

308

Q200409230001

Scientific Notebook No. 607: Potentiostatic
Tests, Cyclic Polarization Test, Crevice
Repassivations Tests, Passive Current
Density Tests, Critical Pitting Temperature
Tests Critical Repassivations Temperature
Test (08/15/2003 through 09/30/2003)

LABORATORY NOTEBOOK

CNWRA/SwRI

CNWRA
CONTROLLED
COPY 607

20.06002.01.081

NOTEBOOK NO. 607
ISSUED TO DARRELL DUNN *Darrell Dunn DD*
ON AUGUST 13 2003
DEPARTMENT CNWRA CC 20
RETURNED 20

Chung-Che Wu, Chung-Che Wu, CW
Brian K. Deaby - B. Deaby - BKD

SCIENTIFIC NOTEBOOK COMPANY
2831 LAWRENCE AVENUE
STEVENSVILLE, MICHIGAN 49127
(800) 537-3028 - <http://www.snco.com>

TITLE _____

From Page No. _____

FROM NB 157 P 208

Initial Scientific notebook entry for corrosion resistant material potentiostatic and potentiodynamic polarization tests.

Title: Potentiostatic tests, cyclic polarization tests, crevice repassivation tests, passive current density tests, critical pitting temperature tests critical repassivation temperature tests.

Tests Performed by: Darrell S. Dunn

Objectives: Measure passive current densities, crevice repassivation potentials, critical pitting temperature and critical repassivation temperature for corrosion resistant candidate materials.

Equipment: EG&G Versastat Serial Number 20104. EG&G model 352 corrosion software. NEC 586 computer. Keithley Electrometer model 614 SN 555368 or equivalent. ASTM G-5 polarization cell, Large 2 L glass cells with Teflon tops, Electrochemical Impedance Spectroscopy system including Solartron 1260 FRA and Solartron 1287 Potentiostat. ESC 440 multichannel potentiostats with National instruments Labview data acquisition software or Strawberry Tree data acquisition software.

Materials: Alloy C-22, Alloy 825, Alloy 625 and Type 316 L stainless steel

Specimen specifications: Cylindrical CPP specimens 1.915" x 0.250" and Crevice repassivation specimens with Teflon crevice washers attached to surface.

Measurement Parameters: Current and Potential as described in TOP-008. Temperature of solution ± 2°C

Required level of accuracy: Potentials ± 5mV. Current less than 0.1 microamp.

Uncertainty and Sources of Error: Current density calculated as current divided by sample area. Actual current density of corroding areas is not determined. Resolution limit of data acquisition systems may limit accuracy of passive current density measurements.

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Darrell S. Dunn

8/15/03

From Page No. _____

Objective: *MEASURE Ep & ERP USING CPP*

Alloy / Heat No.: *625 NX9936AG*

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072
Cal: 3/6/03 Due: 9/6/03

Initial Weight: *31.79877* Model: Sartorius Genius SN: 12809099
Final Weight: *31.75104* Cal: 5/15/03 Due: 11/15/03

Solution: *5.5 M NaCl*
642.95 g NaCl LOT 028794
+ DI WATER TO 2000 mL

Reagents measured with Model: OHAUS SN: 2883
Cal: 7/29/03 Due: 1/29/03

Initial pH: *8.20* Model: Fisher Accumet 950 Meter SN: 3340
Final pH: *7.563* Cal: 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: *100°C* Measured with Hg Thermometer SN: *H98-179*
Cal: *4/29/03* Due: *4/29/04*

Counter Electrode: Platinum Flag

Reference Electrode: *13-620-52 FISHER SCE* SN: *0052116*

Gas: *99.999 % N₂*

Ecorr: *-153* Model: *KEITHLEY 614* SN: *467374*
Ept: *-90* Cal: *10/28/02* Due: *10/28/03*

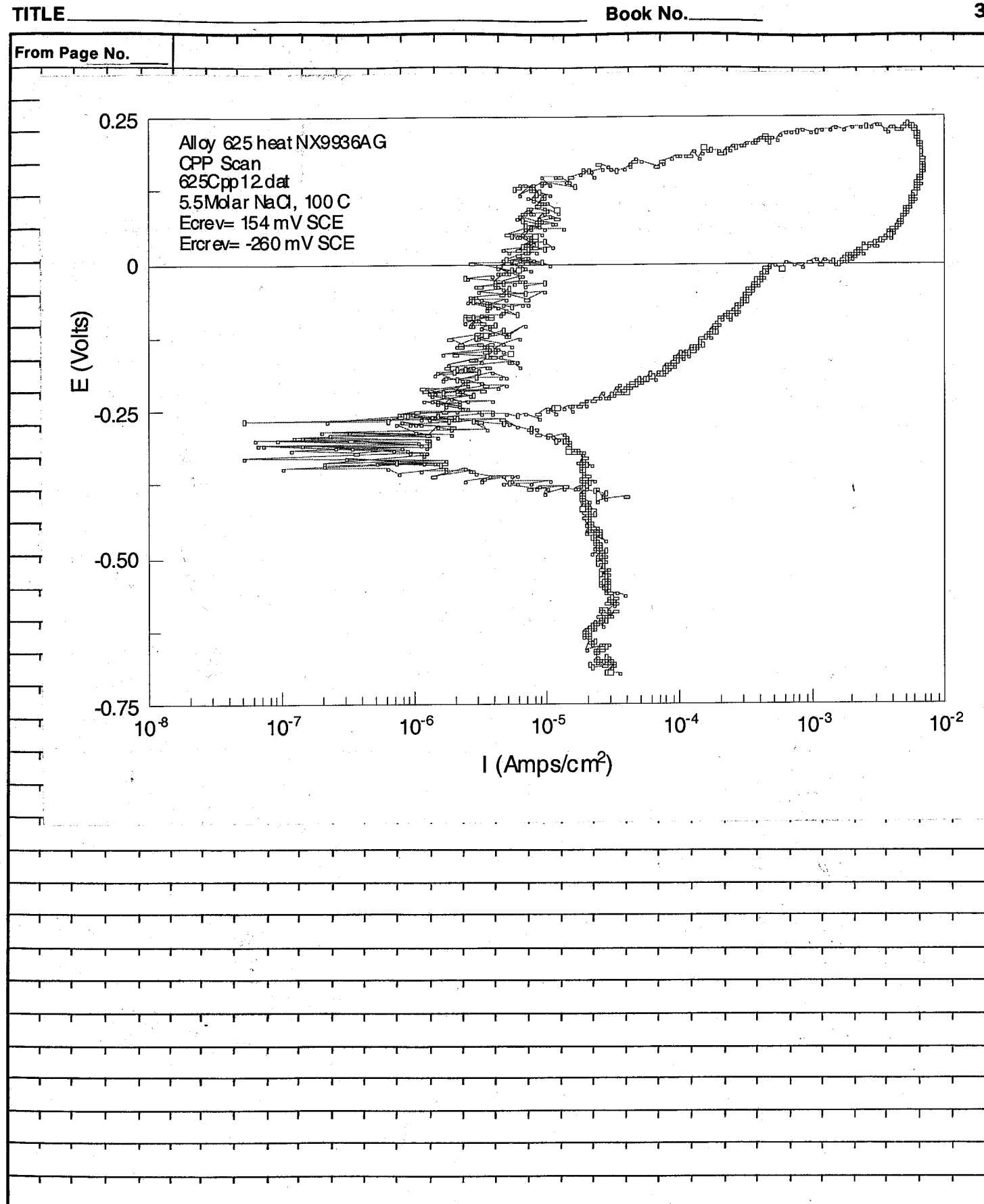
Potentiostat: *EG&G 263A* SN: *66105*

Last Verification Date: *5/1/2003* **Verification Due:** *11/1/2003*

Number of Crevice Corrosion Sites: *5* / 124 (24 max.)
some pitting corrosion on top of specimen

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	<i>8/18/03</i>



Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	<i>8/17/03</i>

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs
1	Crevice corrosion test specimens 20-01402-5 71-027 machined from Alloy 22 plate Deliver To: Darrell Dunn/bldg. 57	EA	7/18/2003	20.00	149.50	2,990.00
				Account: 704-000	Organization: 1.20	Project: 08002.01.081
				Allocation Pct: 100.00	Total Estimated Cost: \$2,990.00	

Requisition: 03000844
 Requisitioner: Dunn, Darrell S.
 Req Organization: 1.20.05.04
 Phone: (210) 522-6090

SOUTHWEST RESEARCH INSTITUTE
 Suggested Supplier: Texas Toolmakers
 City/State: San Antonio, TX
 Contact: Mike Ridgway
 Phone: 494-3651 Fax: 494-6139

Page 1 of 1
 Date Printed: 07/01/2003
 Requisition Date: 07/01/2003

Special Instructions: Please call D. Dunn at x6090 when P.O. number is issued.

Government Project?: YES Property Type: G1 Is Govt. Property being sent to supplier?: YES

Quality Assurance?: YES ASL Required: YES

Sourcing Explanation: The supplier must be on the ASL, WIRE EDM capability.

SUPPLIER SHALL FURNISH DIMENSIONAL INSPECTION DATA VERIFYING COMPLIANCE WITH THE REQUIREMENTS OF THE FABRICATION DRAWINGS.

*Purchase requisition for ALLOY 22
 crevice corrosion test specimen from
 alloy 22 plate heat 2277-8-3175
 additional documentation pages 5-7*

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

[Signature]

8/17/03

Darrell S. Dunn SwRI-CNWRA Phone: (210) 522-6090 Fax: (210) 522-5184 e-mail: ddunn@swri.org	CNWRA Drawing 20-01402-571-027 Dimensional tolerances +/-0.005" unless otherwise specified 16 rms surface finish Crevice Repassivation Specimen	To be completed at time of order: Material: <u>ALLOY 22</u> Heat: <u>2277-8-3175</u> Specimen Orientation: _____ Other: _____
---	---	---

Technical drawing details:
 - Top view: 0.375" x 0.750" plate with a 0.325" diameter hole.
 - Side view: 0.750" height, 0.300" diameter hole, 0.250" depth.
 - End view: 0.375" width, 0.750" height, Min 0.020" radius.
 - Callouts: 1 (hole dia), 2 (#5-40 threads), 3 (0.250" deep), 4 (0.325" Dia), 5 (0.375" width), 6 (0.750" height), 7 (0.375" width), 8 (0.750" height), 9 (0.750" height), 10 (Min 0.020" radius).

Initiated by: *[Signature]* 7/5/2002 Date
 Reviewed by: *[Signature]* 7/5/02 Date
 QA Approval: *[Signature]* 7/5/2002 Date

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date


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[Signature]

8/17/03

From Page No. _____

11411 East Coker Loop
San Antonio, Texas 78216
(210) 494-3651 * Fax (210) 494-6139
www.texastoolmakers.com



A8306  ISO 9002

CERTIFICATE OF CONFORMANCE

TO: Southwest Research Institute CUSTOMER P.O. 383789S
6220 Culebra Road
San Antonio, Tx. 78238-5166 TTI JOB #: 34759/1

DESCRIPTION 20 EA.; P/N 20-01402-571-027 Crevice Repassivation Specimen

WE CERTIFY THAT THE ITEM(S) ON THE ABOVE REFERENCED PURCHASE ORDER HAVE BEEN PROCESSED AND/OR MANUFACTURED IN ACCORDANCE WITH:
Drawing 7/5/02

RECORDS ARE ON FILE AT THIS FACILITY, WHICH VERIFY OUR PROCESS CONTROLS, AND AVAILABLE FOR REVIEW UPON REQUEST. INSPECTION RESULTS ARE AS FOLLOWS:
Accepted

TEXAS TOOLMAKERS,
BY : Casey Ridgway (Casey Ridgway)
TITLE: Q.A. Manager
DATE: 7/22/03

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <u>Casey Ridgway</u>	8/17/03

From Page No. _____

DIMENSIONAL INSPECTION REPORT

TEXAS TOOLMAKERS, INC.

Job No.: 34759/1	Part No.: 20-01402-571-027	Rev. No.: 7/5/02	P.O. No.: 383789S
Customer: SW.R.I.	Part Name: Crevice Repassivation Specimen	Log No.: 3184003-C	
Inspection Plan: <input checked="" type="checkbox"/> 100% <input type="checkbox"/> Specified Dim. <input type="checkbox"/> 1st Article	Quantity: 20	Sample Size: 20	Accept No.: 20 Reject No.: 0 NR No.: 0

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1.	Ø.300		.298-.303	TTT-085	
2.	#6-40		5-40	TTT-Gage	
3.	.250 ▽		.250	TTT-102	
4.	Ø.325		.324-.328	TTT-102	
5.	.375		.375-.378	TTT-102	
6.	.750		.750-.752	TTT-102	
7.	.375		.373-.377	TTT-102	
8.	.750		.752-.754	TTT-102	
9.	.750		.750-.751	TTT-102	
10.	MIN. DROR.		R.O.3	TTT-024	

meets requirements
of drawing page
5

Daniel D
8/17/03

* Recorded if not affected by tolerance block. Sheet 1 of 1

Inspection/Performed by: Casey Ridgway Date: 7-22-03 Customer (as applicable) Date

TTI Form QF-100201 Rev 2

To Page No. _____

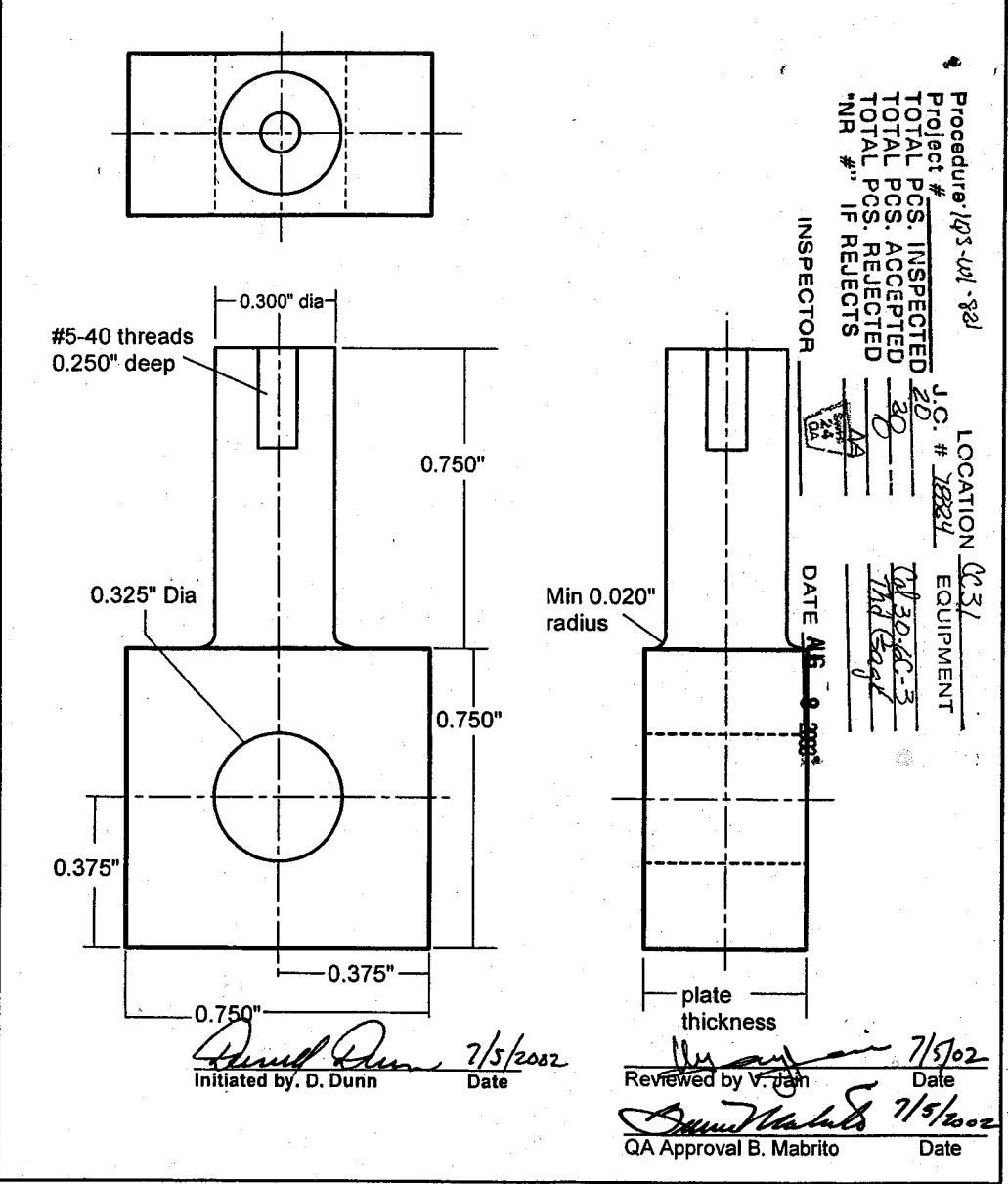
Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <u>Daniel D</u>	8/17/03

From Page No. _____

Darrell S. Dunn
SwRI-CNWRA
Phone: (210) 522-6090
Fax: (210) 522-5184
e-mail: ddunn@swri.org

CNWRA Drawing 20-01402-571-027
Dimensional tolerances +/-0.005"
unless otherwise specified
16 rms surface finish
Crevice Repassivation Specimen

To be completed at time of order:
Material: Alloy 825
41 N: 22 cc 30 FC 3 Mo
Heat: HH4371 FG
Specimen Orientation: N/A
Other: 7/29/03



To Page No. _____

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by Darrell S. Dunn Date 8/17/03

From Page No. _____

Requisition # 03001505 Date: 7/22/2003 Status: PO Generated
Requisitioner: Dunn, Darrell S. Buyer: Silvers, Jimmie W.
Target Place Date: 07/28/03 Date Entered: 07/22/03

Purchase Order # 383908S Vendor: HAYNES INTERNATIONAL, INC.
Order Date: 07/23/03 Due Date: 08/08/03

LN	ORD NO	REC QTY	ACC QTY	REC DATE	SHIP VIA	MOTOR FREIGHT	TOT AMT	DESCRIPTION
1	2	2	2	8/8/2003	MOTOR FREIGHT	\$2,864.40		Alloy C-22 plate, 1 inch thick, 2 feet wide and 2 feet long
2	2	2	2	8/8/2003	MOTOR FREIGHT	\$2,926.00		Alloy C-22 plate, 0.5 inch thick, 2 feet wide and 4 feet lon
3	1	1	1	8/8/2003	MOTOR FREIGHT	\$184.80		Alloy C-22 plate, 0.5 inch thick, 6 inches wide and 2 feet 1
							Total \$5,975.20	

NOTES: (none)
FOOTNOTES: P8 P12 Q4

P.O. FOR ALLOY C-22

To Page No. _____

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by Darrell S. Dunn Date 8/18/03

From Page No. _____

Haynes International
1020 West Park Avenue
PO Box 9013
Kokomo, Indiana, 46902

HAYNES
International

Product Description • Description Produit • Material Beschreibung
0.5 x 6 x 24

HASTELLOY(R) C-22 (R) ALLOY - PLATE
NADCAP CERTIFICATE NUMBER 0089
S400E,S1000E, EN 10204 3.1.B

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIÉ • WERKSZEUGNIS
Customer Reference
Reference Client
Kundenscheidnummer
383908S
Report No.
Rapport Nr.
Zeugnis Nr.
20030725053
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1 Of 4

SOUTHWEST RESEARCH INSTITUTE
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Quantity Ordered
Quantité Commandée
Bestellmenge
1 PC
Quantity Shipped
Quantité Expédiée
Liefermenge
1 PC

