 stock, and 20.0 ml of SO_4 stock solutions (#'s 013-107, 013-107, 019-63, 019-97 resp.). Dilute to the mark.

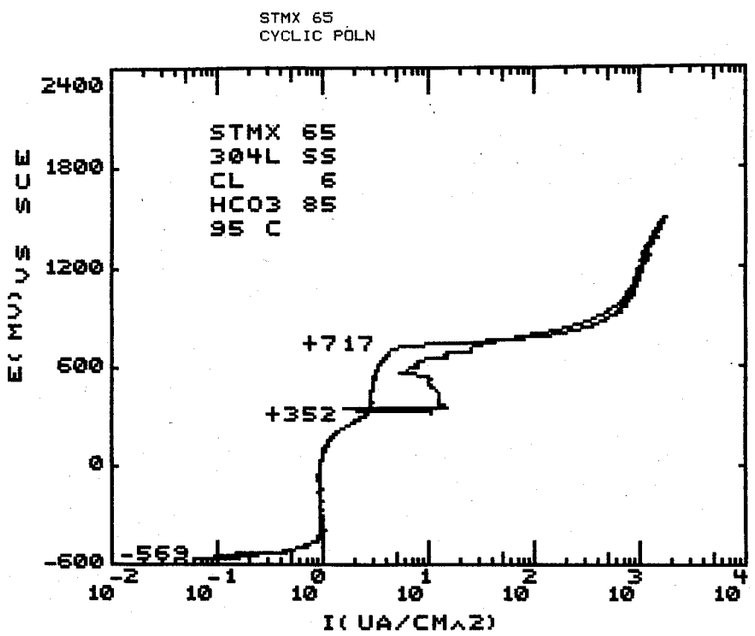
Specimen Dim: ϕ = 0.635 cm l = 1.901 cm A = 4.109 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −704 mV vs SCE
4. E Pt 10 min before start −175 mV
5. Initial Temp. 95.0°C Final Temp. 95.0°C
6. Initial pH 8.59 @ 25°C Final pH 10.02 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen had no pits + retained its metallic luster. Solution remained water clear.

Stored on disk 20-6-#5.

Walter J. Mrochowski
4/26/91

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RUN PARAMETERS

      TECHNIQUE                    CYCLIC POLN
      ORIGINAL NAME                STMX 65
      INITIAL E(MV)                0 VS E
      VERTEX E(MV)                 100 VS E
      FINAL E(MV)                  100 VS E
      SCAN RATE(MV/S)              .17
      THRESHOLD I(UA/CM^2)         5000
      CONDITION E(MV)              PASS
      CONDITION T(S)               PASS
      INIT DELAY(MV/S OR S)        3600  S

SAMPLE PARAMETERS

      AREA(CMS^2)                  4.111
      EQ WT(GM)                    PASS
      DENSITY(GM/CM^3)             PASS
      CATHODIC TAFEL(MV)           PASS
      ANODIC TAFEL(MV)             PASS

DATA SCALE

      ECORR                        -569
      MV/PT                        4
      DATA MAX                     1785.454
      DATA MIN                     -7.540745E-02
      ABS MIN                      3.648747E-02
      ABS MAX                      1785.454

LEGEND

      STATISTICAL MATRIX ON 304L SS
      NO3=10;SO4=20;F=2;T=95 C
      CL=6;HCO3=85
      DE-AERATE W/ARGON
      DONE ON PAR 273

      29 APR 1991
```


Cyclic Polarization of 304L SS
Model Solution: Cl=6, HCO_3=85, NO_3=10, F=2, SO_4=20 95°C
STMX 65

Purpose: To obtain data of effects of various ion concentrations on 304L SS.

The specimen was cylindrical, fabricated at SwRI, from 304L SS heat # T6954. Preparation, procedures, cell, was as in STMX 17. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: To 500 ml of 17MΩ water in a 1-liter volumetric add 0.1224 g $NaHCO_3$ (lot # Fisher 897789). Pipet 60 ml of Cl stock, 20 ml of F stock, 10.0 ml of NO_3 stock, and 20.0 ml of SO_4 stock solutions, same lot #'s as on p. 113. Dilute to the mark.

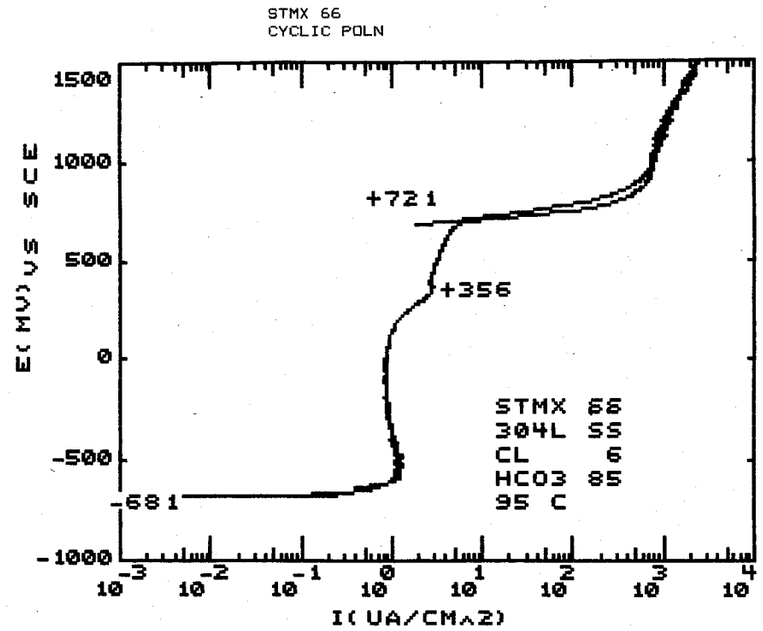
Spec. Dim: ϕ = 0.635 cm l = 1.902 cm A = 4.111 cm²

0. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −569 mV vs SCE
4. E Pt 10 min. before start −266 mV
5. Initial Temp. 95.0°C Final Temp 95.0°C
6. Initial pH 8.35 @ 25°C Final pH 10.04 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Manual reverse @ 7300 μA / +1519 mV

Specimen had its metallic luster + was pit free except one spot where bubbles tend to cling at top of specimen. One small spot of crevice corrosion. Solution remained water clear.

Stored on disk EB+G#5

Walter J. Machowski
4/29/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	STMX 66
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.114
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-681
MV/PT	4
DATA MAX	2372.387
DATA MIN	4.861449E-03
ABS MIN	4.861449E-03
ABS MAX	2372.387

LEGEND

STATISTICAL MATRIX ON 304L SS
NO3=10;SO4=20;F=2;T=95 C
CL=6;HCO3=85
DE-AERATE W/ARGON
DONE ON PAR 273
1ST REPITITION

30 APR 1991

Cyclic Polarization of 304L SS
Model Solution: Same as p.115
STMX 66

Purpose: Same as STMX 65 (1st replication run)

The test specimen, heat #, preparation, procedures, etc were as described in STMX 65. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: Solution was prepared as in STMX 65 using the same lot # chemicals and solutions. Actual salt weight was 0.1223 g $NaHCO_3$.

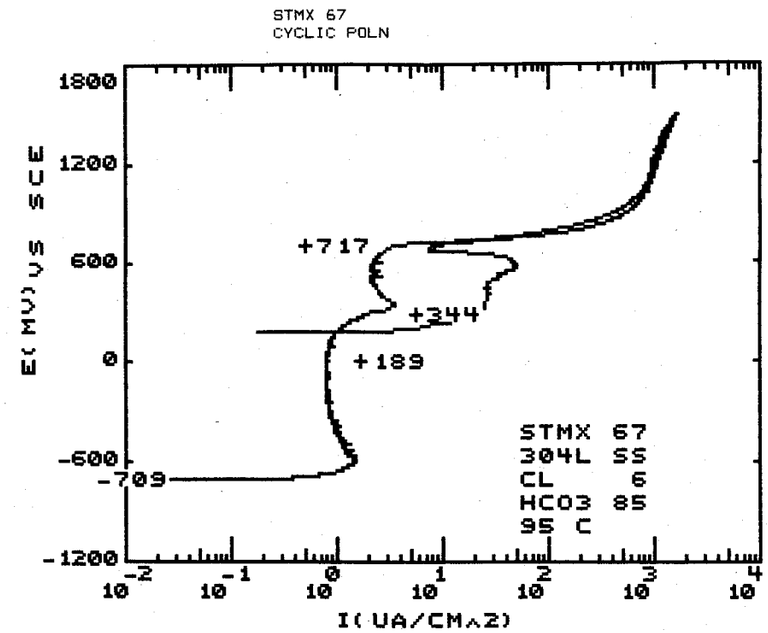
Specimen Dimensions: $\phi = 0.634$ cm $l = 1.907$ cm $A = 4.114$ cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start -681 mV vs SCE
4. E Pt 10 min. before start -272 mV
5. Initial Temp. 95.4°C — Final Temp. 95.0°C
6. Initial pH 8.50 @ 25°C — Final pH 10.00 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Manual reverse @ 9600 μA / +1487 mV

Specimen was free of pits + discoloration. It retained its metallic luster. Solution remained water clear.

Stored on disk EB+P #5

Walter J. Machowski
5/1/91




```
RUN PARAMETERS
    TECHNIQUE                    CYCLIC POLN
    ORIGINAL NAME                STMX 67
    INITIAL E(MV)                0 VS E
    VERTEX E(MV)                 100 VS E
    FINAL E(MV)                  100 VS E
    SCAN RATE(MV/S)              .17
    THRESHOLD I(UA/CM^2)         5000
    CONDITION E(MV)              PASS
    CONDITION T(S)               PASS
    INIT DELAY(MV/S OR S)        3600  S

SAMPLE PARAMETERS
    AREA(CMS^2)                  4.124
    EQ WT(GM)                    PASS
    DENSITY(GM/CM^3)             PASS
    CATHODIC TAFEL(MV)           PASS
    ANODIC TAFEL(MV)             PASS

DATA SCALE
    ECORR                        -709
    MV/PT                        4
    DATA MAX                     1692.531
    DATA MIN                     2.667313E-02
    ABS MIN                      2.667313E-02
    ABS MAX                      1692.531

LEGEND
    STATISTICAL MATRIX ON 304L SS
    NO3=10;SO4=20;F=2;T=95 C
    CL=6;HCO3=85
    DE-AERATE W/ARGON
    DONE ON PAR 273
    2ND REPITITION

    1 MAY 1991
```


Cyclic Polarization of 304L SS
Model Solution: same as STMX 65

STMX 67

Purpose: same as STMX 65 (2nd replication run)

The test specimen, heat #, preparation, procedures, etc were as described in STMX 65. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: Solution was prepared as in STMX 65 with same lot # chemicals and solutions. Actual salt weights were 0.1233 g $NaHCO_3$.

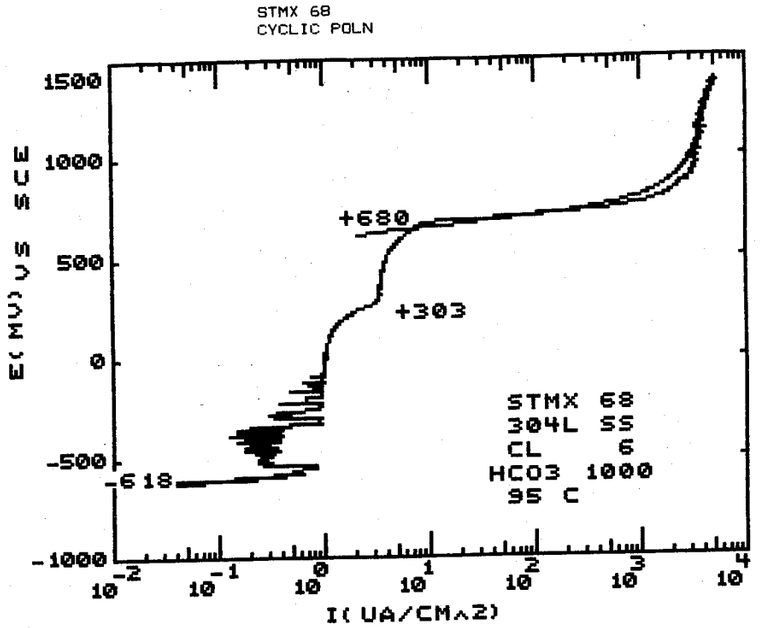
Specimen Dimensions: $\phi = 0.636$ cm $l = 1.905$ cm $A = 4.124\ cm^2$

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start -709 mV vs SCE
4. E Pt 10 min before start -185 mV
5. Initial Temp. 95.3°C — Final Temp. 95.0°C
6. Initial pH 8.37 @ 25°C — Final pH 10.04 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Manual reverse @ 6830 μA / +1507 mV

Specimen had one pit + two spots of discoloration at end near TFE mount. One spot of crevice corrosion. Solution remained water clear.

Stored on disk EC-VC #5.

Walter J. Mackowski
5/1/91




```
RUN PARAMETERS
      TECHNIQUE                    CYCLIC POLN
      ORIGINAL NAME                STMX 68
      INITIAL E(MV)                0 VS E
      VERTEX E(MV)                 100 VS E
      FINAL E(MV)                  100 VS E
      SCAN RATE(MV/S)              .17
      THRESHOLD I(UA/CM^2)         5000
      CONDITION E(MV)              PASS
      CONDITION T(S)               PASS
      INIT DELAY(MV/S OR S)        3600  S

SAMPLE PARAMETERS
      AREA(CMS^2)                  4.122
      EQ WT(GM)                    PASS
      DENSITY(GM/CM^3)             PASS
      CATHODIC TAFEL(MV)           PASS
      ANODIC TAFEL(MV)             PASS

DATA SCALE
      ECORR                        -618
      MV/PT                        4
      DATA MAX                     5215.915
      DATA MIN                     -.0727802
      ABS MIN                      2.426007E-02
      ABS MAX                      5215.915

LEGEND
      STATISTICAL MATRIX ON 304L SS
      NO3=10;SO4=20;F=2;T=95 C
      CL=6;HCO3=1000
      DE-AERATE W/ARGON
      DONE ON PAR 273