ASTM-B-575 Rev 99a N06022 ASME-SB-575 Rev 01 N06022

Heat Number Numero de Cuite Charge Nr.	Chemical Analysis • Analyse Chimique • Chemische Analyse											
	Al	B	C	Cr	Cu	Fe	Mn	Mo	Ni	P	S	W
2277 3 3266		0.005	1.19	21.40	3.75	0.23	73.30	BAL	0.008	0.004	0.03	2.81
2277 3 3266												

Certified By • Certifié Par • Bescheinigt Durch: Chuck Stansell
Certification Supervisor/Technician

07/25/03

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C-22 HEAT 2277-3-3266
0.5" THICK 6" x 24"

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Chuck Stansell

8/18/03

From Page No. _____

Haynes International
1020 West Park Avenue
PO Box 9013
Kokomo, Indiana, 46902

HAYNES
International

Product Description • Description Produit • Material Beschreibung
0.5 x 24 x 48

HASTELLOY(R) C-22 (R) ALLOY - PLATE
NADCAP CERTIFICATE NUMBER 0089
S400E,S1000E, EN 10204 3.1.B

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIÉ • WERKSZEUGNIS
Customer Reference
Reference Client
Kundenscheidnummer
383908S
Report No.
Rapport Nr.
Zeugnis Nr.
20030725051
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TX 782280510 USA
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SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA RD
SAN ANTONIO
TX 782280510 USA

Quantity Ordered
Quantité Commandée
Bestellmenge
2 PC
Quantity Shipped
Quantité Expédiée
Liefermenge
2 PC

ASTM-B-575 Rev 99a N06022 ASME-SB-575 Rev 01 N06022

Heat Number Numero de Cuite Charge Nr.	Chemical Analysis • Analyse Chimique • Chemische Analyse											
	Al	B	C	Cr	Cu	Fe	Mn	Mo	Ni	P	S	W
2277 3 3266		0.005	1.19	21.40	3.75	0.23	73.30	BAL	0.008	0.004	0.03	2.81
2277 3 3266												

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Certification Supervisor/Technician

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C-22 HEAT 2277-3-3266
0.5" THICK 24" x 48"

To Page No. _____

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Date

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Date

Recorded by

Chuck Stansell

8/18/03

From Page No. _____

Haynes International
1020 West Park Avenue
PO Box 9013
Kokomo, Indiana, 46902

HAYNES
International

Product Description - Description Produit - Material Beschreibung
1 x 24 x 24
SQUARE
HASTELLOY(R) C-22 (R) ALLOY - PLATE
NADCAP CERTIFICATE NUMBER 0089
S400E, S1000E, EN 10204 3.1.B

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIÉ • WERKSZEUGNIS
Report No. / Page de Pages / Anzahl der Seiten
2003072502 / 1 OF 4

Customer Reference / Référence Client / Kundenreferenz
38945001-0 / 07/25/03

Date Entered / Date de Commande / Identifikation
07/25/03

Ship To • Destinataire • Bestimmung
SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA RD
SAN ANTONIO
TX 782280510 USA

Sold To • Client • Bestimmung
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TX 782280510 USA

Quantity Ordered / Quantité Commandée / Bestimmung
2 PC

Quantity Shipped / Quantité Expédiée / Lieferung
2 PC

Specification • Spécification • Spezifikation
ASTM-B-575 Rev 99a N06022 ASME-SB-575 Rev 01 N06022

Heat Number / Numéro de Caille / Wärmezahl	Al	B	C	Q-Ts (0.035)	Co	Cr	Cu	Fe	Mn	Mo	Ni	P	S	Si	Ti	V	W
2277 3 3292		0.004			1.32	21.22		3.69	0.23	13.64	BAL	0.005	0.003	0.02		0.13	2.96
2277 3 3292																	

Certified By • Certifié Par • Bescheinigt Durch: Chuck Stansell
Certification Supervisor/Technician

Chuck Stansell

THE PLATING LABORATORY WHERE FROM THESE ANALYSES WERE OBTAINED HAS BEEN APPROVED BY THE BUREAU OF STANDARDS AS A PARTICIPATING LABORATORY FOR THE ANALYSIS OF METALS AND ALLOYS. THE ANALYSES WERE PERFORMED IN ACCORDANCE WITH THE PROCEDURES ESTABLISHED BY THE BUREAU OF STANDARDS. THE ANALYSES WERE PERFORMED IN ACCORDANCE WITH THE PROCEDURES ESTABLISHED BY THE BUREAU OF STANDARDS. THE ANALYSES WERE PERFORMED IN ACCORDANCE WITH THE PROCEDURES ESTABLISHED BY THE BUREAU OF STANDARDS.

C-22 HEAT 2277-3-3292

8/18/03

HEAT 1" THICK 24" x 24"

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

8/18/03

To Page No. _____

From Page No. _____

08/14/2003 14:07 FAX 000010020

CONRAD INC.

0002



staveleyservices
MATERIALS TESTING

192 Internationale Blvd.
Glendale Heights, IL 60139
Telephone 630-681-0008
Facsimile 630-671-5520
www.staveleymt.com

TEST REPORT

SOUTHWEST RESEARCH INST. 7010
6220 CULEBRA RD
P.O. DRAWER 28510
SAN ANTONIO TX 78284
DARRELL S. DUNN

P.O.# 50138
DESCR 08/05/03 ALLOY C-22
ASTM-B-575 FOR UNS N06022
MAT'L
REPORT DATE: 08/14/2003

LAB NO: 0807-032 / 02 RECEIVED DATE: 08/07/2003 JOB NO: 8/8 #V20
HT# 2277-3-3266 (0.5" THICK)

CHEMICAL ANALYSIS

Si	.01 ✓	Mn	.30 ✓	C	.004 ✓
P	.012 ✓	S	.002 / .001 ✓	Ni	BALANCE ✓
Cr	22.15 ✓	Mo	12.90 ✓	V	.15 ✓
Co	1.37 ✓	Fe	3.82 ✓	W	2.85 ✓

TEST METHODS: ASTM E-1019 LATEST REVISION ; ASTM E-1086 LATEST REVISION ;

THE ABOVE TEST RESULTS CONFORMS TO ALLOY C22

AMENDED TEST REPORT

MEETS REQUIREMENTS OF ASTM-B-575
FOR UNSN06022

Chuck Stansell
8/18/03

Bill Swartz
Q.A. INSPECTOR

ALL CHEMICAL TEST RESULTS ARE REPORTED IN WEIGHT PERCENT UNLESS OTHERWISE NOTED.

PAGE 2 OF 2

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ANALYSIS OF 2277-3-3266

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

8/18/03

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From Page No. _____

08/14/2003 14:01 FAX 630-681-5520

CONAR INC.

0001



staveleyservices
MATERIALS TESTING

192 Internationale Blvd.
Glendale Heights, IL 60139
Telephone 630-681-0008
Facsimile 630-871-5520
www.staveleymt.com

TEST REPORT

SOUTHWEST RESEARCH INST. 7010
6220 CULEBRA RD
P.O. DRAWER 28510
SAN ANTONIO TX 78284
DARRELL S. DUNN

P.O.# 50138
DESCR 08/05/03 ALLOY C-22
ASTM-B-575 FOR UNS N06022
MAT'L
REPORT DATE: 08/14/2003

LAB NO: 0807-032 / 01 RECEIVED DATE: 08/07/2003 JOB NO: 8/8 #V19

HT# 2277-3-3292 (1" THICK)

CHEMICAL ANALYSIS

Si	.01 ✓	Mn	.29 ✓	C	.003 ✓
P	.011 ✓	S	.002 / .001 ✓	NI	BALANCE ✓
Cr	22.11 ✓	Mo	12.99 ✓	V	.15 ✓
Co	1.50 ✓	Fe	3.63 ✓	W	2.91 ✓

TEST METHODS: ASTM E-1019 LATEST REVISION ; ASTM E-1086 LATEST REVISION ;

THE ABOVE TEST RESULTS CONFORMS TO ALLOY C22

AMENDED TEST REPORT

MEETS REQUIREMENTS FOR ASTM-B-575

UNS N06022

Darrell D

8/18/03

Bill S...
Q.A. INSPECTOR

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PAGE 1 OF 2

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ANALYSIS OF 2277-3-3292

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Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Darrell D

8/18/03

From Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Darrell D

8/26/03

To Page No. _____

From Page No. _____

OCP v.s. Temperature of Alloy C-22

Objective: To understand the effect of temperature on Ecorr.

Alloy / Heat No. : Alloy C-22 Cylinder / 2277-8-3175

Specimen Preparation: Specimen surfaces polished to 600 Grit finish using SiC paper. Specimens cleaned in acetone and rinsed in DI water. Specimens immersed in nitric acid for 10 minutes.

Specimen #1:	Specimen #2:	Specimen #3:
Initial Wt: 12.7347g	Initial Wt: 12.7140g	Initial Wt: 12.1970g
Final Wt: 12.7355g	Final Wt: 12.7145g	Final Wt: 12.1985g
Model: Sartorius Genius	SN: 12809099	
Cal: 5/15/03	Due: 11/15/03	
Solution:		
4M of Cl ⁻ + DI Water to 2000 mL		
467.62g of NaCl Lot # 028794		
6.5 mL of NaHCO ₃ (1M HCO ₃ ⁻ , 16.809g of NaHCO ₃ Lot # 025498)		

Reagents measured with	Model: OHAUS	SN: 2883
8/15/02 CW	Cal: 7/29/03	Due: 1/29/04
Initial pH: 8.767	8.640 adjusted to 7.979	8/15/04
Final pH: 8.862	Model: Fisher Accumet 950 Meter	SN: 3340
	Cal: 8/11/03	Due: 8/11/04
	pH Probe: #13-620-296	SN: 2291257P6
Test Temperature: 95°C ~ 25°C	Measured with Hg Thermometer	SN: 096-852
	Cal: 6/3/03	Due: 12/3/03

Counter Electrode: Platinum Flag

Reference Electrode: Accumet 13-620-82 **SN:** 8205244

Gas: Compressed Air

Specimen #1:	Specimen #2:	Specimen #3:
Ecorr: -0.169V	Ecorr: -0.190V	Ecorr: -0.156V
Ept: +0.198V		
Model: Keithley 614	SN: 457374	
Cal: 10/28/02	Due: 10/28/03	

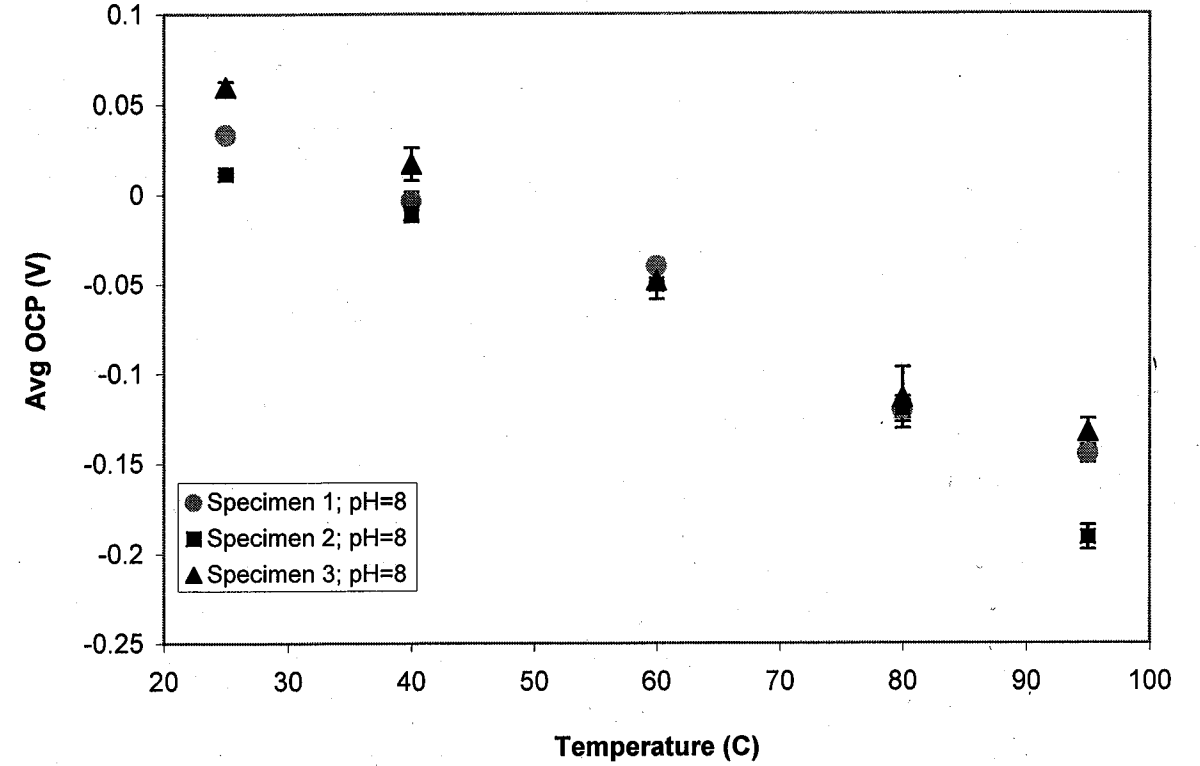
Note: Ecorr and Ept measured with Keithley 614 agree with the values obtained by data acquisition system.

Specimen Examination: light surface staining on all specimens.

Note: Specimens repolished for further testing

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	8/18/03
		Chung Che Wen	

From Page No. _____



Data: Ecorr Temp 4

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	8/25/03
		Chung Che Wen	

From Page No. _____

OCP vs. Temp of Alloy C-22

Objective: To understand the effect of temperature on Ecorr.

Alloy / Heat No. : Alloy C-22 Cylinder / 2277-8-3175

Specimen Preparation: Specimen surfaces polished to 600 Grit finish using SiC paper. Specimens cleaned in acetone and rinsed in DI water. Specimens immersed in nitric acid for 10 minutes.

Specimen #4:	Specimen #5:	Specimen #6:
Initial Wt: 12.70922g	Initial Wt: 12.35139g	Initial Wt: 12.38865g
Final Wt: 12.70974g	Final Wt: 12.33510g	Final Wt: 12.38802g
Model: Sartorius Genius	SN: 12809099	
Cal: 5/15/03	Due: 11/15/03	

Solution: 4 M of Cl⁻ + DI Water to 2000 mL
467.62g of NaCl Lot# 028794
8 mL of Na₂CO₃ (1 M CO₃²⁻, 10.606g of Na₂CO₃ Lot# 028007)

Reagents measured with Model: OHAUS SN: 2883
Cal: 7/29/03 Due: 1/29/03 ^{B110} 3/10/04
1/29/04

Initial pH: 8.737 adjusted to 9.995

Final pH: 9.180 Model: Fisher Accumet 950 Meter SN: 3340
Cal: 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C ~ 25°C Measured with Hg Thermometer SN: H98-170
Cal: 4/29/03 Due: 4/29/04

Counter Electrode: Platinum Flag

Reference Electrode: Accumet 13-620-52 SN: 00042119

Gas: Compressed Air

Specimen #4:	Specimen #5:	Specimen #6:
Ecorr: -0.251V	Ecorr: +0.143V	Ecorr: -0.305
Ept: +0.112V		
Model: Keithley 614	SN: 457374	
Cal: 10/28/02	Due: 10/28/03	

Note: Ecorr and Epe measured with Keithley 614 agree with the values obtained by data acquisition system.

Specimen Examination: Light staining on specimens 4 and 6. Mild staining on specimen 5.

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

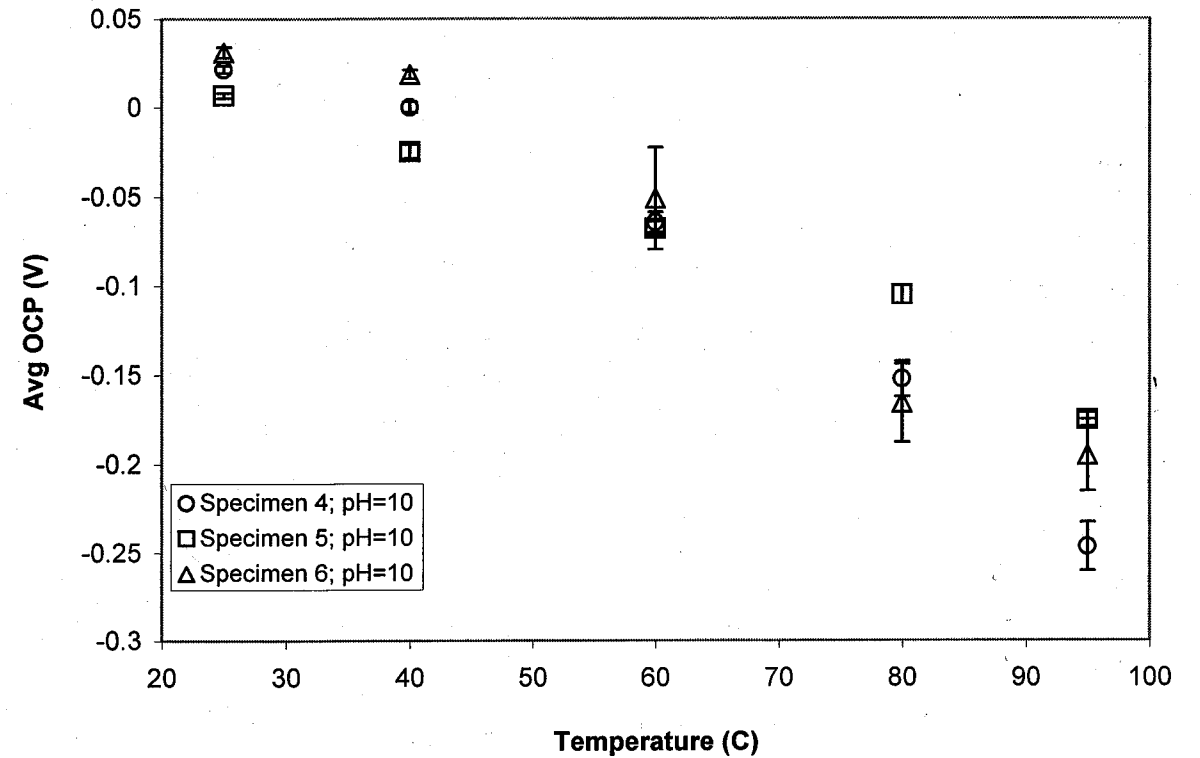
Recorded by

Chung Che Wu

8/18/03

From Page No. _____

Note: Specimens repolished for further testing



Data: Ecorr Temp 4

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Chung Che Wu

8/25/03

From Page No. _____

Potentiostatic Test

Understand the effect of current as a function of time under constant applied potential

Objective: *8/20/03 CW*

Alloy / Heat No. : 825 / HH4371FG

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Due: 9/6/03
Cal: 3/6/03

Initial Weight: 38.62428g Model: Sartorius Genius SN: 12809099
Final Weight: 38.59689g Cal: 5/15/03 Due: 11/15/03

Solution: 5.5M of Cl⁻ + DI water to 2000ml
642.94g of NaCl Lot # 028794

Reagents measured with Model: OHAUS SN: 2883 Due: ~~1/29/03~~ 1/29/04
Cal: 7/29/03

Initial pH: 8.900 Model: Fisher Accumet 950 Meter SN: 3340
Final pH: 7.483 Cal: 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100°C Measured with Hg Thermometer SN: H98-179
Cal: 4/29/03 Due: 4/29/04

Counter Electrode: Platinum Flag

Reference Electrode: 13-620-52 Fisher SCE SN: 0052116

Gas: 99.999% Nitrogen

Ecorr: -0.295V Model: Keithley 614 SN: 467374
Ept: +0.267V Cal: 10/28/02 Due: 10/28/03

Potentiostat: EG & G 263A SN: _____

Last Verification Date: 5/1/2003 Verification Due: ~~11/1/2003~~ 11/1/2003 *do 3/19/04*

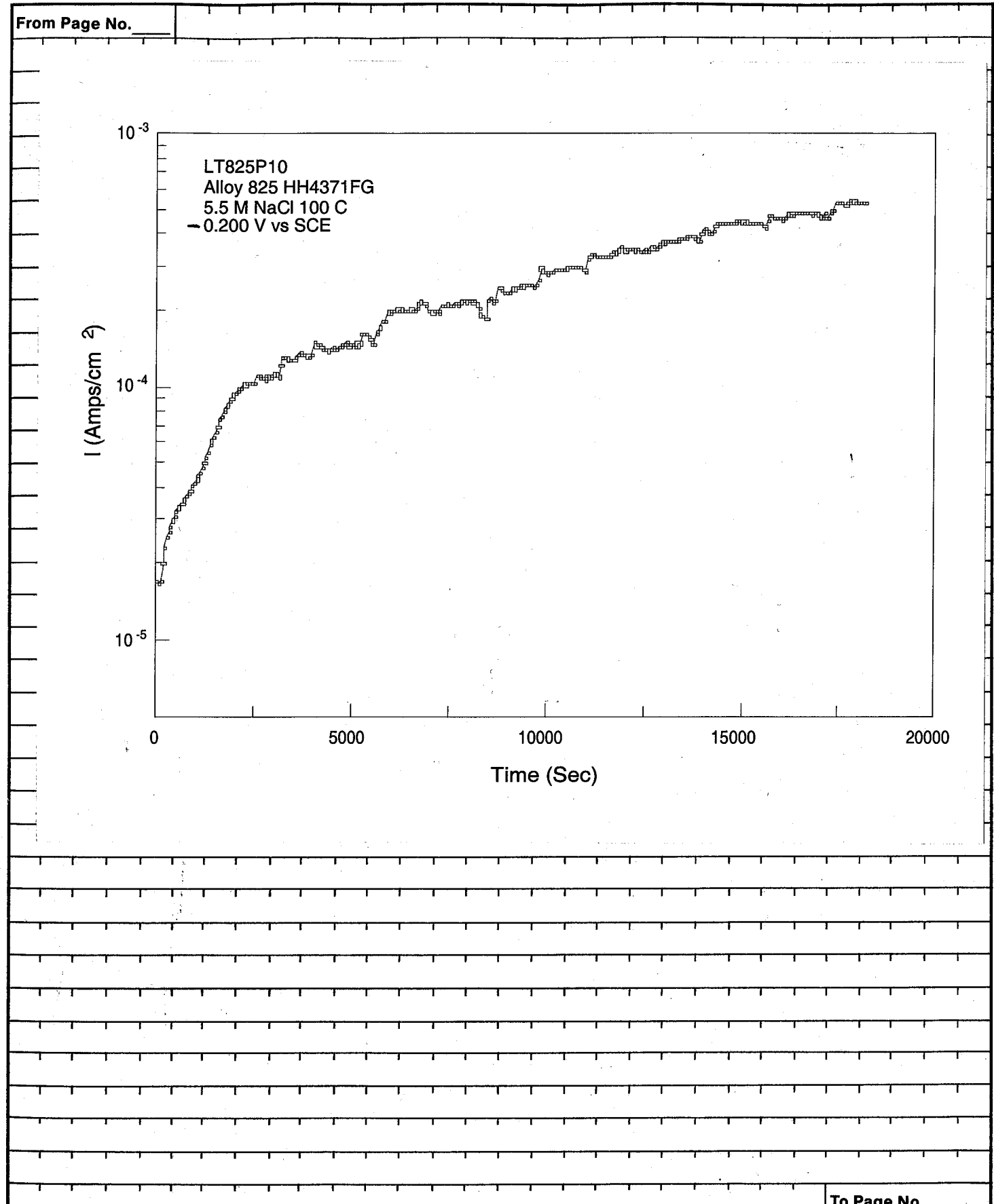
Number of Crevice Corrosion Sites: light surface staining " 12/24 (24 max.)

Note: Applied potential to -200 mV

Data: LT825P10

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Ching-Lee Wu</i>	8/18/03



Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/26/03

From Page No. _____

Potentiostatic Test

Objective: Understand the effect of current as a function of time under constant applied potential.

Alloy / Heat No. : 825 / HH4371FG

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Due: 9/6/03
Cal: 3/6/03

Initial Weight: 38.29017g Model: Sartorius Genius SN: 12809099
Final Weight: 38.07486g Cal: 5/15/03 Due: 11/15/03

Solution: 5.5M of Cl⁻ + DI water to 2000 ml
642.96g of NaCl Lot # 028794

Reagents measured with Model: OHAUS SN: 2883 Due: 4/29/03
Cal: 7/29/03

Initial pH: 8.631 Model: Fisher Accumet 950 Meter SN: 3340
Final pH: 7.289 7.633 Cal: 8/11/03 Due: 8/11/04
8/22/03 CW pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100 C Measured with Hg Thermometer SN: H98-179
Cal: 4/29/03 Due: 4/29/04

Counter Electrode: Platinum Flag
Reference Electrode: 13-620-52 Fisher SCE SN: 0052116

Gas: 99.999% Nitrogen
Ecorr: +0.305V Model: Keithley 614 SN: 467374
Ept: +0.118V Cal: 10/28/02 Due: 10/28/03

Applied Potential: -250mV
Potentiostat: EG&G 263A SN: 66105

Last Verification Date: 5/1/03 Verification Due: 11/1/03

Number of Crevice Corrosion Sites: light surface staining 24 /24 (24 max.)

Date: LT825P11

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

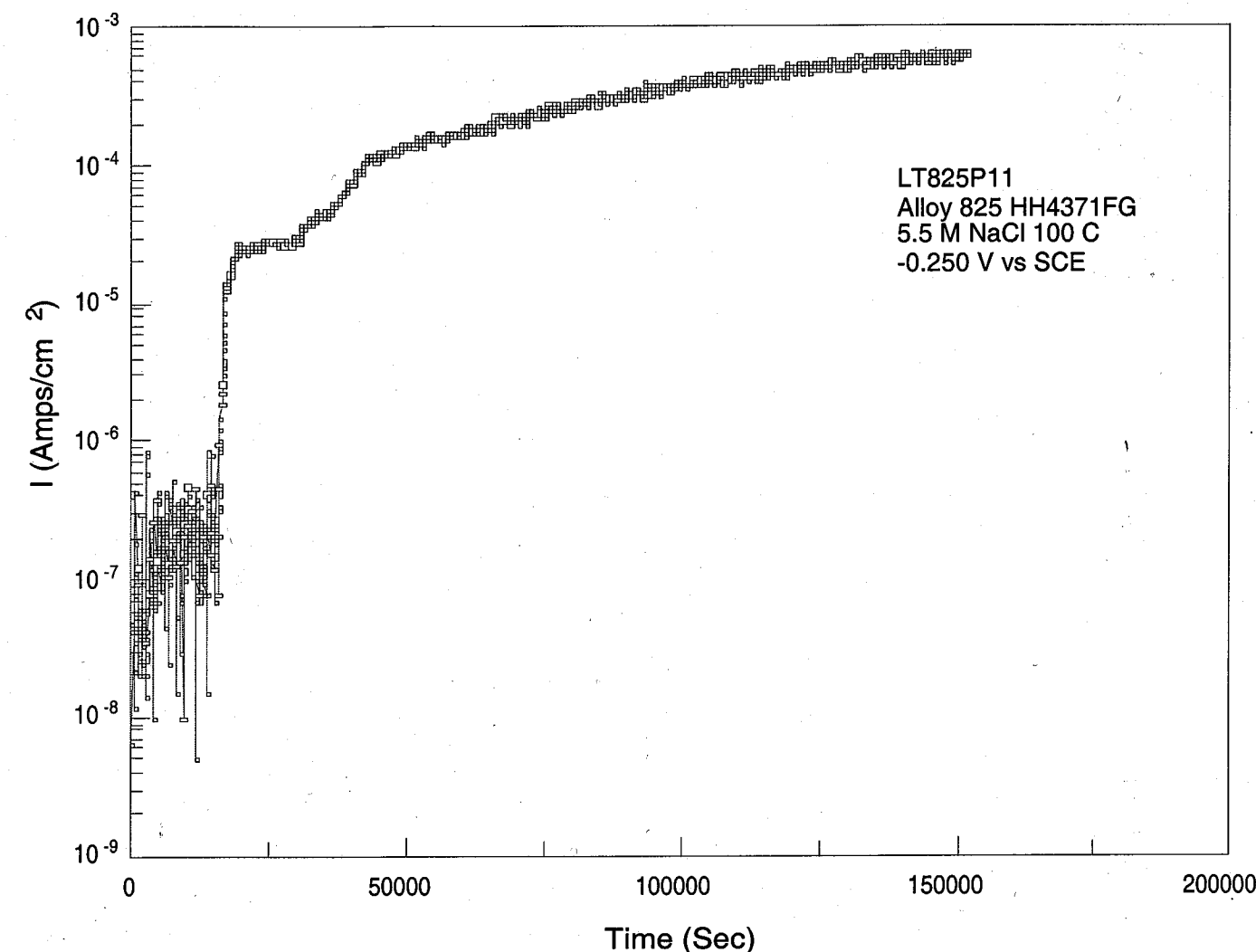
Date

Recorded by

Chung She Wu

8/20/03

From Page No. _____



Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

[Signature]

8/26/03

To Page No. _____

From Page No. _____

Potentiostatic Test

Objective: Understand the effect of current as a function of time under constant applied potential.

Alloy / Heat No. : 825 / HH4371FG

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03

Initial Weight: 39.13558g Model: Sartorius Genius SN: 12809099 Cal: 5/15/03 Due: 11/15/03
Final Weight: 39.13618g

Solution: 5.5 M of Cl⁻ + DI water to 2000ml
642.95g of NaCl Lot # 028794

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: ~~1/29/03~~ 1/29/04 ^{3/10/04}

Initial pH: 8.925 Model: Fisher Accumet 950 Meter SN: 3340 Cal: 8/11/03 Due: 8/11/04
Final pH: 7.089 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100 C Measured with Hg Thermometer SN: H98-179 Cal: 4/29/03 Due: 4/29/04

Counter Electrode: Platinum Flag Reference Electrode: 13-620-52 Fisher SCE SN: 0052116

Gas: 99.999% Nitrogen Ecorr: -0.289 V Model: Keithley 614 SN: 467374 Cal: 10/28/02 Due: 10/28/03
Ept: +0.242 V Applied Potential: -300mV

Potentiostat: EG&G 263A SN: 66105 Last Verification Date: 5/1/03 Verification Due: 11/1/03

Number of Crevice Corrosion Sites: 0 / 24 (24 max.)

Specimen re-weighed and cleaned for further testing. Data: LP825P12

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

8/22/03

Chung-Ehe Wen

From Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

4/16/04

Edward D

From Page No. _____

OCP vs. Temp of Alloy C-22

Objective: To understand the effect of temperature on Ecorr.

Alloy / Heat No. : Alloy C-22 Cylinder / 2277-8-3175

Specimen Preparation: Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water.

Specimen #1:	Specimen #2:	Specimen #3:
Initial Wt: 12.68785g	Initial Wt: 12.31703g	Initial Wt: 12.71181g
Final Wt: 12.68786g	Final Wt: 12.31842g	Final Wt: 12.71199g
Model: Sartorius Genius	SN: 12809099	
Cal: 5/15/03	Due: 11/15/03	

Solution: 4M of Cl⁻ + DI Water to 2000 mL
467.56g of NaCl Lot # 028794

~~1000µL HCl~~ 1000µL of 20% HCl + 1300µL of 1M NaOH added to
8/25/03 CW adjust the pH.

Reagents measured with Model: OHAUS SN: 2883
Cal: 7/29/03 Due: ~~1/29/03~~ 1/29/04 ^{BK} 3/10/04

Initial pH: 8.578 adjusted to 3.014

Final pH: 3.473 Model: Fisher Accumet 950 Meter SN: 3340
Cal: 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C ~ 25°C Measured with Hg Thermometer SN: C96-852
Cal: 6/3/03 Due: 12/3/03

Counter Electrode: Platinum Flag

Reference Electrode: Accumet 13-620-52 SN: 8205244

Gas: Compressed Air

Specimen #1:	Specimen #2:	Specimen #3:
Ecorr: -0.201V	Ecorr: -0.195V	Ecorr: -0.136V
Ept: +0.418V		
Model: Keithley 614	SN: 467374	
Cal: 10/28/02	Due: 10/28/03	

Note: Ecorr and Ept measured with Keithley 614 agree with values measured by data acquisition system.

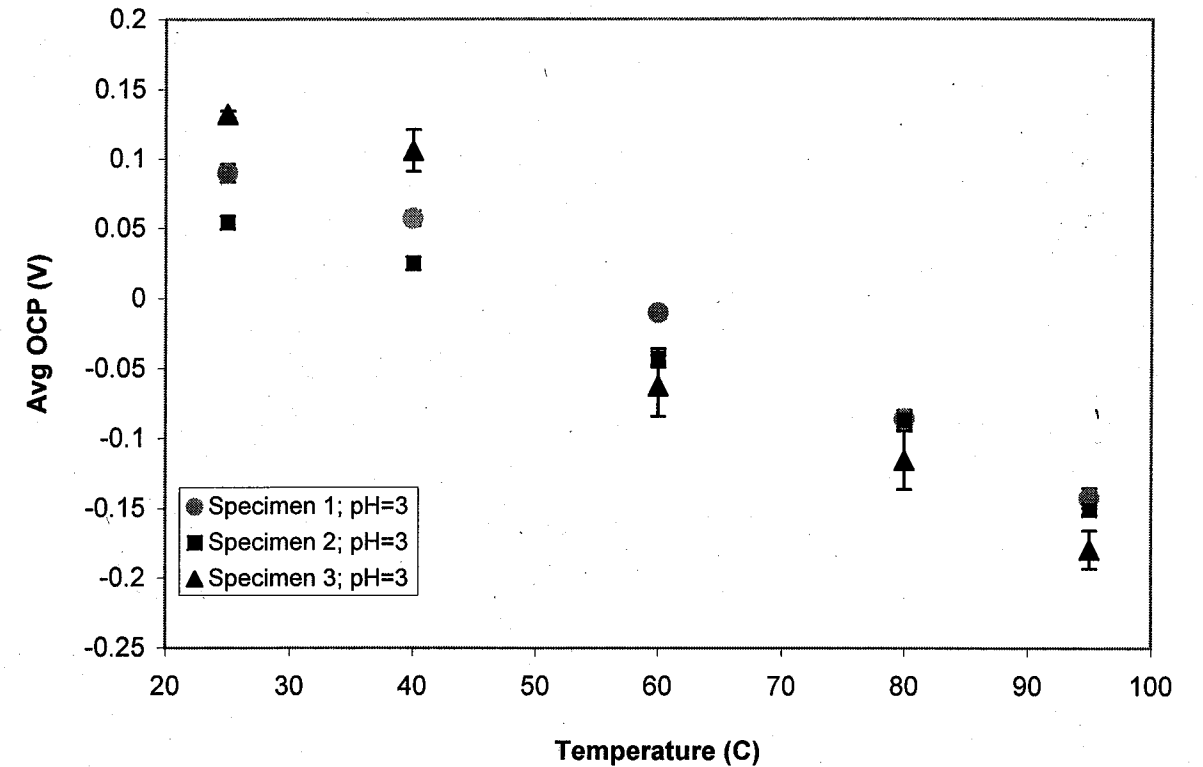
Data: Ecorr Temp 5

Specimens repolished for further testing

To Page No. _____

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by *Chung Che Wen* 8/25/03

From Page No. _____



No corrosion observed. thin surface layer deposit.

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by *Chung Che Wen* 9/3/03

To Page No. _____

From Page No. _____

OCP vs. Temp of Alloy C-22

Objective: To understand the effect of temperature on Ecorr.

Alloy / Heat No. : Alloy C-22 Cylinder / 2277-8-3175

Specimen Preparation: Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water.

Specimen #4:	Specimen #5:	Specimen #6:
Initial Wt: 12.69468g	Initial Wt: 12.17824g	Initial Wt: 12.37440g
Final Wt: 12.69670g	Final Wt: 12.18450g	Final Wt: 12.37179g
Model: Sartorius Genius	SN: 12809099	
Cal: 5/15/03	Due: 11/15/03	

Solution:
 4M of Cl⁻ + DI Water to 2000 mL
 467.56g of NaCl Lot # 028794
 52.7 mL of 1M NaOH added to adjust the pH.

Reagents measured with	Model: OHAUS	SN: 2883
	Cal: 7/29/03	Due: 1/29/04
Initial pH: 8.604 adjusted to 12.003		
Final pH: 11.868	Model: Fisher Accumet 950 Meter	SN: 3340
	Cal: 8/11/03	Due: 8/11/04
	pH Probe: #13-620-296	SN: 2291257P6
Test Temperature: 95°C ~ 25°C	Measured with Hg Thermometer	SN: H98-170
	Cal: 4/29/03	Due: 4/29/04
Counter Electrode: Platinum Flag		
Reference Electrode: Accumet 13-620-52		SN: 00042119
Gas: Compressed Air		

Specimen #4:	Specimen #5:	Specimen #6:
Ecorr: -0.326 V	Ecorr: -0.200 V	Ecorr: -0.115 V
Ept: +0.020 V		
Model: Keithley 614	SN: 467374	
Cal: 10/28/02	Due: 10/28/03	

Note: Ecorr and Ept measured with Keithley 614 agree with values measured by data acquisition system.

Data: EcorrTemp5

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wu</i>	8/25/03

From Page No. _____

Temperature (C)	Specimen 4 (V)	Specimen 5 (V)	Specimen 6 (V)
25	-0.12	-0.08	-0.05
40	-0.15	-0.10	-0.07
60	-0.20	-0.15	-0.12
80	-0.30	-0.25	-0.18
95	-0.45	-0.35	-0.25

No sign of corrosion. thin yellowish surface layer deposit.

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wu</i>	9/3/03

From Page No. _____

Page 1 of 1
Date Printed: 08/27/2003
Requisition Date: 07/23/2003

SOUTHWEST RESEARCH INSTITUTE

Suggested Supplier: Texas Toolmakers
City/State: San Antonio, TX
Contact: Mike Ridgway
Phone: 494-3651 Fax: 494-6139

Requisition: 03001528
Requisitioner: Dunn, Darrell S.
Req Organization: 1.20.05.04
Phone: (210) 522-6090

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs
1	Crevice corrosion test specimens 20-01402.5 71-027 machined from Alloy 22 plate Deliver To: Darrell Dunn/bldg. 57	EA	8/22/2003	20.00	149.50	2,990.00
		Account: 704-000	Organization: 1.20	Project: 06002.01.081	Allocation Pct: 100.00	Total Estimated Cost: \$2,990.00

Special Instructions: Quality & Technical Requirements: Specimens machined as per CWRA drawing 20-01402-571-027. Dimensional inspection per dimensions and tolerances identified in CWRA drawing 20-01402-571-027 is required. Vendor has drawing on file.

Call Darrell Dunn with P.O. number when issued.

Government Project?: YES Property Type: G1 Is Govt. Property being sent to supplier?: YES
Quality Assurance?: YES ASL Required: YES

Approvals: Requestor: Darrell S Dunn Department/Division Management: Budhi Sagar Vijay Jain
Quality Assurance: Robert D Brient

SUPPLIER SHALL FURNISH DIMENSIONAL INSPECTION DATA VERIFYING COMPLIANCE WITH THE REQUIREMENTS OF THE FABRICATION DRAWINGS.