                                   2 MAY 1991
```


Cyclic Polarization of 304L SS
Model Solution: HCO_3=1000, Cl=6, NO_3=10, F=2, SO_4=20 95°C

STMX 68

Purpose: Same as STMX 65.

The test specimen, heat #, preparation, etc were as described in STMX 65. Ref SCE #4 was used and checked as before, difference was less than 0.5 mV.

Test Solution Prep: Solution was prepared as in STMX 65 with same lot # chemicals and solutions, except that ~~1.455~~ 1.43545 g of $NaHCO_3$ were added. w/ Mochulski

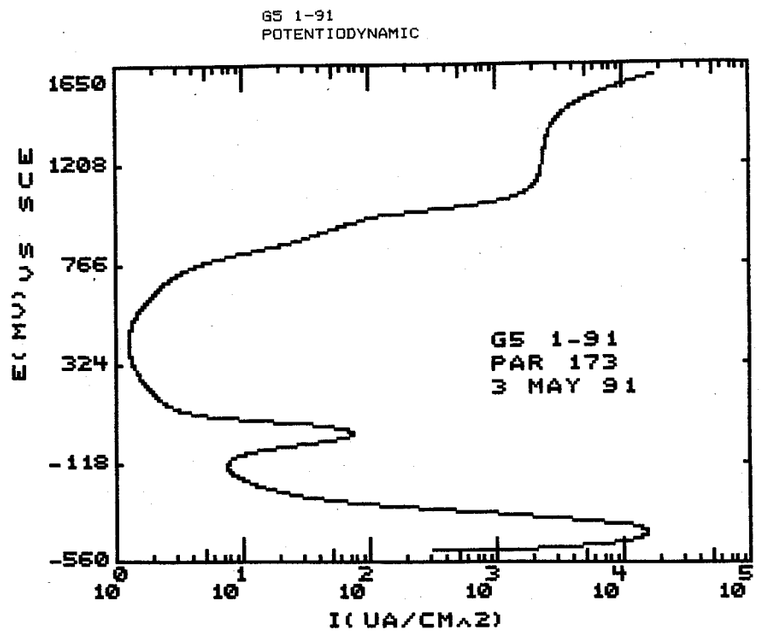
Spec. Dim: ϕ = 0.636 cm l = 1.904 cm A = 4.122 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start.
3. E corr at start −618 mV vs SCE
4. E Pt 10 min. before start −190 mV
5. Initial Temp. 95.4°C Final Temp. 95.2°C
6. Initial pH 8.54 @ 25°C Final pH 9.93 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen had no pits + retained its metallic luster. Solution remained water clear

Stored on disk LT+P #5

Walter J. Mochulski
5/2/91



RUN PARAMETERS

TECHNIQUE	POTENTIODYNAMIC
ORIGINAL NAME	G5 1-91
INITIAL E(MV)	0 VS E
FINAL E(MV)	1600 VS R
SCAN RATE(MV/S)	.17
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	~~PASS~~ ~~300 S~~ 0

SAMPLE PARAMETERS

AREA(CMS^2)	3.398
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-510
MV/PT	2
DATA MAX	17510.3
DATA MIN	-602.7075
ABS MIN	1.247793
ABS MAX	17510.3

LEGEND

G5 STD RUN ON PAR 173/276
INSTRUMENT BACK FROM CAL LAB
1N H2SO4 AT 30 C
ARGON PURGE

3 MAY 1991

0 Storm interrupted night after start — restarted manually

G5 1-91

Purpose: PAR 173 calibrated by cal lab — test to check function of instrument

Test was run in accordance with G5 procedure using ASTM supplied 430SS specimen.

Initial Temp 31.0°C Final Temp. 30.0°C

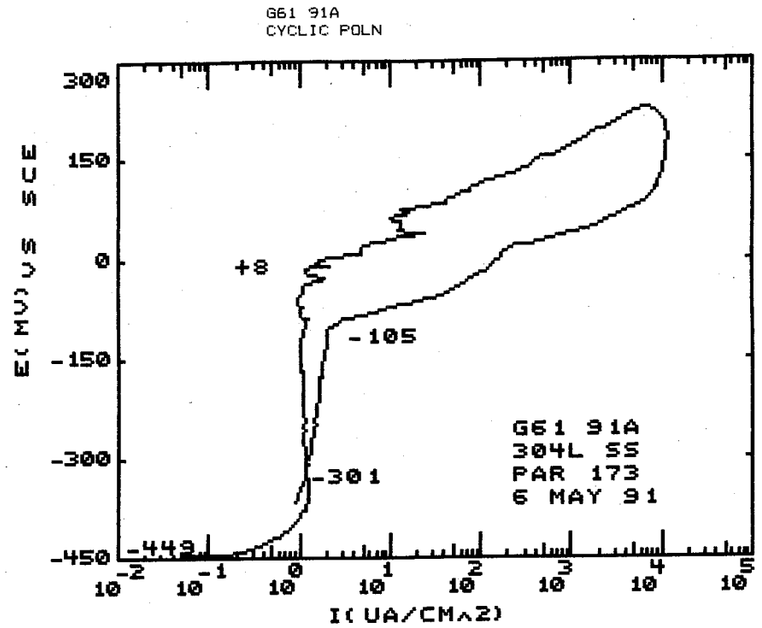
E Pt @ ~~55~~ 50 minutes immersion −203 mV vs SCE

E corr @ 55 minutes immersion −518 mV " "

Spec. dim ϕ = 0.931 cm l = 0.929 cm A = 3.398 cm²

Stored on disk EB+B #5

Walter J. Machowski
5/3/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	G61 91A
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS R
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.122
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-449
MV/PT	4
DATA MAX	11620.57
DATA MIN	.0346919
ABS MIN	.0346919
ABS MAX	11620.57

LEGEND

G61 TEST ON 304L SS
RUN ON PAR 173/276
INSTRUMENT BACK FROM CAL LAB
ARGON PURGE

6 MAY 1991

G61 91A
Purpose: same as G5 on page 123

Test was run in accordance with G61 procedures. A cylindrical 304L SS (heat# T0954) specimen was used.

Temperature was at 25°C for the whole test

E Pt @ 50 min. immersion +452 mV vs. SCE

E corr at start -449 mV

Spec Dim ϕ = 0.636 cm l = 1.904 cm A = 4.122 cm²

Stored on disk EG&G #5

Walter J. Machowski
5/6/91

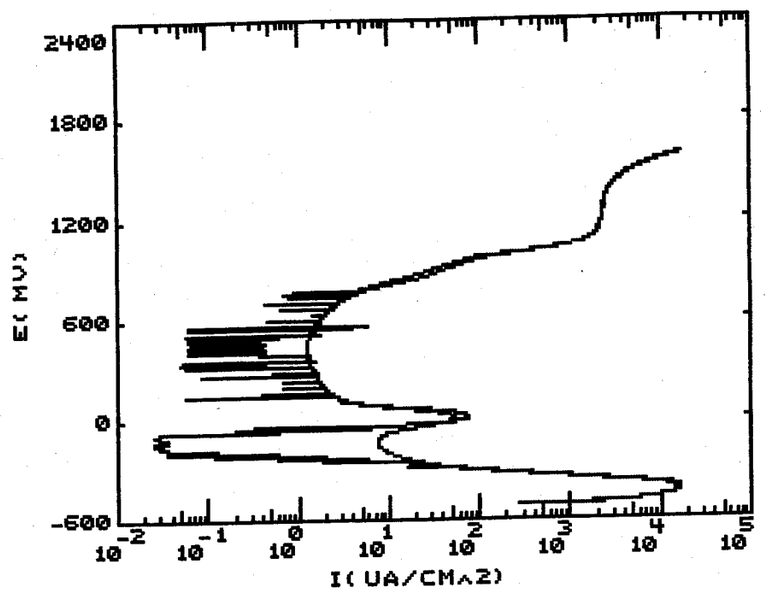
Preparation of 600 ppm Cl Stock Solution
Purpose: For use in preparation of test solutions.

Weigh out 0.9875 g of NaCl (Fisher lot # 885407). Dissolve in 500 ml of 17 MΩ water in a 1-liter volumetric flask & dilute to the mark.

Label as SN CNWRA 019-127.

Walter J. Moskowski
5/23/91

G5 2-91
POTENTIODYNAMIC



RUN PARAMETERS

TECHNIQUE	POTENTIODYNAMIC
ORIGINAL NAME	G5 2-91
INITIAL E(MV)	0 VS E
FINAL E(MV)	1600 VS R
SCAN RATE(MV/S)	.17
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	3.354
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-513
MV/PT	2
DATA MAX	16785.93
DATA MIN	-5.948122
ABS MIN	2.534287E-02
ABS MAX	16785.93

LEGEND

G5 STD RUN ON PAR 273
RUN AT END OF STMX SERIES
1N H2SO4 AT 30 C
ARGON PURGE

20 MAY 1991

G5 2-91

Purpose: G5 test is run after a series of tests. This one is for the end of the STMX series

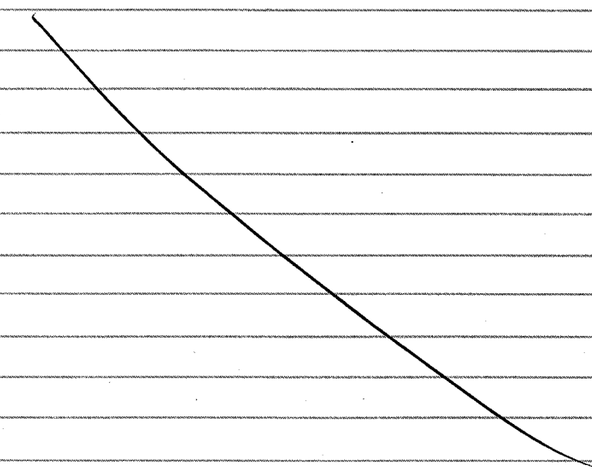
Test was run in accordance with G5 procedure using ASTM supplied 430SS specimen.

Initial Temp. 30.5°C Final Temp. 30.0°C

E Pt 50 min. after immersion ~~-514 mV~~ -301 mV ASTM
Ecor 55 " " " -514 mV

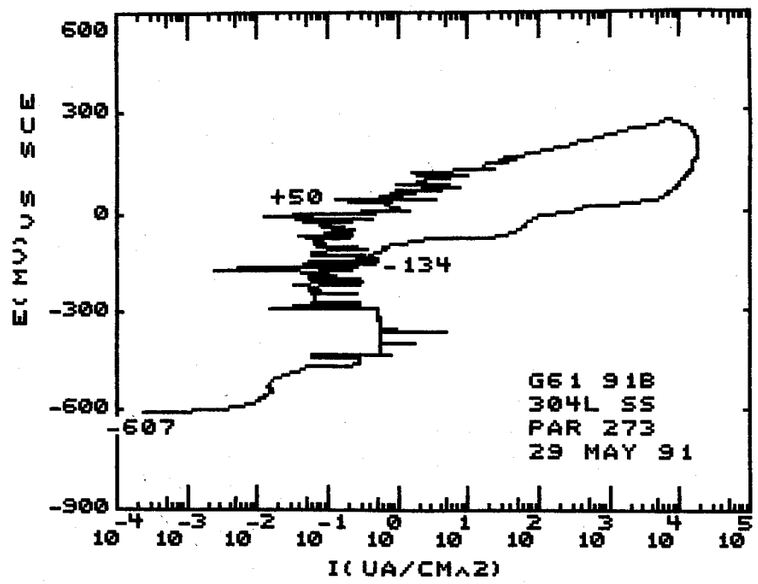
Spec. dim. $\phi = 0.923$ cm $l = 0.926$ cm $A = 3.354$ cm^2

Stored on disk ECOF #5.



Walter J. Machowski
5/24/91

G61 91B
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	G61 91B
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS R
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.122
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-607
MV/PT	4
DATA MAX	18219.31
DATA MIN	-.359049
ABS MIN	2.426007E-04
ABS MAX	18219.31

LEGEND

G61 TEST ON 304L SS
RUN ON PAR 273
END OF STMX SERIES
ARGON PURGE

29 MAY 1991

G61 91-B
~~Purpose~~: Same as G5 on page 129.

The test was run in accordance with G61 procedures. A cylindrical 304L SS (heat # T0954) specimen was used.

Temperature was 25°C for the entire test.

E Pt @ 50 min immersion +350 mV

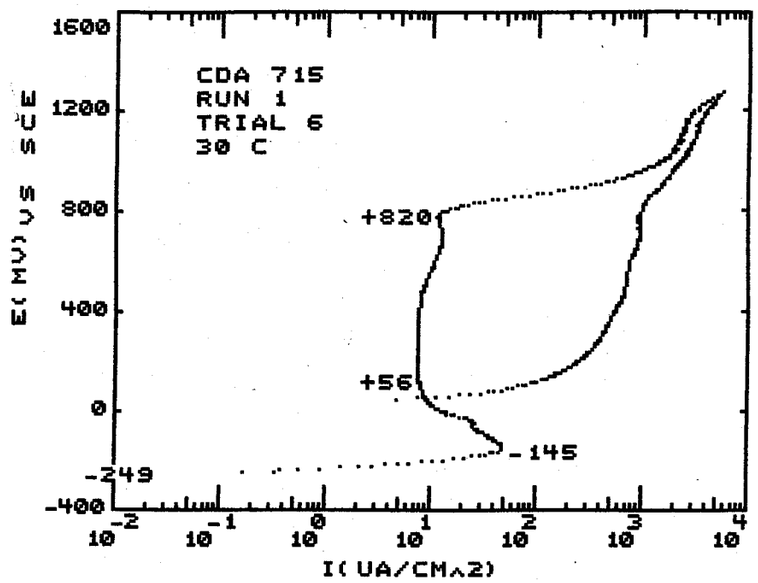
E corr at start -607 mV

Spec. Dim $\phi = 0.914$ cm $l = 1.2500$ cm $A = 4.245$ cm^2

Stored on disk EC&C #5.

Walter J. Machowski
5/24/91

CDA 1
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 1
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.106
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-249
MV/PT	4
DATA MAX	5504.14
DATA MIN	.0243546
ABS MIN	.0243546
ABS MAX	5504.14

LEGEND

CDA 715;RUN 1;TRIAL 6
DE-AERATE W/ARGON
HCO3=8500;SO4=1000;T=30
CL=6;NO3=10;F=2

DONE ON PAR 273
25 JUNE 1991

Cyclic Polarization of CDA 715
Model Solution: Cl=6, NO_3=10, F=2, HCO_3=8500; SO_4=1000 T=30
CDA 1 (Run #1 Trial #6)

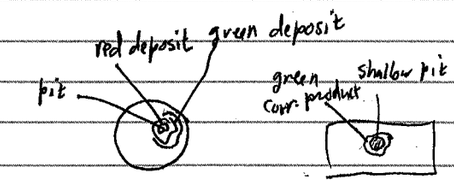
Purpose: To collect data for evaluation of effects of various selected ionic species on the corrosion of CDA-102 and CDA-715 using a factorial experiment.

The test specimen was cylindrical CDA-715 (heat # 7037). Preparation, procedures, cell, etc were as in STMX 17 (p.9). Reference SCE #4 was used, and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 12.198 g of $NaHCO_3$ and 1.4792 g Na_2SO_4 (Fisher lot #'s 897789 and 901213). Pipett 10.0 ml of NO_3 stock, 2.0 ml of F stock, and 10.0 ml of Cl stock solutions, ~~#~~ 019-63, 013-107, and 019-127 resp. dilute to the mark.

Spec Dim ϕ = 0.636 cm l = 1.896 cm A = 4.106 cm^2

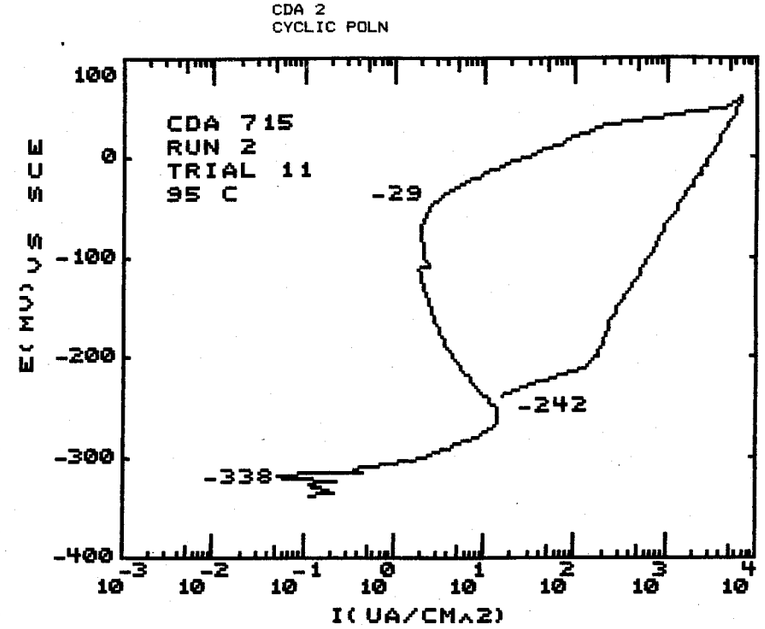
1. Spec not pre-passivated; all surfaces polished to 600 grit.
2. Spec held at open circuit for one hour before start.
3. E corr at start -249 mV vs SCE
4. E Pt 10 min before start - 130 mV
5. Initial Temp. 31.0°C Final Temp. 31.0°C
6. Initial pH 8.34 Final Temp. 9.25
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2



Stored on disk EC&C #5.

Specimen had dark coating w/areas of light bluish green corrosion product. Solution remained clear. Some shallow pits where corrosion product was observed. On the ends, deep pits surrounded by spongy red deposit which is surrounded by green deposit (Basic $CuCO_3$?) was observed.

Walter J. Machowski
6/25/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 2
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.123
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-342
MV/PT	4
DATA MAX	6621.392
DATA MIN	-.2328402
ABS MIN	0
ABS MAX	6621.392

LEGEND

CDA RUN 2; TRIAL 11
DE-AERATE W/ARGON
HCO3=85;SO4=20;NO3=10;F=2
CL=1000;T=95

DONE ON PAR 273
27 JUNE 1991

Cyclic Polarization of CDA 715
Model Solution: Cl = 1000, SO_4 = 20, NO_3 = 10, F = 2, HCO_3 = 85 95°C
Run #2 Trial #11 as prodenni
CDA 2
(Purpose: Same as CDA 1.

The test specimen was as described in CDA 1. Preparation, procedures, etc were as described in ~~SMX~~ 17(p.9). Ref SCE #4 was used, and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1223 g of $NaHCO_3$ (Fisher lot # 897789) and 1.6488 g of NaCl (Fisher lot # 885407). Pipet 20.0 ml of SO_4 stock, 2.0 ml of F stock, and 10.0 ml of NO_3 stock solutions (resp. #'s #019-97, 013-107, 019-63). Dilute to the mark.

Spec. Dim ϕ = 0.635 cm l = 1.908 cm A = 4.123 cm^2

1. Spec not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start −338 mV vs SCE
4. E Pt 10 min before start −110 mV
5. Initial Temp. 95.0°C Final Temp. 95.0°C
6. Initial pH 8.15 Final pH 9.78
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen covered w/a reddish brown film. Solution had slight yellow tinge. General corrosion seemed to have occurred.

Standard Disc EB+G #5

Walter J. Machowski
6/27/91

Preparation of SO_4 Stock Solution

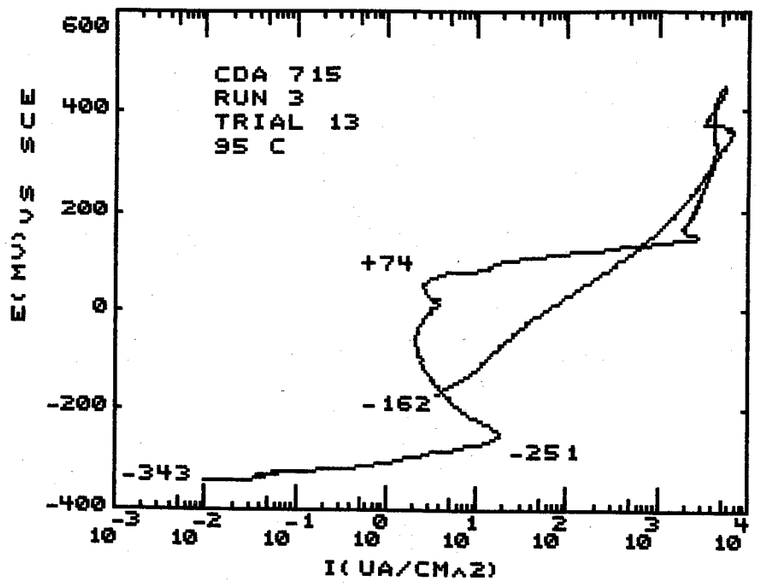
Purpose: Stock solution used in preparation of test solutions

Weigh out 1.4788 g of Na_2SO_4 (Fisher #901213). Dissolve in 500 ml. of DMW water in a 1-liter volumetric flask & dilute to the mark.

Label as SN CWORM 019-13)

Walter J. Machowski
7/1/91

CDA 3
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 3
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.117
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-343
MV/PT	4
DATA MAX	6703.911
DATA MIN	9.958708E-03
ABS MIN	9.958708E-03
ABS MAX	6703.911

LEGEND

CDA 715;RUN 3; TRIAL 13
DE-AERATE W/ARGON
CL=6;F=2;NO3=10;HCO3=85
SO4=1000;T=95 C

DONE ON PAR 273
2 JULY 1991

Cyclic Polarization of CDA 715
Model. Solution: Cl=6, NO_3=10, F=2, HCO_3=85, SO_4=1000 95°C
CDA 3 Run 3; Trial 13
Purpose: Same as CDA 1.

The test specimen, preparation, procedures, cell, etc were as in CDA 1. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1218 g $NaHCO_3$ and 1.4791 g Na_2SO_4 (Fisher lot #'s 897789 and 901213 resp.). Pipet 10.0 ml of Cl stock, 10.0 ml of NO_3 stock, and 2.0 ml of F stock sol'ns (CWARA #'s 019-127, 019-63 and 013-107, resp). Dilute to the mark.

Spec. Dim ϕ = 0.635 cm l = 1.905 cm A = 4.117 cm^2
(1) Specimen not pre passivated; all surfaces polished to 600 grit
(2) Specimen held at open circuit for one hour before start.
(3) E corr at start −343 mV vs SCE
(4) E RP 10 min before start → not taken
(5) Initial Temp. 95.0°C Final Temp. 95.0°C
(6) Initial pH 8.26 Final pH 9.99
(7) Scan rate 0.17 mV/sec
(8) Argon purge
(9) Done on PAR 273
(10) Auto reverse @ 5000 μA/cm^2

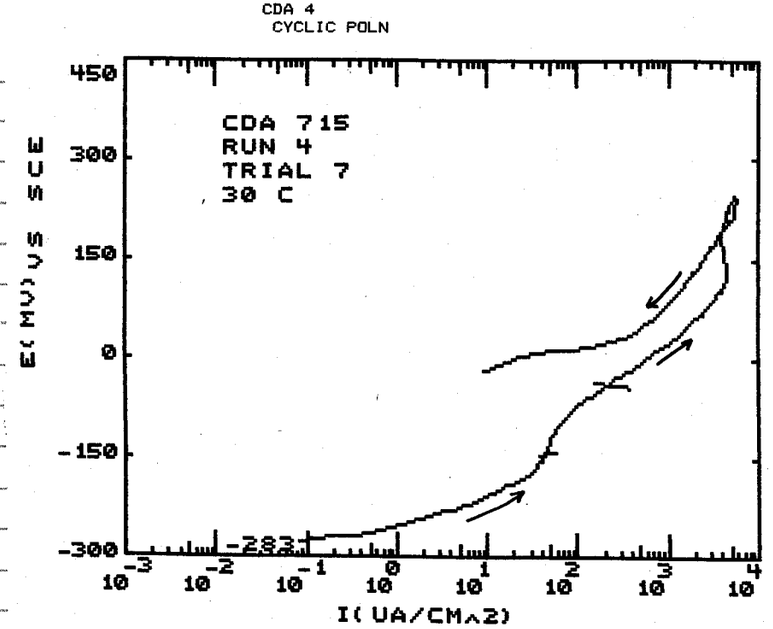
Specimen not pitted but covered with a dark brown scale which easily flaked off. Solution remained clear.

Sample was immersed in 1M H_2SO_4 for 2 min (approx) to remove scale. No pitting. — N.S.

Stored on disk EC+P #5

Re examination of sample on the ends indicated shallow "pits" Not known if it is just another ~~form~~ result of extreme general corrosion. — N.S.

Walter J. Mackowski
7/2/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 4
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.111
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-291
MV/PT	4
DATA MAX	5789.346
DATA MIN	-1899.781
ABS MIN	0
ABS MAX	5789.346

LEGEND

CDA 715; RUN 4; TRIAL 7
DE-AERATE W/ARGON
HCO3=85;NO3=10;F=2
CL=1000;SO4=1000;T=30 C

DONE ON PAR 273
3 JULY 1991

Cyclic Polarization of CDA 715
Model Solution: Cl=1000; SO_4=1000, HCO_3=85, NO_3=10, F=2 30°C
CDA 4 Run 4 Trial 7 aerated
Purpose: Same as CDA 1.

The test specimen, preparation, procedure, cell, etc were as CDA 1. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1208 g $NaHCO_3$, 1.4793 g Na_2SO_4, and 1.6468 g NaCl (same lot's as p. 135 and p. 139). Pipet 2.0 ml of F stock and 10.0 ml of NO_3 stock solution (same #'s as p. 139). Dilute to the mark.

Spec. Dim: ϕ = 0.635 cm l = 1.905 cm A = 4.111 cm^2

1. Specimen not pre-passivated; all surface polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start − 291 mV vs SCE
4. E Pt 10 min before start + 89 mV
5. Initial Temp 31.0°C Final Temp 30.5°C
6. Initial pH 8.05 Final pH 9.24
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

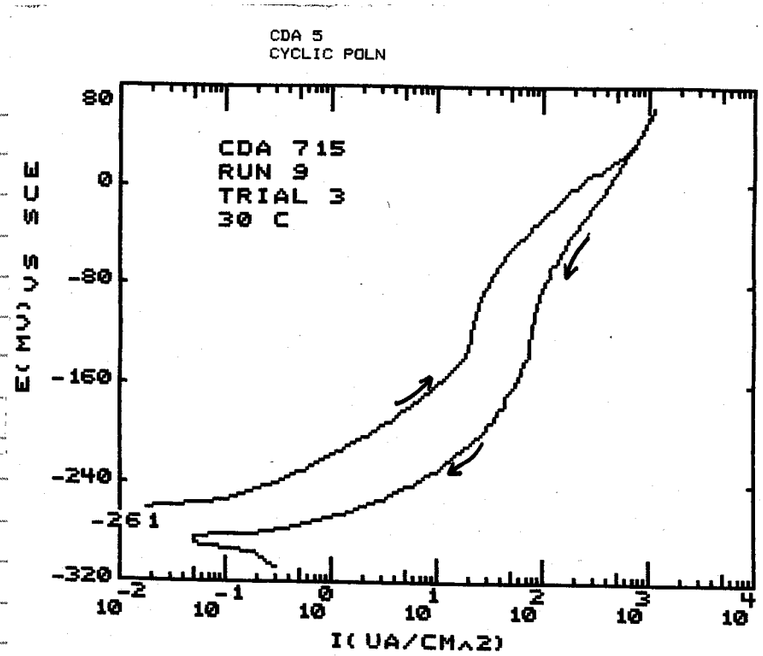
Specimen had general corrosion and a scale that easily fell off. Solution had some yellowish gelatinous ppt + was moderately clear.

Stored on disk EB-H5

Sample reddish in color

— NB 10/7

Walter J. Machowski
7/3/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 5
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	1000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.1
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-261
MV/PT	4
DATA MAX	1129.268
DATA MIN	-.3048781
ABS MIN	1.804878E-02
ABS MAX	1129.268

LEGEND

CDA 715;RUN 9; TRIAL 3
DE-AERATE W/ARGON
CL=1000;F=2;NO3=10;HCO3=85
SO4=20;T=30 C

DONE ON PAR 173/276
2 JULY 1991

Cyclic Polarization of CDA 715 CDA-5

Model Solution Cl = 1000 SO_4 = 20 HCO_3 = 85 NO_3 = 10 F = 2 30°C argon

Run 9 Trial 3

Purpose: Same as CDA 1

The test specimen, preparation, procedure, cell, etc were as CDA 1. Ref SCE #1 was used diff < 1.0 mV. with respect to SCE #3.

Test Solution Prep. To 500 mL of 17 MΩ water in a 1-liter volumetric add .1222 g $NaHCO_3$, 1.6567 g NaCl (same lot # as p 135 & p 139) Pipet 2.0 mL of F stock and 10.0 mL of NO_3 stock, and 20.0 mL SO_4 stock solution (same #'s as p 139) Dilute to mark.

Spec. Dim: ϕ = .636 cm ℓ = 1.901 cm A =

1. Specimen not pre-passivated, polished w/ 600 grit.
2. held at open potential for 1 hr.
3. E corr at start -261 mV vs SCE
4. E Pt 10 min before start +112 mV
5. Initial Temp: 32°C Final Temp: 31°C
6. Initial pH 8.49 Final pH: 9.18
7. Scan Rate 0.17 mV/sec
8. Argon purge 99.9997%
9. Done on Par 173/276
10. Auto reverse @ 5000 μA/cm²

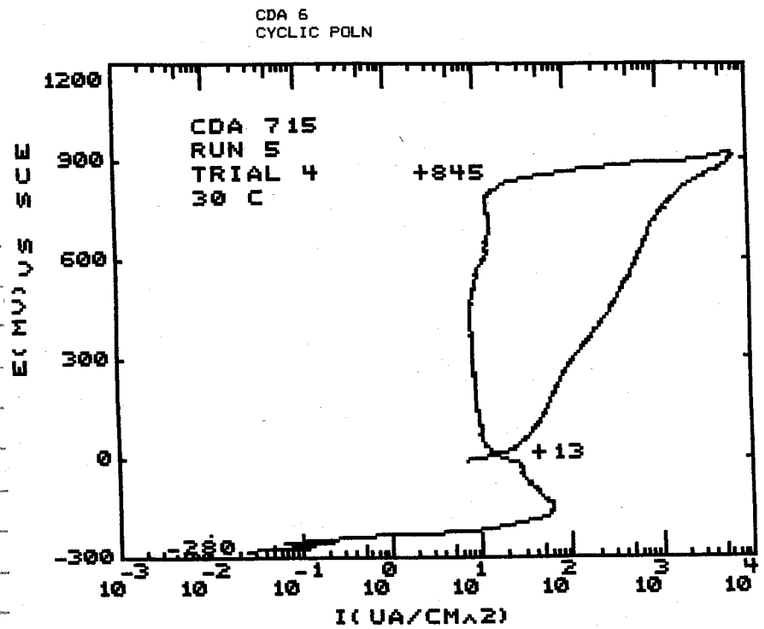
Specimen had general corrosion and a scale that easily flaked. Solution had yellowish tint and ppt.

Stored on disk EG & G 4

Thomas C Page 7/3/91

Sample mostly "white" in color i.e. Nickel-like

— NS 10/7



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 6
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.113
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-288
MV/PT	4
DATA MAX	7075.128
DATA MIN	-.1361537
ABS MIN	0
ABS MAX	7075.128

LEGEND

CDA 715;RUN 5; TRIAL 4
DE-AERATE W/ARGON
SO4=20;NO3=10;F=2
CL=1000;HCO3=8500;T=30 C

DONE ON PAR 273
8 JULY 1991

Cyclic Polarization of CDA-715
Model Solution: Cl=1000, HCO_3=8500, NO_3=10, SO_4=20, F=2 30°C
CDA 6 Run 5; Trial 4

Purpose: Same as CDA 1.

The test specimen, preparation, procedures, cell, etc were as described in CDA 2. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6464 g NaCl and 12.1963 g $NaHCO_3$ (same lot #'s as p.135 + 139). Pipet 10.0 ml of NO_3 stock, 20.0 ml of SO_4 stock and 2.0 ml of F stock solutions (same #'s as p.135). Dilute to the mark.

Spec. dim. ϕ = 0.635 cm l = 1.903 cm A = 4.113 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −288 mV vs SCE
4. E Pt 10 min before start +326 mV
5. Initial Temp. 29.8°C Final Temp: 30°C
6. Initial pH 8.52 Final pH 9.17
7. Scan rate 0.17 mV/sec
8. Done on PAR 273
9. Argon purge
10. Auto reverse @ 5000 μA/cm^2

Specimen was covered w/ many areas of bluish-green corrosion deposits, under which areas of shallow pitting or localized attack had occurred. Solution remained clear.

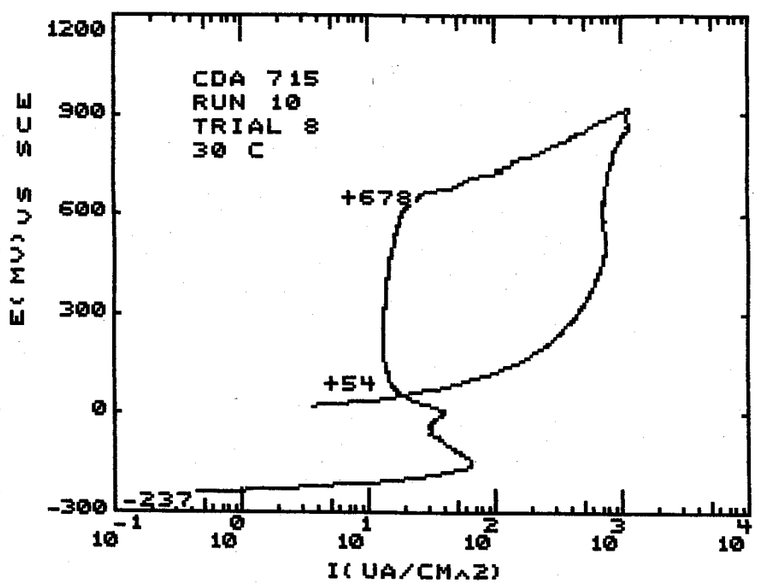
classic Type I pitting: Bluish green outer deposit, reddish inner deposit, shallow pitting underneath. — WS

Stored on disk EC+d #5.

Walter J. Mackowski
7/8/91

Sample white in color
— WS

CDA 7
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 7
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	1000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.12
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-239
MV/PT	4
DATA MAX	1150.485
DATA MIN	.3398058
ABS MIN	.3398058
ABS MAX	1150.485

LEGEND

CDA 715;RUN 10;TRIAL 8
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=8500
SO4=1000;T=30 C;F=2

DONE ON PAR 173/276
8 JULY 1991

Cyclic Polarization of CDA 715
Model Solution Cl = 1000 HCO_3 = 8500 NO_3 = 10 SO_4 = 1000 F = 2 T = 30C
CDA 7 Run 10 TRIAL 8
Purpose: Same as CDA 1

The test specimen, preparation, procedures, cell, etc. were described in CDA 1. Ref SCE #1 used. Checked diff < 1mV vs SCE #3.

Test Solution Prep: To 500 mL of 17 mΩ H_2O in a 1-Liter volumetric add 1.6463g NaCl, 12.2006g $NaHCO_3$, 1.4796g Na_2SO_4 (Same lot #'s as p 135 & p139) Pipet 10.0mL NO_3^- stock, 2.0 mL F^- stock (same #'s as p 135) dilute to mark.

Spec Dim: ϕ = .635 cm ℓ = 1.905 cm A = 4.117 cm^2

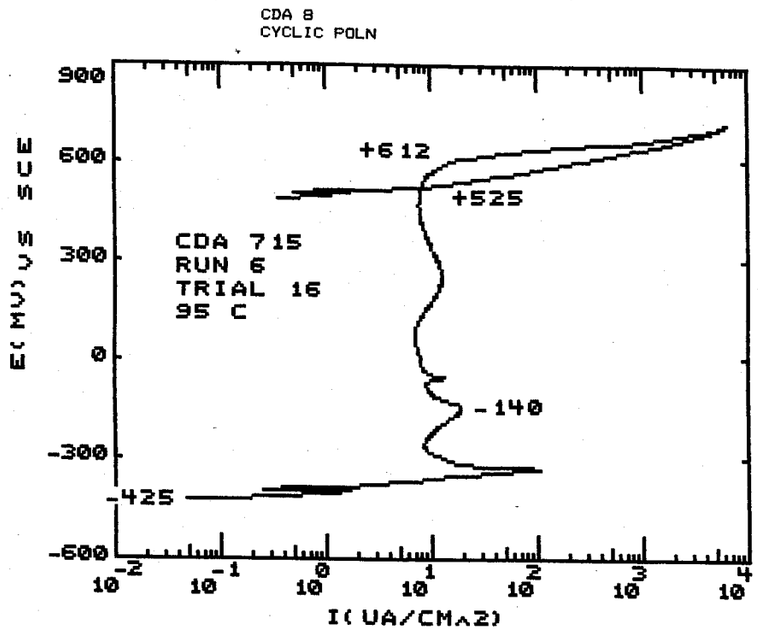
1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start -240 mV
4. E pt 10 min before start +56 mV
5. Initial Temp 32°C Final T - 31°C
6. Initial pH 8.25 Final pH 9.13
7. Scan rate 0.17 mV/sec
8. Done on PAR 173/276
9. Argon purge 99.999%
10. Auto reverse @ 1000 μA/cm^2

Specimen holder leaked. Greenish corrosion scale from brass holder formed at teflon-sample junction. The specimen showed no corrosion. Was some discoloration near junction.

Stored on EG&G #4

Shallow pits on one part of the sample which were covered by greenish deposit. Sample was white in color.
— NS 10/7

Thomas C Page
7/8/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 8
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.115
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-425
MV/PT	4
DATA MAX	6342.649
DATA MIN	4.860267E-02
ABS MIN	4.860267E-02
ABS MAX	6342.649

LEGEND

CDA 715; RUN 6; TRIAL 16
DE-AERATE W/ARGON
NO3=10;F=2;T=95 C
CL=1000;SO4=1000;HCO3=8500

DONE ON PAR 273
9 JULY 1991

Cyclic Polarization of CDA-715
Model Solution: Cl=1000, SO_4=1000, HCO_3=8500, NO_3=10, F=2 95°C
CDA 8 Run 6 Trial 16
Purpose: Same as CDA 1

The test specimen, procedure, preparation, etc were as described in CDA 1. Ref SCE #4 was used and checked as before, difference was

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 1.6468 g NaCl, 1.4789 g Na_2SO_4 and $NaHCO_3$ 12.202 g (same lot #'s as p.135 + 138). Pipet 2.0 ml of F stock and 10.0 ml of SO_4 stock solutions (same #'s as p.135). Dilute to the mark.

Spec. Dim. ϕ = 0.635 cm l = 1.904 cm A = 4.115 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start −425 mV vs SCE
4. E Pt 10 min before start. −450 mV
5. Initial Temp. 94.5°C Final Temp. 95.0°C
6. Initial pH 8.38 Final pH 10.08
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

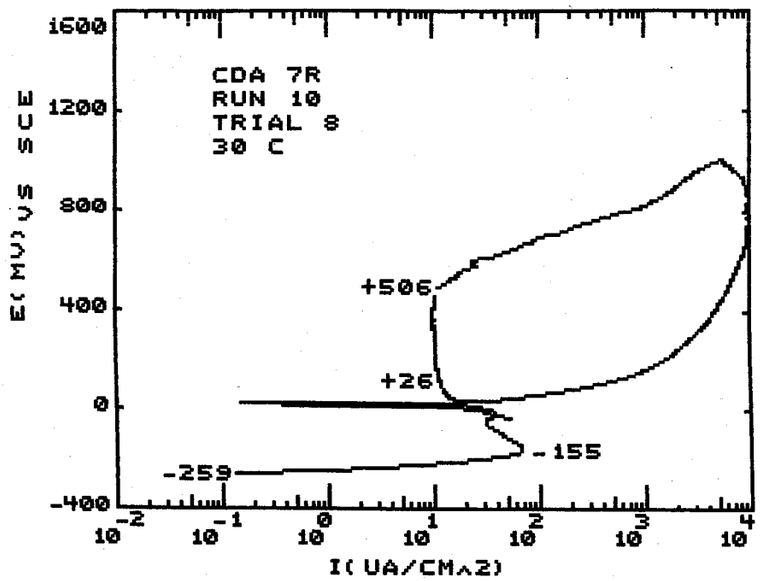
Specimen slightly darkened, but no corrosion occurred. Solution remained water clear.

Stored on EC&G #5.

Specimen "white" in color. — N.S. 10/7

Walter J. Machowski
7/9/91

CDA 7R
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 7R
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.115
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-259
MV/PT	4
DATA MAX	9866.343
DATA MIN	-4218.712
ABS MIN	.090887
ABS MAX	9866.343

LEGEND

CDA 715;RUN 10;TRIAL 8
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=8500
SO4=1000;T=30 C;F=2

RERUN OF CDA 7

DONE ON PAR 173/276
9 JULY 1991

Cyclic Polarization of CDA 715
Model Solution Cl = 1000 HCO_3 = 8500 NO_3 = 10 SO_4 = 1000 F = 2 T = 30C

CDA 7R Run 10 Trial 8 Rerun

Purpose: Same as CDA 1

The test specimen, preparation, procedures, cell, etc. were described in CDA 1. Ref SCE #1 used. Checked and diff < 1mV vs SCE #3.

Test Solution Preparation: To 800mL of 17mΩ H_2O in a 1-L volumetric add 1.647g NaCl, 12.2063g $NaHCO_3$, 1.4782g Na_2SO_4 (Same lot #'s as p135 & p139) Pipet 10.0mL NO_3^- stock, 2.0mL F^- stock (Same #'s as p135) dilute to mark.

Specimen Diameter: ϕ = .635cm l = 1.904cm A = 4.115cm²

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start -139
4. E pt 10 min before start
5. Initial Temp 31°C Final 30°C
6. Initial pH 8.52 Final pH 9.42
7. Scan Rate 0.17 mV/sec
8. Done on PAR 173/276
9. Argon purge 99.999%
10. Auto reverse @ 5000 μA/cm²

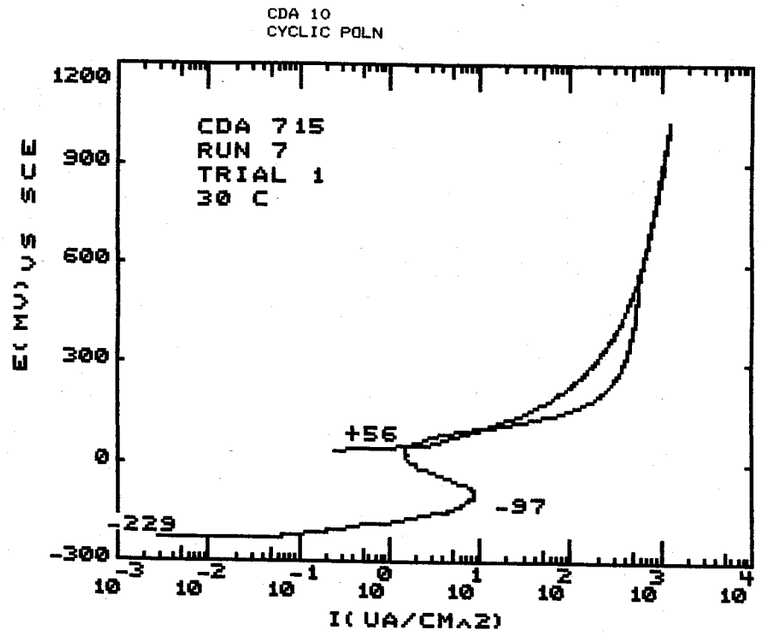
Large number of deep local corrosion pits.
Greenish precipitate corrosion product covering pits.
Red deposit inside pits.

Saved EG&G #4

Sample white in color

— NS 10/7

Thomas C Page
7/9/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 10
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.107
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-229
MV/PT	4
DATA MAX	1275.87
DATA MIN	2.678354E-03
ABS MIN	2.678354E-03
ABS MAX	1275.87

LEGEND

CDA 715;RUN 7; TRIAL 1
DE-AERATE W/ARGON
CL=6;NO3=10;SO4=20
F=2;HCO3=85;T=30 C

DONE ON PAR 273
10 JULY 1991

Cyclic polarization of CDA-715
Model Solution: Cl = 6, NO_3 = 10, SO_4 = 20, F = 2, HCO_3 = 85 30°C
CDA 10 Run 7 Trial 1
Purpose: Same as CDA 1.

The test specimen, preparation, procedures, etc were as described in CDA 1. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1209 g of $NaHCO_3$ (same lot # as p.135). Pipet 10.0 of Cl, 20.0 ml of SO_4, 2.0 ml of F and 10.0 ml of NO_3 stock solution (same #'s as p.133 + p.135). Dilute to the mark.

Spec. Dim: ϕ = 0.635 cm l = 1.900 cm A = 4.107 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start -229 mV vs SCE
4. E Pt 10 min before start +85 mV
5. Initial Temp. 30.0°C Final Temp. 31.0°C
6. Initial pH @ 25° 8.04 Final pH @ 25°C 9.46
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Manual reverse @ 5100 μA / +1035 mV.

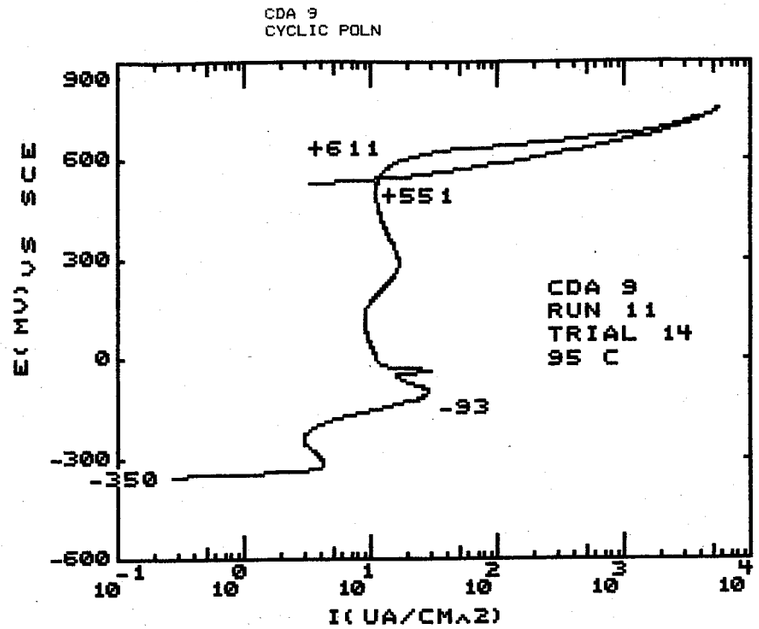
Specimen not pitted but had brown staining. Solution remained relatively clear.

Stored on disk EBTC #5

Brown film formed in local areas flaked off easily. No pitting.

— NS 10/7

Walter J. Mochowski
7/10/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 9