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/27/03

From Page No. _____

DIMENSIONAL INSPECTION REPORT

TEXAS TOOLMAKERS, INC.

Job No.: 34815/1	Part No.: 20-01402-571-027	Rev. No.: 7/5/02	P.O. No.: 3839035
Customer:	Part Name: Crevice Repassivation Specimen	Log No.: 3204005-C	
Inspection Plan: <input checked="" type="checkbox"/> 100 %	Quantity: 20	Sample Size: 20	Accept No.: 20
<input type="checkbox"/> Specified Dim.	<input type="checkbox"/> 1st Article	<input type="checkbox"/>	<input type="checkbox"/>

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1.	Ø.300		.297-.300	TTA-102	✓
2.	#5-40		5-40	TTA-gage	✓
3.	.250 V		.260-.290	TTA-102	✓
4.	Ø.325		Ø.325	TTA-103	✓
5.	.375		.374-.378	TTA-102	✓
6.	.750		.750-.752	TTA-102	✓
7.	.375		.373-.376	TTA-102	✓
8.	.750		.750-.755	TTA-102	✓
9.	.750		.757-.756	TTA-102	* ✓
10.	.020 R.		.020 R	TTA-097	✓

DIMENSIONAL TOLERANCE SPECIFIED AS 0.005" ALTHOUGH 0.756 EXCEEDS DIMENSIONAL TOLERANCE, THIS DIMENSIONAL VARIATION WILL NOT AFFECT FITNESS FOR USE OR TEST RESULTS. THEREFORE SPECIMENS ACCEPTED AS IS

[Signature]
8/27/03

* Recorded if not affected by tolerance block. Sheet 1 of 1

Inspection Performed by: *[Signature]* Date: 8-27-03 Customer (as applicable) Date: _____

TTI Form QF-100201 Rev 2

DRAWING ON PAGE 5

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/27/03

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy/Heat No.: 316L SS / P80746

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver:	Proto #6104	SN: 139072
	Cal: 3/6/03	Due: 9/6/03
Initial Weight: 30.9556g	Model: Sartorius Genius	SN: 12809099
Final Weight: 29.68831g	Cal: 5/15/03	Due: 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.87g NaCl Lot # 028794

Reagents measured with	Model: OHAUS	SN: 2883	<i>blk 3/10/04</i>
	Cal: 7/29/03	Due: 4/29/03 1/29/04	
Initial pH: 8.846	Model: Fisher Accumet 950 Meter	SN: 3340	
Final pH: 10.488	Cal: 8/11/03	Due: 8/11/04	
	pH Probe: #13-620-296	SN: 2291257P6	

Test Temperature: 100C
Measured with Hg Thermometer SN: C96-816
Cal: 6/3/03 Due: 12/3/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE #13-620-51 SN: 8029166

Gas: 99.999% Nitrogen
Ecorr: -0.362V Model: Keithley 614 SN: 0704934
Ept: +0.181V Cal: 6/09/03 Due: 6/09/04

Applied: -300 mV v.s. SCE
Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: ~~2/1/03~~
2/1/04 *blk
3/10/04*

Number of Crevice Corrosion Sites: 24/24 (24 max.)
Pitting and Localized corrosion

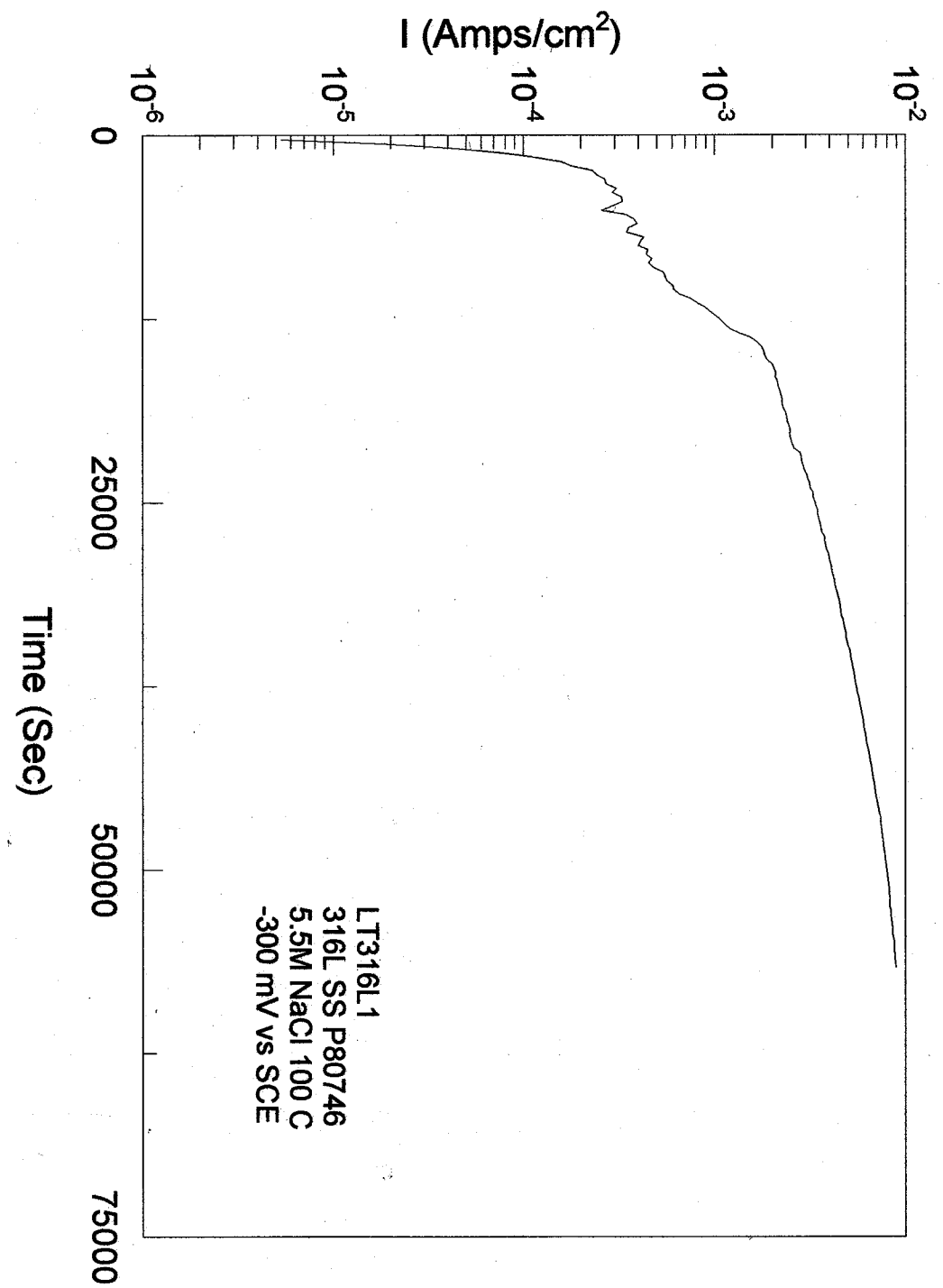
Data: LT316L1

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wen</i>	8/28/03

TITLE _____

From Page No. _____



To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wen</i>	9/10/03

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: Alloy 625 / NX9936AG

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03

Initial Weight: 31.37914g Model: Sartorius Genius SN: 12809099 Cal: 5/15/03 Due: 11/15/03
Final Weight: 27.81971g

Solution: 5.5M NaCl + DI Water to 2000mL
642.94g of NaCl Lot # 028794

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/04
1/29/04

Initial pH: 8.959 Model: Fisher Accumet 950 Meter SN: 3340 Cal: 8/11/03 Due: 8/11/04
Final pH: 10.894 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C Measured with Hg Thermometer SN: 1238002 Cal: 1/15/03 Due: 1/15/04

Counter Electrode: Platinum Flag Reference Electrode: Fisher SCE # 13-620-52 SN: 8210516

Gas: 99.999% Nitrogen Ecorr: -0.283V Model: Keithley 614 SN: 0704934 Cal: 6/09/03 Due: 6/09/04
Ept: -0.223V Applied: 50mV vs SCE

Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: 2/1/03
2/1/04 8/1/04 3/1/04

Number of Crevice Corrosion Sites: 24 / 24 (24 max.)
Extreme transpassive dissolution.

Data: LT625P1

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

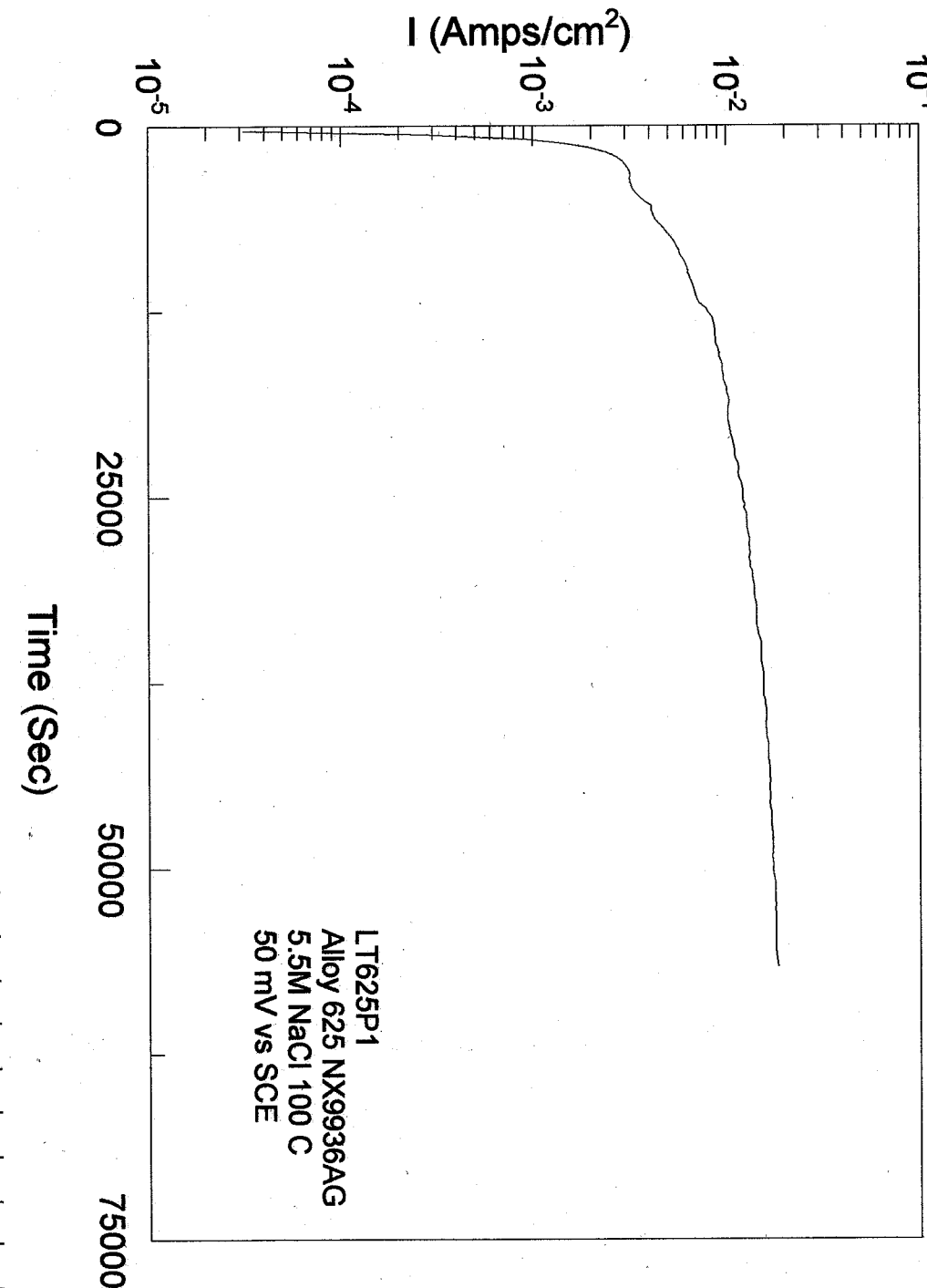
Date

Recorded by

Chung Che Wan

8/28/03

From Page No. _____



To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Chung Che Wan

9/10/03

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: Alloy 625 / NX 9936AG

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03
Initial Weight: 31.17248 Model: Sartorius Genius SN: 12809099
Final Weight: 20.92515g Cal: 5/15/03 Due: 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.95g of NaCl Lot # 028794

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/04
Initial pH: 8.945 Model: Fisher Accumet 950 Meter SN: 3340
Final pH: 11.296 Cal: 8/11/04 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C Measured with Hg Thermometer SN: E98-273 Cal: 3/27/03 Due: 9/27/2003

Counter Electrode: Platinum Flag Reference Electrode: Fisher SCE #13-620-52 SN: 0066110

Gas: 99.999% Nitrogen Ecorr: -0.328V Model: Keithley 614 SN: 0704934
Ept: -0.053V Cal: 6/09/03 Due: 6/09/04
Applied: 0 mV vs. SCE

Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: 2/1/04
2/1/04 3/10/04

Number of Crevice Corrosion Sites: 24/24 (24 max.)
Severe transpassive dissolution.

Data: LT625P2

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

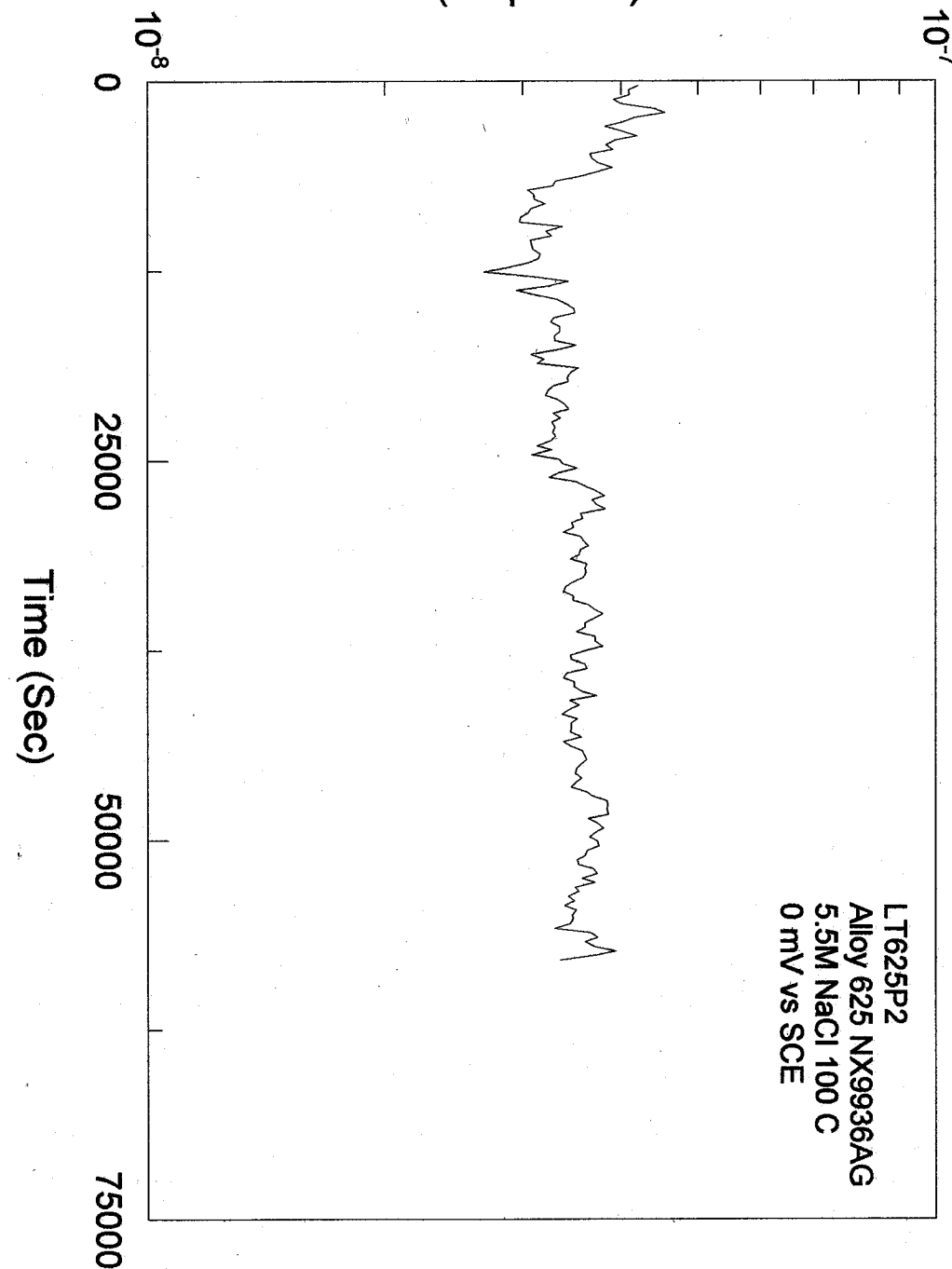
Recorded by _____

8/28/03

Chung-Che Wu

From Page No. _____

I (Amps/cm²)



To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

7/10/03

Chung-Che Wu

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: Alloy C-22 / 2277-8-3175

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03

Initial Weight: 39.77252g Model: Sartorius Genius SN: 12809099 Cal: 5/15/03 Due: 11/15/03
Final Weight: 27.03917g

Solution: 5.5M NaCl + DI Water to 2000mL
642.95g of NaCl Lot #028794

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/04
1/29/04 8/10/04

Initial pH: 8.855 Model: Fisher Accumet 950 Meter SN: 3340 Cal: 8/11/03 Due: 8/11/04
Final pH: 6.013 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C Measured with Hg Thermometer SN: E98-191 Cal: 6/3/03 Due: 12/3/03

Counter Electrode: Platinum Flag Reference Electrode: Fisher SCE #13-620-52 SN: 9250071

Gas: 99.999% Nitrogen Ecorr: -0.213V Model: Keithley 614 SN: 0704934 Cal: 6/09/03 Due: 6/09/04
Ept: +0.089V

Applied: 400 mV vs. SCE Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: ~~2/1/03~~ 2/1/04 8/10/04

Number of Crevice Corrosion Sites: 24 / 24 (24 max.)
Severe transpassive dissolution.