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.111
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-350
MV/PT	4
DATA MAX	5619.071
DATA MIN	-498.1756
ABS MIN	.2724398
ABS MAX	5619.071

LEGEND

CDA 715;RUN 11;TRIAL 14
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=8500
SO4=1000;F=2;T=95 C

DONE ON PAR 173/276
10 JULY 1991

Cyclic Polarization of CDA-715
Model Solution Cl = 6 NO_3 = 10 SO_4 = 1000 F = 2 HCO_3 = 8500 95°C
CDA 9 Run 11 Trial 14
Purpose: Same as CDA 1

The test specimen, preparation, procedures, etc. were described in CDA 1. Ref SCE #1 was used difference < 1.0 mV.

Test Solution Prep: To 500 mL of 17 MΩ water in a 1-L volumetric flask. ADD 12.2082 g $NaHCO_3$ (Same lot # as p 135). ADD 1.4762 g Na_2SO_4 (Same lot # as p 139) Pipet 10.0 mL Cl, 2.0 mL of F, and 10.0 mL NO_3 stock solutions (Same #'s as p.139 & p 135) Dilute.

Spec Dim: ϕ = .635 cm l = 1.902 cm A = cm²

1. Specimen not prepassivated; all surfaces polished to 600 grit
2. Specimen held at open circuit potential for 1 hr before start
3. Ecorr at start ~~-22~~ TCP 7/16/91 -340 mV
4. Ept 10 min before start -194 mV
5. Initial Temp 94°C Final 93°C
6. Initial pH 8.43 Final pH — not taken
7. Scan Rate 0.17 mV/sec
8. Purge w/ Argon 99.999%
9. Done on Pcm 173/276
10. Crossover at 5000 uA/cm²

Specimen tarnished brown color no pitting. Test Solution remained clear.

Test Done 7/10/91

There was one area in the crevice that had shallow corrosion and green deposit

— N.S.

Thomas C Page
7/16/91

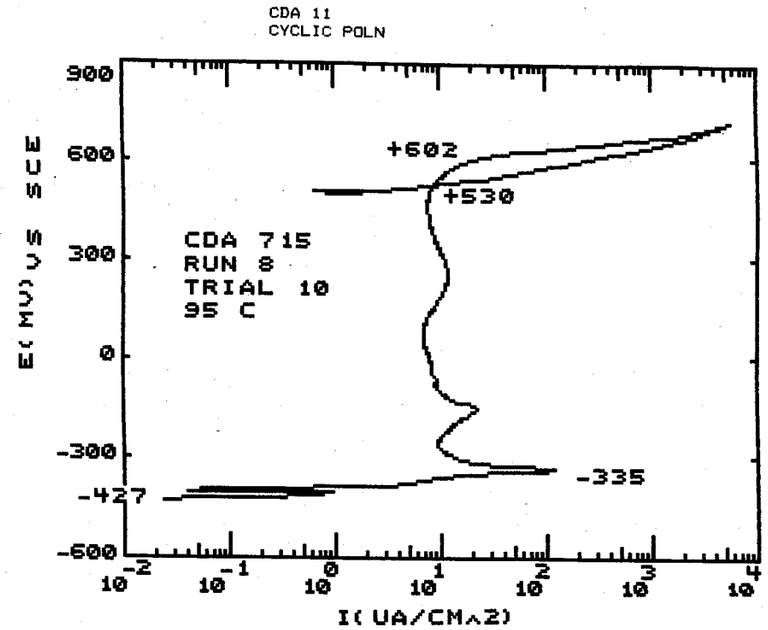
Cyclic Polarization of CDA-715
Model Solution: $Cl = 6$, $NO_3 = 10$, $SO_4 = 20$, $F = 2$, $HCO_3 = 85$ 30°C
CDA 10 Run 2 Trial 1
Purpose: Same as CDA I.

Test specimen, preparation, cell, etc were as in CDA I. Ref SCE #4 was used and checked, difference < 1.0mV.

Test Solution Prep:

experiment already described on p. 153

W J Machowski
7/17/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 11
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.098
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-427
MV/PT	4
DATA MAX	5685.7
DATA MIN	-3.904343E-02
ABS MIN	2.440215E-02
ABS MAX	5685.7

LEGEND

CDA 715;RUN8; TRIAL 10
DE-AERATE W/ARGON
CL=6;NO3=10;SO4=20;F=2
HCO3=8500;T=95 C

DONE ON PAR 273
11 JULY 1991

Cyclic Polarization of CDA-715
Model Solution: Cl=6, SO_4=20, NO_3=10, F=2, HCO_3=8500 95°C
CDA 11 Run 8; Trial 10
Purpose: Same as CDA 7.

The test specimen, preparation, procedures, etc were as described in CDA 7. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 12.1994 g $NaHCO_3$ (same lot # as p. 135). Pipet 10.0 ml of Cl stock, 20.0 ml of SO_4 stock, 2.0 ml of F stock and 10.0 ml of NO_3 stock solutions (same #s as p. 135 + p. 139. dilute to the mark.

Spec. Dim: ϕ = 0.636 cm l = 1.892 cm A = 4.098 cm^2

1. Spec not pre-passivated; all surfaces polished to 600 grit.
2. Spec held at open circuit for one hour before start.
3. E corr at start -427 mV vs SCE
4. E Pt 10 min before start -400 mV.
5. Initial Temp. 94.5°C Final Temp. 95.0°C
6. Initial pH 8.42 @ 25°C Final pH 10.16 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done of PAR 273
10. Auto reverse @ 5000 μA/cm^2

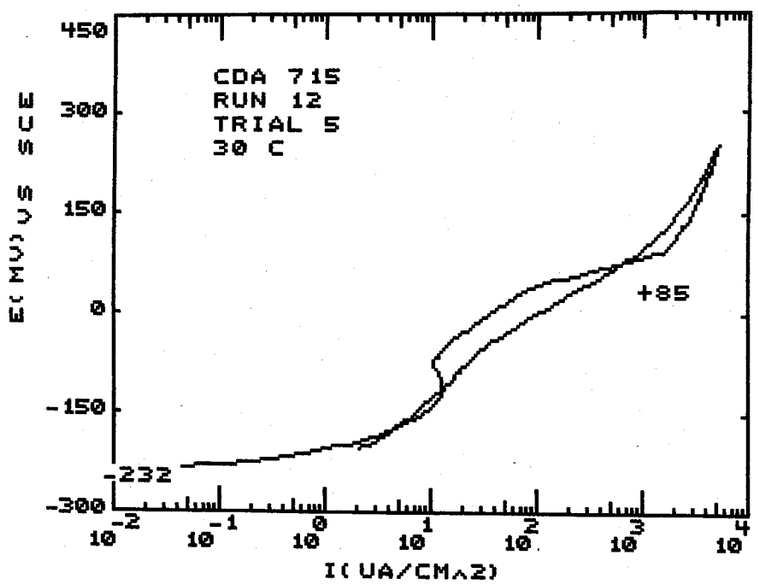
Specimen not pitted, but covered with dark brownish stains over 80% of surface. Solution remained clear.

Specimen appeared uncorroded.
Metallic sheen intact. WJ 10/7

Stored on disk EG&G #5.

Walter J. Machowski
7/17/91

CDA 12
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 12
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.104
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-232
MV/PT	4
DATA MAX	5214.425
DATA MIN	4.459064E-02
ABS MIN	4.459064E-02
ABS MAX	5214.425

LEGEND

CDA 715;TRIAL 5;RUN 12
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=85
SO4=1000;F=2;T=30 C

DONE ON PAR 173/276
11 JULY 1991

CDA 12 RUN 12 TRIAL 5

Purpose: Same as CDA 1

The test specimen, preparation, procedures, etc. were described in CDA 1. Ref SCE #1 was used. Pot. diff < 1.0 mV with SCE #3.

Test Solution Prep: To 500 mL of 17 MΩ H_2O in a 1-L volumetric flask. ADD .122 g $NaHCO_3$ and 1.4780 g Na_2SO_4 (same lot #'s as p135 & p139) pipet 10.0 mL Cl, 2.0 mL F, 10.0 mL NO_3 (stock same as p135 & p139) Dilute to the mark.

Spec Dram: Φ = .634 cm = 1.902 cm A = 4.104 cm²

① Specimen not pre-passivated; all surfaces polished to 600 grit
② Specimen held at open-circuit potential for 1 hour prior to start
③ Ecorr at start −232 mV
④ Initial Temp 30°C Final Temp 32°C
⑤ Initial pH 8.54 Final pH 9.24
⑥ Scan Rate 0.17 mV/sec
⑦ Purge with Argon 99.999%
⑧ Done on Par 173/276
⑨ Auto reverse at 5000 nA/cm²

Test Solution remained clear. The sample had flakey copper colored ppt. Sample is tarnished copper color.

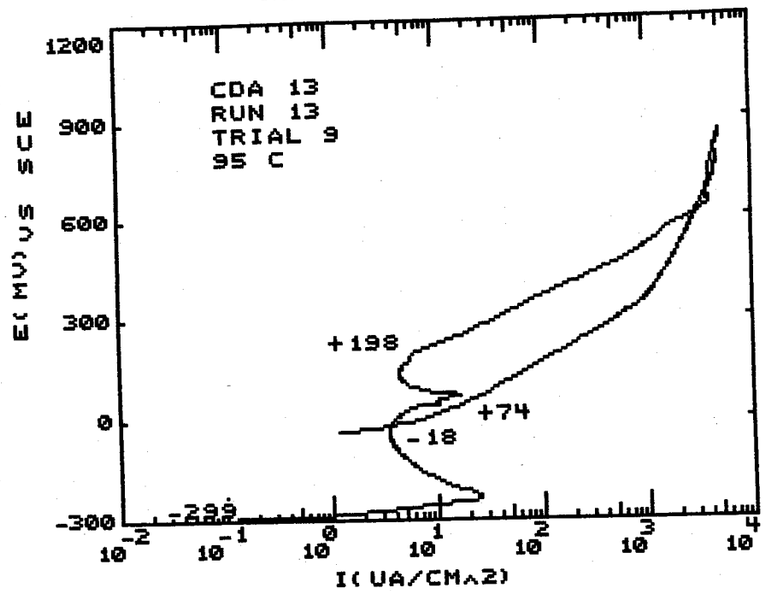
Test Done 7/11/91

EG&G #4

Uniform corrosion
JS 10/7

Thomas C Page
7/16/91

CDA 13
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 13
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.1
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-299
MV/PT	4
DATA MAX	5097.561
DATA MIN	8.536585E-02
ABS MIN	8.536585E-02
ABS MAX	5097.561

LEGEND

CDA 715;TRIAL 9;RUN 15
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=85
SO4=20;F=2;T=95 C

DONE ON PAR 173/276
12 JULY 1991

Cyclic Polarization of CDA 715
Model Solution - Cl = 6, SO_4 = 20, NO_3 = 10, HCO_3 = 85, F = 2 T = 95°C

CDA 13 Trial 9 Run 13

Purpose: Same as CDA 1

The test specimen, preparation, procedures, etc. were discribed in CDA 1. Ref SCE #1 was used potential against SCE #3 < 1 mV

Test Solution Prep.: To 500 mL of 17 MΩ H_2O in a 1-L volumetric flask add .1224 g $NaHCO_3$ (Same lot # as p135) pipet 10.0 mL Cl, 10.0 mL NO_3, 2.0 mL F, 20 mL SO_4 (Same stock as p 135 & p139) Dilute to mark.

Spec. Diam: ϕ = .634 in = 1.900 cm A = 4.10 cm²

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit potential for 1 hr before test start.
3. Ecorr at start −310 mV
4. E Pt at 10 min prior −305 mV
5. Initial pH 8.50 Final pH 9.78
6. Initial Temp 95°C Final Temp 93°C
7. Scan Rate 0.17 mV/sec
8. Purge with Argon 99.999%
9. Done on Par 173/276
10. Cuto inverse at 5000 mA/cm²

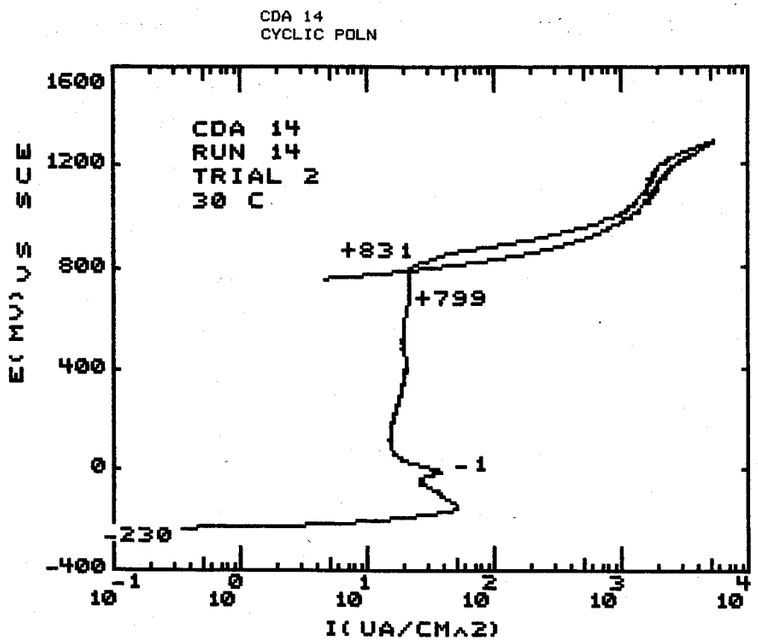
General selective corrosion of Nickel leaving flakey copper film and copper colored smudge underneath. Solution is turbid appears "dirty"

Done 7/12/91

E G & G #4

AS 10/7

Thomas C Page
7/16/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 14
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.098
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-230
MV/PT	4
DATA MAX	5392.875
DATA MIN	-8.150317
ABS MIN	.3440703
ABS MAX	5392.875

LEGEND

CDA 715;TRIAL 2;RUN 14
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=8500
SO4=20;F=2;T=30 C

DONE ON PAR 173/276
15 JULY 1991

Cyclic Polarization of CDA 715
Model Soln: HCO_3=8500; Cl=6; SO_4=20; NO_3=10; F=2 T = ~~30°C~~ 30°C TCP 7/22/91

CDA 14 Trial 2 Run 14

Purpose: Same as CDA1

The test specimen, preparations, procedures, etc. were described in CDA1. SCE #1 was used. Potential of ~~SCE #~~ TCP SCE #1 vs SCE #3 < 1.0 mV

Test Sol'n Prep: To 500 mL of 17 MΩ H_2O in a 1-L volumetric flask add 12.200 g $NaHCO_3$ (same lot # as p 135) pipet 10.0 mL Cl, 20.0 mL SO_4, 10.0 mL NO_3, 2.0 mL F (same stock as p 135 & p. 139) Dilute to mark.

Spec. Dim: Φ = .633 cm l = 1.9025 cm A = 4.098 cm²

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit potential for 1 hr prior to start.
3. Ecor at start -235 mV
4. Ept at 10 min prior 75 mV
5. Initial Temp 32°C Final Temp 30°C
6. Initial pH 8.29 Final pH 9.08
7. Scan Rate 0.17 mV/sec
8. Purge with Argon 99.999%
9. Done on Par 173/276
10. Auto reverse at 5000 uA/cm²

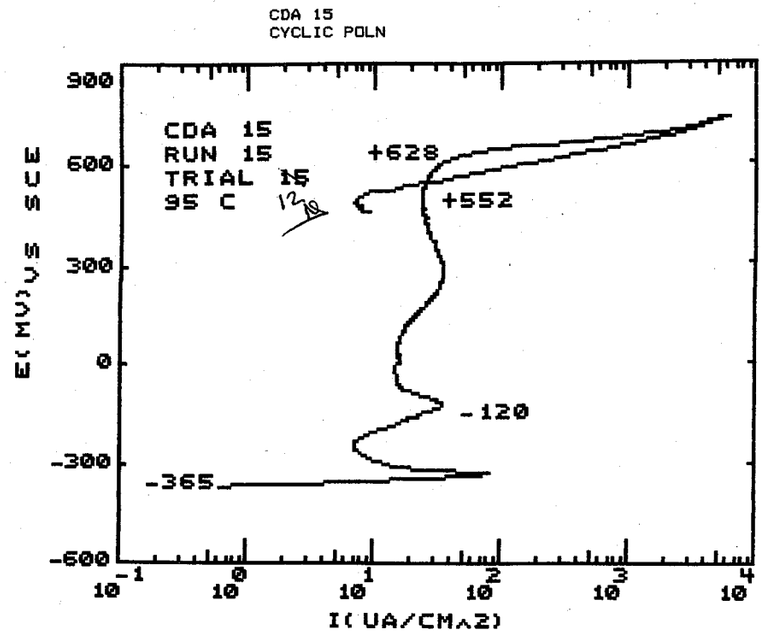
No apparent corrosion. Sample was tarnished. Solution remained clear.

Done 7/15/91

EG&G #4

Thomas C Page 7/16/91

Specimen exhibited metallic sheen. But there were longitudinal, river-like marks on parts of the sample. Related to residual stress pattern? — NS 10/7/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 15
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.088
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-365
MV/PT	4
DATA MAX	6090.999
DATA MIN	-5.009785
ABS MIN	.5797457
ABS MAX	6090.999

LEGEND

CDA 715;RUN 15;TRIAL 12
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=8500
SO4=20;F=2;T=95 C

DONE ON PAR 173/276
16 JULY 1991

Cyclic Polarization of CDA 715 TCP 7/22/91
Model Sol'n : HCO_3 = 8500; Cl = 1000; SO_4 = 20 ; NO_3 = 10, F = 2 T = 95°C

CDA 15 Trial 12 ; Run 15

Purpose : Same as CDA 1

This test specimen, preparation, procedures, etc. were described in CDA 1 SCE # 1 was used & was checked vs SCE # 3 ; diff < 1.0 mV

Test Sol'n Prep. : To 500 mL of 17 mΩ H_2O in a 1-L vol. flask add 12.2030 g $NaHCO_3$; 1.6453 g NaCl (same lot #'s as p 135 & p139) pipet 10.0 mL NO_3 TCP, 20 mL SO_4, 2.0 mL F (same stock as p135 & p 139) Dilute to mark.

Spec. Dim: ϕ = .632 cm l = 1.901 cm A = 4.088 cm²

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit potential for 1 hr prior to start
3. Ecorr start −365 mV vs SCE
4. Ept 10 min prior to start −254 mV
5. Initial T 93°C Final 94°C
6. Initial pH 8.41 Final 9.87
7. Scan Rate 0.17 mV/sec
8. Purge w/ Argon 99.999%
9. Done on Par 173/276
10. Auto Reverse at 5000 nA/cm²

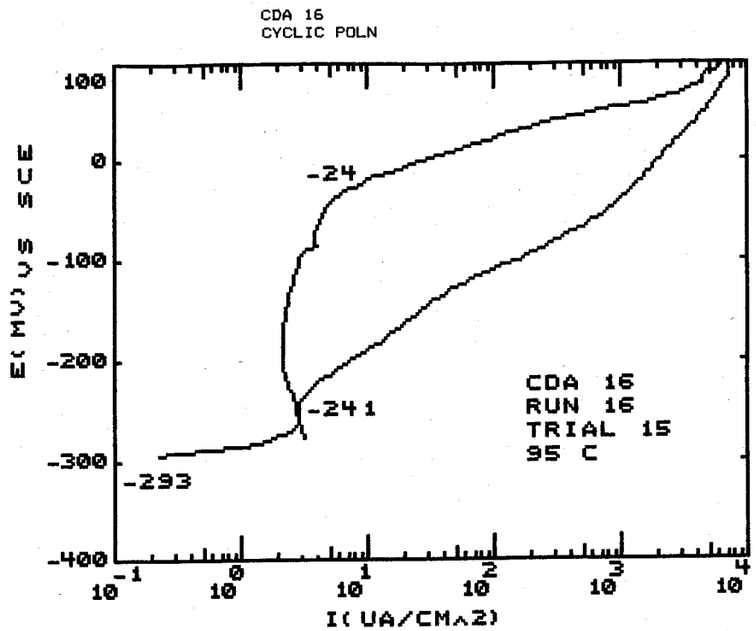
Test Solution was clear. Sample was tarnished.

Test Stored on EG&G #4

Test Performed 7/16/91

10/7

Thomas C Page
7/22/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 16
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.1
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-293
MV/PT	4
DATA MAX	7170.732
DATA MIN	-3.507317
ABS MIN	.1926829
ABS MAX	7170.732

LEGEND

CDA 715;TRIAL 15;RUN 16
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=85
SO4=1000;F=2;T=95 C

DONE ON PAR 173/276
17 JULY 1991

CDA 16

Purpose : Same as CDA 1

The test specimen, preparation, procedures, etc. were described in CDA #1. SCE #1 was used. Checked vs SCE #3 diff < 1.0 mV

Test Sol'n Prep. : To 500 mL of 17 MΩ H_2O in a 1-L volumetric flask add .1227g $NaHCO_3$, 1.4770g Na_2SO_4, 1.6452g NaCl (Same lot #'s as p 135 & 139) Pipet 10.0 mL NO_3 ; 2.0 mL F (Same stock as p 135 & p139) Dilute to mark.

Spec. Dim : ϕ = .6335 cm ; l = 1.9015 cm ; A = 4.10 cm²

① Specimen not pre-passivated ; all surfaces polished to 600 grit.
② Specimen held at open circuit potential for 1 hr before test.
③ Ecorr start -293 mV
④ Ept 10 min before start -125 mV
⑤ Initial T 94°C Final 95°C
⑥ Initial pH 9.70 Final 10.02
⑦ Scan Rate 0.17 mV/sec
⑧ Purge w/Argon 99.999%
⑨ Done on Par 173/276
⑩ Auto Reverse at 5000 uA/cm²

Too high. Possible measurement/recording error. -N

Copper-colored test solution. Copper flake covering. Sample underneath pinkish color. Sample holder leaked. Test redo as CDA 16R (p181)

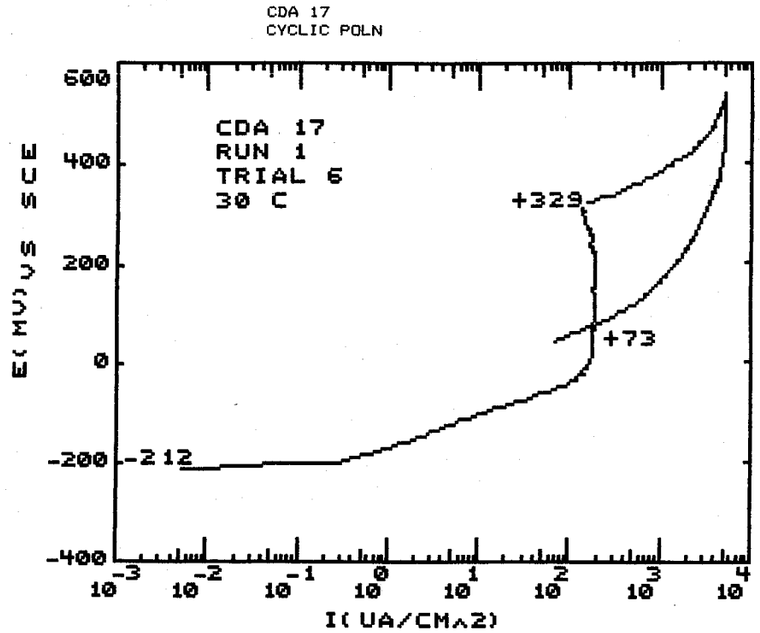
Test Stored on EG&G #4

Test Done on 7/17/91

See comments on p.181

N 10/7/91

Thomas C Page 7/22/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 17
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.108
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-212
MV/PT	4
DATA MAX	5258.033
DATA MIN	-87.87732
ABS MIN	5.355404E-03
ABS MAX	5258.033

LEGEND

CDA 102;RUN 1; TRIAL 6
DE-AERATE W/ARGON
CL=6;F=2;NO3=10
HCO3=8500;SO4=1000;T=30 C

DONE ON PAR 273
16 JULY 1991

Cyclic Potentiation of CDA-102
Model Solution: Cl=6, SO_4=1000, HCO_3=8500, F=2, NO_3=10 30°C

CDA 17 Run 1 Trial 6

Purpose: Same as CDA 7.

The test specimen was CDA-102 from heat no. 6681. All other procedures, preparation, etc were as in CDA 7. Ref. SCE #4 was used and checked as before, difference was less than 1.0mV.

Test Solution: Prep: To 500ml of 17MΩ water in a 1-liter volumetric add 12.1894 g of $NaHCO_3$ and ~~1.6468~~ 1.4786 g of ~~NaCl~~ Na_2SO_4 (same lot #'s as p. ~~135~~ 139). Pipet 100 ml of Cl stock, 10.0 ml of NO_3 stock, and 2.0 ml of F stock solution (same lot #'s as p. 139). Dilute to the mark.

W J Machovski 7/17/91

Spec. Dim: ϕ = 0.636 cm l = 1.8997 cm A = 4.108 cm²

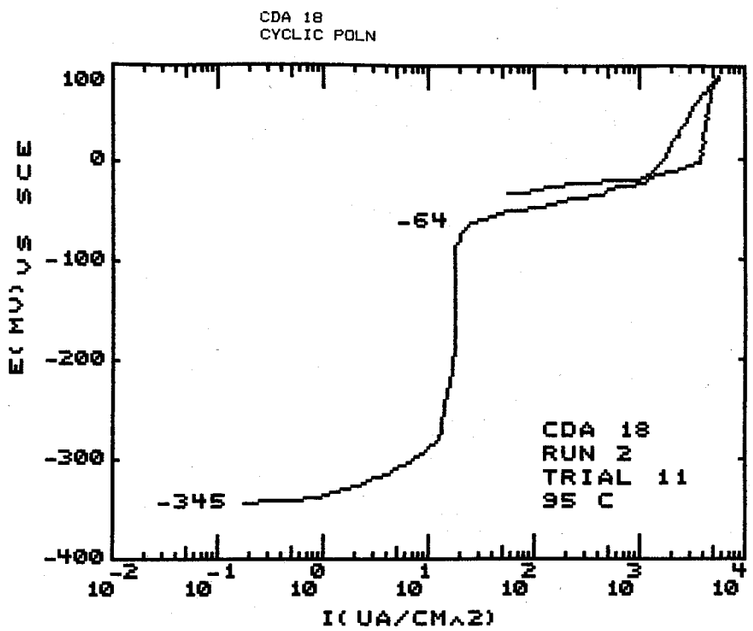
1. Spec not pre-passivated & all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start.
3. E corr at start -212 mV vs SCE.
4. E Pt 10 min. before start -235 mV.
5. Initial Temp. 30.0°C Final Temp. 32.0°C
6. Initial pH 8.45 Final pH 9.25
7. Scan rate 0.17 mV/sec
8. Argon Purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm²

Specimen was darkened & had about 50-60% bluish-green corrosion product, under which shallow local attack had occurred. Solution was clear, but had a very, very, slight bluish tinge.

Stored on disk EC&C #5.

Walter J. Machovski 7/17/91

red corrosion product under green deposit. WJ 7/17/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 18
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.118
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-345
MV/PT	4
DATA MAX	5536.668
DATA MIN	-1.629432
ABS MIN	8.013599E-02
ABS MAX	5536.668

LEGEND

CDA 102; RUN 2; TRIAL 11
DE-AERATE W/ARGON
HCO3=85;SO4=20;NO3=10;F=2
CL=1000;T=95

DONE ON PAR 273
17 JULY 1991

Cyclic Polarization of CDA-102

Model Solution: Cl=1000, F=2, NO_3=10, SO_4=20, HCO_3=85 95°C

CDA 18 Run 2 Trial 11

Purpose: Same as CDA 1.

The test specimen, preparation, procedures, cell, etc were as described in CDA 17. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1235 g $NaHCO_3$ and 1.6468 g NaCl (same lot #'s as p.135). Pipet 20.0 ml of SO_4 stock, 2.0 ml of F stock and 10.0 ml of NO_3 stock solution (same #'s as p.135). dilute to the mark.

Spec. Dim: ϕ=0.636 cm l=1.902 cm A=4.118 cm^2

1. Spec not pre-passivated; all surfaces polished to 600 grit.
2. Spec held at open circuit for one hour before start
3. E corr at start, -345 mV vs SCE
4. E Pt 10 min before start -165 mV
5. Initial Temp. 95.0°C Final Temp. 95.0°C
6. Initial pH 9.08 Final pH 9.96
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

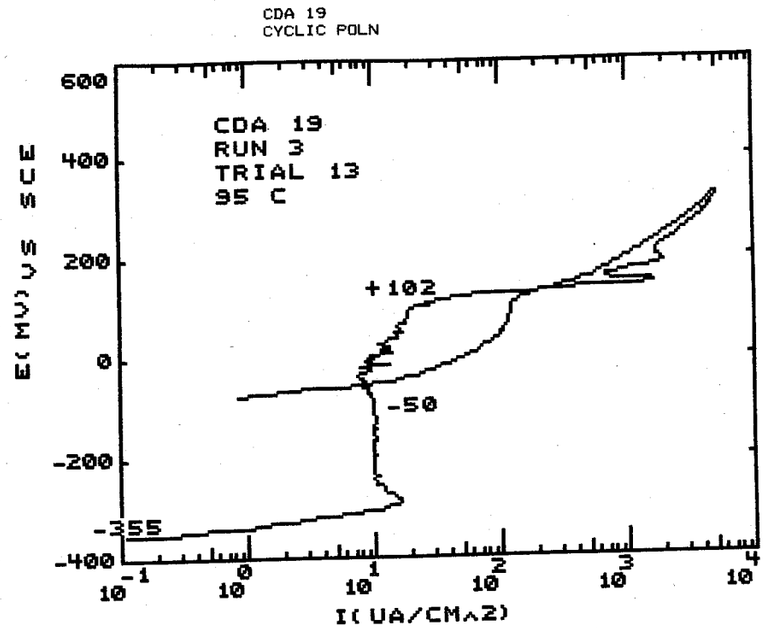
Specimen covered w/a reddish-brown film which readily flaked off. Solution was yellowish

Stored on dish ECOC #5

Uniform corrosion.

10/7/91

Walt J. Mackowski
7/17/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 19
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.102
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-355
MV/PT	4
DATA MAX	5216.967
DATA MIN	.1121404
ABS MIN	.1121404
ABS MAX	5216.967

LEGEND

CDA 102; RUN 3; TRIAL 13
DE-AERATE W/ARGON
CL=6;F=2;NO3=10;HCO3=85
SO4=1000;T=95 C

DONE ON PAR 273
18 JULY 1991

Cyclic Polarization of CDA-102
Model Solution; Cl = 6, F = 2, NO_3 = 10, HCO_3 = 85, SO_4 = 1000 95°C
CDA 19 Run 3 Trial 13
Purpose: Same as CDA 7.

The test ~~solution~~ specimen, preparation, procedures, etc were as in CDA 17. Ref SCE #4 was used and checked as before, but the difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ of 1-liter volumetric add 0.1531 g of $NaHCO_3$ and 1.4789 g of Na_2SO_4 (same lot #'s as p. 139). Pipet 10.0 ml of Cl stock, 10.0 ml of NO_3 stock, and 2.0 ml of F stock solution (lot #'s same as p. 139) dilute to the mark.

Spec. Dim: ϕ = 0.634 cm l = 1.901 cm A = 4.102 cm^2

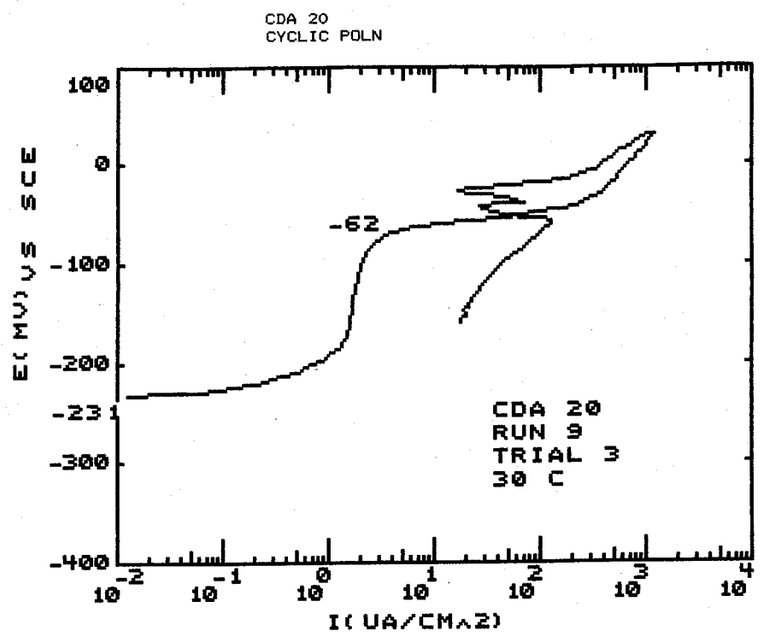
1. Spec not pre-passivated; all surfaces polished to 600 grit
2. Spec held at open circuit for one hour before start.
3. E corr at start −355 mV vs SCE
4. E Pt 10 min before start −75 mV
5. Initial Temp. 95.3°C Final Temp. 95.0°C
6. Initial pH 8.28 Final pH 10.22
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen covered w/a dark deposit. Solution had a brownish tinge. Specimen holder had leaked, test should be re-run.

Stored on disk EG&G #5

Walter J. Machowski
7/18/91

10/7/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 20
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	1000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.111
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-231
MV/PT	4
DATA MAX	1172.464
DATA MIN	-72.48844
ABS MIN	1.289224E-02
ABS MAX	1172.464

LEGEND

CDA 102;TRIAL 3;RUN 9
DE-AERATE W/ARGON
CL=1000;F=2;NO3=10;HCO3=85
SO4=20;T=30 C

DONE ON PAR 173/276
19 JULY 1991

Cyclic Polarization CDA 102
Model Sol'n: HCO_3=85; Cl=1000, SO_4=20, NO_3=10, F=2 T=30°C
CDA 20
Purpose: Same as CDA 1

The test specimen, preparation, procedures, etc were as in CDA 17. Ref SCE #1 was used. Checked against SCE #4 diff 1.4 mV.

Test Sol'n Prep: To 500 mL of 17 MΩ H_2O in a 1-L volumetric flask add .1220g $NaHCO_3$, 1.6462g NaCl (Same lot # as p 135 & p 139) pipet 20.0 mL SO_4, 10.0 mL NO_3, 2.0 mL F (Same stock as p 135 & p 139) Dilute to mark.

Spec. Dim: ϕ = .635 cm l = 1.902 cm A = 4.111 cm²

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit potential for 1-hr before test.
3. E corr at start -231 mV
4. E pt at 10 min prior -15 mV
5. Initial Temp 30°C Final 32°C
6. Initial pH 8.18 Final 8.96
7. Scan Rate 0.17 mV/sec
8. Purge w/Argon 99.999%
9. Done on Par 173/276
10. Auto reverse at 5000 μA/cm²

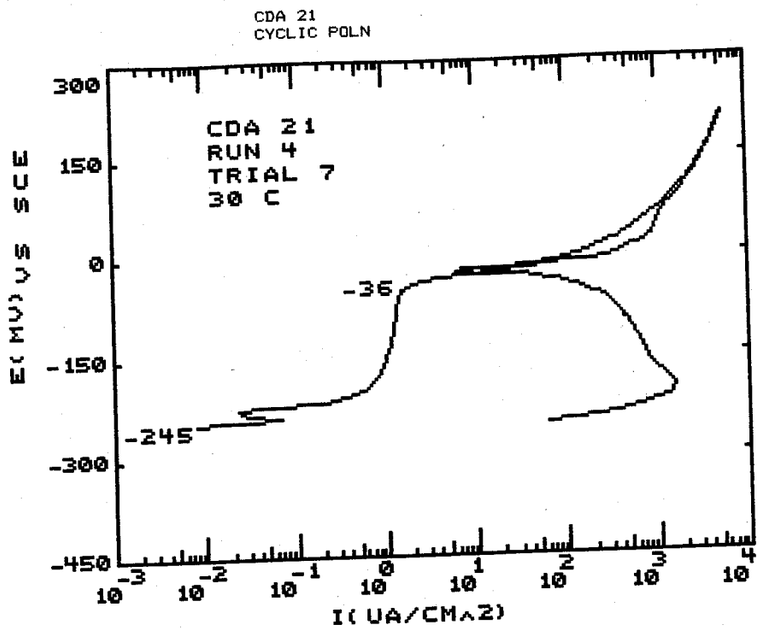
Clean test solution. Tarnish film on sample. Does not wipe-off.

Test Stored on EG&G #4
Test Done 7/19/91

Tarnish was ~~gold~~ bronze colored.

15/7/91

Thomas Page
7/22/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 21
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.1
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-245
MV/PT	4
DATA MAX	5365.854
DATA MIN	-1482.927
ABS MIN	7.317073E-03
ABS MAX	5365.854

LEGEND

CDA 102; RUN 4; TRIAL 7
DE-AERATE W/ARGON
HCO3=85;NO3=10;F=2
CL=1000;SO4=1000;T=30 C

DONE ON PAR 273
19 JULY 1991

Cyclic Polarization on CDA-102
Model Solution: Cl = 1000, SO_4 = 1000, F = 2, NO_3 = 10, HCO_3 = 85 30°C
CDA 21 Run 4 Trial 7
Purpose: Same as CDA 1

The test specimen, preparation, procedures, etc were as described in CDA 17. Ref SCE #4 was used and checked as before, difference was less than 1.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1208 g $NaHCO_3$, 1.4791 g Na_2SO_4 and 1.6461 g NaCl, (same lot #'s as p. 135 and p. 139). Pipet 10.0 ml of NO_3 stock and 2.0 ml of F stock solution (same lot #'s as p. 135). Dilute to the mark.

Spec Dim: ϕ = 0.634 cm l = 1.8998 cm A = 4.100 cm^2

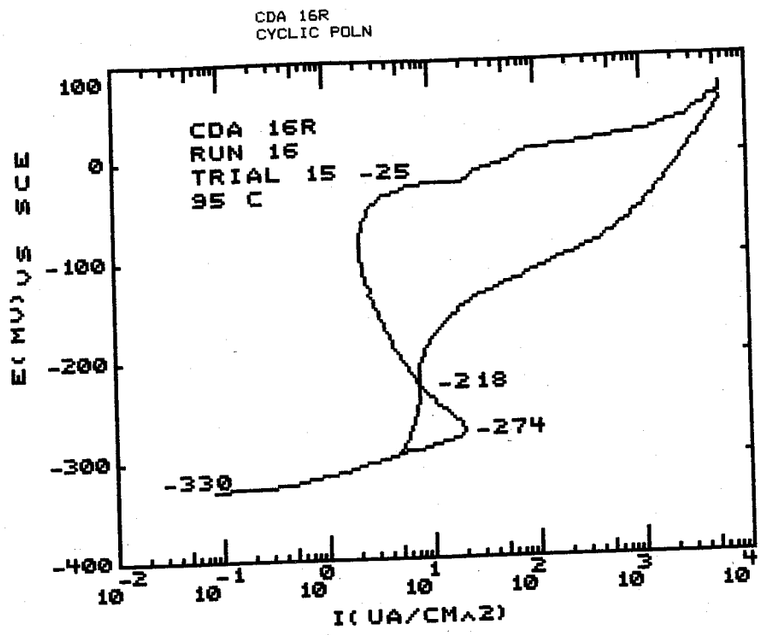
1. Spec not pre-passivated; all surfaces polished to 600 grit.
2. Spec held at open circuit for one hour before start.
3. E corr at start −245 mV vs SCE
4. E pt 10 min before start +30 mV
5. Initial Temp: 29.5°C Final Temp: 31.0°C
6. Initial pH 8.01 Final pH 9.21
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto-reverse @ 5000 μA/cm^2

Specimen had a dark, flaky scale + general corrosion underneath. Solution had a slight greenish tint.

Stored on disk EC-4th #5

10/7/91

Walter J. Machowski
7/19/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 16R
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.093
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-330
MV/PT	4
DATA MAX	5765.942
DATA MIN	-5.003665
ABS MIN	8.600049E-02
ABS MAX	5765.942

LEGEND

CDA 715;TRIAL 15;RUN 16
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=85
SO4=1000;F=2;T=95 C

DONE ON PAR 173/276
18 JULY 1991

Cyclic Polarization of CDA 715
Model Sol'n : HCO_3 = 85 ; Cl = 1000, SO_4 = 1000, NO_3 = 10, F = 2 T = 95°C
CDA 16R
Purpose same as CDA 1

The test specimen preparation, procedures, etc. were described in CDA 1. SCE #1 was checked vs SCE #4 diff 1.4 mV.

Test Solution Prep: To 500mL of 17 MΩ H_2O in a 1-L volumetric flask add .1229g $NaHCO_3$; 1.6470g NaCl; 1.4785g Na_2SO_4 (Same lot # as p135 & p139) Pipet 10.0mL NO_3, 2.0 mL F⁻ (Same Stock as p 135 & p139) Dilute to mark.

Spec. Dim : Φ = .637cm l = 1.9035cm A =

① Specimen not pre-passivated; all surfaces polished to 600 grit.
② Specimen held at open circuit potential for 1hr before test.
③ Ecorr start -331 mV
④ Ept 10 min prior to start -74 mV
⑤ Initial Temp 95°C Final 95°C
⑥ Initial pH 8.23 Final 9.68
⑦ Scan Rate 0.17 mV/sec
⑧ Purge w/ Argon 99.999%
⑨ Done on Par 173/276
⑩ Auto reverse at 5000 μA/cm²

Orangish-Copper-colored test solution.
Dark copper flake covering film. Sample underneath is pinkish color.

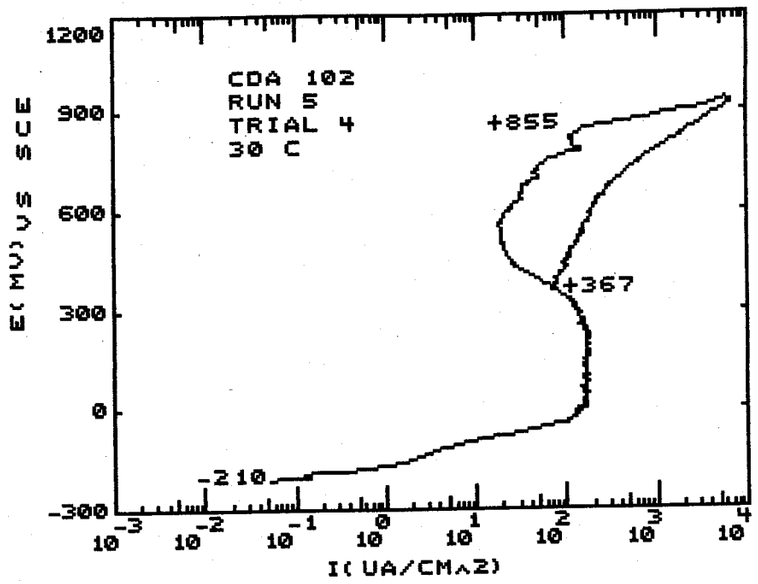
Test stored on EG&G #4
Test done on 7/18/91

Patches of red film.
Over the red film, areas of green deposit. No localized corrosion

Thomas Chapel 7/22/91

10/7/91

CDA 22
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 22
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.117
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-214
MV/PT	4
DATA MAX	6703.911
DATA MIN	-.1457372
ABS MIN	0
ABS MAX	6703.911

LEGEND

CDA 102;RUN 5; TRIAL 4
DE-AERATE W/ARGON
SO4=20;NO3=10;F=2
CL=1000;HCO3=8500;T=30 C

DONE ON PAR 273
22 JULY 1991

Cyclic Polarization of CDA-102
Model Solution: Cl = 1000, HCO_3 = 8500, SO_4 = 20, NO_3 = 10, F = 2 30°C
CDA 22 Run 5 Trial 4
Purpose: Same as CDA 1