Data: C22L15

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

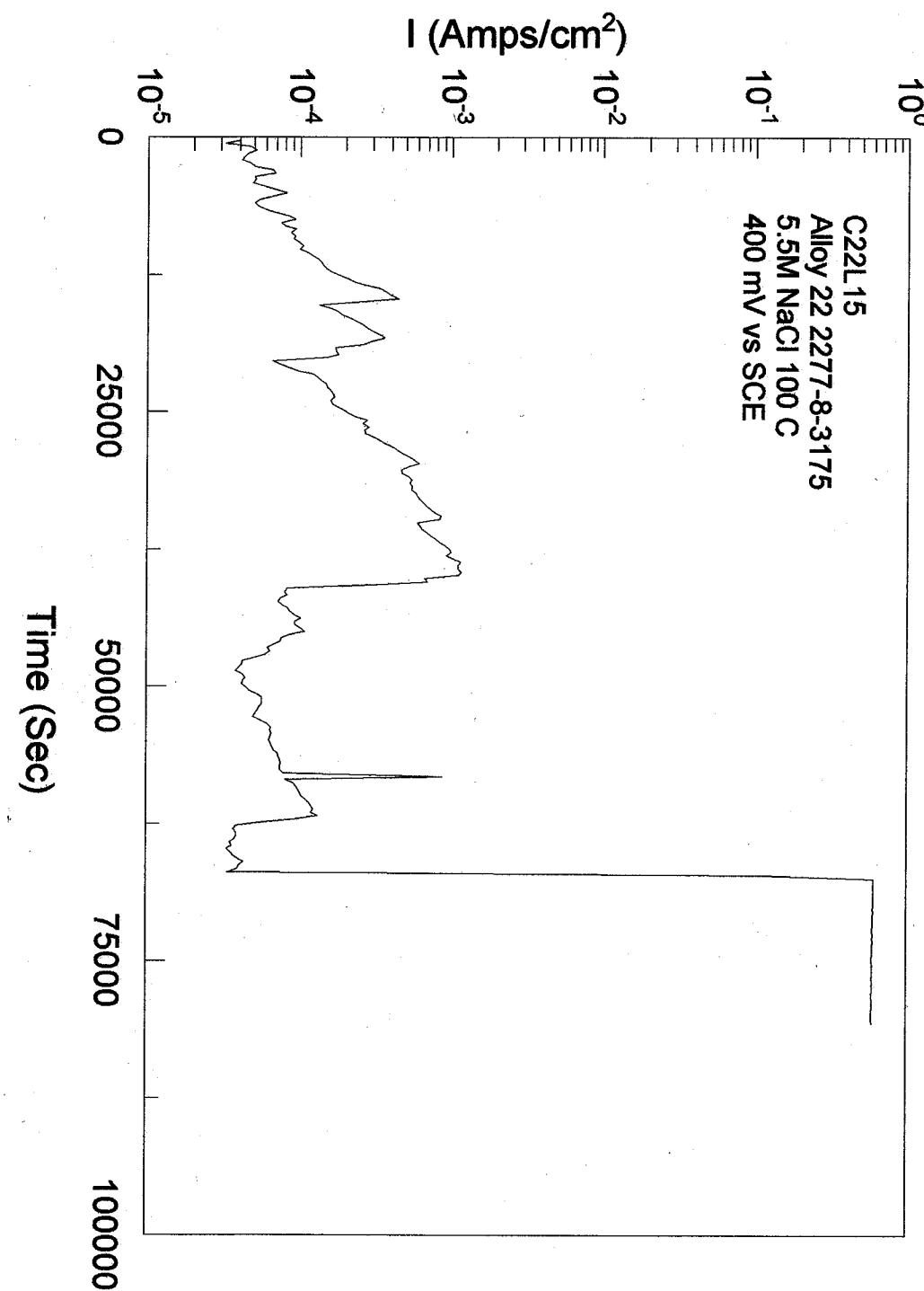
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8/28/03

Chung-Che Wan

From Page No. _____



To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

9/10/03

Chung-Che Wan

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: Alloy C-22 / 2277-8-3175

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072
Cal: 3/6/03 Due: 9/6/03

Initial Weight: 40.04108 g **Model:** Sartorius Genius SN: 12809099
Final Weight: 37.76575g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.92 g of NaCl Lot #028794

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** ~~1/29/03~~ 1/29/04 ^{3/10/04}

Initial pH: 8.875 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 5.753 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C **Measured with Hg Thermometer SN:** C96-783
Cal: 4/29/03 **Due:** 10/29/03

Counter Electrode: Platinum Flag

Reference Electrode: Fisher SCE #13-620-52 SN: 0066128

Gas: 99.999% Nitrogen

Ecorr: -0.238V **Model:** Keithley 614 SN: 0704934
Ept: -0.039V **Cal:** 6/09/03 **Due:** 6/09/04

Eapplied: 300 mV vs. SCE

Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 **Verification Due:** ~~2/1/03~~ 2/1/04 ^{8/03} 3/10/04

Number of Crevice Corrosion Sites: 2 / 24 (24 max.)
Transpassive dissolution.

Data: C22L16

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wen</i>	8/28/03

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Data lost due to computer problem.

B.S.P.
3/10/04

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Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wen</i>	9/10/03

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: 316L / P80746

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072
Cal: 3/6/03 Due: 9/6/03

Initial Weight: 30.99263g **Model:** Sartorius Genius SN: 12809099
Final Weight: 30.73673g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.88g of NaCl Lot # 030198

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/04 ^{8/29 3/10/04}
Initial pH: 8.390 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 6.743 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C **Measured with Hg Thermometer SN:** C96-816
Cal: 6/3/03 **Due:** 12/3/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE # 13-620-51 SN: 8027166

Gas: 99.999% Nitrogen
Ecorr: -0.360V **Model:** Keithley 614 SN: 0704934
Ept: +0.167V **Cal:** 6/09/03 **Due:** 6/09/04

Eapplied (vs SCE): -325 mV
Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 **Verification Due:** 2/1/04 ^{8/29 3/10/04}

Number of Crevice Corrosion Sites: 24/24 (24 max.)
Localized corrosion. Heavy golden surface staining.

Data: LT316L2

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

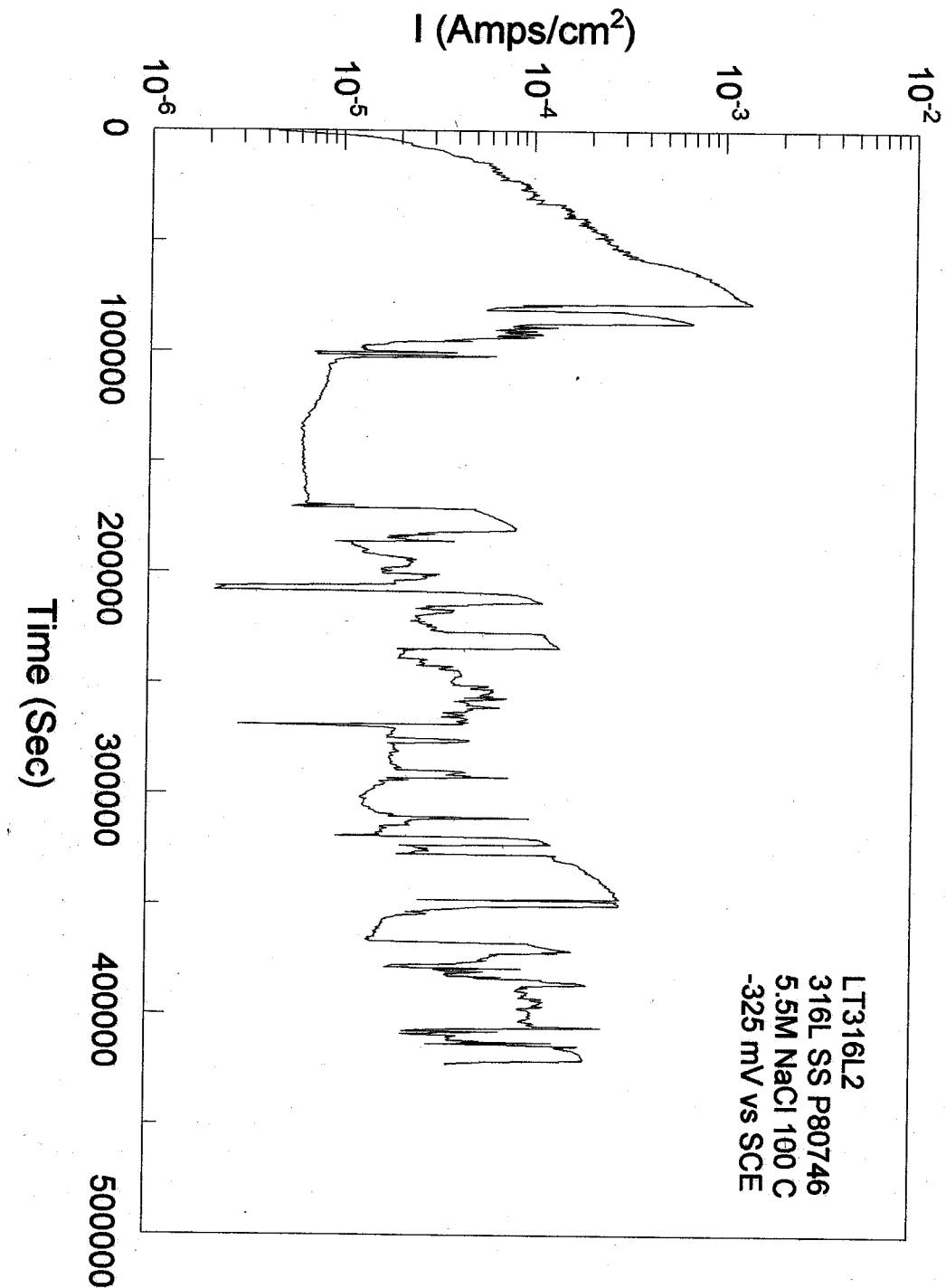
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Chung-Che Wu

8/29/03

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Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

Chung-Che Wu

9/10/03

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: Alloy 825 / HH4371FG

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03

Initial Weight: 39.58965g Model: Sartorius Genius SN: 12809099 Final Weight: 39.54488g Cal: 5/15/03 Due: 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL 642.88g of NaCl Lot # 030198

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/04 1/29/04 3/10/04

Initial pH: 8.475 Model: Fisher Accumet 950 Meter SN: 3340 Final pH: 5.879 Cal: 8/11/03 Due: 8/11/04 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C Measured with Hg Thermometer SN: C96-649 Cal: 6/15/03 Due: 1/15/04

Counter Electrode: Platinum Flag Reference Electrode: Fisher SCE # 13-620-52 SN: 8210516

Gas: 99.999% Nitrogen Ecorr: -0.299V Model: Keithley 614 SN: 0704934 Ept: -0.700V Cal: 6/09/03 Due: 6/09/04

Applied (vs SCE): -275 mV Eapplied (vs SCE): -275 mV Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: 2/1/03 8/1/04 3/10/04

Number of Crevice Corrosion Sites: 7/24 (24 max.)

LT825P13a Data: LT825P13

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Date

Invented by

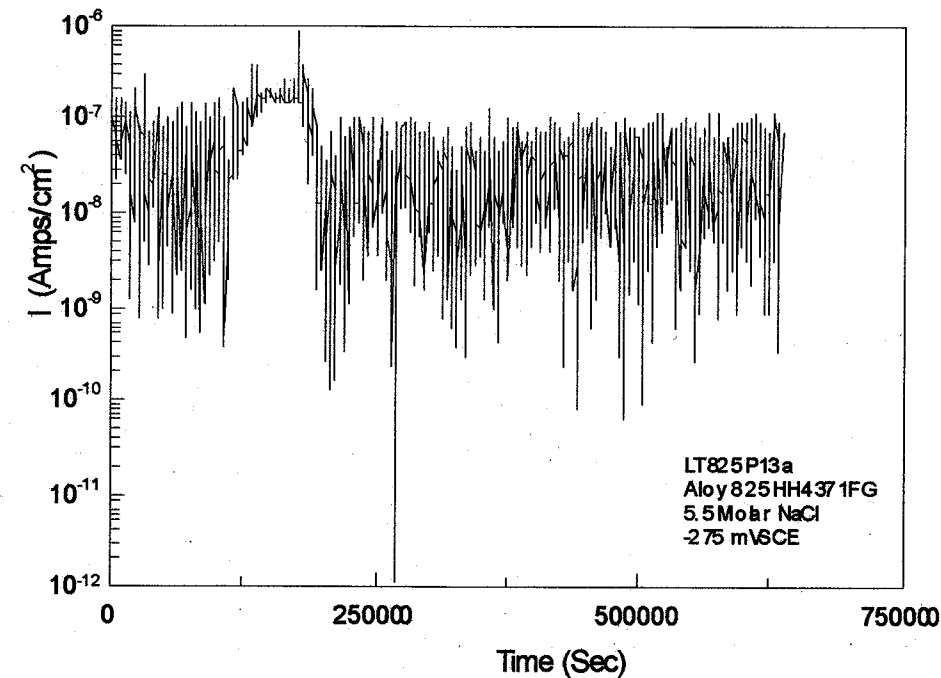
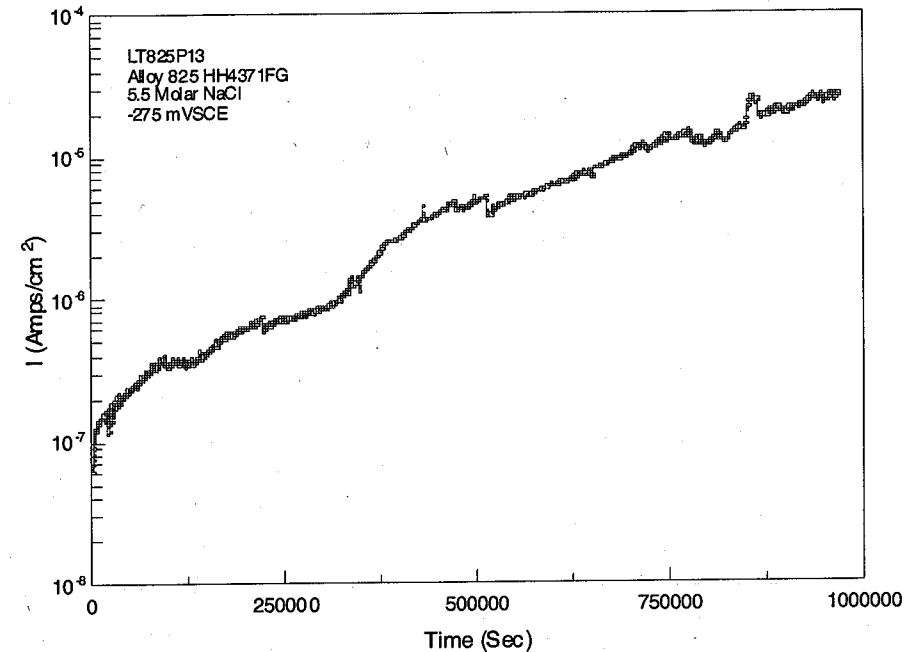
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Recorded by

Chung-Che Wu

8/29/03

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Invented by

Date

Recorded by

Chung-Che Wu

9/10/03

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Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: C-22 / 2277 - 8 - 3175

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Due: 9/6/03
Cal: 3/6/03

Initial Weight: 40.47213g **Model:** Sartorius Genius SN: 12809099
Final Weight: 40.31788g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.87g of NaCl Lot # 030198

Reagents measured with **Model:** OHAUS SN: 2883 **Due:** 1/29/03
Cal: 7/29/03

Initial pH: 8.430 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 7.422 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C **Measured with Hg Thermometer SN:** C96-783
Cal: 4/29/03 **Due:** 10/29/03

Counter Electrode: Platinum Flag

Reference Electrode: Fisher SCE #13-620-52 SN: 0066128

Gas: 99.999% Nitrogen

Ecorr: -0.173V **Model:** Keithley 614 SN: 0704934
Ept: -0.088V **Cal:** 6/09/03 **Due:** 6/09/04

Applied (vs SCE): 200 mV

Potentiostat: Solartron 1480 SN: 00240053

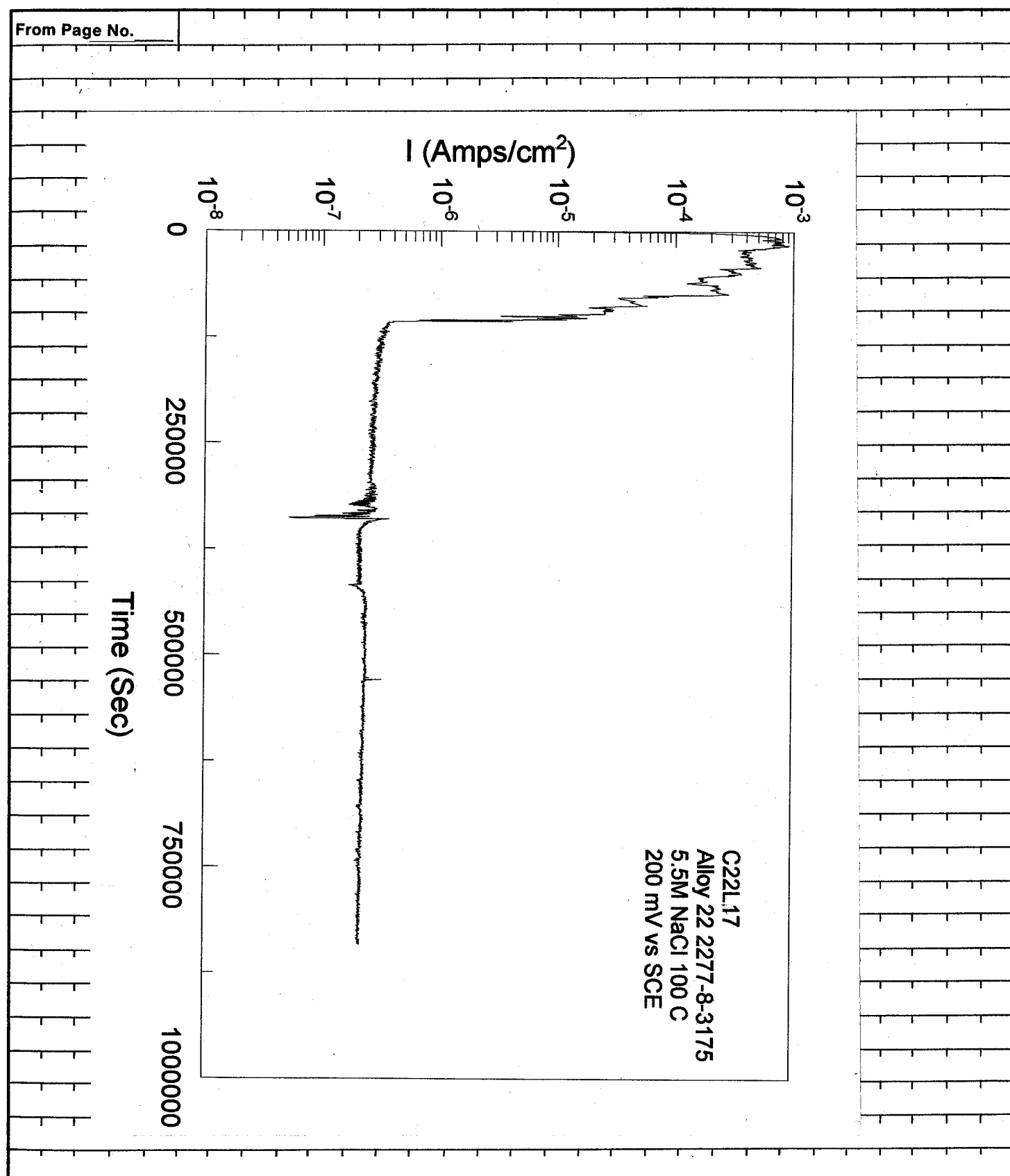
Last Verification Date: 8/1/03 **Verification Due:** 2/1/04
2/1/04 3/10/04

Number of Crevice Corrosion Sites: 21 / 24 (24 max.)
Light surface staining

Data: C22L17

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wan</i>	8/29/03



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Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wan</i>	9/10/03

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: Alloy 625

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Due: 9/6/03
Cal: 3/6/03

Initial Weight: 31.32192g **Model:** Sartorius Genius SN: 12809099
Final Weight: 30.84650g **Cal:** 5/15/03 Due: 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.89g of NaCl Lot # 034103

Reagents measured with **Model:** OHAUS SN: 2883 Due: ~~1/29/03~~ 1/29/04 ^{8/20 3/10/04}
Cal: 7/29/03

Initial pH: 8.405 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 7.933 **Cal:** 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C **Measured with Hg Thermometer SN:** E98-273 Due: 9/27/03
Cal: 3/27/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE #13-620-52 SN: 0066110