The test specimen, preparation, procedures, etc was as described in CDA 17. Ref SCE #4 was used and checked as before, difference was less than 1.5 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 12.1893 g of $NaHCO_3$ and 1.6457 g of NaCl (same lot #'s as p.135). Pipet 20.0 ml of SO_4 stock, 10.0 ml of NO_3 stock and 2.0 ml of F stock solutions (same #'s as p.135). Dilute to the mark.

Spec. Dim: ϕ = 0.655 cm l = 1.905 cm A = 4.117 cm^2

1. Spec held at open circuit for one hour before start.
2. Spec not pre-passivated, all surfaces polished to 600 grit.
3. E corr at start −214
4. E pt 10 min before start — not taken
5. Initial Temp. 29.0°C Final Temp. 33.0°C
6. Initial pH 8.39 Final pH 9.22
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

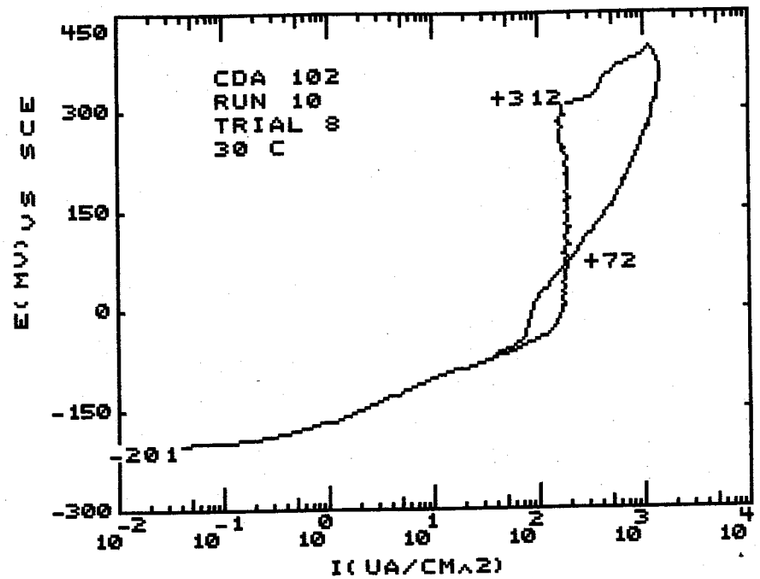
Specimen covered w/ small spots of blue-green corrosion product. Solution remained clear.

Stored on disk EC&A #5

Red deposit under the green deposit. shallow, localized attack under realty.
10/7/91

Walter J. Machowski
7/22/91

CDA 23
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 23
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	1000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.095
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-201
MV/PT	4
DATA MAX	1418.803
DATA MIN	-5.001221
ABS MIN	3.687424E-02
ABS MAX	1418.803

LEGEND

CDA 102;TRIAL 8;RUN 10
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=8500
SO4=1000;T=30 C;F=2

DONE ON PAR 173/276
22 JULY 1991

The cyclic polarization of CDA 102
Model Sol'n: 8500 HCO_3, 1000 Cl, 1000 SO_4, 10 NO_3, 2 F, 30°C

CDA 23

Purpose: Same as CDA 1

The test specimen, preparation, procedures, etc. were described in CDA 17. Ref SCE #1 was used and checked as before, difference < 1.0 mV

Test Solution Prep: In 500 mL of 17 MΩ H_2O in a 1-L volumetric flask, add 1.6465g NaCl, 1.4795g Na_2SO_4, 12.1994g $NaHCO_3$ (Same lot #'s as p135 & p139) pipet, 10.0 mL NO_3, 2.0mL F (Same stock as p135 & p139) Dilute to mark.

Spec. Dim: ϕ = .6325cm l = 1.9025cm A = 4.095cm²

1. Spec not pre-passivated, all surfaces polished to 600 grit
2. Specimen held at open circuit potential for 1-hr before test
3. Ecorr at start -202 mV
4. Ept @ 10min before -128 mV
5. Initial Temp 29°C Final 31°C
6. Initial pH 8.46 Final 9.09
7. Scan Rate 0.17 mV/sec
8. Argon Purge 99.999%
9. Done on Par 173/276
10. Auto reverse at 5000 uA/cm²

Specimen tarnished film with several local attacks. Green precipitate covers these spots with corroded spots beneath. Attack also at junction of sample & holder (green also). Clear solution.

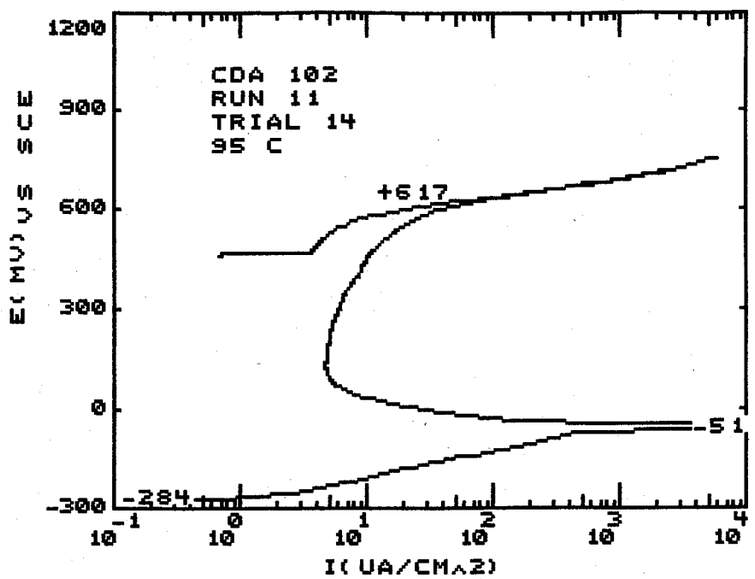
Saved on EG&G #4

Attack not as extensive as in previous sample, CDA 22.

10/7/91

Thomas Page
7/23/91

CDA 24
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 24
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3400 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.102
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-284
MV/PT	4
DATA MAX	5777.669
DATA MIN	-.1487079
ABS MIN	.1487079
ABS MAX	5777.669

LEGEND

CDA 102;TRIAL 14;RUN 11
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=8500
SO4=1000;F=2;T=95 C

DONE ON PAR 173/276
23 JULY 1991

Cyclic Polarization of CDA 102
Model Sol'n : HCO_3 = 8500, Cl = 6, SO_4 = 1000, NO_3 = 10, F = 2 T = 95°C
CDA24 ~~Trial 8 RUN 12~~ Run 11 Trial 14 w/ Mackinnon
Purpose : Same as CDA 1

The test specimen, preparation, procedures, etc. were described in CDA 17. Ref SCE #1 was used and checked against SCE #3, diff < 1.0 mV

Test Solution Prep: To 500 mL of 17 MΩ H_2O in a 1-L volumetric flask, add 12.2020 g $NaHCO_3$, 1.4793 g Na_2SO_4 (same lot #'s as p135 & p139) pipet 10.0 mL NO_3, 10.0 mL Cl, 2.0 mL F (same stock as p135 & p139) dilute to mark.

Specimen Dimension: ϕ = .6327 cm l = 1.9055 cm A = 4.102 cm²

1. Specimen not pre-passivated, all surfaces polished to 600 grit.
2. Specimen held at open circuit potential for 1-h before test
3. Ecorr at start -303 mV
4. Ept @ 10 min before -176 mV
5. Initial Temp 93°C Final 94°C
6. Initial pH 8.51 Final 9.78
7. Scan Rate 0.17 mV/sec
8. Argon Purge 99.999%
9. Done on Par 173/276
10. Auto Reverse at 5000 μA/cm²

Thick black film that does not rub off.
Clear test solution.

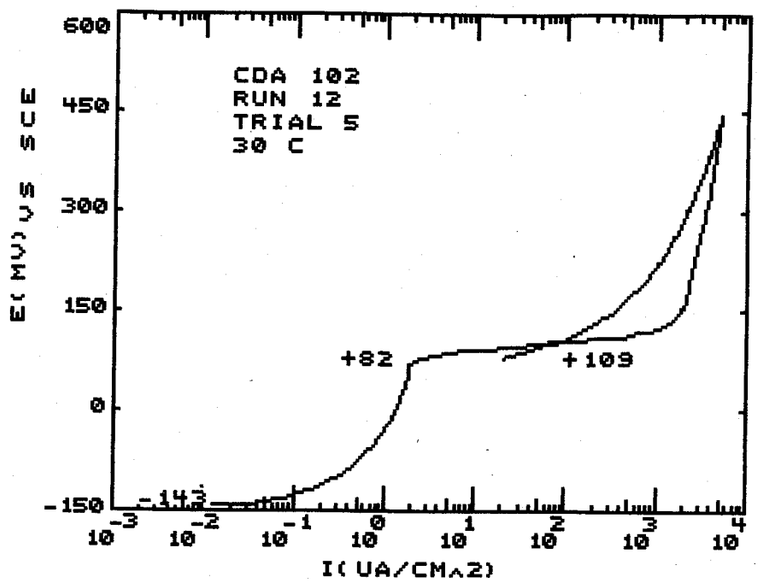
Done on E&G #4

The black film is Thick & opaque.

10/7/91

Thomas C Page
7/31/91

CDA 25
CYCLIC POLN



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 25
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.107
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-143
MV/PT	4
DATA MAX	5137.57
DATA MIN	-498.6608
ABS MIN	8.522036E-03
ABS MAX	5137.57

LEGEND

CDA 102;TRIAL 5;RUN 12
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=85
SO4=1000;F=2;T=30 C

DONE ON PAR 173/276
25 JULY 1991

Cyclic Polarization of CDA 102
Model Sol'n: HCO_3 = 85, Cl = 6, SO_4 = 1000, NO_3 = 10, F = 2 T = 30 °C

CDA 25 TRIAL 5 RUN 12

Purpose: Same as CDA 1

The test specimen, preparation, procedures, etc, were described in CDA 17. Ref SCE #3 was used, checked against SCE #1. diff < 1.0 mV

Test Solution Prep: To 500 mL of 17 MΩ H_2O in a 1-L volumetric flask, add .1221 g $NaHCO_3$, 1.4787 g Na_2SO_4 (same lot #'s as p 135 & p 139) pipet 10.0 mL Cl, 10.0 mL NO_3, 2.0 mL F (same stock as p 135 & p 139) Dilute to mark.

Specimen Dimension: ϕ = .6335 cm = 1.905 cm A = 4.107 cm²

1. Specimen not pre-passivated, all surfaces polished to 600 grit
2. Specimen held at open-circuit potential for 1-h before test
3. Ecorr at start −143 mV vs SCE
4. Ept 10 min before start – not taken
5. Initial Temp 30 °C Final 31 °C
6. Initial pH 8.64 Final 9.24
7. Scan Rate 0.17 mV/sec
8. Argon Purge 99.999%
9. Done on PAR 173/276
10. Auto reverse at 5000 μA/cm²

Specimen had brown flakey film. comes off very easily. Clear test solution.

Saved on EG&G #4

Thomas Chase
7/31/91

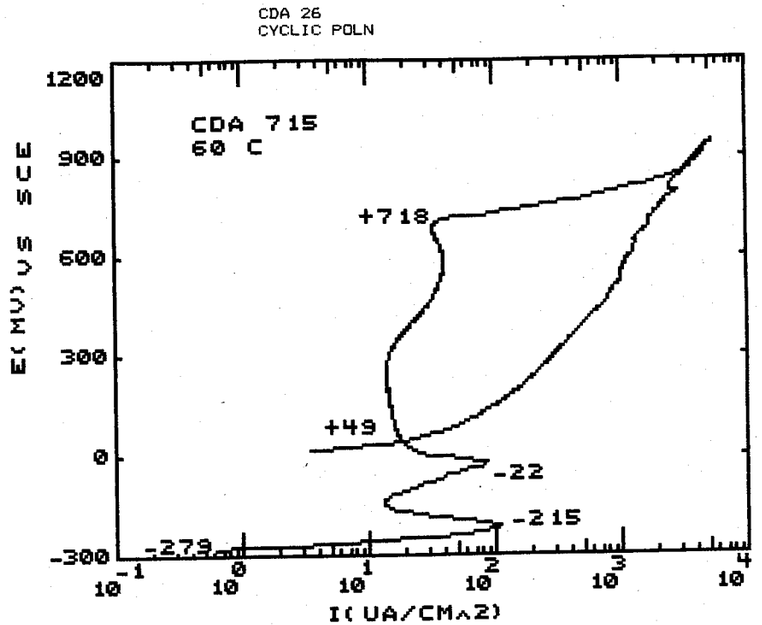
Preparation of F Stock Solution

Purpose: Stock solution used in preparation of test solutions

Weigh out 2.2100g of Na F (Fisher lot # 896405) Dissolve in 500 mL of 17 mΩ water in a 1-liter volumetric flask and dilute to mark.

Label as SN CNWRA 019-191.

Thomas C Pace
7/31/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 26
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.088
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-279
MV/PT	4
DATA MAX	5283.758
DATA MIN	-50.09785
ABS MIN	.611546
ABS MAX	5283.758

LEGEND

CDA 715
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=8500
SO4=1000;F=2;T=60 C

DONE ON PAR 173/276
1 AUG 1991

The Cyclical Polarization of CDA 715
Model Sol'n : 8500 ppm HCO_3; Cl=1000, SO_4=1000, F=2, NO_3=10 T=60°C
CDA 26
Purpose: Same as CDA 1

The test specimen preparation, procedures, etc., were described in CDA 1 except Ref SCE #1 was used. Checked against SCE #3 diff < 1.0 mV.

Test Solution Prep: To 1-L of 17 MΩ H_2O in a 2-L volumetric flask, add 24.400 g $NaHCO_3$, 3.2924 g NaCl, 2.9599 g Na_2SO_4 (Same lot #'s as p135 & p139) pipet 10.0 mL NO_3 and 2.0 mL F (Same stock # as p135 & p139) Dilute to mark. 1-L of this solution for CDA 26 & CDA 27.

Specimen Dimension: ϕ = .6323 cm l = 1.900 cm A = 4.088 cm²

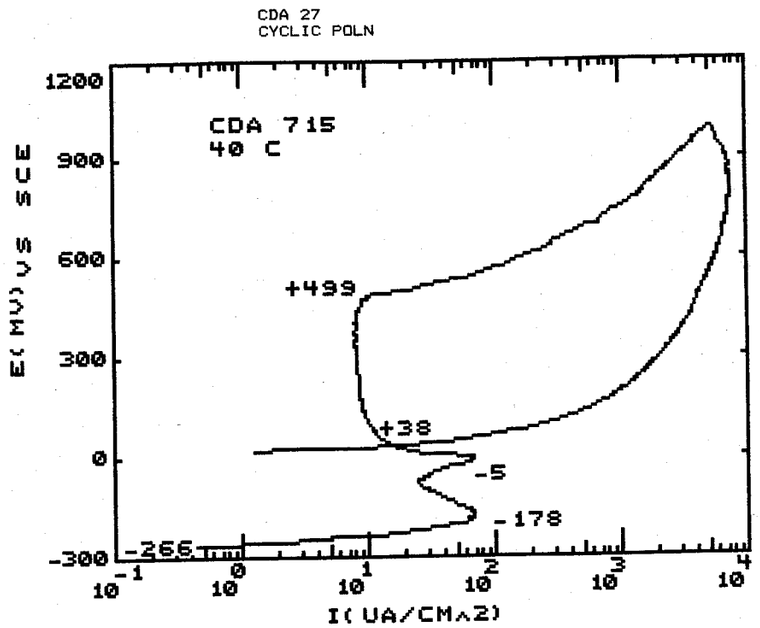
1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open-circuit potential for 1-h before test
3. E corr at start -280 mV vs SCE
4. E pt 10 min before -158 mV
5. Initial Temp 60° C Final 59°C
6. Initial pH 8.49 Final pH 9.48
7. Scan Rate 0.17 mV/sec
8. Argon Purge 99.999%
9. Done on Par 173/276
10. Cato Reverse at 5000 uA/cm²

Few local corrosion pits covered by green precipitate on sample. Test Solution is clear

Save on EG & G #4

Sample white in color in the uncorroded areas.
10/7/91

Thomas C Fog
Aug 2 1991



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 27
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.0966
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-266
MV/PT	4
DATA MAX	7591.661
DATA MIN	-1.269345
ABS MIN	.2196944
ABS MAX	7591.661

LEGEND

CDA 715
DE-AERATE W/ARGON
NO3=10;F=2;T=40 C
CL=1000;SO4=1000;HCO3=8500

DONE ON PAR 273
1 AUG 1991

Cyclical Polarization of CDA 715
Model Soln: HCO_3 = 8500, Cl = 1000, SO_4 = 1000, NO_3 = 10, F = 2 T = 40C

CDA 27

Purpose Same as CDA 1

The test specimen, preparation, procedures, etc., were described in CDA 17. Ref SCE #1 was used. Checked against SCE #3 difference < 1.0 mV

Test Solution Prep : See CDA 26 p.193

Specimen Dimension : ϕ = .6335 cm l = 1.900 cm A = 4.0966 cm^2

1. Specimen not pre-passivated, all surfaces polished to 600 grit.
2. Specimen held at open-circuit potential for 1-4 before test.
3. Ecorr at start -268 mV vs SCE
4. Ept 10 min before +402 mV
5. Initial Temp 40°C Final 40°C
6. Initial pH 8.49 Final 9.33
7. Scan Rate 0.17 mV/sec
8. Argon Purge 99.999 %
9. Done on Par 273
10. Auto reverse at 5000 uA/cm^2

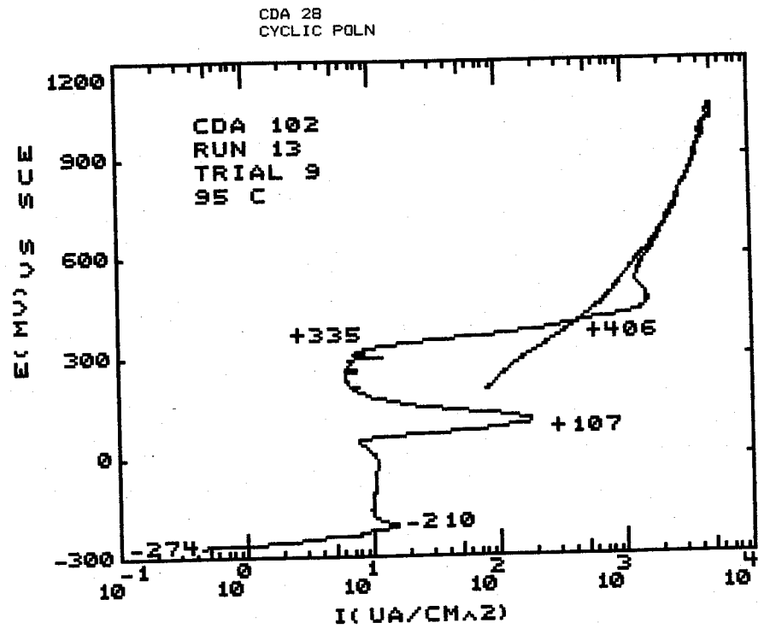
Specimen has quite a lot of pits covered by green precipitate (local) esp near end. Test solution has slight green tint.

Save on EG&G #5

Sample white in color in the uncorroded areas.

10/7/91

Thomas C Page
8/2/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 28
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.0807
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-274
MV/PT	4
DATA MAX	5072.659
DATA MIN	-50.18747
ABS MIN	.2867155
ABS MAX	5072.659

LEGEND

CDA 102;TRIAL 9;RUN 15
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=85
SO4=20;F=2;T=95 C

DONE ON PAR 173/276
2 AUG 1991

Cyclical Polarization of CDA 102
Model Sol'n : HCO_3 = 85; Cl = 6 ; SO_4 = 20, NO_3 = 10, F = 2 T = 95°C

CDA 28 J 9 R 13

Purpose : Same as CDA 1

The test specimen preparation, procedures, etc, were described in CDA 17. Ref SCE #1 was used checked against SCE #3 diff < 1.0 mV

Test Solution Prep: To 500 mL of 17 MΩ H_2O in a 1-L volumetric flask add 0.1224 g $NaHCO_3$ (same lot # as p 135) pipet 10.0 mL Cl, 20.0 mL SO_4, 10.0 mL NO_3, 2.0 mL F (same stock as p135 & p139) Dilute to mark.

Specimen Dimension: ϕ = .6315 cm l = 1.899 cm A = ~~4.08~~ 4.0807 cm² TCA

① Specimen not pre-passivated, all surfaces polished to 600 grit
② Specimen held at open-circuit potential for 1-h before start
③ Ecorr at start −274 mV vs SCE
④ E pt at 10 min before − not taken
⑤ Initial Temp 94°C Final 95.0°C
⑥ Initial pH not taken Final 10.27
⑦ Scan Rate 0.17 mV/sec
⑧ Argon Purge 99.999%
⑨ Done on Par 173/276
⑩ Auto reverse at 5000 μA/cm²

Specimen holder leaked badly. Specimen had a dark powdery film. Solution was brownish. Test should be re-run.

Stored on disk EC+G #4.

Thomas C Page
8/2/91

dark green film/deposit on sample. No visible local attack.
10/7/91

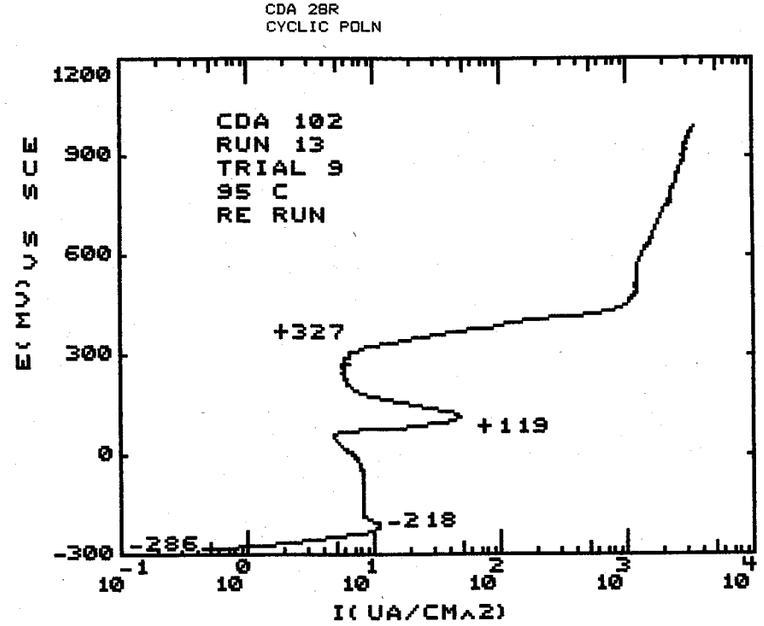
Preparation of NO_3 Stock Solution 1000 ppm

Purpose: Stock solution used in preparation of test solutions.

Weigh out 1.3793 g of $NaNO_3$ (Fisher lot # 897183), dissolve in 500 ml of 17 MΩ water in a 1-liter volumetric flask. Dilute to the mark.

Label as SN CNWRA 019-199.

Walter J. Machowski
8/5/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 28R
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.31
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-286
MV/PT	4
DATA MAX	3508.121
DATA MIN	-475.174
ABS MIN	.2853828
ABS MAX	3508.121

LEGEND

CDA 102;TRIAL 9;RUN 15
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=85
SO4=20;F=2;T=95 C
TEST IS RE-RUN DUE TO LEAK

DONE ON PAR 173/276
6 AUG 1991

Cyclic Polarization of CDA-102
Model Solution: Samoa CDA28

CDA 28R

Purpose: Same as CDA I. This run due to leak in CDA28.

The test specimen, preparation, procedures, etc were as described in CDA 17. Ref SCE #1 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-liter volumetric add 0.1230 g of $NaHCO_3$ (same lot as p.135).

disregard original ~~Pipet 10.0 ml of Cl, 20.0 ml of HSO_4, 10.0 ml of HNO_3, and 2.0 ml of F stock solutions (lot #'s 019-127, 019-199, 019-191, and~~

rewrite Pipet 10.0 ml of Cl, 20.0 ml of SO_4, 10.0 ml of NO_3, and 2.0 ml of F stock solutions # 019-127, 019-137, 019-199, and 019-191 respectively. Dilute to the mark.

Spec. Dim: $\phi = 0.640$ cm $l = 1.907$ cm $A = 4.156$ cm^2

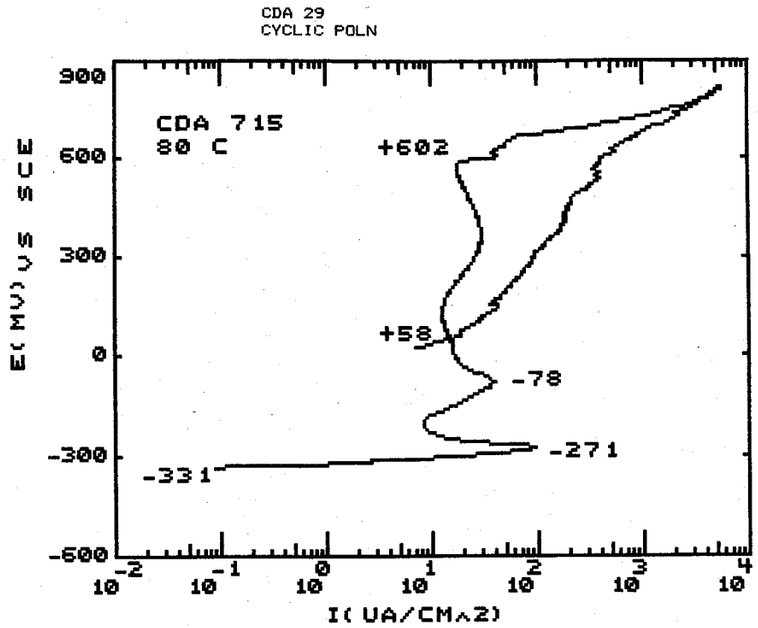
1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour prior to start
3. E corr at start −288 mV vs SCE
4. E Pt 10 min before start −127 mV
5. Initial Temp. 94.2°C Final Temp. 95.8°C
6. Initial pH 8.02 @ 25°C Final pH 10.28 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 173/276
10. Experiment accidentally aborted — data saved; no reverse scan was obtained; will re-run the test

Specimen covered with a dark blackish-green powdery film. Solution had a slight greenish tint.

Stored on disk EBTC #4

Walter J. Machowski
8/6/91

very shallow local attack under green deposit. 10/7/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 29
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.156
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-331
MV/PT	4
DATA MAX	5606.352
DATA MIN	7.218479E-02
ABS MIN	7.218479E-02
ABS MAX	5606.352

LEGEND

CDA 715
DE-AERATE W/ARGON
NO3=10;F=2;T=80 C
CL=1000;SO4=1000;HCO3=8500

DONE ON PAR 273
6 AUG 1991

Cyclic Polarization of CDA-715
Model Solution: 8500 = HCO_3; Cl = 1000, SO_4 = 1000, F = 2, NO_3 = 10 80°C

CDA 29

Purpose: Same as CDA 1.

The test specimen, procedures, preparation, etc were as described in CDA 1. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-L volumetric add 12.2101 g of $NaHCO_3$, 1.6467 g of NaCl, and 1.4781 g Na_2SO_4 (Fisher lot #'s 897789, 885407, + 901213 resp.) Pipet 10.0 ml of NO_3 and 2.0 ml of F stock solutions (#019-199 and 019-191 resp.) dilute to the mark.

Spec. Dim: Φ = 0.636 cm l = 1.998 cm A = 4.310 cm²

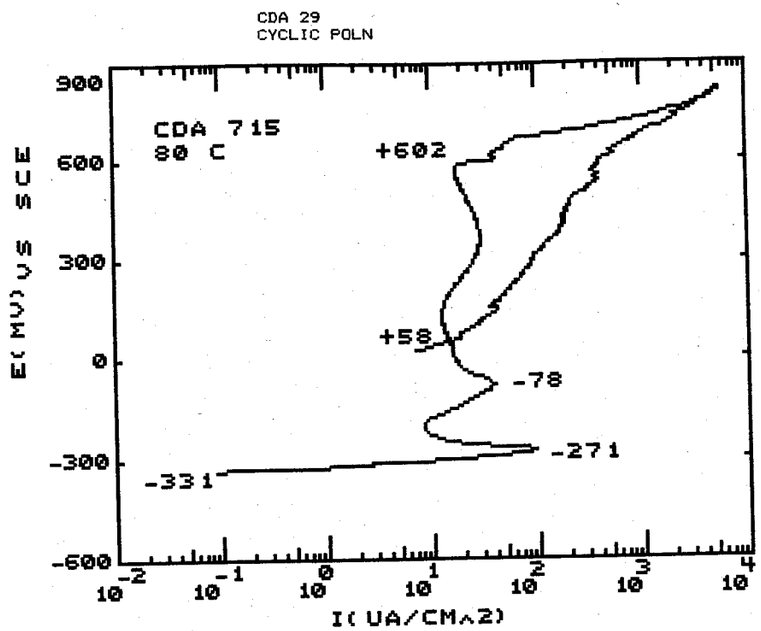
1. Specimen not pre-passivated; all surface polished to 600 grit
2. Specimen held at open circuit for one hour prior to start
3. E corr at start −332 mV vs SCE
4. E Pt 10 min before start +90 mV
5. Initial Temp. 81.0°C Final Temp. 80.0°C
6. Initial pH 8.34 @ 25°C Final pH 9.51 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm²

Specimen had small amount of greenish corrosion product at mounted end + at edge of lower end. Specimen somewhat darkened w/ some areas of shallow localized corrosion appearing. Solution remained clear.

Stored on disk EC+A #5.

10/7/91

Walter J. Mochowski
8/6/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 29
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.156
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-331
MV/PT	4
DATA MAX	5606.352
DATA MIN	7.218479E-02
ABS MIN	7.218479E-02
ABS MAX	5606.352

LEGEND

CDA 715
DE-AERATE W/ARGON
NO3=10;F=2;T=80 C
CL=1000;SO4=1000;HCO3=8500

DONE ON PAR 273
6 AUG 1991

Cyclic Polarization of CDA-715
Model Solution: 8500 = HCO_3; Cl = 1000, SO_4 = 1000, F = 2, NO_3 = 10 80°C
CDA 29

Purpose: Same as CDA 1.

The test specimen, procedures, preparation, etc were as described in CDA 1. Ref SCE #4 was used and checked as before, difference was less than 1.0 mV

Test Solution Prep: To 500 ml of 17MΩ water in a 1-L volumetric add 13.2101 g of $NaHCO_3$, 1.6467 g of NaCl, and 1.4781 g Na_2SO_4 (Fisher lot #'s 897789, 885407, + 901213 resp.) Pipet 10.0 ml of NO_3 and 2.0 ml of F stock solutions (#019-199 and 019-191 resp.) dilute to the mark.

Spec. Dim: Ø = 0.636 cm l = 1.998 cm A = 4.310 cm^2

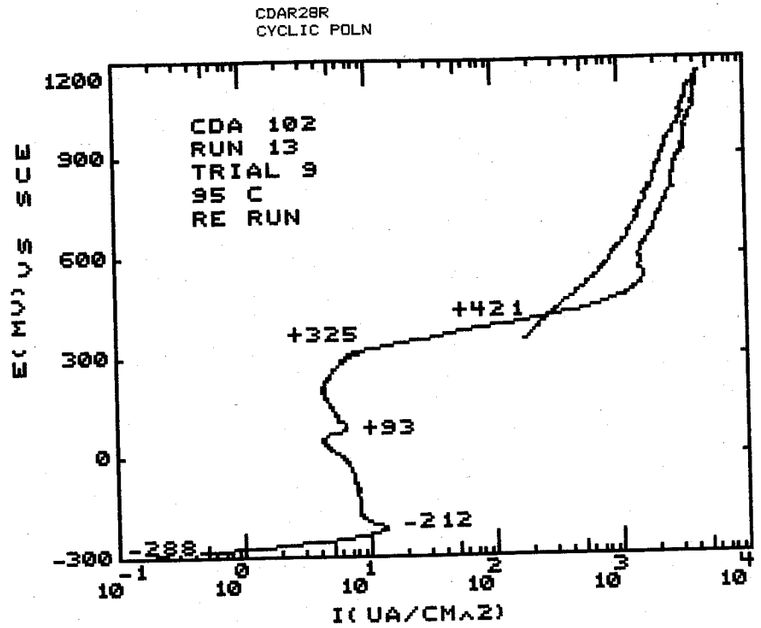
1. Specimen not pre-passivated; all surface polished to 600 grit
2. Specimen held at open circuit for one hour prior to start
3. E corr at start −332 mV vs SCE
4. E Pt 10 min before start +90 mV
5. Initial Temp. 81.0°C Final Temp. 80.0°C
6. Initial pH 8.34 @ 25°C Final pH 9.51 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen had small amount of greenish corrosion product at mounted end + at edge of lower end. Specimen somewhat darkened w/ some areas of shallow localized corrosion appearing. Solution remained clear.

Stored on disk EC&A #5.

10/7/91

Walter J. Mochowski
8/6/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDAR28R
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.162
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-288
MV/PT	4
DATA MAX	4404.132
DATA MIN	.2090341
ABS MIN	.2090341
ABS MAX	4404.132

LEGEND

CDA 102;TRIAL 9;RUN 15
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=85
SO4=20;F=2;T=95 C
THIS IS 2ND RE-RUN OF THIS TEST

DONE ON PAR 173/276
7 AUG 1991

Cyclic Polarization of CDA-102
Model Solution: Same as CDA28R

CDAR28R

Purpose: Same as CDA 1. This re-run due to accidental shut off on CDA 28R.

The test specimen, etc were as in CDA 28R. Ref SCE #4 was used and checked, difference less than 1.0mV.

Test Solution Prep: Same as CDA28R using same lot #'s for chemicals and stock solutions. Actual weight of $NaHCO_3$ added was 0.1223g.

Spec. Dim: $\phi = 0.642$ cm $l = 1.903$ cm $A = 4.162\ cm^2$

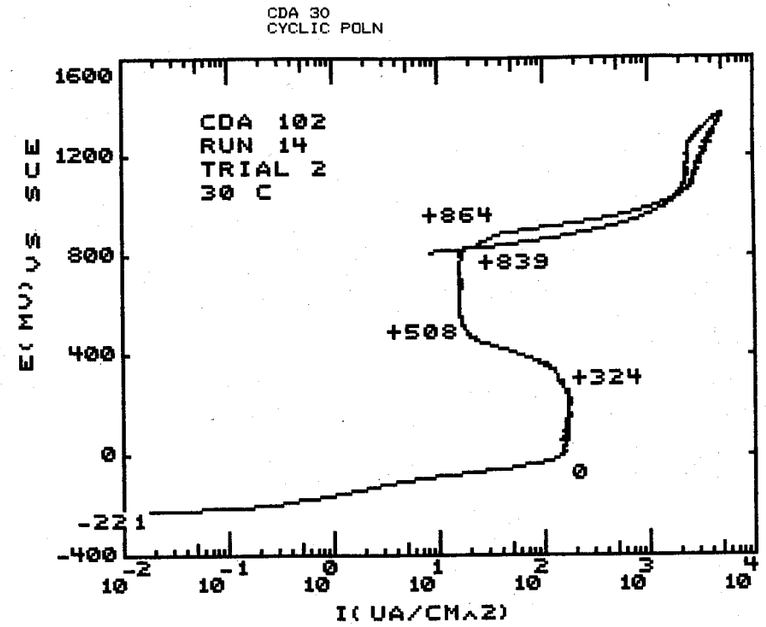
1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before starting.
3. E corr at start −290 mV vs SCE
4. E Pt 10 min. before start −47mV
5. Initial Temp. 96.0°C Final Temp. 94.8°C
6. Initial pH 8.20 @25°C Final pH 10.37 @25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 173/276
10. Manual rev @ 178804A/+1157mV

Specimen covered w/a dark flaky scale which easily came off. Some areas appeared red-brown when the outside scale was wiped off. Solution had a dirty brown color.

Stored on disk EC&C #4

10/7/91

Walter J Machowski
8/7/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 30
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.119
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-221
MV/PT	4
DATA MAX	5122.603
DATA MIN	1.165331E-02
ABS MIN	1.165331E-02
ABS MAX	5122.603

LEGEND

CDA 102;RUN 14; TRIAL 2
DE-AERATE W/ARGON
CL=6;NO3=10;HCO3=8500
SO4=20;F=2;T=30 C

DONE ON PAR 173/276
8 AUG 1991

Cyclic Polarization of CDA-102
Model Solution: HCO_3 = 8500, Cl = 6, SO_4 = 20, NO_3 = 10, F = 2 30°C
CDA 30 Run 14; Trial 2
Purpose: Same as CDA 1.

The test specimen, procedures, preparation, etc were as described in CDA 17. Ref SCE #4 was used and checked vs another, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-L volumetric add 12.1898 g of $NaHCO_3$ (Fisher lot # 897789). Pipet 0.0 ml of Cl, 20.0 ml of SO_4, 10.0 ml of NO_3, and 2.0 ml of F stock solutions (same #'s as p. 201). Dilute to the mark.

Spec. Dim: d = 0.635 cm l = 1.906 cm A = 4.119 cm^2

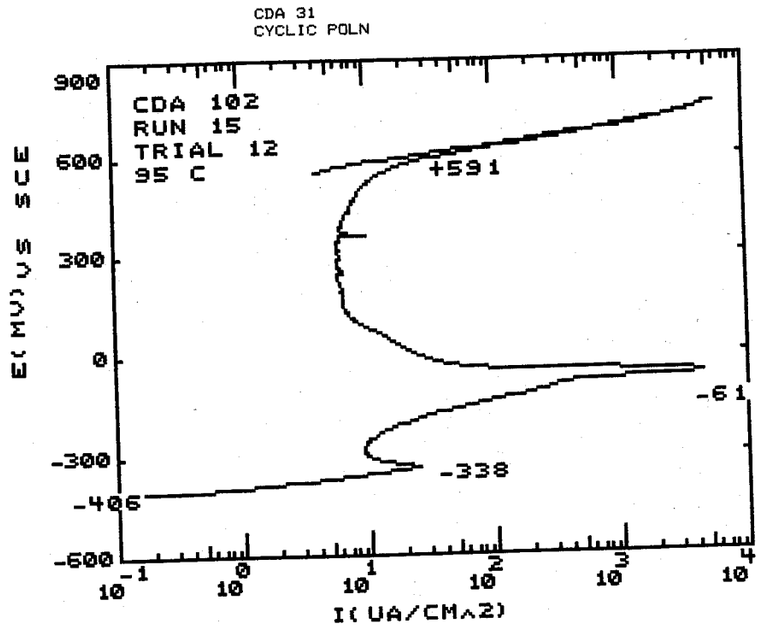
1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start
4. E Pt 10 min before start +10 mV
5. Initial Temp. 29.2°C Final Temp. 30.0°C
6. Initial pH 8.41 @ 25°C Final pH 9.28 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen was very dark all over with a few areas of greenish-bluish localized corrosion product. Some localized attack may have occurred in some spots under this greenish corrosion product. Solution remained clear.

Stored on disk EC+C #4

10/7/91

Walter J. Pachowski
8/8/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 31
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.194
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-406
MV/PT	4
DATA MAX	5937.053
DATA MIN	.1168336
ABS MIN	.1168336
ABS MAX	5937.053

LEGEND

CDA 102;RUN 15; TRIAL 12
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=8500
SO4=20;F=2;T=95 C

DONE ON PAR 173/276
9 AUG 1991

Cyclic Polarization of CDA-102
Model Solution: HCO_3=8500, Cl=1000, SO_4=20, NO_3=10, F=2 95°C

CDA 31 Run 15 Trial 12

Purpose: Same as CDA I.

Test specimen, preparation, procedures, etc were as in CDA 17. Ref SCE #4 was used, and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-L volumetric add 12.1983 g of $NaHCO_3$ and 1.6468 g of NaCl (same lot #'s as p.203). Pipet 20.0 ml of SO_4, 10.0 ml of NO_3 and 20 ml of F stock solutions (lot #'s 019-137, 019-199 + 019-191 resp.). Dilute to the mark.

Spec. dim: ϕ=0.638 cm l=1.908 cm A=4.194 cm²

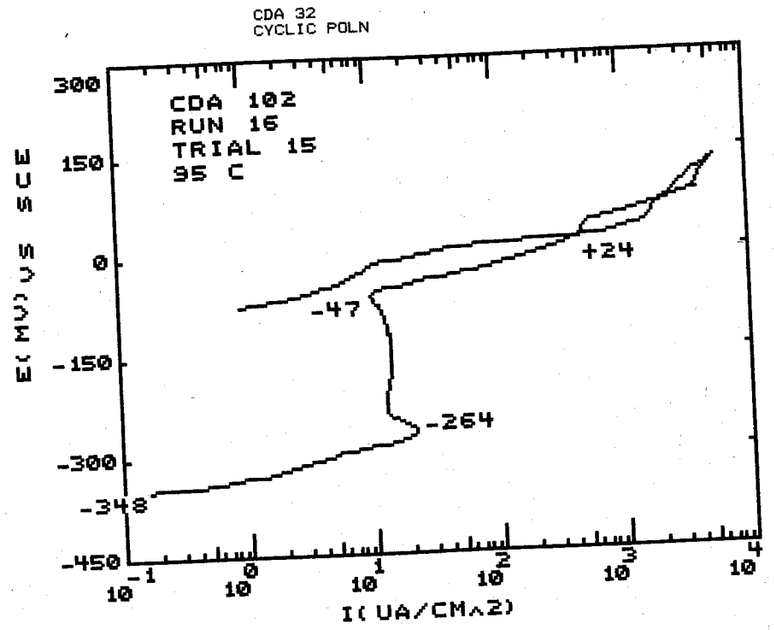
1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start
4. E Pt 10 min before start -208 mV
5. Initial Temp. 95.5°C Final Temp. 95.5°C
6. Initial pH 8.36 @ 25°C Final pH 9.86 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 173/276
10. Auto reverse @ 5000 μA/cm²

Specimen covered w/a black, moderately adherent film. Solution remained clean.

Stored on disk EC+C #4

Walter J. Mochowski
8/9/91

10/7/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 32
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.12
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-348
MV/PT	4
DATA MAX	5582.524
DATA MIN	-4.970874
ABS MIN	.1337379
ABS MAX	5582.524

LEGEND

CDA 102;RUN 16; TRIAL 15
DE-AERATE W/ARGON
CL=1000;NO3=10;HCO3=85
SO4=1000;F=2;T=95 C

DONE ON PAR 173/276
14 AUG 1991

Cyclic Polarization of CDA-102
Model Solution: Cl=1000, SO_4=1000, NO_3=10, F=2, HCO_3=85 95°C

CDA 32 Run 16 Trial 15
Purpose: Same as CDA 2.