Gas: 99.999% Nitrogen
Ecorr: -0.167V **Model:** Keithley 614 SN: 0704934
Ept: +0.430V **Cal:** 6/09/03 Due: 6/09/04

Applied (vs SCE): -50mV

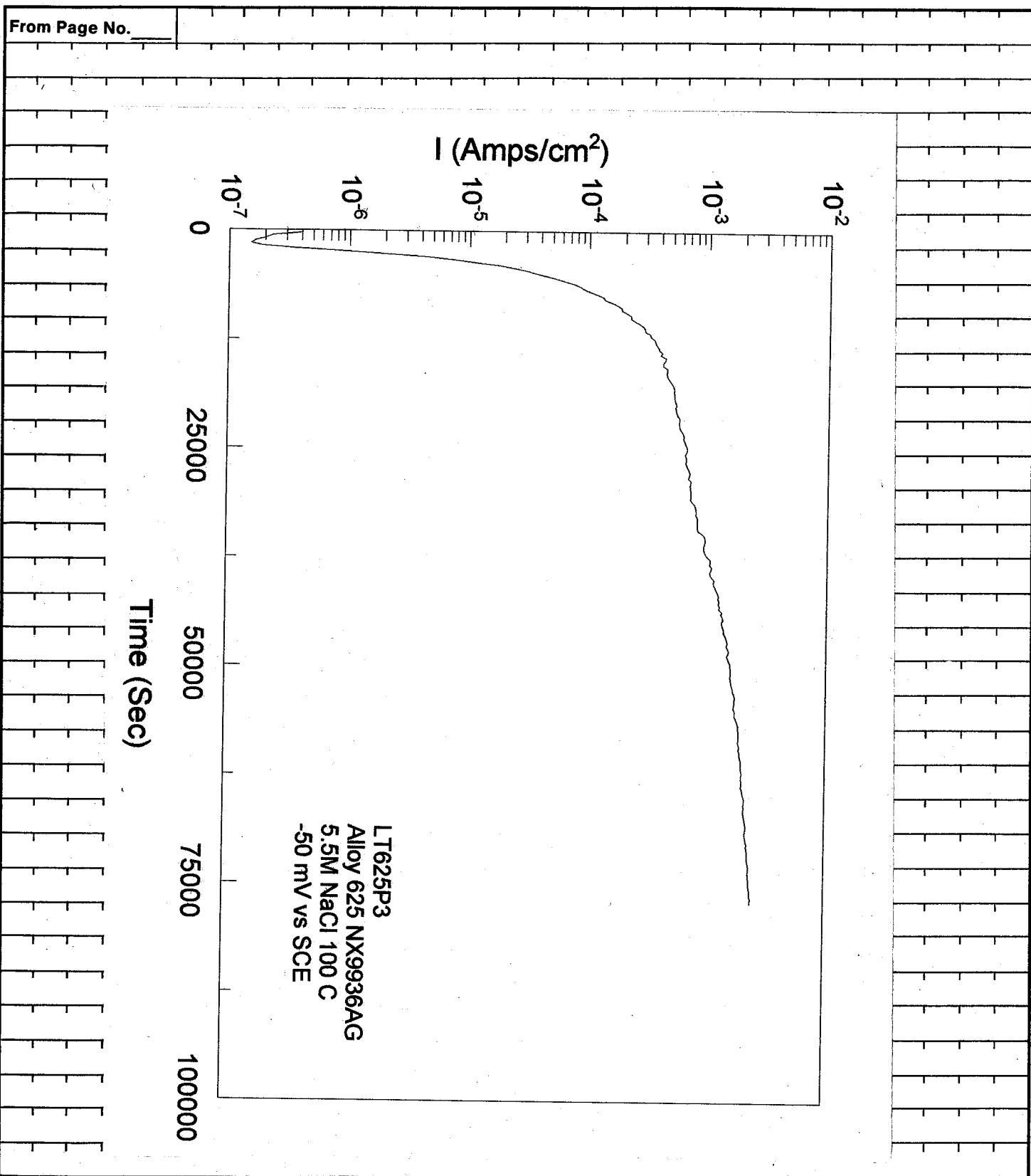
Potentiostat: Solartron 1480 SN: 00240053
Last Verification Date: 8/1/03 **Verification Due:** ~~2/1/03~~ 2/1/04 ^{BK9 3/10/04}

Number of Crevice Corrosion Sites: 21/24 (24 max.)
Transpassive dissolution. Light surface staining.

Data: LT625P3

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date 9/2/03
Recorded by *Chung Che Wen*

To Page No. _____



Witnessed & Understood by me, _____ Date _____
Invented by _____ Date 9/10/03
Recorded by *Chung Che Wen*

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Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: 316L / P80746

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SIC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03

Initial Weight: 28.25390g Model: Sartorius Genius SN: 12809099 Final Weight: 28.26164g Cal: 5/15/03 Due: 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL

642.90g of NaCl Lot# 03403

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/04 8/19/04 3/19/04

Initial pH: 8.638 Model: Fisher Accumet 950 Meter SN: 3340 Final pH: 7.023 Cal: 8/11/03 Due: 8/11/04 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C Measured with Hg Thermometer SN: E98-191 Cal: 6/3/03 Due: 9/12/03 9/2/03 CW

Counter Electrode: Platinum Flag

Reference Electrode: Fisher SCE #13-620-52 SN: 9250071

Gas: 99.999% Nitrogen

Ecorr: -0.241V Model: Keithley 614 SN: 0704934 Ept: -0.123V Cal: 6/09/03 Due: 6/09/04

Eapplied (vs SCE): -350 mV

Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: 2/1/03 2/1/04 8/10/04 3/10/04

Number of Crevice Corrosion Sites: 0/24 (24 max.) No sign of corrosion will continue testing specimen

micro surface staining 2/12/04 BSK

LT316L3_a Data: LT316L3

Next Test See NB# Pg#

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

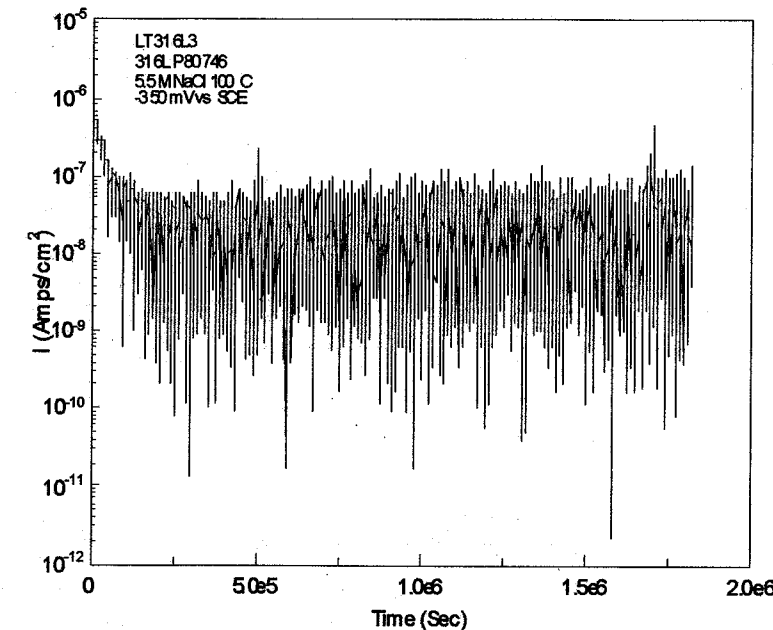
Date

Recorded by

Chung-Che Wen

9/2/03

From Page No. _____



Chung-Che Wen 9/24/03

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

B. B. J.

7/30/03

From Page No. _____

Thermally Age Process for 5 min @ 870°C

Quantity = 16 total Alloy C-22 Specimens Heat # 2277-8-3175

Oven: Linberg SN# 909172 Model # 51333

Oven Set point: 875°C

Oven Temperature 882°C
 measurement taken with Omega Microprocesser thermometer
 Model # MH22 SN# T-94140 cal 5/4/03 due 11/8/03
 thermocouple # 332 cal 7/21/03 due 1/21/04

Div one group of 6 specimens, one group of 6
 then finishes with one group of 4 specimens

Oven returns back to set point in between groups of specimens

All specimens will be polished to a 600 Grit Finish
 And User for testing to be determined

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Date

Invented by

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9/3/03

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Witnessed & Understood by me,

Date

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Date

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9/16/03

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Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: C-22 / 2277-8-3175

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072
Cal: 3/6/03 Due: 9/6/03

Initial Weight: 40.10642 g **Model:** Sartorius Genius SN: 12809099
Final Weight: 40.07356g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.88g of NaCl Lot # 034103

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/04 *sup 3/10/04*

Initial pH: 8.299 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 7.332 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C **Measured with Hg Thermometer** SN: E98-273
Cal: 3/27/03 **Due:** 9/27/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE # 13-620-52 SN: 0066110

Gas: 99.999% Nitrogen
Ecorr: -0.416V **Model:** Keithley 614 SN: 0704934
Ept: +0.306V **Cal:** 6/09/03 **Due:** 6/09/04

Applied (vs SCE): 100 mV
Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 **Verification Due:** 2/1/03 *sup 2/1/04* *sup 3/10/04*

Number of Crevice Corrosion Sites: 2/24 (24 max.)

Light surface staining

Data: C22L18

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

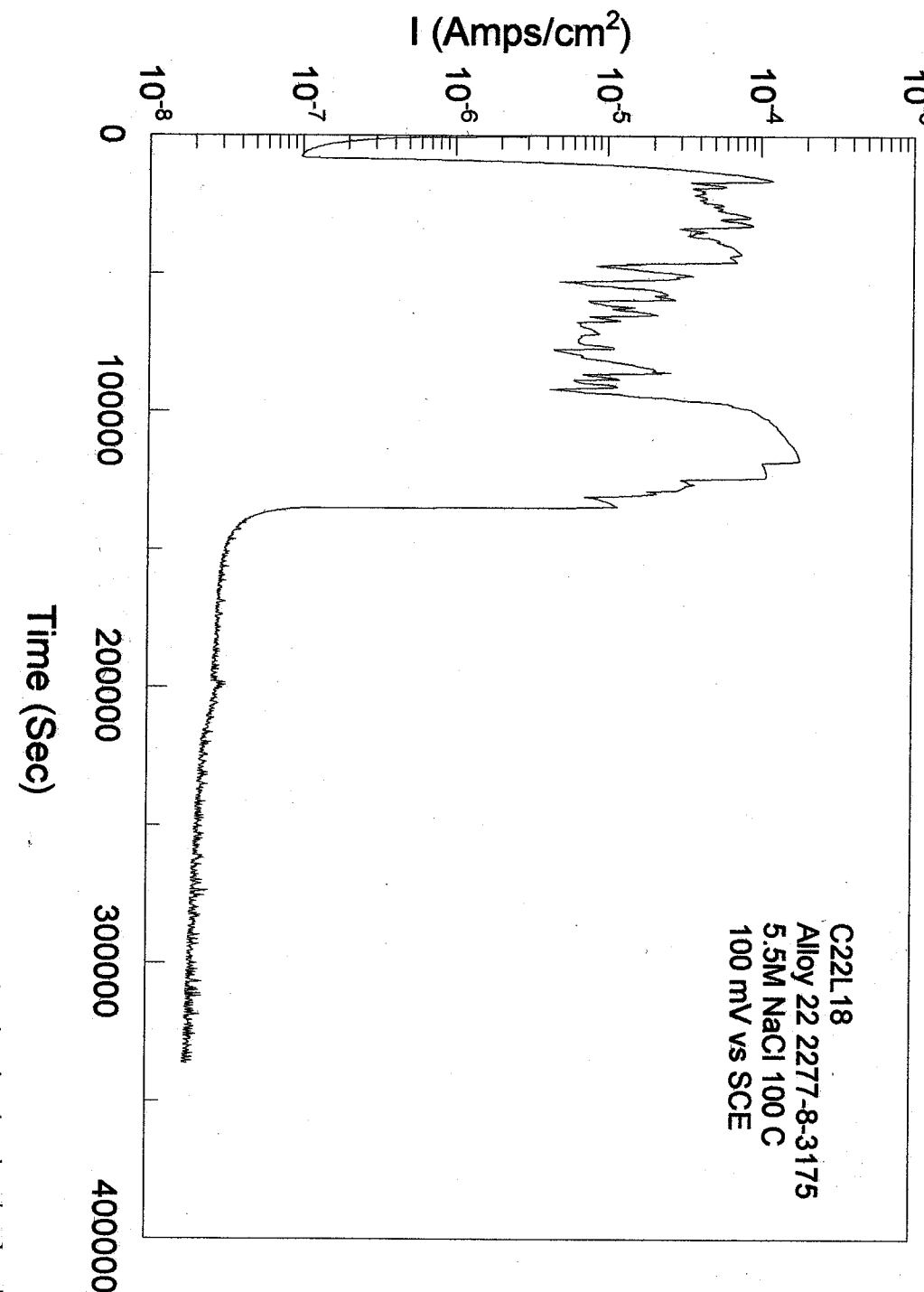
Date _____

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Chung Che Wen

9/4/03

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Date _____

Invented by _____

Date _____

Recorded by _____

Chung Che Wen

9/10/03

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From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: 625 / NX9936AG *625 9/4/03*

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03
Sartorius Genius SN: 12809099 Due: 11/15/03
Model: Sartorius Genius Cal: 5/15/03

Initial Weight: 31.43209 g
Final Weight: 31.34543 g

Solution: 5.5M NaCl + DI Water to 2000mL
642.89 g of NaCl Lot #030198

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/04 *8/10/04 3/10/04*
Model: Fisher Accumet 950 Meter SN: 3340
Cal: 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

9/4/03 CW
Initial pH: ~~8.062~~ 8.602
Final pH: 7.412

Test Temperature: 100C Measured with Hg Thermometer SN: C96-816 Cal: 6/3/03 Due: 12/3/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE # 13-620-51 SN: 8027166

Gas: 99.999% Nitrogen
Ecorr: -0.319V Model: Keithley 614 SN: 0704934 Due: 6/09/04
Ept: -0.666V Cal: 6/09/03

Applied (vs SCE): -100 mV
Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 **Verification Due:** 2/1/03 *2/1/04 8/10/04 3/10/04*

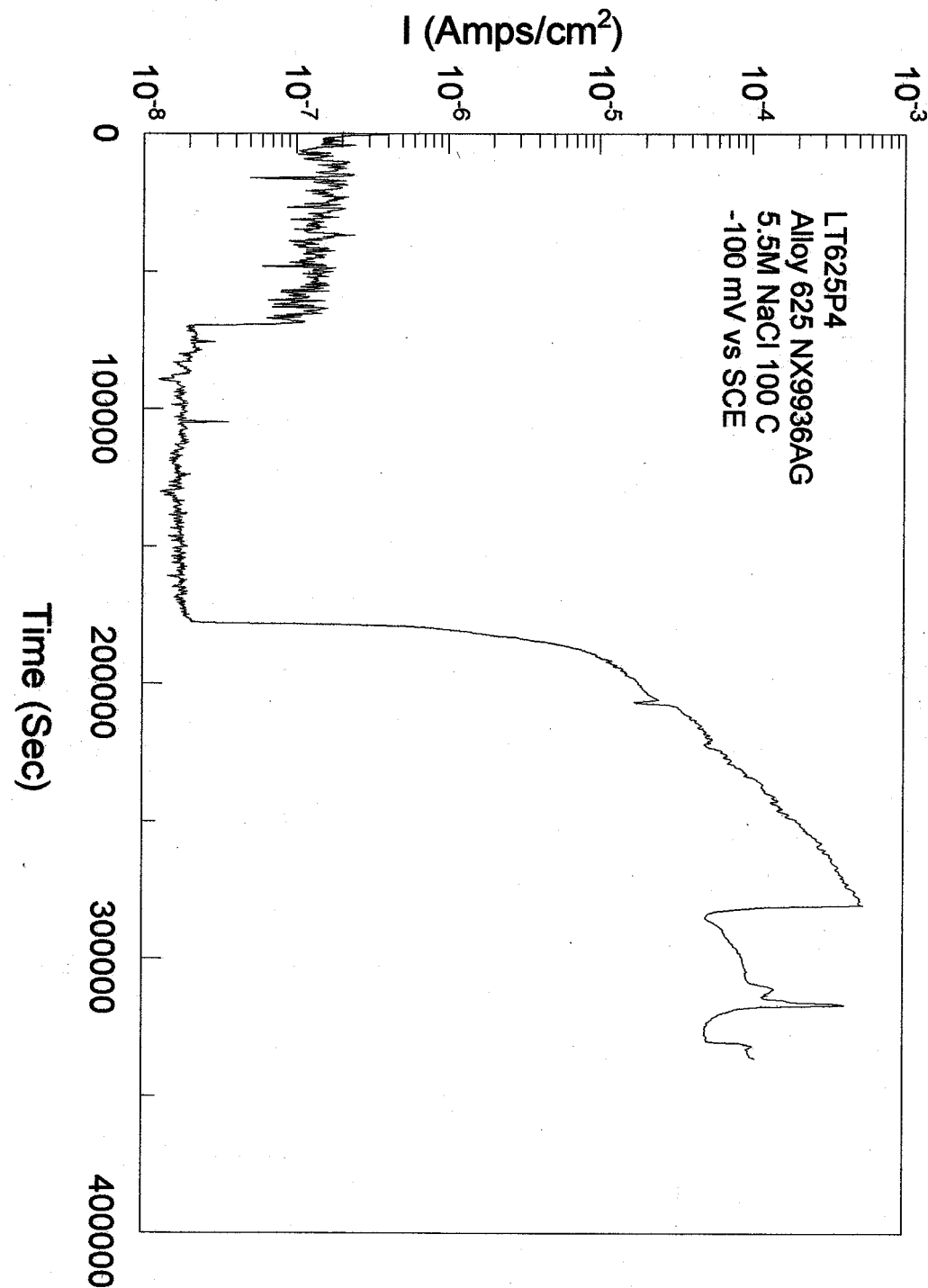
Number of Crevice Corrosion Sites: 22/24 (24 max.)
Light surface staining.

Data: LT625P4

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Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wen</i>	9/4/03

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Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung Che Wen</i>	9/10/03

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy/Heat No.: Thermally aged C-22 / 2277-8-3175 (See pg #52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SIC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver:

Proto #6104

SN: 139072

Cal: 3/6/03

Due: 9/6/03

Initial Weight: 40.15920g

Model: Sartorius Genius

SN: 12809099

Final Weight: 40.14514g

Cal: 5/15/03

Due: 11/15/03

Solution:

8M of Cl^- + 2M of NO_3^- + DI Water to 2000ml
 1626.77g of $Mg(Cl)_2 \cdot 6H_2O$ { 310.26g Lot # 030073
 1316.51g Lot # 030320
 513.05g of $Mg(NO_3)_2 \cdot 6H_2O$ Lot # 033942

Reagents measured with

Model: OHAUS

SN: 2883

Cal: 7/29/03

Due: 1/29/04

Initial pH: 3.853

Model: Fisher Accumet 950 Meter

SN: 3340

Final pH: 5.233

Cal: 8/11/03

Due: 8/11/04

pH Probe: #13-620-296

SN: 2291257P6

Test Temperature: 110°C

Measured with Hg Thermometer SN: C96-106

Cal: 5/1/03

Due: 5/1/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52

SN: 8210528

Gas: 99.999% Nitrogen Gas

Ecorr: ~~-0.446V~~ + 0.059V

Model: Keithley 614

SN: 467374

Ept: ~~+0.449V~~ + 0.567V

Cal: 10/28/02

Due: 10/28/03

Potentiostat: EG&G Model 273

SN: 10120

Last Verification Date: 3/4/03

Verification Due: 9/4/03

Number of Crevice Corrosion Sites: Few localized corrosion within the fed. 23/24 (24 max.)
 Severe intergranular corrosion on all open surface area.

Data: C22R166B

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

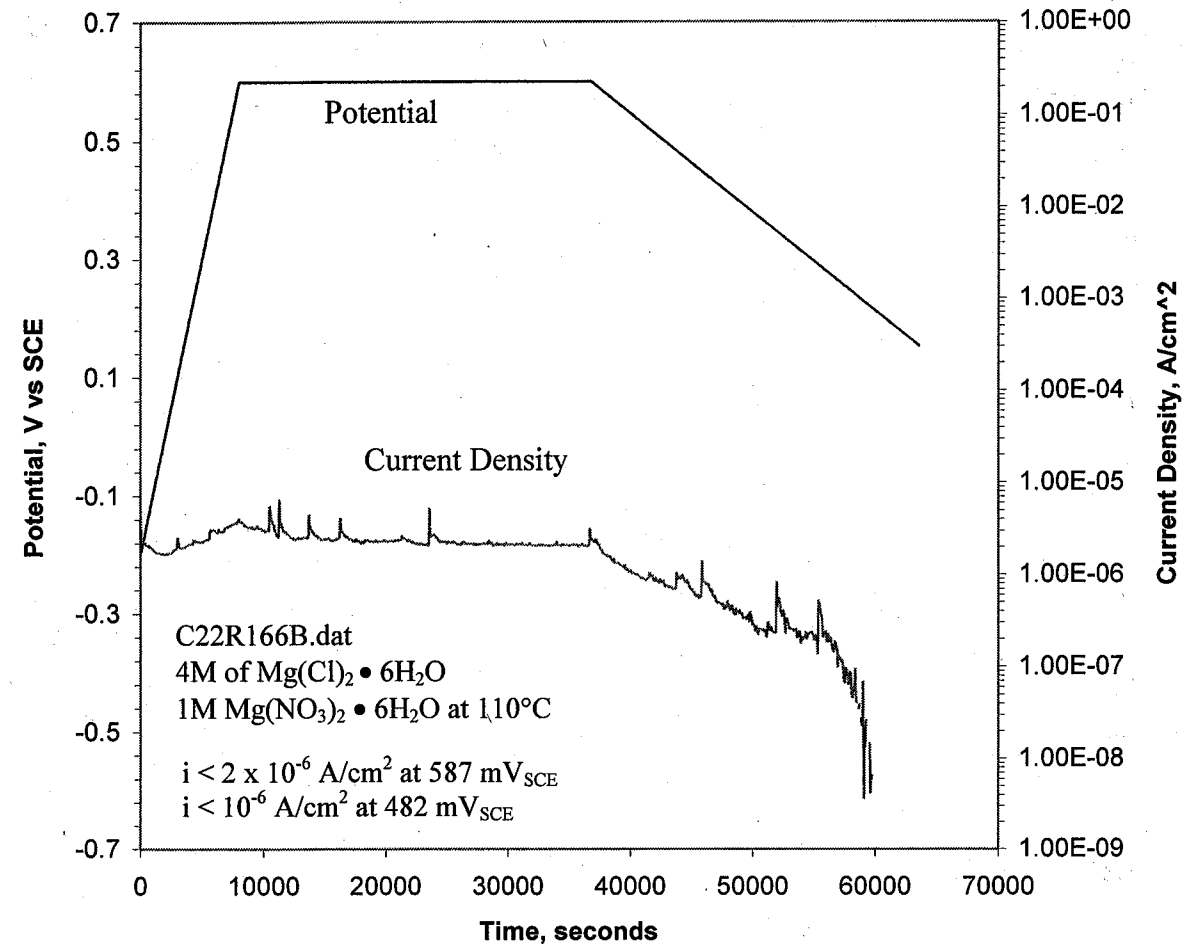
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Recorded by

Chung Che Wu

9/4/03

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Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Chung Che Wu

9/11/03

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Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No.: Thermally aged C-22 / 2277-8-3175 (see pg #52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver:

Proto #6104

SN: 139072

Cal: 3/6/03

Due: 9/6/03

Initial Weight: 40.17849 g

Model: Sartorius Genius

SN: 12809099

Final Weight: 40.17837 g

Cal: 5/15/03

Due: 11/15/03

Solution: 8M of Cl^- + 2.4M of NO_3^- + DI Water to 2000 mL1626.65 g of $Mg(Cl)_2 \cdot 6H_2O$ Lot # 030073615.54 g of $Mg(NO_3)_2 \cdot 6H_2O$ Lot # 033942

Reagents measured with

Model: OHAUS

SN: 2883

Cal: 7/29/03

Due: 1/29/04

Initial pH: 3.862

Model: Fisher Accumet 950 Meter

SN: 3340

Final pH: 5.071

Cal: 8/11/03

Due: 8/11/04

pH Probe: #13-620-296

SN: 2291257P6

Test Temperature: 110°C

Measured with Hg Thermometer SN: C96-377

Cal: 7/15/03

Due: 1/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52

SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: ~~-0.106 V~~ +0.156 V

Model: Keithley 614

SN: 467374

Ept: ~~+0.094 V~~ +385 V

Cal: 10/28/02

Due: 10/28/03

Potentiostat: EG&G Model 273

SN: 10120

Last Verification Date: 3/4/03

Verification Due: 9/4/03

Number of Crevice Corrosion Sites:

0/24 (24 max.)

Specimen repolished for further testing.

Data: C22R167B

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

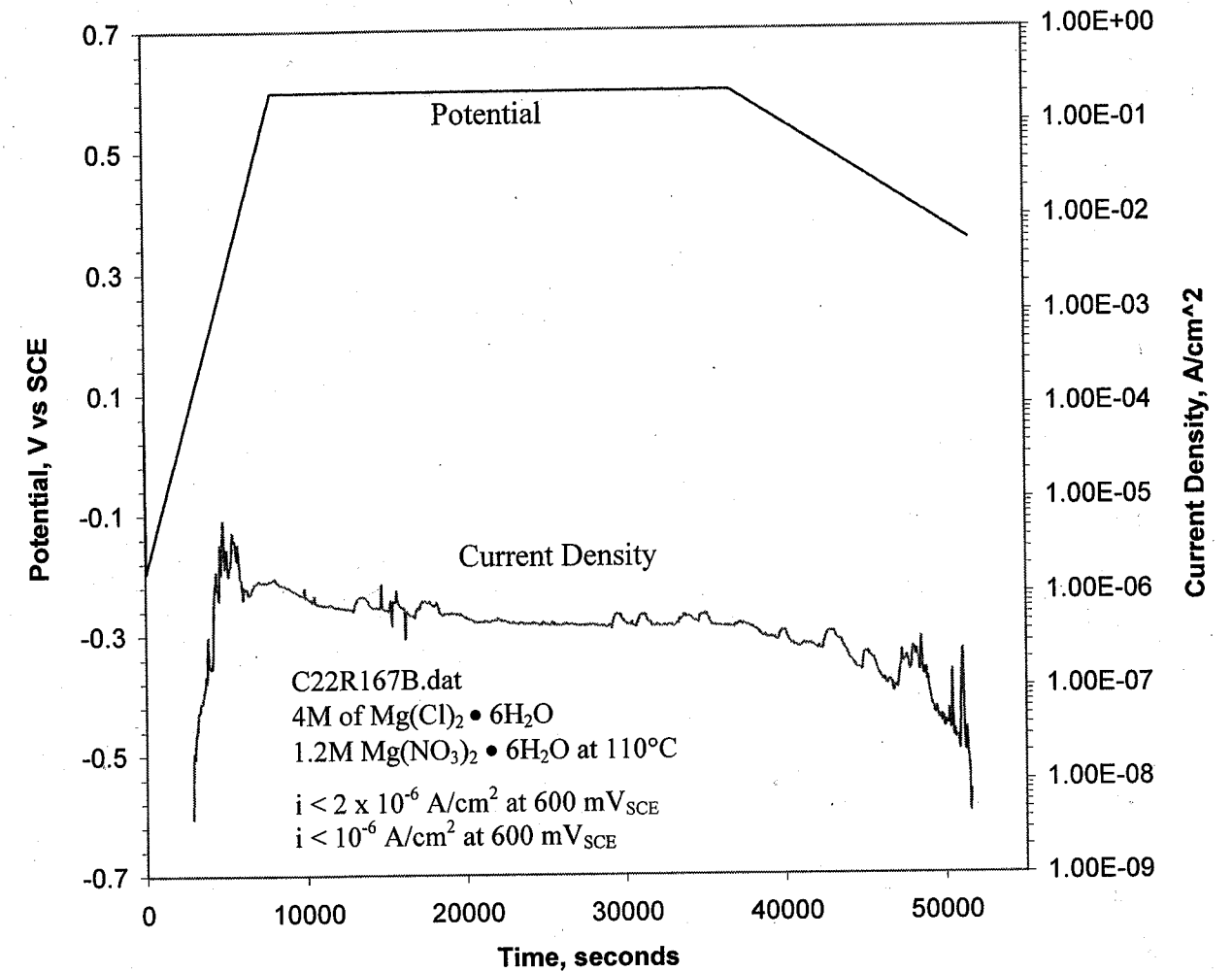
Date

Recorded by

Chung-che Wu

9/4/03

From Page No. _____



To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Chung-che Wu

9/12/03

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Due: 9/6/03
Cal: 3/6/03
Initial Weight: 41.19389 g Model: Sartorius Genius SN: 12809099
Final Weight: 41.15329 g Cal: 5/15/03 Due: 11/15/03

Solution: 8M of Cl⁻ + 0.2M of NO₃⁻ + DI Water to 2000 ml
1627.48g of Mg(Cl)₂ · 6H₂O Lot # 030320
51.59 g of Mg(NO₃)₂ · 6H₂O Lot # 033942

Reagents measured with Model: OHAUS SN: 2883 Due: 1/29/03
Cal: 7/29/03
Initial pH: 4.059 Model: Fisher Accumet 950 Meter SN: 3340 Due: 8/11/04
Final pH: 5.813 Cal: 8/11/03
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 110°C Measured with Hg Thermometer SN: C96-106
Cal: 5/1/03 Due: 5/1/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 8210528

Gas: 99.999% Nitrogen Gas

Ecorr: -0.263 V Model: Keithley 614 SN: 467374
Ept: +0.121 V Cal: 10/28/02 Due: 10/28/03

Potentiostat: EG&G Model 273 SN: 10120

Last Verification Date: 3/4/03 Verification Due: 9/4/03

Number of Crevice Corrosion Sites: 17/24 (24 max.)
Light surface staining

Data: C22R168

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

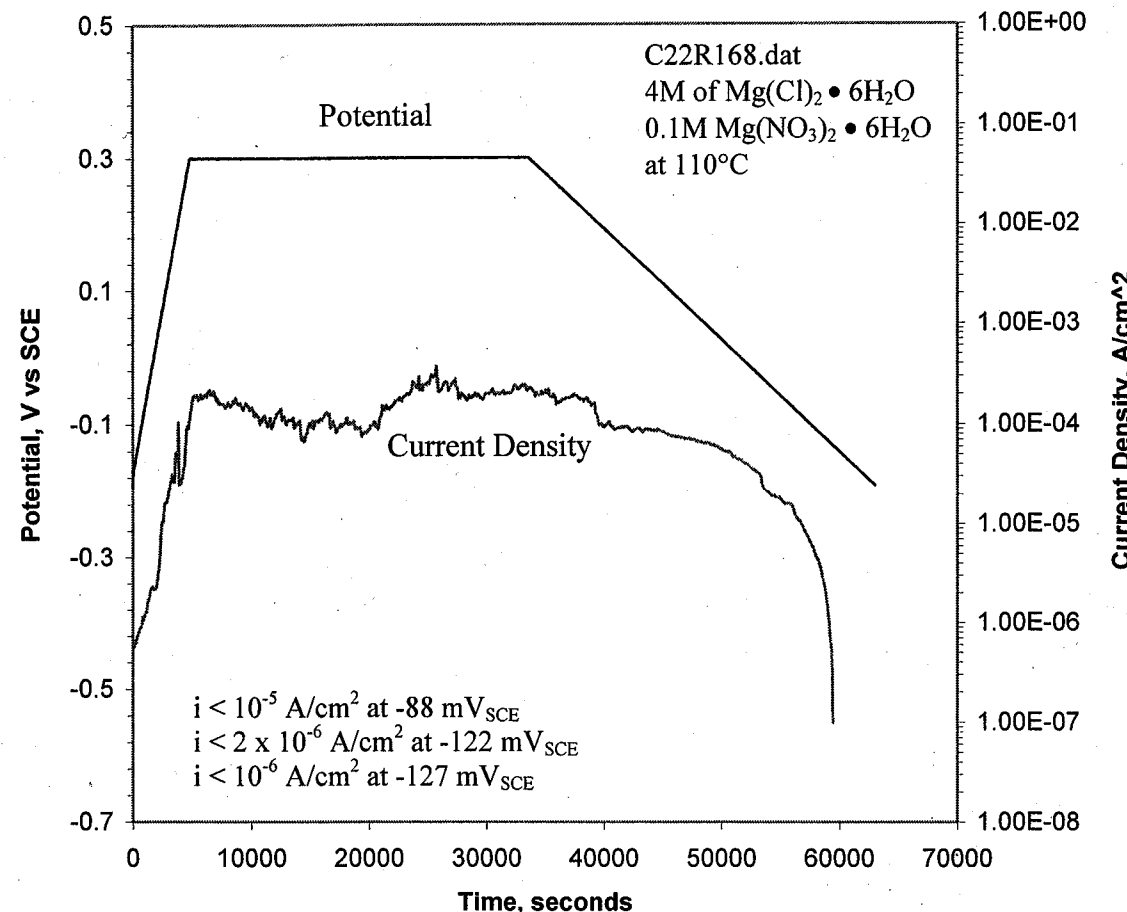
Date _____

Recorded by _____

9/8/03

Chung Che Wu

From Page No. _____



Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

9/12/03

Chung Che Wu

To Page No. _____

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver:	Proto #6104	SN: 139072
	Cal: 3/6/03	Due: 9/6/03
Initial Weight: 40.96396g	Model: Sartorius Genius	SN: 12809099
Final Weight: 40.87636g	Cal: 5/15/03	Due: 11/15/03

Solution: 8M of Cl⁻ + DI Water to 2000ml
1627.54g of Mg(Cl)₂ · 6H₂O Lot # 030320

Reagents measured with	Model: OHAUS	SN: 2883
	Cal: 7/29/03	Due: 1/29/04
Initial pH: 4.447	Model: Fisher Accumet 950 Meter	SN: 3340
Final pH: 5.166	Cal: 8/11/03	Due: 8/11/04
	PH Probe: #13-620-296	SN: 2291257P6

Test Temperature: 110°C
Measured with Hg Thermometer SN: C96-377
Cal: 7/15/03 Due: 1/15/04

Counter Electrode: Platinum Flag
Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas		
Ecorr: -0.294V	Model: Keithley 614	SN: 467374
Ept: -0.095V	Cal: 10/28/02	Due: 10/28/03
Potentiostat: EG&G Model 273		SN: 10120

Last Verification Date: 3/4/03 Verification Due: 9/4/03

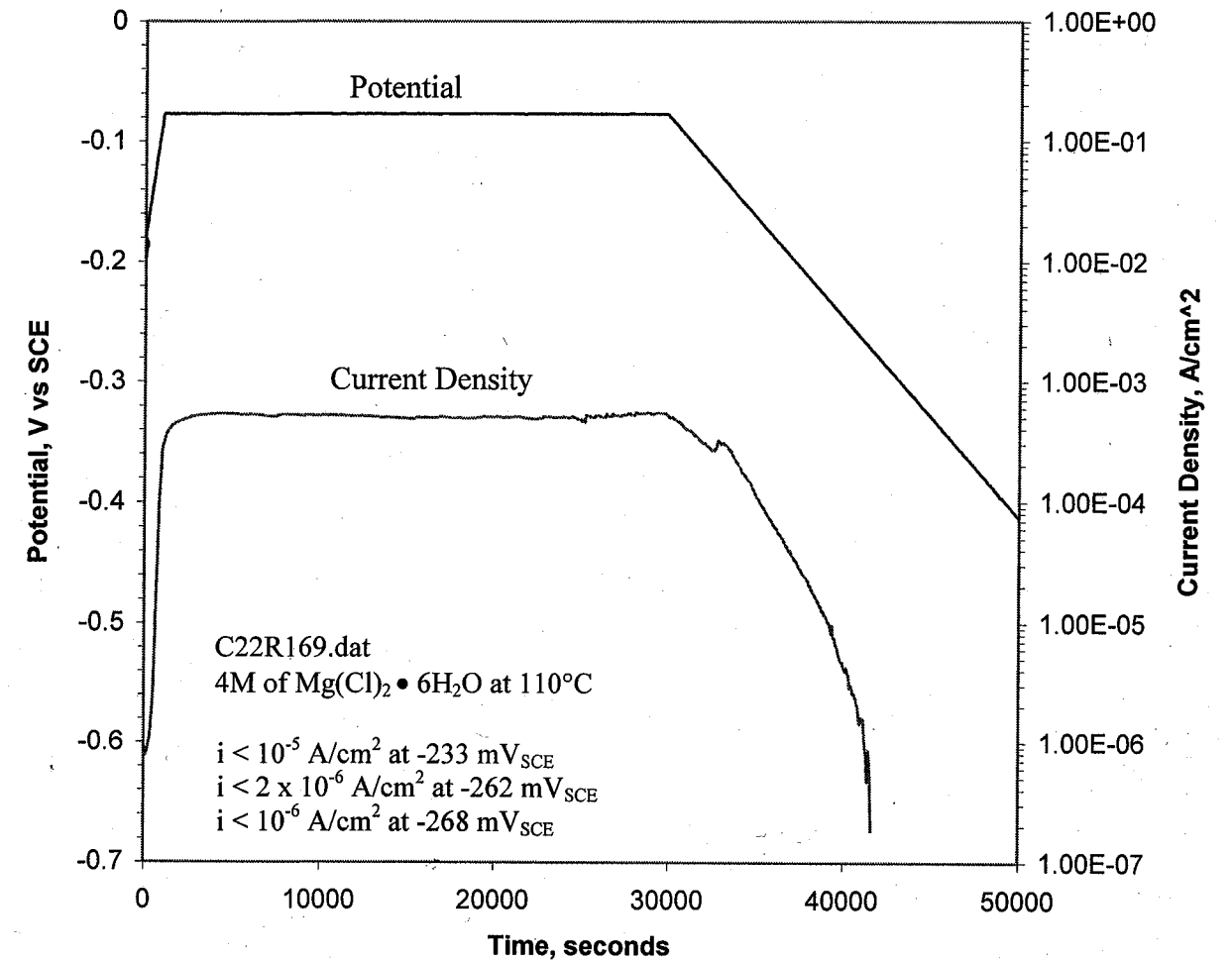
Number of Crevice Corrosion Sites: 24/24 (24 max.)
Light surface staining.