The test specimen, preparation, procedures, etc were as described in CDA 17. Ref SCE #4 was used and checked as before, difference was less than 10 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-L vol-umetric add 0.1219 g $NaHCO_3$, 1.6458 g of NaCl and 1.4790 g of Na_2SO_4 (Fisher lot #'s 897789, 885407, and 901213 resp). Pipet 10.0 ml of NO_3 and 2.0 ml of F stock solutions (CWRA #'s 019-199 and 019-191 resp.) Dilute to the mark.

Spec. Dim: ø = 0.636 cm l = 1.903 cm A = 4.120 cm^2.

1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start −349 mV vs SCE
4. E pt 10 min before start −224 mV
5. Initial Temp. 95.5°C Final Temp. 95.0°C
6. Initial pH 8.13 @ 25°C Final pH 10.35 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 173/276
10. Auto reverse @ 5000 μA/cm^2

Specimen covered w/a reddish-brown flaky scale which easily came off. General corrosion occurred + pains of the metal were easily visible. Solution was a bright yellow-

Stored on disk CDA #4

Walter J. Machowski
8/14/91

10/7/91

10/18/91

Av. init. pH: 8.35
std. dev.: 0.16

Av. Final pH (30C): 9.24
std. dev.: 0.15

Av. Final pH (95C): 9.95
std. dev.: 0.15

A - Active
A/P - Active-Passive

Summary of Factorial Experiments on CDA-715

Alloy	Run No.	Trial No	HCO3	Cl	SO4	NO3	T	Ecorr	Ebreak	Erp	Comments	
CDA 715	7	1	85	6	20	10	30	-229	56	56	Uniform corrosion, brown film	A/P?
	14	2	8500	6	20	10	30	-230	831	799	No pitting, Ni-color	
	9	3	85	1000	20	10	30	-261	NA	NA	Uniform corrosion, Ni color	A
	5	4	8500	1000	20	10	30	-280	845	13	Pits, green deposit, Ni-color	
	12	5	85	6	1000	10	30	-232	NA	NA	Uniform corrosion, flaky red film	A
	1	6	8500	6	1000	10	30	-249	820	56	Deep Pits, green deposits	
	4	7	85	1000	1000	10	30	-283	NA	NA	Uniform corrosion, red film	A
	10	8	8500	1000	1000	10	30	-259	506	26	Deep pits, green deposit, Ni-color	
	10	8	8500	1000	1000	10	30	-237	678	54	Shallow pits, green deposit,Ni-colo	
	13	9	85	6	20	10	95	-299	198	-18	Uniform corrosion, Red film	A/P
	8	10	8500	6	20	10	95	-427	602	530	No pitting, dark brown stain	
	2	11	85	1000	20	10	95	-338	-29	-242	Uniform corrosion,red film	A/P
	15	12	8500	1000	20	10	95	-365	628	552	No pitting	
	3	13	85	6	1000	10	95	-343	74	-162	A few shallow pits	A/P
	11	14	8500	6	1000	10	95	-350	611	551	Shallow pits at crevice	
	16	15	85	1000	1000	10	95	-293	-24	-241	Uniform corrosion, Red film	A/P
	6	16	8500	1000	1000	10	95	-425	612	525	No pits, Ni-color	

N. Sridhar

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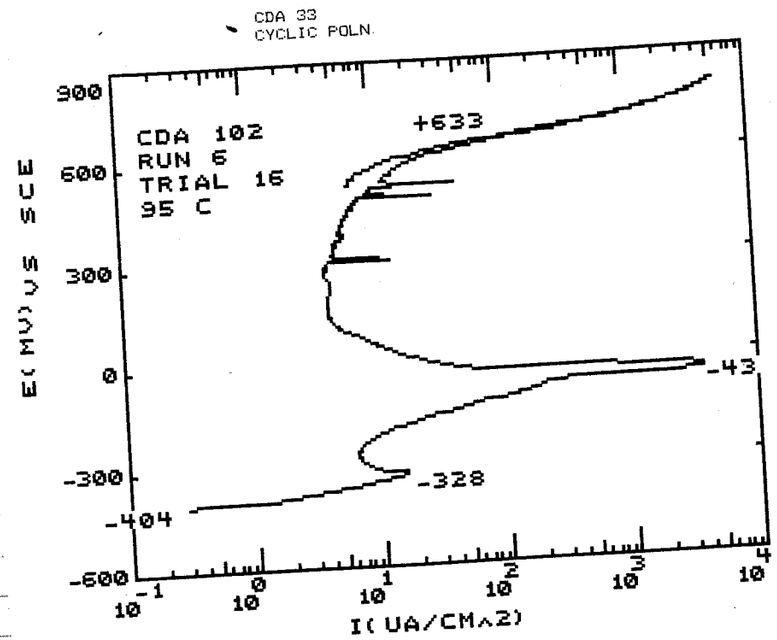
Metta J. Machuca
10/23/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 33
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.113
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-404
MV/PT	4
DATA MAX	5737.904
DATA MIN	.2917579
ABS MIN	.2917579
ABS MAX	5737.904

LEGEND

CDA 102; RUN 6; TRIAL 16
DE-AERATE W/ARGON
NO3=10;F=2;T=95 C
CL=1000;SO4=1000;HCO3=8500

DONE ON PAR 273
22 OCT 1991

Cyclic Polarization of CDA-102
Model Solution: Cl=1000; SO_4=1000; HCO_3=8500; NO_3=10; F=2 95°C
CDA 33 Run 6; Trial 16

Purpose: Same as CDA 2 (p.133)

The test specimen, preparation, procedures, etc were as described in CDA 17 (p.171). Ref SCE #1 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-L volumetric add 12.1739 g $NaHCO_3$, 1.6460 g NaCl and 1.4789 g Na_2SO_4 (Fisher lot #'s 897788, 885407, & 901213 resp.). Pipet 10.0 ml of NO_3 stock (and 2.0 ml of F stock solution #019-199 and #019-191 resp.). Dilute to the mark.

Spec. Dim: ϕ=0.653 cm l=1.910 cm A=4.113 cm²

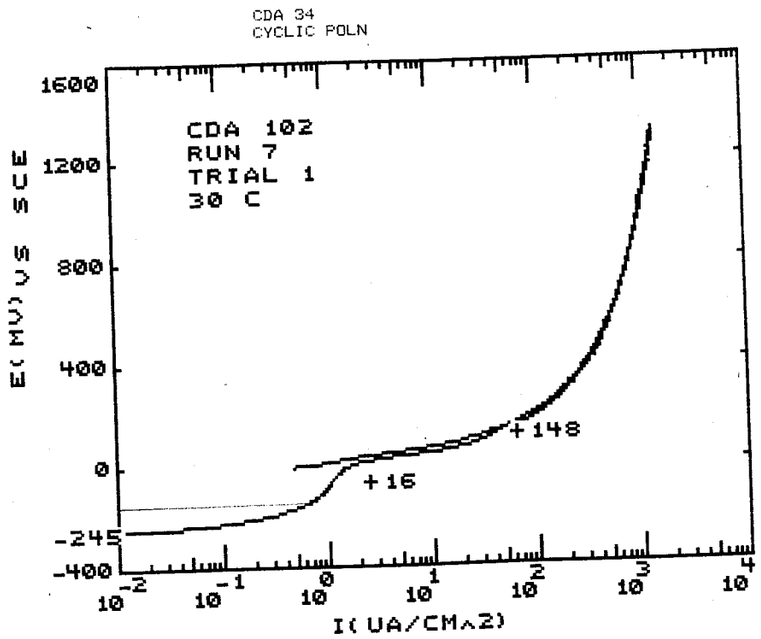
1. Specimen not pre-passivated; all surfaces polished to 600 grit.
2. Specimen held at open circuit for one hour before start
3. E corr at start −405 mV vs SCE
4. E Pt 10 min before start −194 mV
5. Initial Temp. 95.5°C Final Temp. 94.0°C
6. Initial pH 8.29 @ 25°C Final pH 9.65 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm²

Specimen covered w/a black, dull uniform film which was moderately adherent. Test solution remained water clear.

Stored on disk EG&G #5.

12/16/91

Walter J. Mochowski
10/22/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 34
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.106
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-245
MV/PT	4
DATA MAX	1444.228
DATA MIN	1.169021E-02
ABS MIN	1.169021E-02
ABS MAX	1444.228

LEGEND

CDA 102; RUN 7; TRIAL 1
DE-AERATE W/ARGON
CL=6;NO3=10;SO4=20
F=2;HCO3=85;T=30 C

DONE ON PAR 273
23 OCT 1991

Cyclic Polarization of CDA-102
Model Solution: Cl = 6, SO_4 = 20, NO_3 = 10, F = 2, HCO_3 = 85 30°C

CDA 34 Run 7; Trial 1

Purpose: Same as CDA 2 (p.133)

The test specimen, preparation, procedures, etc were as described in CDA 17 (p.171). Ref SCE #4 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-L volumetric add 0.1226 g of $NaHCO_3$ (same lot # as p.215). Pipet 10.0 ml of Cl stock, 20.0 ml of SO_4 stock, 10.0 ml of NO_3 stock, and 20 ml of F stock solutions (lot #'s 019-127, 019-132, 019-199, + 019-190 resp.) dilute to the mark.

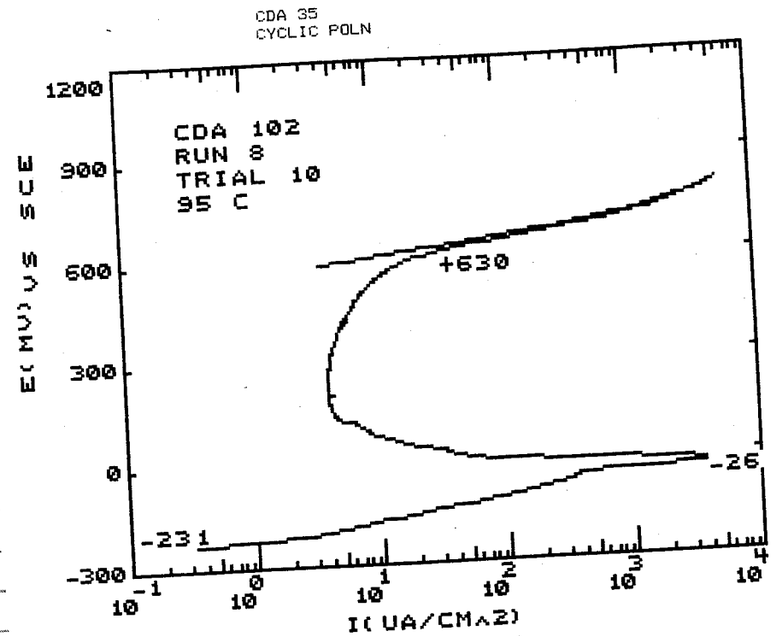
Spec. Dim: ϕ = 0.634 cm l = 1.903 cm A = 4.106 cm²

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start −246 mV vs SCE
4. E Pt 10 min. before start −170 mV
5. Initial Temp. 30.0°C Final Temp. 31.0°C
6. Initial pH 8.18 @ 25°C Final pH 9.67 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Manual reverse @ 5930 μA / +1311 mV

Specimen covered w/a dark brownish film which flaked off very easily. General corrosion was evident, and pitting could be discerned on the specimen. Solution had a slight bluish tinge, mostly due to a fluffy bluish precipitate (small amount).

Stored on disk EG+G #5

Walter J. Mochowski
10/23/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 35
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.095
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-231
MV/PT	4
DATA MAX	5470.086
DATA MIN	.3250305
ABS MIN	.3250305
ABS MAX	5470.086

LEGEND

CDA 102; RUN 8; TRIAL 10
DE-AERATE W/ARGON
CL=6;NO3=10;SO4=20;F=2
HCO3=8500;T=95 C

DONE ON PAR 273
24 OCT 1991

Cyclic Polarization of CDA-102
Model Solution: HCO_3=8500; Cl=6, SO_4=20, NO_3=10, F=2 95°C

CDA 35 Run 8; Trial 10

Purpose: Same as CDA 1 (p. 133).

The test specimen, preparation, procedures, etc were as described in CDA 17 (p. 121). Ref SCE #1 was used and checked as before, differences were less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-L volumetric add 12.1978 g $NaHCO_3$ (same lot # as p. 215). Pipet 10.0 ml of Cl, 20.0 ml of SO_4, 10.0 ml of NO_3 and 2.0 ml of F stock solutions (same lot #'s as p. 217). Dilute to the mark.

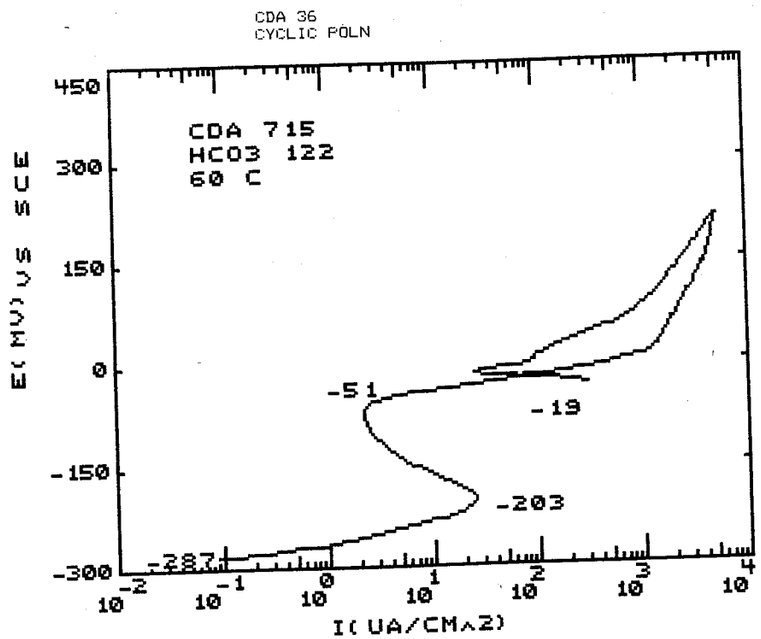
Spec Dim: ϕ=0.635 cm l=1.894 cm A=4.095 cm^2

① Specimen not pre-passivated; all surfaces polished to 600 grit
② Specimen held at open circuit for one hour before start
③ E_{corr} at start −231 mV vs SCE
④ E Pt 10 min. before start −197 mV
⑤ Initial Temp. 95.0°C Final Temp. 94.2°C
⑥ Initial pH 8.35 @ 25°C Final pH 9.69 @ 25°C
⑦ Scan rate 0.17 mV/sec
⑧ Argon purge
⑨ Done on PAR 273
⑩ Auto reverse @ 5000 μA/cm^2

Specimen covered w/a black, dull, uniform film which was moderately adherent. Test solution remained water clear.

Stored on disk EC+C #5.

Walter J. Mochowski
10/24/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 36
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.07
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-287
MV/PT	4
DATA MAX	5159.705
DATA MIN	-408.3538
ABS MIN	5.651106E-02
ABS MAX	5159.705

LEGEND

CDA 715; EFFECT OF BICARBONATE
DE-AERATE W/ARGON
HCO3=122; CL=1000; SO4=1000
NO3=10; F=2
60 C

DONE ON PAR 273
25 OCT 1991

Cyclic Polarization of CDA-715
Model Solution: HCO_3 = 122; Cl=1000; SO_4=1000; NO_3=10; F=2 60°C

CDA 36

Purpose: To evaluate the effect of bicarbonate on the pitting of CDA-715.

CDA-715 (Lot # 7037) was used. Specimen preparation, procedures, etc were as described in CDA 2 (p. 133). Ref SCE #1 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: To 500 ml of 17 MΩ water in a 1-L volumetric add 0.1691 g of $NaHCO_3$ (Same lot # as p. 215). Add 1.4881 g of Na_2SO_4 and 1.6468 g NaCl (lot #'s on p. 215). Pipet 10.0 ml of NO_3 and 2.0 ml of F stock solutions (lot #'s on p. 215). Dilute to the mark.

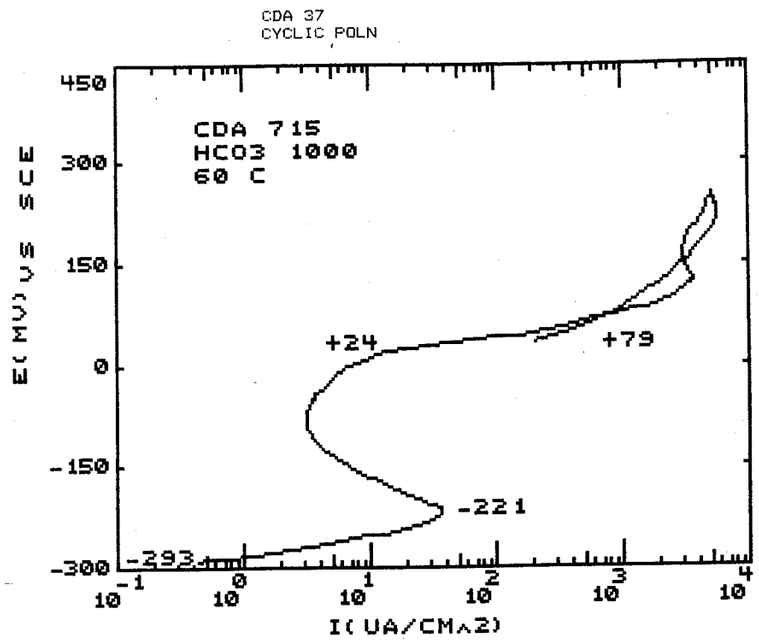
Spec. Dim: ϕ = 0.632 cm l = 1.896 cm A = 4.070 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start -287 mV vs SCE
4. E PC 10 min before start -2 mV.
5. Initial Temp. 61.0°C Final Temp. 61.0°C
6. Initial pH 8.05 @ 25°C Final pH 9.18 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen covered w/a copper colored film which easily flaked off. Solution was clear with some orange precipitate. No localized attack observed.

Stored on disk EG+G #5.

Walter J. Mackowski
10/25/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 37
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.098
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-293
MV/PT	4
DATA MAX	5710.103
DATA MIN	-1059.053
ABS MIN	.2098585
ABS MAX	5710.103

LEGEND

CDA 715; EFFECT OF BICARBONATE
DE-AERATE W/ARGON
HCO3=1000; CL=1000; SO4=1000
NO3=10; F=2
60 C

DONE ON PAR 273
28 OCT 1991

Cyclic Polarization of CDA-715
Model Solution: Same as p.221 except 1000ppm HCO_3 60°C
CDA 37
Purpose: Same as CDA 36 (p. 221)

The test specimen, preparation, procedures, cell, etc were as described in CDA 1 (p. 133). Ref SCE #1 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: Prepared as on p.221 from same chemical + solution lot #'s. Actual salt weights were 1.3880 g $NaHCO_3$; 1.4789 g Na_2SO_4 and 1.6472 g of NaCl.

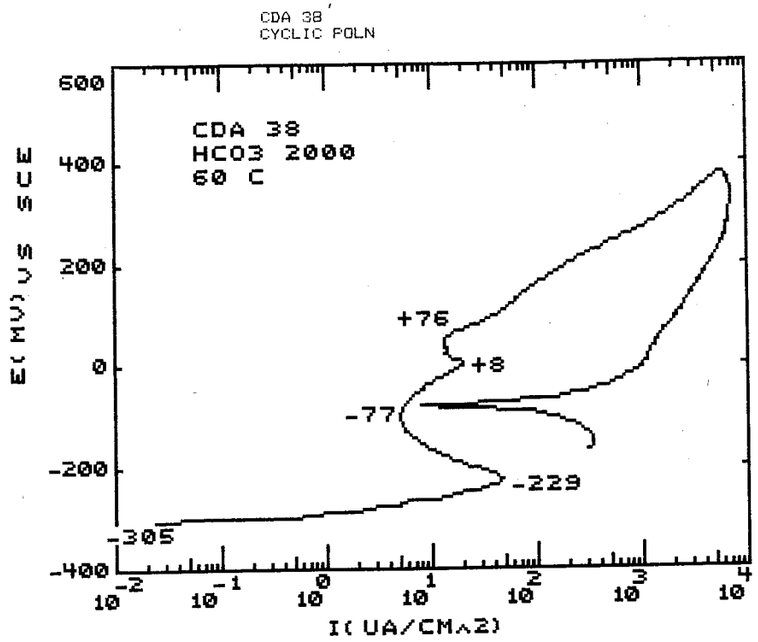
Spec. Dim: $\phi = 0.636$ cm $l = 1.892$ cm $A = 4.098$ cm^2

1. Specimen not pre-passivated; all surface polished to 600 grit.
2. Specimen held at open circuit for one hour before start.
3. E corr at start −293 mV vs SCE.
4. E Pt 10 min before start +50 mV.
5. Initial Temp. 60.5°C Final Temp. 59.0°C
6. Initial pH 8.37 @ 25°C Final pH 9.09 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen covered in part w/ reddish-brown film on top of which was some bluish-green film. Film was easily removed. Solution remained clear. No pitting or localized attack observed.

Stored on disk EC+C #5.

Walter J. Mackowski
10/28/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 38
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.103
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-305
MV/PT	4
DATA MAX	7019.254
DATA MIN	-338.7765
ABS MIN	2.437241E-02
ABS MAX	7019.254

LEGEND

CDA 715; EFFECT OF BICARBONATE
DE-AERATE W/ARGON
HCO3=2000; CL=1000; SO4=1000
NO3=10; F=2
60 C

DONE ON PAR 273
29 OCT 1991

Cyclic Polarization of CDA-715
Model Solution: Same as p221 except 2000 ppm HCO_3 60°C
CDA 38
Purpose: Same as CDA 36 (p.221)

The test specimen, preparation, procedures, etc were as described in CDA 2 (p.133). Ref SCE #1 was used and checked as before, difference was less than 1.0 mV.

Test Solution Prep: Prepared as on p.221 from same chemical + solution lot #'s. Actual salt weights used were 2.7792 g $NaHCO_3$; 1.4790 g Na_2SO_4; + 1.6461 g of NaCl.

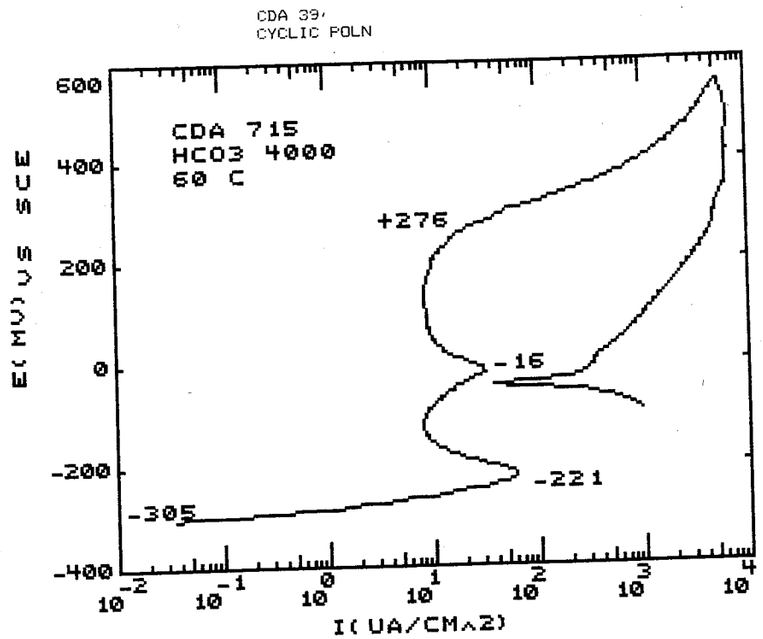
Spec. Dim: ϕ = 0.635 cm l = 1.898 g/cm (avg.) A = 4.103 cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimens held at open circuit for one hour before start
3. E corr at start −305 mV vs SCE
4. E Pt 10 min before start +51 mV
5. Initial Temp. 60.0°C Final Temp. 60.0°C
6. Initial pH 8.39 @ 25°C Final pH 9.28 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen had copper colored scale on it. Solution was clear. Some shallow pits and/or localized attack was evident.

Stored on disk EC+A #5

Walter J. Kochowski
10/29/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 39
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.095
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-305
MV/PT	4
DATA MAX	6691.087
DATA MIN	-959.707
ABS MIN	3.614164E-02
ABS MAX	6691.087

LEGEND

CDA 715; EFFECT OF BICARBONATE
DE-AERATE W/ARGON
HCO3=4000; CL=1000; SO4=1000
NO3=10; F=2
60 C

DONE ON PAR 273
30 OCT 1991

Cyclic Polarization of CDA-715
Model Solution: same as p.221 except 4000 ppm HCO_3 60°C
CDA 39
Purpose: same as CDA 36 (p.221).

The test specimen, preparation, procedures, cell, etc were as described in CDA 2 (p.133). Ref SCE #1 was used and checked as before, difference was less than 1 mV.

Test Solution Prep. Prepared as on p.221 from same chemical and solution lot #'s. Actual salt weights used were 5.5555 g $NaHCO_3$; 1.4790 g Na_2SO_4; and 1.6459 g of NaCl.

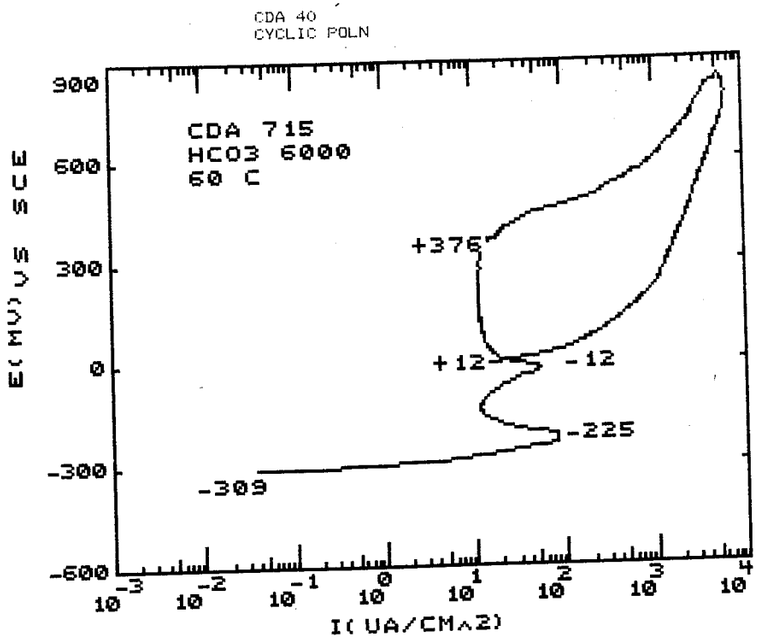
Spec. Dim: $\phi = 0.635$ cm $l = 1.894$ cm $A = 4.095$ cm^2

1. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start −305 mV vs SCE
4. E Pt 10 min before start +62 mV
5. Initial Temp. 60.0°C Final Temp. 60.0°C
6. Initial pH 8.34 @ 25°C Final pH 9.23 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273
10. Auto reverse @ 5000 μA/cm^2

Specimen had ~50% area of copper colored scale w/ some bluish green product on top of that. Pitting was evident in the "silver" colored part of the specimen. Solution was clear.

Stored on disk EB+B #5

Walter J. Moberly
10/30/91



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CDA 40
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.096
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

ECORR	-313
MV/PT	4
DATA MAX	6567.382
DATA MIN	-3.662109E-02
ABS MIN	0
ABS MAX	6567.382

LEGEND

CDA 715; EFFECT OF BICARBONATE
DE-AERATE W/ARGON
HCO3=6000; SO4=1000; CL=1000
NO3=10; F=2
60 C

DONE ON PAR 273
31 OCT 1991

Cyclic Polarization of CDA-715
Model Solution: Same as p.221 <u>except</u> 6000 ppm HCO_3 60°C
CDA 40

<u>Purpose</u>: Same as CDA 36 (p.221).

The test specimen, procedure, preparation, etc. were as described in CDA I (p.133). Ref SCE#1 was used and checked as before, difference was less than 1.0 mV.

<u>Test Solution Prep</u>: Prepared as on p.221 from the same chemical and solution lot #'s. Actual salt weights used were 8.3334 g $NaHCO_3$; 1.4792 g Na_2SO_4; + 1.6470 g NaCl.

<u>Spec. Dim</u>: $\phi = 0.634$ cm $l = 1.898$ cm $A = 4.096$ cm^2

0. Specimen not pre-passivated; all surfaces polished to 600 grit
2. Specimen held at open circuit for one hour before start
3. E corr at start
4. E Pt 10 min before start −50 mV
5. Initial Temp. 61.0°C Final Temp. 60.5°C
6. Initial pH 8.33 @ 25°C Final pH 9.25 @ 25°C
7. Scan rate 0.17 mV/sec
8. Argon purge
9. Done on PAR 273.
10. Auto reverse @ 5000 μA/cm^2

Specimen was slightly darkened w/ greenish globules of corrosion spotted over the surface. No pits were evident. Solution remained clear.

Stored on disk EC+C #5

Shallow areas of attack under green corrosion product.

Walter J. Mlechowski
10/31/91

Preparation of SO_4 Stock Solution

Purpose: Stock solution used in preparation of test solutions.

Weigh out 1.4787 g of Na_2SO_4 (Fisher lot # 90/213). Dissolve in 500 ml of 17 MΩ water in a 1-L volumetric flask + dilute to the mark.

Label as SW CWARA 019-231

Walter J. Machowski
11/1/91

Room temperature test

Purpose: To determine what cause the increase in pH over time in the test solutions.

Solution Prep: A solution containing: 8500 ppm HCO_3; 1000 ppm Cl; 1000 ppm SO_4; 10 ppm NO_3 and 2 ppm F was prepared by the following

In a 2-L volumetric add 1 liter 17 MΩ water add 24.1793 g $NaHCO_3$, 3.2928 g NaCl, and 2.9577 g of Na_2SO_4 (same lot #'s as p. 221). Pipet 20.0 ml of NO_3 and 2.0 ml of F stock solutions (lot # 019-199 + 019-190 resp). dilute to mark.

Method: Approx. 900 ml of this solution was placed in each of two polypropylene bottles which were loosely covered w/ Kimwipes to keep out dust. The solutions were held at 25°C in a shaker bath which oscillated @ 30 Hz. pH readings in triplicate were taken at periodic intervals.

initial pH	8.18, 8.20, 8.22 (all pH's @ 25°C)	
+ 1 day	8.32, 8.32, 8.32 (bottle 1)	8.58, 8.58, 8.58 (bottle 2)
+ 3½ "	8.75, 8.74, 8.74 (")	8.80, 8.80, 8.80 (")
+ 5 "	8.81 8.81 8.81 (")	8.88 8.88 8.88 (")
+ 7 "	8.85 8.85 8.85 (")	8.92 8.91 8.91 (")
+ 9½ "	8.93 8.94 8.94 (")	8.97 8.98 8.98 (")
+ 20 "	8.97 8.97 8.97 (")	9.16 9.16 9.16 (")

A second solution w/ 85 ppm HCO_3 was prepared by: to 500 ml of 17 MΩ in a 1-L volumetric add 0.1224 g $NaHCO_3$ (same lot # as p. 221). Pipet 10.0 ml Cl, 20.0 ml SO_4, 10.0 ml NO_3 and 2.0 ml of F stock solutions (lot #'s on p. 217). dilute to mark.

Place about 200 ml. in a polypropylene bottle as noted above and place in same shake bath.

	all pH's @ 25°C		
initial pH	8.08	8.10	8.08
+ 1 day	8.38	8.48	8.32
+ 3 "	8.75	8.81	8.78

Walter J. Moskowitz
11/1/91

+4½ days	8.82	8.85	8.82	{double checked cal + buffers
+10 days	8.39	8.27	8.27	
+20 days	8.32	8.29	8.30	

A third solution, containing only 8500 ppm HCO_3 was prepared by weighing 12.1994 g of $NaHCO_3$ (lot #on p. 221) into a 1-L volumetric w/500 ml of 17 MΩ water and diluting to volume. About 900 ml were placed in a polypropylene bottle and placed in the same shaker bath as the other two solutions.

initial pH	8.13 @ 25°C		
+1 day	8.50		
+3 days	8.77	8.77	8.78
+7 days	8.95	8.94	8.94
+13 "	9.09	9.08	9.08

95°C Temperature Test

Purpose: Same as on p. 233.

Solution Prep: To 500 ml of 17 MΩ water in a 1-L volumetric add 12.2018 g $NaHCO_3$, 1.6169 g NaCl, + 1.4788 g Na_2SO_4 (same lot #'s as p. 221). Pipet 10.0 ml NO_3 and 2.0 ml of F stock solutions (stock #'s on p. 233). Dilute to mark.

Method: Put about 900 ml of the solution in the 5-port corrosion flask that has been in use. Attach condenser + close all the ports and heat to 95°C. Remove about 30 ml at certain time intervals into a 4 oz glass bottle and stopper tightly. Cool under stream of cold water + when cool, measure pH. Replace into test flask after pH measurement.

Readings as flask heated up:

	pH
40°C after 15 min	8.13
75°C " 30 "	8.46
94°C " 45 "	8.53
95°C " 55 "	8.58

Readings at 95°C (Note: pH was measured at RT after solution attained 95°C)

	pH
after 15 min	8.64
" 30 "	8.70
" 45 "	8.71
" 1 hr	8.73
" 2 "	8.81
" 4 "	8.84

After 4 hrs, started Ar purge: 15 min. after purge start, pH was 9.21
after 30 min of purging pH was 9.35
Discontinued the test.

Walter J Machowski
11/1/91

pH Change in Solutions

95°C Test

Purpose: Same as p. 233.

Solution Prep: Same as on p. 235 w/same chemical + solution lot #'s. Actual salt weights were 12.1983 g $NaHCO_3$, 1.6462 g NaCl and 1.4788 g Na_2SO_4.

Method: Same as on p. 233. This test will be allowed to run for 24 hours.

Initial pH 8.20 @ 25°C Final pH 8.89 @ 25°C

The total dissolved CO_2 was determined using ASTM D513: Method A "Gas Sensing Electrode Test Method". The Orion 720A pH/ISE was used w/a Orion CO_2 gas sensing electrode. The CO_2 value was then converted to bicarbonate. The sample was diluted 200:1 w/17MΩ water.

as mixed CO_2 = 33.6 mg/L 9316 ppm HCO_3

after 24 hrs. CO_2 = 32.4 " " 8989 ppm HCO_3

Walter J. Mackowski
11/13/91

Assay of CO_2 in Bicarbonate Test Solutions:

Purpose: To try to correlate pH changes with changes in bicarbonate concentrations.

The solutions described on pp. 233, 234 + 235 were analyzed for CO_2 concentration using ASTM D513 as described on p. 236.

	Solution	CO_2 (mg/L)	HCO_3 (ppm)
	85 ppm HCO_3 (initial)	65.7	91
	" " (final)	82.1	113
two aliquots of same mixture	8500 ppm HCO_3 (initial)	289 (20:1 dil)	8013
	" " (final)	269 (" ")	7458
	8500 ppm HCO_3 (initial)	296 (20:1 dil)	8207
	" " (final)	269 (" ")	7348
(*)	8500 HCO_3; 24 hr, N_2 (initial)	288 (20:1)	7985
	" " " (final)	185 (20:1)	5129
	8500 HCO_3; 24 hr, no purge (int)	32.4 (200:1)	8873
	" (final)	257 (200:1)	7126
	8500 HCO_3 only (initial)	33.6 (200:1)	9316
	" " " (final)	26.1 (200:1)	7237

(*) this solution measured "fresh" all others measured 2-4 weeks after preparation.

Walter J. Mackowski
11/26/91

Film Formation on CDA-715 (Lot. 7037)

COPTST.1

Purpose: To monitor current in high HCO_3 solution with polarized copper alloy with additive of various reactive ions.

Spec Prep: A cylindrical specimen was wet polished in 220 + finally 600 grit paper. It was cleaned in soapy water in an ultrasonic bath, rinsed w/DI water, rinsed w/acetone and dried in hot air. The 5 neck corrosion cell described on p. 9 was used for the test.

Solution Prep: An 8500 HCO_3, 6 Cl; 10 NO_3; 20 SO_4; and 2 ppm F solution was prepared. Two liters were made in a 2-L volumetric by adding 24.4 g of $NaHCO_3$ (Fisher lot # 897>E9) to 1-L of 17 MΩ water. Pipet 20.0 ml of Cl, 40.0 ml of SO_4, 20.0 ml of NO_3 and 4.0 ml of F stock solutions (# 019-127, 019-231, 019-199 and ~~[illegible]~~ 019-191 resp.) dilute to mark w/ H_2O

Procedure: Purge one hour w/ N_2. Immerse specimen + hold at OCV for one hour. Polarize at +500 mV and after one hour add $Cl^{\ominus}$ to make-up 1000 ppm (use 900 ml of test solution, then add 100 ml of 10,000 ppm $Cl^{\ominus}$) Using multi channel p-stat + Strawberry Tree WB, record current density, voltage + time - see p. 240). Run at room temperature.

Specimen was a dark grey color.

Stored on disk COPDAT 1.

Note: the data acquisition program Workbench PC was used and the logic sequence for the COPTST series was stored under CDA1.HBB.
N. Fuichat

Walter J. Mocharski
12/13/91

Film Formation on CDA-715 (Ex. 7037)

Outputs:
< None >

Name: AO:3 Analog Output
Card Type: STI ACAO-12
Channel Number: 3
Range: +|- 5 Volts
Resolution: 0.024%
Inputs:
CA22 set potential
Outputs:
< None >

Name: AO:4 Analog Output
Card Type: STI ACAO-12
Channel Number: 4
Range: +|- 5 Volts
Resolution: 0.024%
Inputs:
CA26 set potential
Outputs:
< None >

s solution
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et polished
t was
both, rinsed
d in hot air
n p. 9 was

sq; and
iters were
24.4 g of
l water.
f NO_3 and
019-231,
lute to mark

specimen +
500 mV and
00 ppm (use
000 ppm Cl^-)
ee WB,
see p. 240).

Note:

Mocharski

12/13/91

N. Fridkes

Film Formation on CDA-715 (Ex. 7037)

Y Axis Label:	< None >
Y Axis Min:	1.0e-07
Y Axis Max:	0.001
Inputs:	
CA1 c.d. ch.1	
Outputs:	
< None >	

Name:	CH2 c. d. ch.2
Chart Color:	White
X Axis Label:	Hours
X Axis Min:	0.0
X Axis Max:	36.0
Y Axis Label:	< None >
Y Axis Min:	1.0e-07
Y Axis Max:	0.001
Inputs:	
CA4 c. d. ch. 2	
Outputs:	
< None >	

Name:	CH5 c. d. ch3
Chart Color:	White
X Axis Label:	Hours
X Axis Min:	0.0
X Axis Max:	36.0
Y Axis Label:	< None >
Y Axis Min:	1.0e-07
Y Axis Max:	0.001
Inputs:	
CA20 c. d. ch. 3	
Outputs:	
< None >	

Name:	CH6 c. d. ch. 4
Chart Color:	White
X Axis Label:	Hours
X Axis Min:	0.0
X Axis Max:	36.0
Y Axis Label:	< None >
Y Axis Min:	1.0e-07
Y Axis Max:	0.001
Inputs:	
CA23 c. d. ch. 4	
Outputs:	
< None >	

Type: Analog Output

Name:	AO:1 Analog Output
Card Type:	STI ACAO-12
Channel Number:	1
Range:	+/- 5 Volts
Resolution:	0.024%
Inputs:	
CA3 set potential	
Outputs:	
< None >	

Name:	AO:2 Analog Output
Card Type:	STI ACAO-12
Channel Number:	2
Range:	+/- 5 Volts
Resolution:	0.024%
Inputs:	
CA6 set potential	

solution
of

et polished
way
both, rinsed
d in hot air
p. 9 was

sq; and
ters were
4.4 g of
water.
NO_3 and
219-231,
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ecimen +
00 mV and
0 ppm (use
0 ppm $Cl^{\ominus}$)
e WB,
ee p. 240).

Note:

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12/13/91

N. Fuchs

Film Formation on COA-715 (Pt. 7037)

Axis Label: < None >

Name:	LO4 COPTST10.DAT
Log Status:	< disabled >
Sample Rate:	15.0 Minutes
Gate:	< None >
Data Format:	
Heading:	CONSTANT POTENTIAL DATA, CH.4
File Path:	C:\WB
File Name:	COPTST10.DAT
Date Stamp:	enabled
Time Stamp:	enabled
Inputs:	
TI4 Timer	CA23 c. d. ch. 4 CA24 invert
Outputs:	
< None >	

Type: Meter

Name:	MT1 Meter
Output Type:	Fixed Point
Units:	< None >
Integer:	6
Decimal:	3
Inputs:	
CA2 invert	
Outputs:	
< None >	

Name:	MT2 Meter
Output Type:	Fixed Point
Units:	< None >
Integer:	6
Decimal:	3
Inputs:	
CA5 invert	
Outputs:	
< None >	

Name:	MT7 Meter
Output Type:	Fixed Point
Units:	< None >
Integer:	6
Decimal:	3
Inputs:	
CA21 invert	
Outputs:	
< None >	

Name:	MT8 Meter
Output Type:	Fixed Point
Units:	< None >
Integer:	6
Decimal:	3
Inputs:	
CA24 invert	
Outputs:	
< None >	

Type: Chart

Name:	CH1 c.d.ch.1
Chart Color:	White
X Axis Label:	Hours
X Axis Min:	0.0
X Axis Max:	36.0

Note: ...

12/13/91

N. Fridlas

Film Formation on CDA-715 (Pt. 7037)

Y input:	< None >
"a" constant:	0.0
"b" constant:	-1.0
"c" constant:	0.0
Inputs:	
AI:16 measured pot	
Outputs:	
MT8 Meter	LO4 COPTST10.DAT

Name:	CA26 set potential
Function:	aX + bY
X input:	PL6 Pulse
Y input:	0.0
"a" constant:	0.5
"b" constant:	0.0
"c" constant:	0.0
Inputs:	
PL6 Pulse	
Outputs:	
AO:4 Analog Output	

Type: Log

Name:	LO1 Log		
Log Status:	< disabled >		
Sample Rate:	5.0 Minutes		
Gate:	< None >		
Data Format:			
Heading:	CONSTANT POTENTIAL DATA, CH.3		
File Path:	< None >		
File Name:	< None >		
Date Stamp:	enabled		
Time Stamp:	enabled		
Inputs:			
TI1 Timer	CA1 c.d. ch.1	CA2	invert
Outputs:			
< None >			

Name:	LO2 Log		
Log Status:	< disabled >		
Sample Rate:	5.0 Minutes		
Gate:	< None >		
Data Format:			
Heading:	CONSTANT POTENTIAL DATA, CH.3		
File Path:	< None >		
File Name:	< None >		
Date Stamp:	enabled		
Time Stamp:	enabled		
Inputs:			
TI2 Timer	CA4 c. d. ch. 2	CA5	invert
Outputs:			
< None >			

Name:	LO3 COPTST9.DAT		
Log Status:	< disabled >		
Sample Rate:	15.0 Minutes		
Gate:	< None >		
Data Format:			
Heading:	CONSTANT POTENTIAL DATA, CH.3		
File Path:	C:\WB		
File Name:	COPTST9.DAT		
Date Stamp:	enabled		
Time Stamp:	enabled		
Inputs:			
TI3 Timer	CA20 c. d. ch. 3	CA21	invert
Outputs:			

Note:

12/13/91

N. Swidler

Film Formation on COA-715 (Pt. 7037)

Outputs: None

MT2 Meter — LO2 Log

Name: CA6 set potential
Function: aX + bY
X input: PL2 Pulse
Y input: 0.0
"a" constant: 0.5
"b" constant: 0.0
"c" constant: 0.0
Inputs:
PL2 Pulse
Outputs:
AO:2 Analog Output

Name: CA20 c. d. ch. 3
Function: aX / bY
X input: AI:5 current ch. 3
Y input: 4.12
"a" constant: -1.0
"b" constant: 10.0
"c" constant: 0.0
Inputs:
AI:5 current ch. 3
Outputs:
CH5 c. d. ch3 — LO3 COPTST9.DAT

Name: CA21 invert
Function: aX + bY
X input: AI:15 measured pot
Y input: 0.0
"a" constant: -1.0
"b" constant: 0.0
"c" constant: 0.0
Inputs:
AI:15 measured pot
Outputs:
MT7 Meter — LO3 COPTST9.DAT

Name: CA22 set potential
Function: aX + bY
X input: PL5 Pulse
Y input: 0.0
"a" constant: 0.5
"b" constant: 0.0
"c" constant: 0.0
Inputs:
PL5 Pulse
Outputs:
AO:3 Analog Output

Name: CA23 c. d. ch. 4
Function: aX / bY
X input: AI:7 current ch. 4
Y input: 4.11
"a" constant: -1.0
"b" constant: 10.0
"c" constant: 0.0
Inputs:
AI:7 current ch. 4
Outputs:
CH6 c. d. ch. 4 — LO4 COPTST10.DAT

Name: CA24 invert
Function: aX + bY
X input: AI:16 measured pot

N. Sridhar 12/13/91

Film Formation on CDA-715 (Pt. 7037)

Start value: Low
Reset on exit enabled
Inputs:
< None >
Outputs:
TI4 Timer CA26 set potential

Type: Calculation

Name:	CA1 c.d. ch.1
Function:	aX / bY
X input:	AI:1 current ch. 1
Y input:	4.12
"a" constant:	-1.0
"b" constant:	10.0
"c" constant:	0.0

Inputs:
AI:1 current ch. 1
Outputs:
CH1 c.d.ch.1 LO1 Log

Name:	CA2 invert
Function:	aX + bY
X input:	AI:13 measured pot
Y input:	0.0
"a" constant:	-1.0
"b" constant:	0.0
"c" constant:	0.0

Inputs:
AI:13 measured pot
Outputs:
MT1 Meter LO1 Log

Name:	CA3 set potential
Function:	aX + bY
X input:	PL1 Pulse
Y input:	0.0
"a" constant:	0.5
"b" constant:	0.0
"c" constant:	0.0

Inputs:
PL1 Pulse
Outputs:
AO:1 Analog Output

Name:	CA4 c. d. ch. 2
Function:	aX / bY
X input:	AI:3 current ch. 2
Y input:	4.12
"a" constant:	-1.0
"b" constant:	10.0
"c" constant:	0.0

Inputs:
AI:3 current ch. 2
Outputs:
CH2 c. d. ch.2 LO2 Log

Name:	CA5 invert
Function:	aX + bY
X input:	AI:14 measured pot
Y input:	0.0
"a" constant:	-1.0
"b" constant:	0.0
"c" constant:	0.0

Inputs:
AI:14 measured pot

N. Swidler 12/13/91

Film Formation on CDA-715 (Pt. 7037)

Inputs:
< None >
Outputs:
CA24 invert

Type: Timer

Name: TI1 Timer
Inputs:
PL1 Pulse
Outputs:
LO1 Log

Name: TI2 Timer
Inputs:
PL2 Pulse
Outputs:
LO2 Log

Name: TI3 Timer
Inputs:
PL5 Pulse
Outputs:
LO3 COPTST9.DAT

Name: TI4 Timer
Inputs:
PL6 Pulse
Outputs:
LO4 COPTST10.DAT

Type: Pulse

Name:	PL1	Pulse
High Duration:	496.0	Hours
Low Duration:	0.1	Seconds
Start Value:	Low	
Reset on exit	enabled	
Inputs:		
< None >		
Outputs:		
TI1 Timer	CA3	set potential

Name:	PL2	Pulse
High Duration:	496.0	Hours
Low Duration:	0.1	Seconds
Start Value:	Low	
Reset on exit	enabled	
Inputs:		
< None >		
Outputs:		
TI2 Timer	CA6	set potential

Name:	PL5	Pulse
High Duration:	496.0	Hours
Low Duration:	0.1	Seconds
Start Value:	Low	
Reset on exit	enabled	
Inputs:		
< None >		
Outputs:		
TI3 Timer	CA22	set potential

Name:	PL6	Pulse
High Duration:	496.0	Hours
Low Duration:	0.1	Seconds

Note:

N. finished

12/13/91

Film Formation on CDA-715 (Rt. 7037)

Fast Mode: < disabled >
Inputs:
< None >
Outputs:
CA20 c. d. ch. 3

Name: AI:7 current ch. 4
Card Type: STI ACPC-16
Channel Number: 7
Range: Auto V
Resolution: Lo Noise (17ms)
Output Type: Voltage
Sample rate: 10.0 Hertz
Fast Mode: < disabled >
Inputs:
< None >
Outputs:
CA23 c. d. ch. 4

Name: AI:13 measured pot
Card Type: STI ACPC-16
Channel Number: 13
Range: Auto V
Resolution: Lo Noise (17ms)
Output Type: Voltage
Sample rate: 10.0 Hertz
Fast Mode: < disabled >
Inputs:
< None >
Outputs:
CA2 invert

Name: AI:14 measured pot
Card Type: STI ACPC-16
Channel Number: 14
Range: Auto V
Resolution: Lo Noise (17ms)
Output Type: Voltage
Sample rate: 10.0 Hertz
Fast Mode: < disabled >
Inputs:
< None >
Outputs:
CA5 invert

Name: AI:15 measured pot
Card Type: STI ACPC-16
Channel Number: 15
Range: Auto V
Resolution: Lo Noise (17ms)
Output Type: Voltage
Sample rate: 10.0 Hertz
Fast Mode: < disabled >
Inputs:
< None >
Outputs:
CA21 invert

Name: AI:16 measured pot
Card Type: STI ACPC-16
Channel Number: 16
Range: Auto V
Resolution: Lo Noise (17ms)
Output Type: Voltage
Sample rate: 10.0 Hertz
Fast Mode: < disabled >

Note:

N. Swidler

12/13/91

Film Formation on CDA-715 (Rt. 7037)

Worksheet Name: CDA1.WBB

Hardware list:

Name	AIs	AOs	DIOs	CTs	DIs	DOs
STI ACPC-16	16	0	16	0	0	0
STI ACAO-12	0	6	8	0	0	0

Maximum icons: 464
Grid size: 16
Snap to grid: < disabled >
Report Unsynch: < disabled >
Fast Mode: enabled
Fast Mode Samples: 1000
Fast Mode Rate: 1.0 Kilohertz
Com ports: 2

Port: COM 1
Comment: Mouse connected

Port: COM 2
Baud rate: 9600
Data bits: 8
Stop bits: 1
Duplex: Half
Parity: None
XonXoff: < disabled >
Echo wait: < disabled >
Line delay: < disabled >

IEEE: < disabled >

Type: Analog Input

Name: AI:1 current ch. 1
Card Type: STI ACPC-16
Channel Number: 1
Range: Auto V
Resolution: Lo Noise (17ms)
Output Type: Voltage
Sample rate: 10.0 Hertz
Fast Mode: < disabled >
Inputs:
< None >
Outputs:
CA1 c.d. ch.1

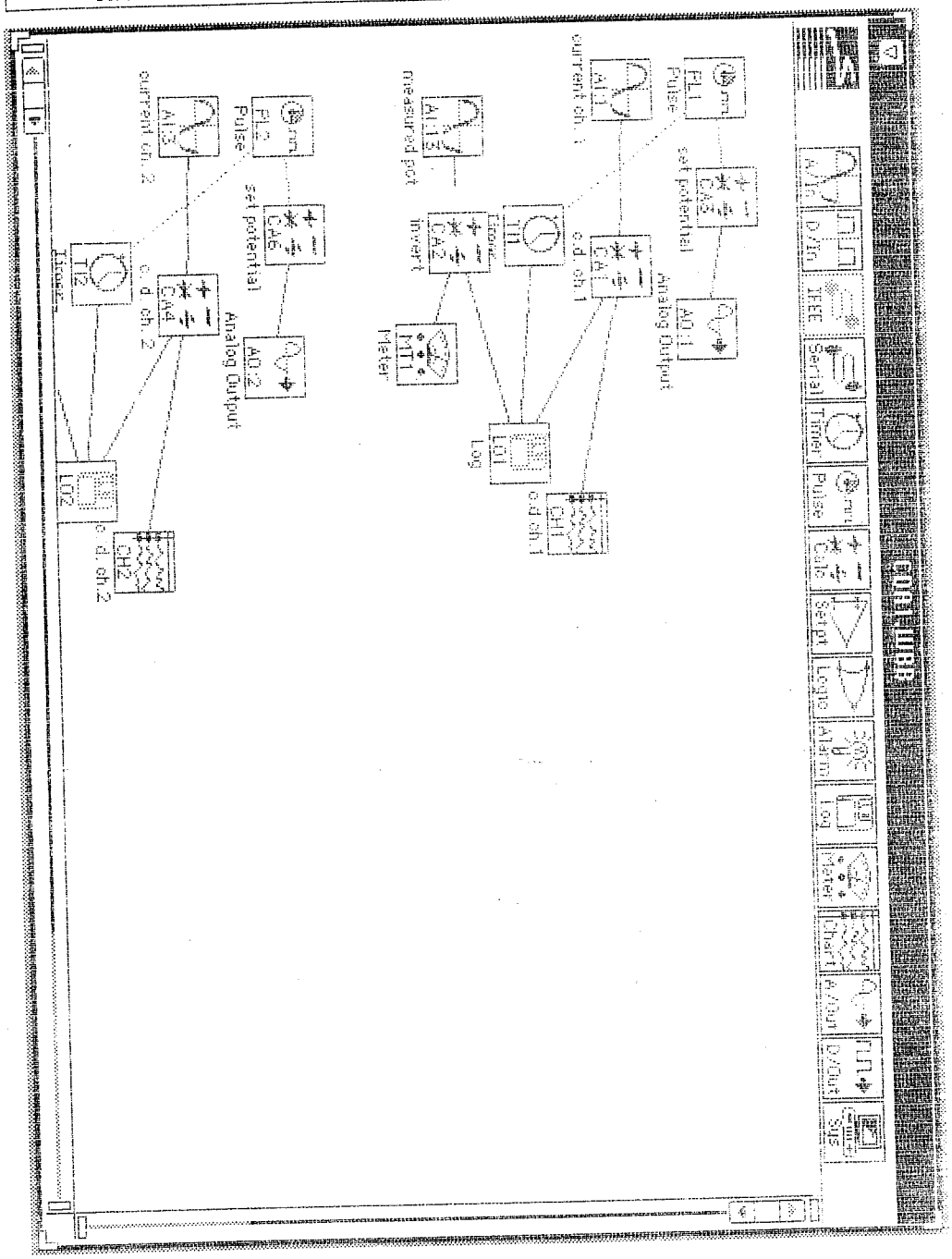
Name: AI:3 current ch. 2
Card Type: STI ACPC-16
Channel Number: 3
Range: Auto V
Resolution: Lo Noise (17ms)
Output Type: Voltage
Sample rate: 10.0 Hertz
Fast Mode: < disabled >
Inputs:
< None >
Outputs:
CA4 c. d. ch. 2

Name: AI:5 current ch. 3
Card Type: STI ACPC-16
Channel Number: 5
Range: Auto V
Resolution: Lo Noise (17ms)
Output Type: Voltage
Sample rate: 10.0 Hertz

Note :

N. Swidler 12/13/91

Film Formation on CDA-715 (Pt. 7037)



Note :

12/13/91

N. Swisher

Film Formation on CDA-715 (Bt. 7032)

COPTST.2

Purpose: Same as p.238

Tests were the same as on p.238, except this one at 95°C.

Same solution was used as in COPTST2.

Specimen had a thin gold-brown film.

Stored on disk COPDAT 2.

Walter D Machowski
12/13/91

COPTST 3 and COPTST 4

Purpose: Same as COPTST 2 (p. 238)

Cylindrical specimens were prepared as described on p. 238. The same 5-neck flasks were used. Test temperature for both tests was 95°C

Solution Two liters were prepared as described on p. 238 from same lot no chemicals + solutions.

After holding at open circuit for one hour, polarize at +500 mV vs SCE for one hour. To COPTST 3 add 1.3304 g of Na_2SO_4 (lot #) in 30 ml of water to bring to about 1000 ppm SO_4. To COPTST 4 add 100 ml of 10,000 ppm Cl to bring to 1000 ppm Cl. Monitor current.

Note: Due to an error in setting of logging format, no useful current data was obtained.

COPTST 3: Specimen dark + covered w/ bluish green film (moderately thick)

COPTST 4: Specimen covered w/ a thin reddish-brown film.

Stored on disk COPDAT 2.

Walter J. Mechowski
12/18/91

Film Formation on CDA-102 (Lot # 6681)

COPTST 5

Purpose: Same as COPTST 1.

Specimen, preparation, cells were as described on p. 238.

Two liters of solution were prepared as on p. 238 from same lot # chemicals and solutions.

1. De-aerate one hour before immersion
2. Hold at open circuit one hour
3. Polarize at +500 mV vs SCE for one hour
4. Add 1.3304 g Na_2SO_4 (same lot # as p. 241) to bring cell conc. to 1000 ppm SO_4
5. Monitor current
6. Test at R.T.

Specimen covered w/ thick bluish-green film.

Stored on disk COPDAT 1.

Walter J. Machowski
12/26/91

COPTST 6

Purpose: Same as COPTST 1.

Specimen, preparation, cells were as described on p. 238.

Same solution as COPTST 5 was used.

1. De-aerate one hour before immersion
2. Hold at open circuit one hour
3. Polarize at +500 mV vs SCE for one hour
4. Add 100 ml of 10,000 ppm Cl sol'n to bring cell conc. to 1000 ppm Cl
5. Monitor current
6. Test run at R.T.

Specimen covered w/ a thick bluish green film.

Stored on disk COPDAT 1.

Walter J. Machowski
12/26/91 ~~12/26~~

COPTST 7

Purpose: Same as COPTST 1.

Specimen preparation, solutions, etc were as described on p. 238.

Two liters of solution was prepared as described on p. 238 from the same lot # chemicals and solutions.

1. De-aerate one hour before immersion
2. Hold at open circuit one hour
3. Polarize at +500 mV vs SCE for one hour
4. Add 9.3304 g Na_2SO_4 (same lot # as p. 241) to bring cell conc to 1000 ppm SO_4.
5. Monitor current
6. Test run at 95°C

Specimen was a dark red-brown color.

Stored on disk COPDAT 1.

Walter J. Machowski
12/27/91

COPTST 8

Purpose: Same as COPTST 1.

Specimen preparation, etc were as described on p. 238.

Same solution as COPTST 7 was used.

1. De-aerate one hour before immersion
2. Hold at open circuit one hour
3. Polarize at +500 mV vs SCE for one hour
4. Add 100 ml of 10,000 ppm Cl solution
5. Monitor current
6. Test run at 95°C

Specimen was a dark gray-blue color.

Stored on disk COPDAT 1.

Walter J. Machowski
12/27/91

Film Formation on CDA-715 (Lot 7037)

COPTST 9

Purpose: Same as COPTST 1

Specimen preparation, procedures, test cell, etc were as described on p. 238.

Two liters of test solution were prepared as described on p. 238 from the same lot # chemicals and solutions.

① de-aerate one hour before immersion
② Hold at open circuit one hour
③ Polarize at +500 mV vs SCE for one hour.
④ Monitor current
⑤ Test run at 30°C.

Specimen had a greyish metallic film.

Stored on disk COPDAT 1.

Walter J. Machowski
1/2/92

Film Formation on CDA-102 (Lot # 6681)

COPTST 10

Purpose: Same as COPTST 1

Specimen prep, procedures, test cell, etc. were as described on p. 238.

Used same solution as COPTST 9.

① de-aerate one hour before immersion
② Hold at open circuit one hour
③ Polarize at +500 mV vs SCE for one hour.
④ Monitor current.
⑤ Test run at 30°C.

Specimen had a thin greenish film.

Stored on disk COPDAT 1.

Walter J. Machowski
1/2/92

Cyclic Polarization of CDA-102 (6681)

Cu T3

Purpose:

The test specimen, procedures, preparation, etc were as described on p. 171. Run was made on PAR 173/276.

A 0.07M borax + 0.15M boric acid solution was prepared by adding to 1500 ml of 17MΩ water in a 2-L volumetric the following: 57.1949 g borax and 18.5492 g boric acid (Fisher lot #'s 914886 and 916567A resp.). Stir until dissolved and dilute to volume.

1. Specimen polished to 600 grit
2. Held at OCV for one hour
3. E corr at start −178 mV vs SCE
4. Temp. room temp (~25°C)
5. Initial pH 8.60 Final pH 8.67
6. Scan rate 0.167 mV/sec
7. Purge w/ Argon (99.999%)
8. Done on PAR 173/276
9. Auto reverse @ 5000 μA/cm²

Test solution remained clear; specimen appeared the same before + after the test.

Stored on ECF # ~~4~~ 5

4/8/92

See page ~~269~~ 257

Walter J. Machowski
3/23/92

Cyclic Polarization of CDA-102 (6681)

Cu T4

Purpose:

Test specimen, procedures, preparation, etc were as described on p. 171. Run was made on PAR 273.

A 0.075M borax + 0.15M boric acid solution + 6 ppm Cl + 20 ppm SO_4 + 10 ppm NO_3 + 2 ppm F was made by:
To 1500 ml of 17MΩ water in a 2-L volumetric add 57.1946 g borax and 18.5501 g boric acid (Fisher lot #'s 914886 and 916567A resp.) Pipet 20.0 ml of Cl stock, 40.0 ml of SO_4 stock, 20.0 ml of NO_3 stock and 4.0 ml of F stock solutions (019-127, 025-91, 025-66 and 019-191 resp). Stir until dissolved and dilute to volume.

1. Specimen polished to 600 grit.
2. Held at OCV for one hour
3. E corr at start −235 mV vs SCE
4. Temp: room temp (~25°C)
5. Initial pH 8.60 Final pH 8.70
6. Scan rate 0.167 mV/sec
7. Purge w/ Argon (99.999%)
8. Done on PAR 273
9. Auto reverse @ 5000 μA/cm²

Test solution remained clear. Specimen appeared unchanged.

Stored on ECF #5.

See page ~~265~~ 258

Walter J. Machowski
3/23/92

Cyclic Polarization of CDA-715 (7037)

Run Cu T5

Purpose:

Test specimen, preparation, procedure were as on p. 133.

Used same solution as Cu T3.

1. Specimen polished to 600 grit
2. Held at OCV one hour
3. E corr at start −145 mV vs SCE
4. Temp: room temp (~25°C)
5. Initial pH 8.60 Final pH 8.66
6. Scan rate 0.167 mV/sec
7. Purge w/Argon (99.995%)
8. Done on PAR 173/276
9. Auto reverse at 5000 μA/cm²

Solution remained clear. Specimen appeared unchanged.

Stored on EG+G #~~4~~ 5 4/9/92

See page 259

Walter J. Mochowski
3/23/92

Cyclic Polarization of CDA-715 (7037)

Cu T6

Purpose:

Test specimen, preparation, procedure, etc were as on p. 133.

Used same solution as Cu T4.

1. Specimen polished to 600 grit.
2. Held at OCV one hour.
3. E corr at start −236 mV vs SCE.
4. Temp: room temp (~25°C)
5. Initial pH 8.60 Final pH 8.67
6. Scan rate 0.167 mV/sec
7. Purge w/Argon (99.995%)
8. Done on PAR 273
9. Auto reverse at 5000 μA/cm²

Solution remained clear. Specimen appeared unchanged.

Stored on EG+G #~~5~~ 4 4/9/92

See page 260

Walter J. Mochowski
3/23/92

Cyclic Polarization of CDA-102 (6681)

Cu T7

Purpose:

The test specimen, procedures, preparation, etc were as on p. ~~173~~, 171 WJMachowski 3/24/92

Solution: 2-Liters was prepared from the same lot # chemicals and solutions as described on p. 249. To one liter of this was added 0.122 g of $NaHCO_3$ (Fisher lot # 897789).

1. Specimen polished to 600 grit.
2. Held at OCV for one hour
3. E corr at start −173 mV vs SCE
4. Temp. room temp (~25°C)
5. Initial pH 8.66 Final pH 8.68
6. scan rate 0.167 mV/sec
7. Purge w/Argon (99.999%)
8. Done on PAR 173/276
9. Auto reverse @ 5000 μA/cm²

Solution remained clear + specimen appeared unchanged.

Stored on EG+G #~~4~~ 5. WJM 3/25/92

See page 261

Walter J. Machowski
3/24/92

Cyclic Polarization of CDA-102 (6681)

Cu T8

Purpose:

The test specimen, procedures, preparation were as on p. 171.

Solution: Used one liter of "base" solution on p. 252 and to this was added 0.0139 g $NaHCO_3$ (same lot # p. 252)

1. Specimen polished to 600 grit
2. Held at OCV for one hour
3. E corr at start −204 mV vs SCE
4. Temp: room temp (~25°C)
5. Initial pH 8.67 Final pH 8.68
6. Scan rate 0.167 mV/sec
7. Purge w/Argon (99.999%)
8. Done on PAR 273
9. Auto reverse @ 5000 μA/cm²

Solution remained clear + specimen appeared unchanged.

Stored on EG+G ~~#5~~ #4. WJMachowski 3/25/92

See page 262

Walter J. Machowski
3/24/92

Cyclic Polarization of CDA-102 (6681)

Cu T9

Purpose:

The test specimen was the same one from Cu T8 → repolished. Procedures, etc were as on p.171

Solution: One liter prepared by adding 28.5977 g of borax and 9.2749 g boric acid to 700 ml of 17MΩ water. Add 1.2221 g of $NaHCO_3$ (same lot #/s as p.252) Pipet 10.0 ml of Cl_2, 10.0 ml of NO_3, 20.0 ml of SO_4 and 2.0 ml of F stock solution (same lot #/s as p.249). Dilute to mark.

1. Specimen polished to 600 grit.
2. Held at OCV for one hour
3. E corr at start −174 mV vs SCE
4. Room temp (~25°C)
5. Initial pH 8.66 Final pH 8.67
6. scan rate 0.167 mV/sec
7. Purge w/Argon (99.999%)
8. Done on PAR 273
9. Auto reverse @ 5000 μA/cm²

Solution remained clear and specimen appeared unchanged.

Stored on EG+G #5

See page 263

Walter J. Moehlenkamp
3/25/92

Cu T10

Purpose:

The test specimen from Cu T7 was repolished and used for this test. Preparation, procedures, etc were as on p.171.

Solution: Two liters of solution were prepared as on p.249 from the same lot # chemicals + solutions. One liter of this solution was measured out and to this 2.442 g of $NaHCO_3$ was added to give approx 1700 ppm HCO_3.

1. Specimen polished to 600 grit.
2. Held at OCV for one hour.
3. E corr at start −194 mV vs SCE
4. Room temp (~25°C)
5. Initial pH 8.64 Final pH 8.71
6. Scan rate 0.167 mV/sec
7. Purge w/Argon (99.999%)
8. Done on PAR 173/276
10. Auto reverse @ 5000 μA/cm²

Solution remained clear + specimen appeared unchanged.

Stored on EG+G #4.

See page 264

Walter J. Moehlenkamp
3/26/92

Cyclic Polarization of CDA 102 (6681)

Cu T11

Prepare:

Used same specimen as Cu T7 (repolished.) Procedures, preparation etc were as on p. 171.

Solution: To 500 ml of 17 MΩ water in a 1-L volumetric add 1.6468 g NaCl and 0.1225 g ~~stock~~. $NaNO_3$ 0.0 m 3/27/92 (same lot #'s as p. 254). Pipet 10.0 ml of NO_3 stock, 20.0 ml of SO_4 stock and 2.0 ml of F stock solution (same lot #'s as p. 249. Dilute to the mark.

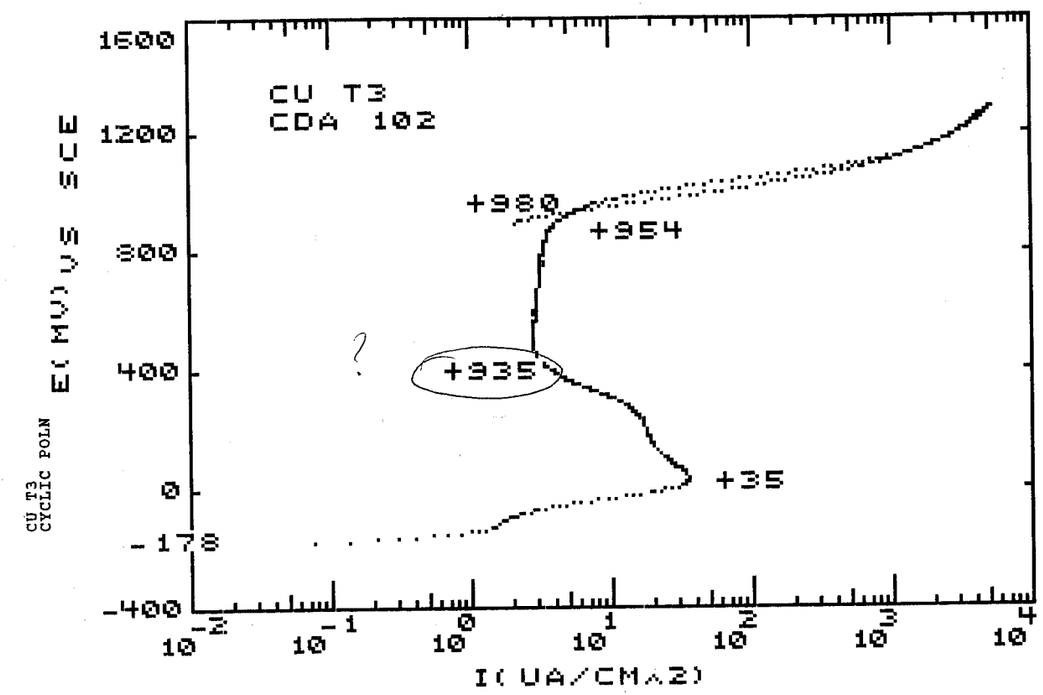
1. Polish to 600 grit.
2. Sleeve + hold at OCV for one hour
3. E scan at start −135 mV vs SCE
4. Room temp (~25°C)
5. Initial pH 8.31 Final pH 9.13
6. Scan rate 0.167 mV/sec
7. Purge w/argon (99.999%)
8. Alone on Pan 173/276
9. Auto reverse @ 5000 μA/cm²

Solution had blue ppt and specimen had a flaky brownish film. Grains visible when flaky scale was off.

Stored on EG+G #4

see page 265.

Walter J. Marchuski
3/27/92




```
UN PARAMETERS                          CYCLIC POLN
                                       CU T3
     TECHNIQUE                         0 VS E
     ORIGINAL NAME                     100 VS E
     INITIAL E(MV)                     -100 VS E
     VERTEX E(MV)                      .17
     FINAL E(MV)                       5000
     SCAN RATE(MV/S)                   PASS
     THRESHOLD I(UA/CM^2)              PASS
     CONDITION E(MV)                   PASS
     CONDITION T(S)                    3600  S
     INIT DELAY(MV/S OR S)

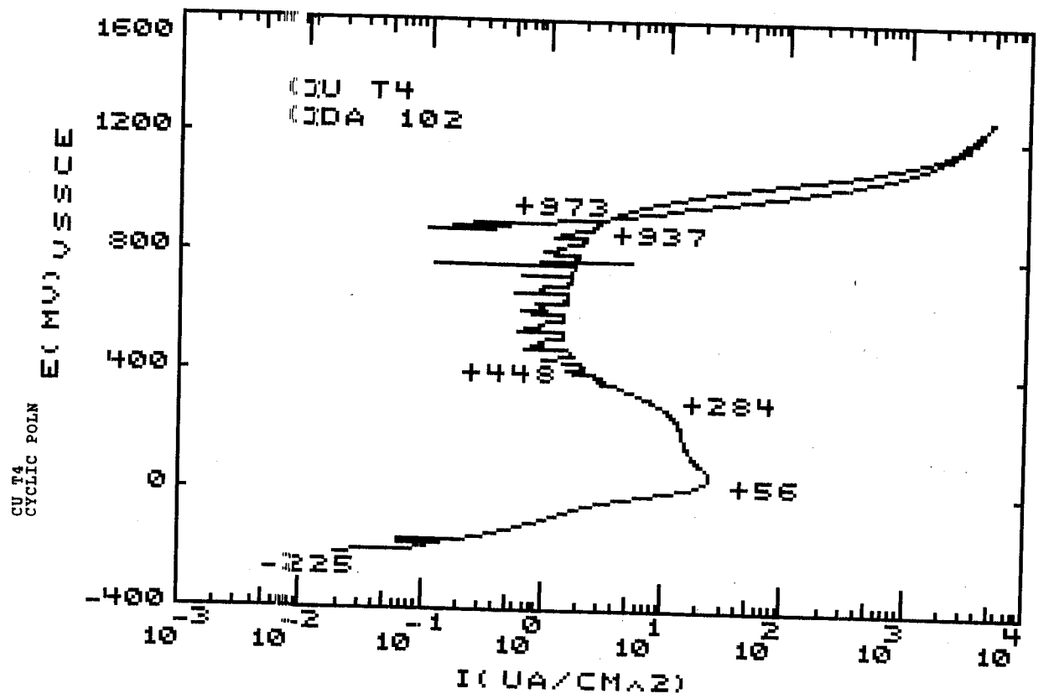
AMPLE PARAMETERS
          AREA(CMS^2)                  4.17
          EQ WT(GM)                    PASS
          DENSITY(GM/CM^3)             PASS
          CATHODIC TAFEL(MV)           PASS
          ANODIC TAFEL(MV)             PASS

ATA SCALE
          ECORR                        -178
          MV/PT                        4
          DATA MAX                     5371.703
          DATA MIN                     1.558753E-02
          ABS MIN                      1.558753E-02
          ABS MAX                      5371.703

EGEND
          TEST ON CDA-102 AT 25 C
          0.075M BORAX+0.15M BORIC ACID
          ~~CL-=1, SO4=20, NO3=10, F=2~~
          PH 8.6
          PURGE W/ARGON
```

N Sridhar 3/27/92

Cu-T4



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CU T4
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.126
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

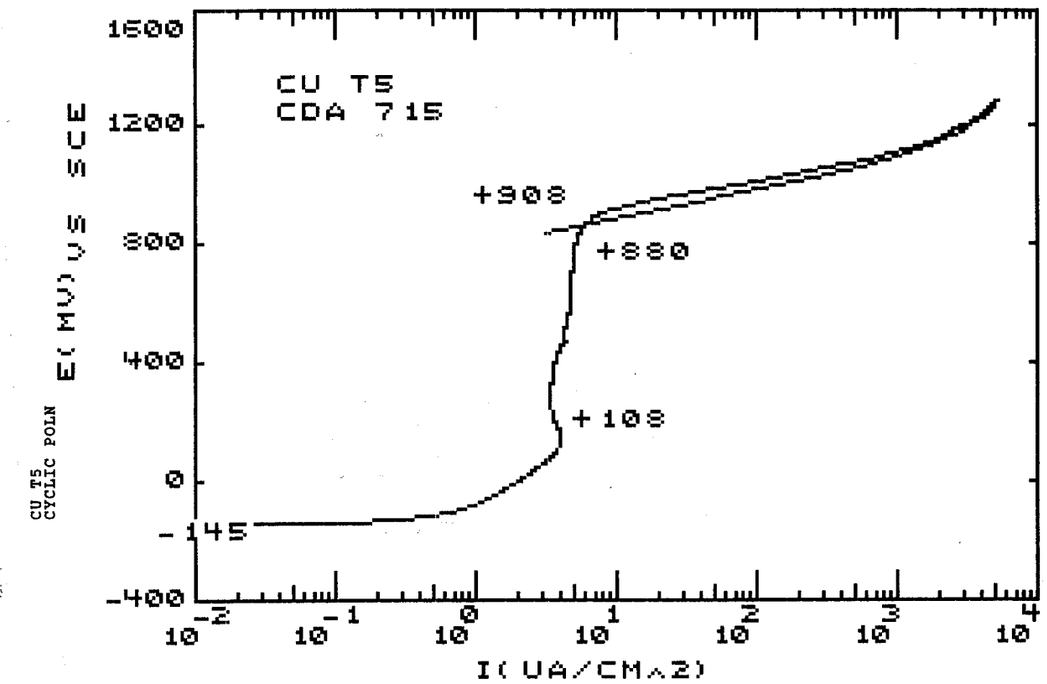
ECORR	-225
MV/PT	4
DATA MAX	5210.858
DATA MIN	-6.519632E-02
ABS MIN	0
ABS MAX	5210.858

LEGEND

TST ON CDA-102 AT 25 C
0.075M BORAX+0.15M BORIC ACID
NO OTHER ANIONS
PH 8.6
PURGE W/ARGON

Cl^- SO_4^{2-}
NO_3^- F^-
acetate

N. Swidler 3/27/92



JN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CU T5
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

AMPLE PARAMETERS

AREA(CMS^2)	4.192
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

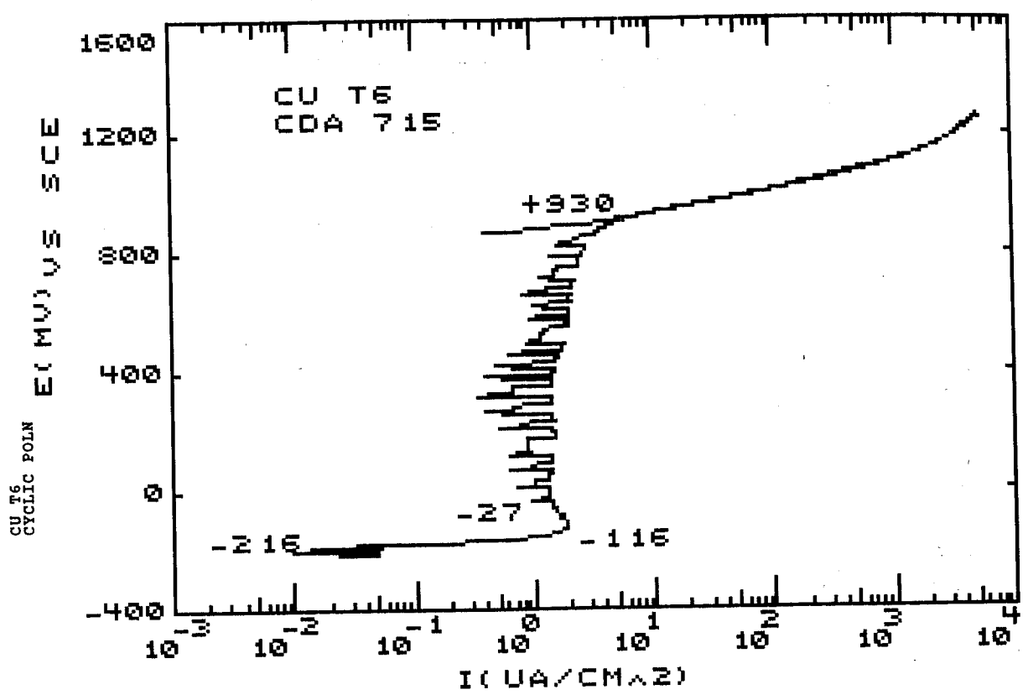
ATA SCALE

ECORR	-145
MV/PT	4
DATA MAX	5319.657
DATA MIN	2.266221E-02
ABS MIN	2.266221E-02
ABS MAX	5319.657

EGEND

TEST ON CDA 715 AT 25 C
0.075M BORAX+0.15M BORIC ACID
CL=6; SO4=20; NO3=10; F=2
PH 8.6
PURGE W/ARGON

N. Swidler 3/27/92



UN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CU T6
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

AMPLE PARAMETERS

AREA(CMS^2)	4.166
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

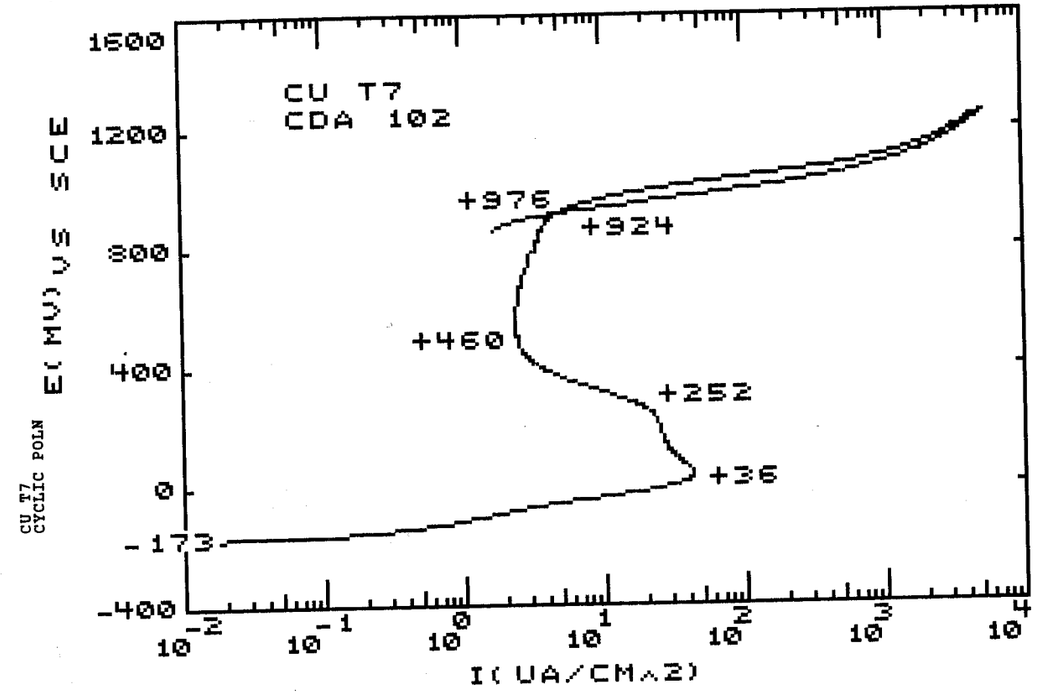
ATA SCALE

ECORR	-236
MV/PT	4
DATA MAX	5328.853
DATA MIN	-5.352857E-02
ABS MIN	0
ABS MAX	5328.853

EGEND

TEST ON CDA 715 AT 25 C
0.075M BORAX+0.15M BORIC ACID
Same as CuT4 NO OTHER ANIONS
PH 8.6
PURGE W/ARGON

N. Sridhar 3/27/92



N PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CU T7
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

MPLE PARAMETERS

AREA(CMS^2)	4.076
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

TA SCALE

ECORR	-173
MV/PT	4
DATA MAX	5201.177
DATA MIN	-50.24533
ABS MIN	1.447497E-02
ABS MAX	5201.177

GEND

TEST ON CDA 102 AT 25 C
0.075M BORAX+0.15M BORIC ACID
CL=6; SO4=20; NO3=10; F=2
85 PPM HCO3
PURGE W/ARGON

24 MAR 1992

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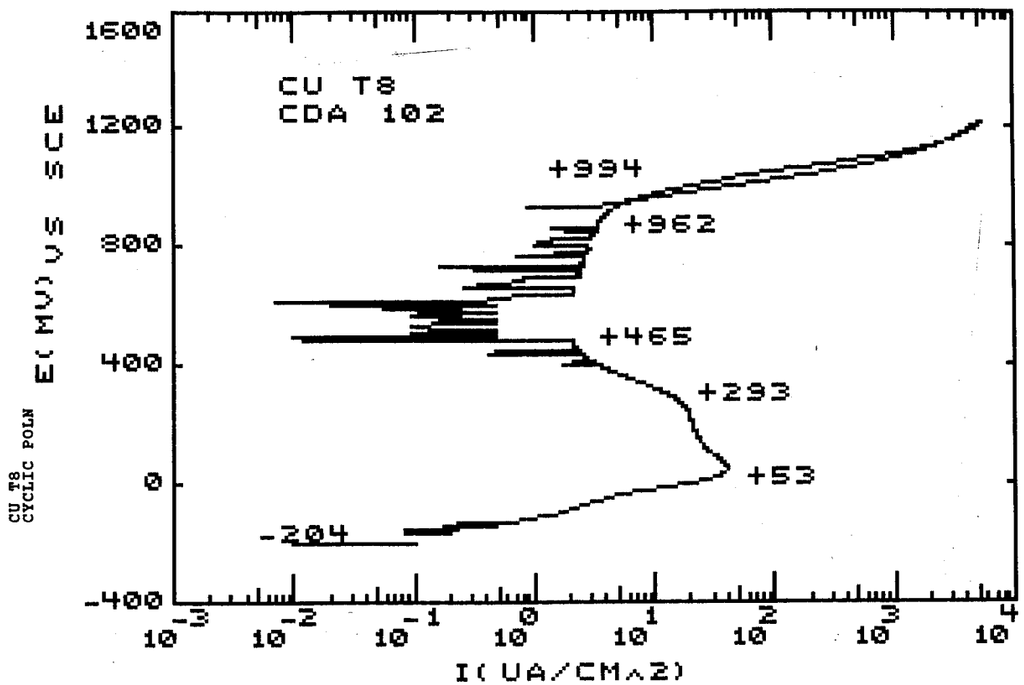


UN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CU T8
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

AMPLE PARAMETERS

AREA(CMS^2)	4.144
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

ATA SCALE

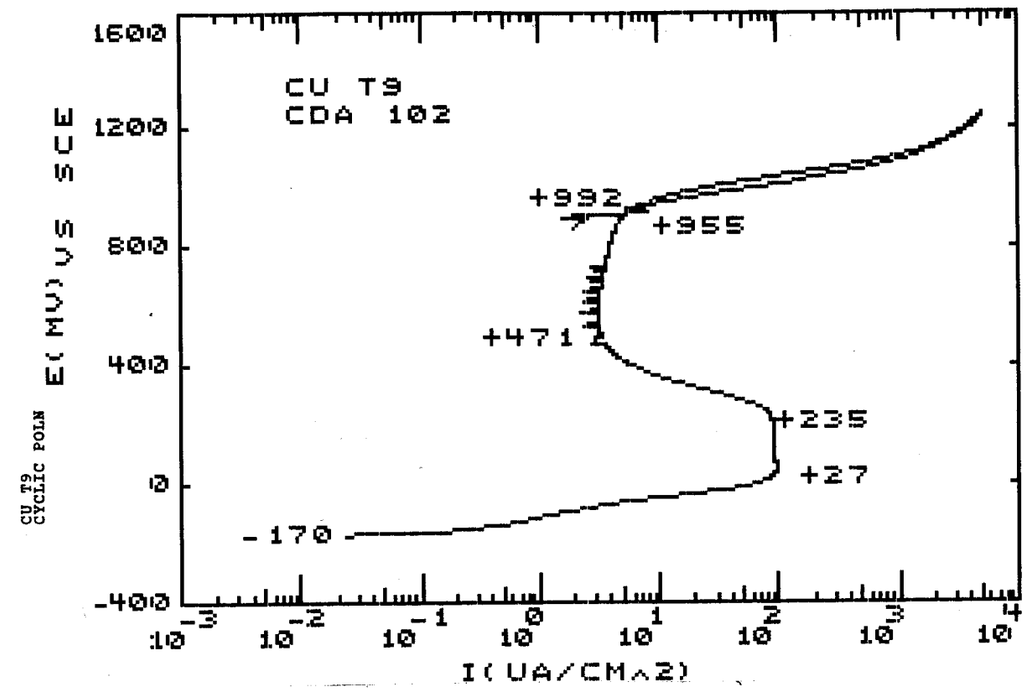
ECORR	-204
MV/PT	4
DATA MAX	5357.143
DATA MIN	-.2244208
ABS MIN	6.756756E-03
ABS MAX	5357.143

EGEND

TEST ON CDA 102 AT 25 C
0.075M BORAX+0.15M BORIC ACID
CL=6; NO3=10; SO4=20; F=2
10 PPM HCO3
PURGE W/ARGON

24 MAR 1992

N. Sridhar
3/27/92



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CU T9
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.154
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

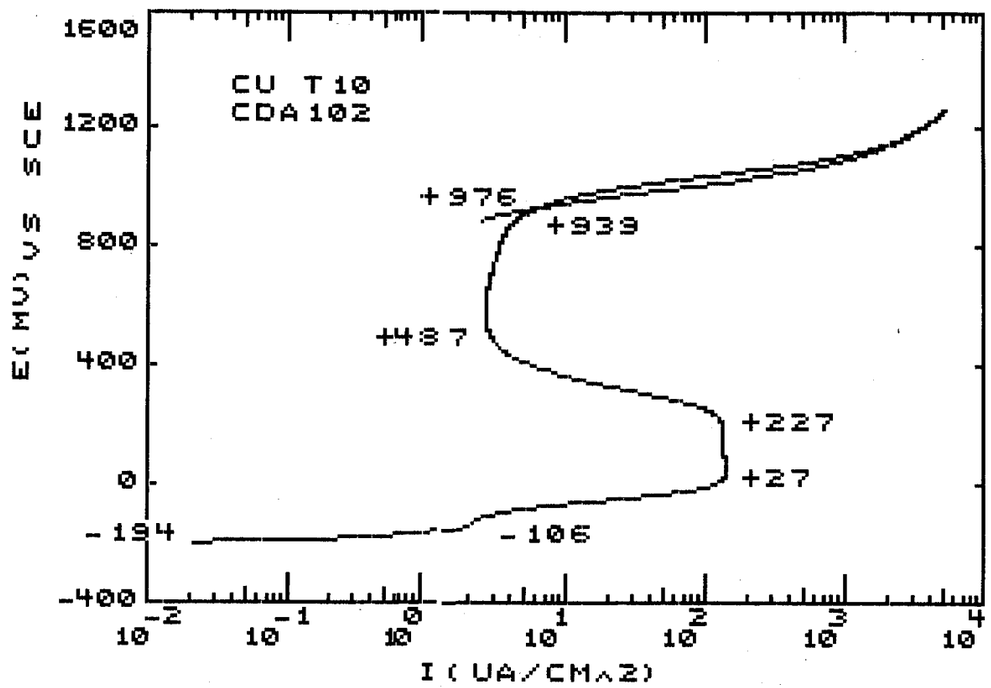
ECORR	-174
MV/PT	4
DATA MAX	5223.881
DATA MIN	0
ABS MIN	0
ABS MAX	5223.881

LEGEND

TEST ON CDA 102 AT 25 C
0.075M BORAX+0.15M BORIC ACID
CL=6; SO4=20; NO3=10; F=2
850 PPM HCO3
PURGE W/ARGON

25 MAR 1992

N. Sridhar
3/27/92



RUN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CU T10
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

SAMPLE PARAMETERS

AREA(CMS^2)	4.006
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

DATA SCALE

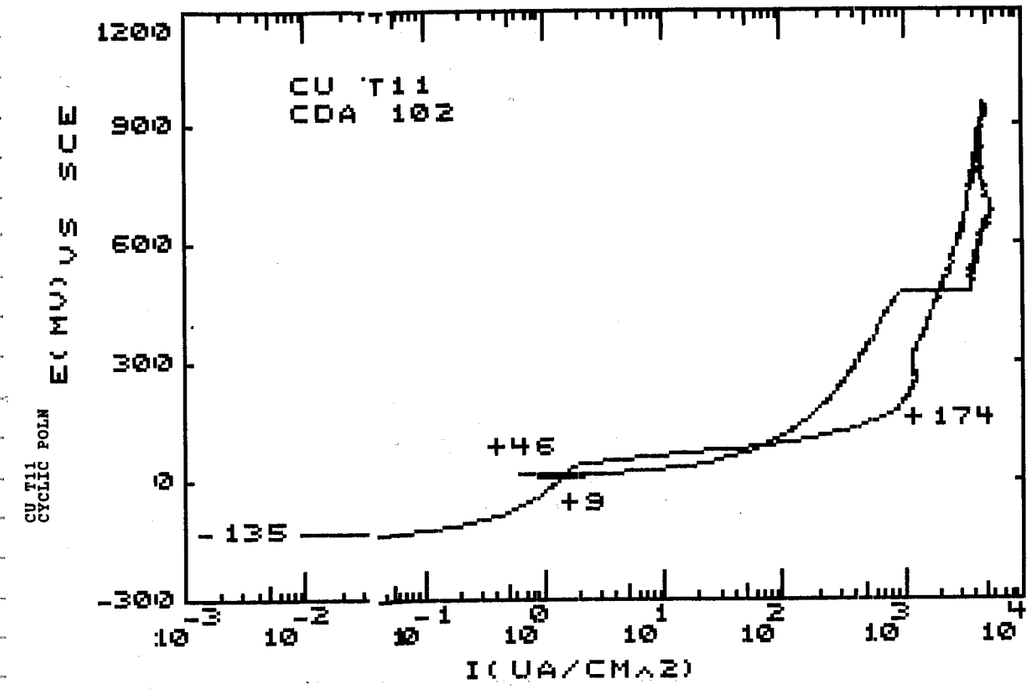
ECORR	-194
MV/PT	4
DATA MAX	5292.062
DATA MIN	.0214678
ABS MIN	.0214678
ABS MAX	5292.062

LEGEND

TEST ON CDA 102 AT 25 C
0.075M BORAX+0.15M BORIC ACID
CL=6; NO3=10; SO4=20; F=2
1700 PPM HCO3
PURGE W/ARGON

26 MAR 1992

N. Sridhar
3/27/92



CU T11
CYCLIC POLN

(UN PARAMETERS

TECHNIQUE	CYCLIC POLN
ORIGINAL NAME	CU T11
INITIAL E(MV)	0 VS E
VERTEX E(MV)	100 VS E
FINAL E(MV)	-100 VS E
SCAN RATE(MV/S)	.17
THRESHOLD I(UA/CM^2)	5000
CONDITION E(MV)	PASS
CONDITION T(S)	PASS
INIT DELAY(MV/S OR S)	3600 S

;AMPLE PARAMETERS

AREA(CMS^2)	4.026
EQ WT(GM)	PASS
DENSITY(GM/CM^3)	PASS
CATHODIC TAFEL(MV)	PASS
ANODIC TAFEL(MV)	PASS

)ATA SCALE

ECORR	-135
MV/PT	4
DATA MAX	5861.897
DATA MIN	-2.116244
ABS MIN	9.190263E-03
ABS MAX	5861.897

.EGEND

TEST ON CDA 102 AT 25 C
J-13 MODEL SOLUTION
CL=6; SO4=20; NO3=10; F=2
85 PPM HCO3
PURGE W/ARGON

27 MAR 1992

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File Types: (.exe, .bat, .zip, etc.)	dat, binary
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