Data: C22R169

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung-Che Wan</i>	9/8/03

To Page No. _____

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Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung-Che Wan</i>	9/12/03

To Page No. _____

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: 625/NX9936A G

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072
Cal: 3/6/03 Due: 9/6/03

Initial Weight: 31.20065 g **Model:** Sartorius Genius SN: 12809099
Final Weight: 31.18101 g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.89 g of NaCl Lot # 034103

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/04 *6/29/04 3/10/04*

Initial pH: 8.356 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 7.436 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C **Measured with Hg Thermometer SN:** C96-866
Cal: 6/3/03 **Due:** 12/3/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE #13-620-51 SN: 8027166

Gas: 99.999% Nitrogen
Ecorr: -0.300V **Model:** Keithley 614 SN: 0704934
Ept: -0.526V **Cal:** 6/09/03 **Due:** 6/09/04
Eapplied (vs SCE): -150mV

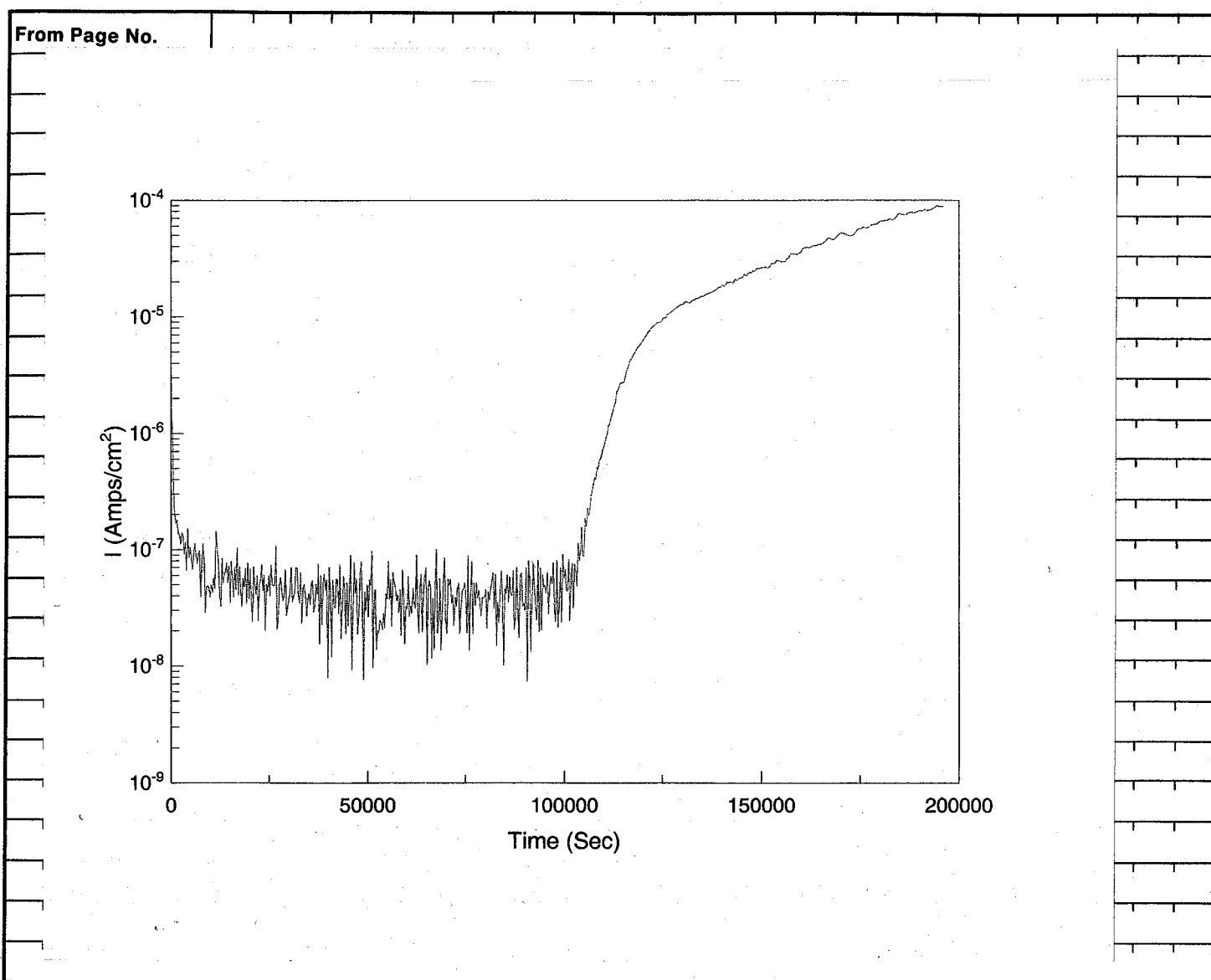
Potentiostat: Solartron 1480 SN: 00240053
Last Verification Date: 8/1/03 **Verification Due:** 2/1/03 *6/10 2/1/04 3/10/04*

Number of Crevice Corrosion Sites: 14/24 (24 max.)
Little surface staining

Data: LP625PS

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	9/8/03
		<i>Ching Che Wu</i>	



$i > 2 \times 10^{-5} \text{ A/cm}^2$ at 143100 seconds

$i > 1 \times 10^{-5} \text{ A/cm}^2$ at 126300 seconds

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	4/16/04
		<i>[Signature]</i>	

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: C-22 / 2277-8-3175

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03
 Model: Sartorius Genius SN: 12809099 Cal: 5/15/03 Due: 11/15/03

Initial Weight: 39.96252 g
Final Weight: 39.94492 g

Solution: 5.5M NaCl + DI Water to 2000mL
 642.88g of NaCl Lot # 034103

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: ~~1/29/03~~ 1/29/04
Initial pH: 8.310 Model: Fisher Accumet 950 Meter SN: 3340 Cal: 8/11/03 Due: 8/11/04
Final pH: 7.375 pH Probe: #13-620-296 SN: 2291257P6 Due: 8/11/04

Test Temperature: 100C Measured with Hg Thermometer SN: E98-273 Cal: 3/27/03 Due: 9/27/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE # 13-620-52 SN: 0066110

Gas: 99.999% Nitrogen
Ecorr: -0.321 V Model: Keithley 614 SN: 0704934 Cal: 6/09/03 Due: 6/09/04
Ept: -0.198 V

Applied (vs SCE): 0 mV
Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 **Verification Due:** ~~2/1/03~~ 2/1/04 5/10/04 3/10/04

Number of Crevice Corrosion Sites: 3 / 24 (24 max.)
 Little surface staining

Data: C22L19

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

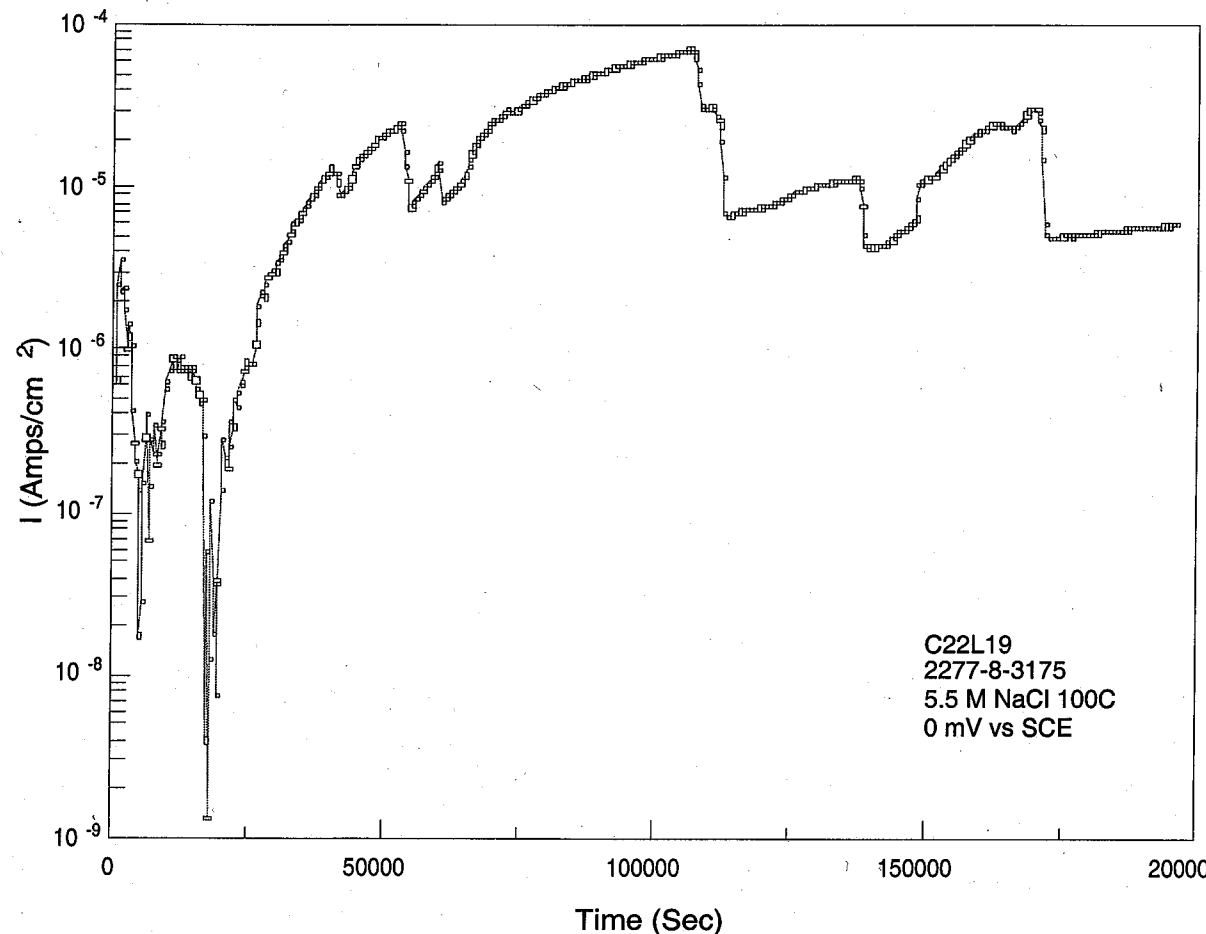
Date _____

Recorded by _____

Ching Che Wu

9/8/03

From Page No. _____



To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

B. J. ...

10/10/03

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: 316 L / P80746

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03

Initial Weight: 30.75406g Model: Sartorius Genius SN: 12809099 Final Weight: 30.75540g Cal: 5/15/03 Due: 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL 308.00g of NaCl Lot# 030198 } Total 642.88g of NaCl 334.88g of NaCl Lot# 034103

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/03 1/29/04 3/10/04

Initial pH: 8.480 Model: Fisher Accumet 950 Meter SN: 3340 Final pH: 7.812 Cal: 8/11/03 Due: 8/11/04 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C Measured with Hg Thermometer SN: C96-783 Cal: 4/29/03 Due: 10/29/03

Counter Electrode: Platinum Flag

Reference Electrode: Fisher SCE #13-620-52 SN: 0066128

Gas: 99.999% Nitrogen

Ecorr: -0.430V Model: Keithley 614 SN: 0704934

Ept: -0.093V Cal: 6/09/03 Due: 6/09/04

Eapplied (vs SCE): -375 mV

Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: 2/1/03 2/1/04 3/10/04

Number of Crevice Corrosion Sites: 0/24 (24 max.) Mild staining on all surfaces of specimen

Data: LT316L4

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

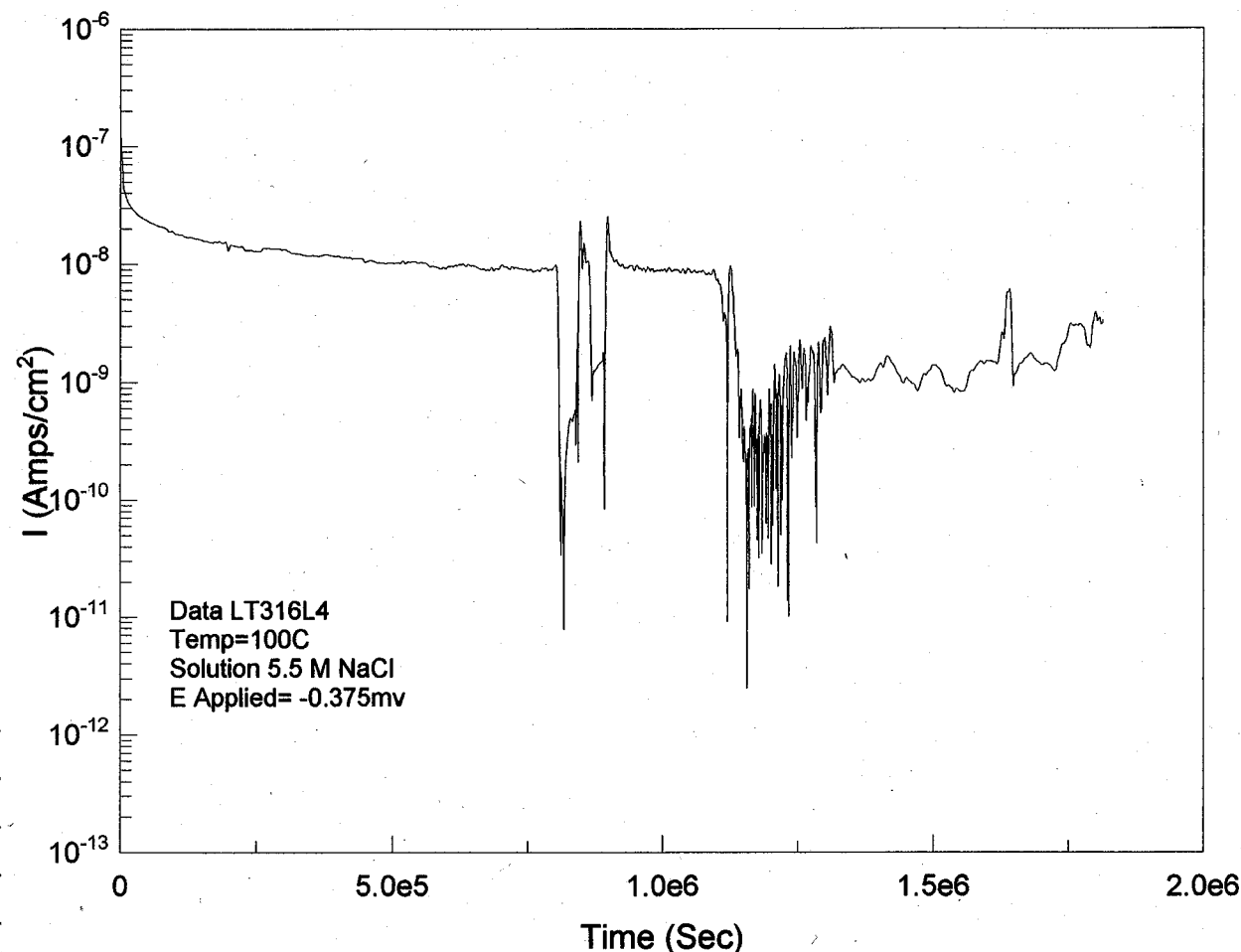
Date _____

Recorded by _____

9/8/03

Ching Che Wen

From Page No. _____



Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

10/1/03

B. J. J.

To Page No. _____

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver:	Proto #6104	SN: 139072
	Cal: 3/6/03	Due: 9/6/03
Initial Weight: 40.23171g	Model: Sartorius Genius	SN: 12809099
Final Weight: 40.22932g	Cal: 5/15/03	Due: 11/15/03

Solution: 8M of Cl⁻ + 0.2M of NO₃ + DI water to 2000 mL
 1627.16g of Mg(Cl)₂ · 6H₂O Lot # 030320
 51.54g of Mg(NO₃)₂ · 6H₂O Lot # 033942

Reagents measured with	Model: OHAUS	SN: 2883
	Cal: 7/29/03	Due: 1/29/04
Initial pH: 4.406	Model: Fisher Accumet 950 Meter	SN: 3340
Final pH: 5.268	Cal: 8/11/03	Due: 8/11/04
	pH Probe: #13-620-296	SN: 2291257P6

Test Temperature: 80°C	Measured with Hg Thermometer SN: C96-106
	Cal: 5/1/03
	Due: 5/1/04

Counter Electrode: Platinum Flag	
Reference Electrode: Fisher 13-620-52	SN: 8210528

Gas: 99.999% Nitrogen Gas	
Ecorr: -0.336 V	Model: Keithley 614
Ept: +0.170 V	Cal: 10/28/02
	SN: 467374
	Due: 10/28/03

Potentiostat: EG&G Model 273	SN: 10120
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Last Verification Date: 3/4/03	Verification Due: 9/4/03
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Number of Crevice Corrosion Sites:	8 / 24 (24 max.)
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Data: C22R170

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

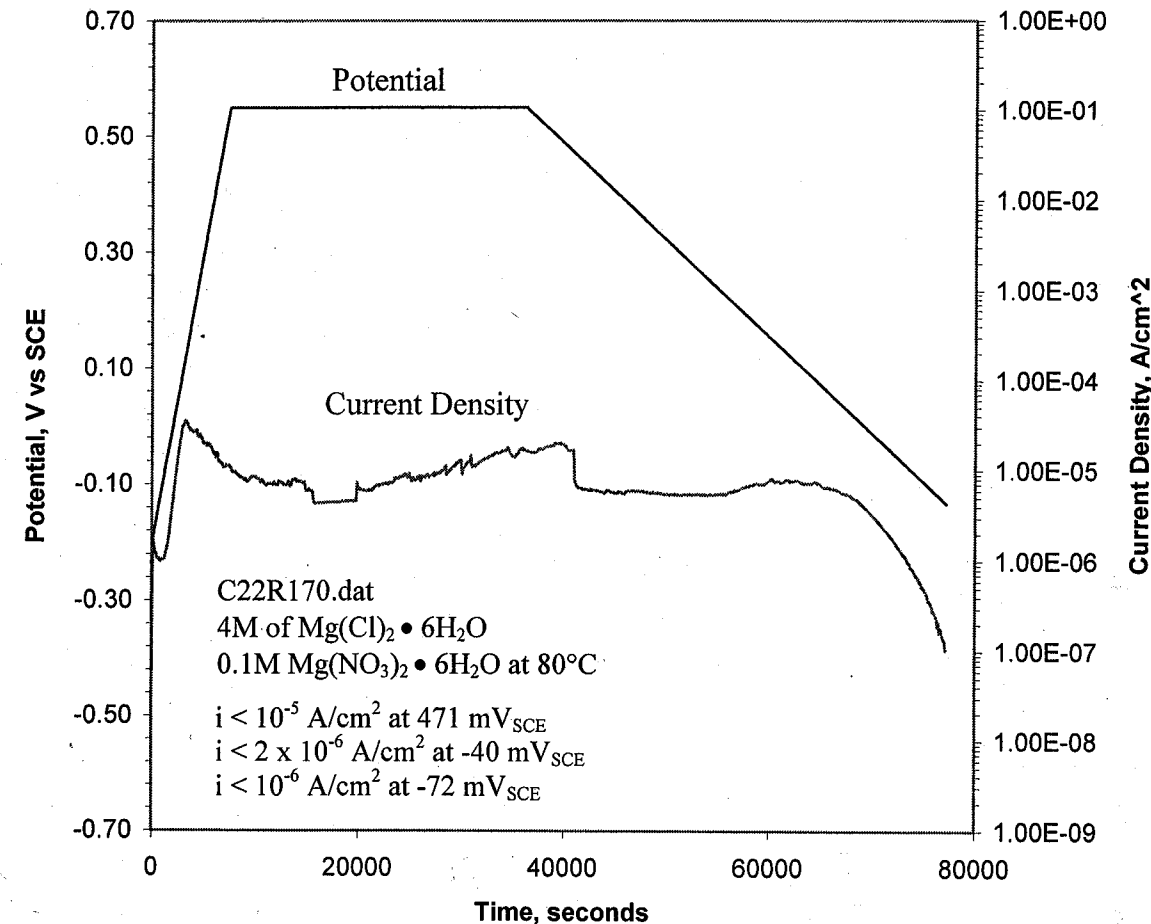
Date _____

Recorded by _____

9/9/03

Chung-che Wu

From Page No. _____



Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

9/12/03

Chung-che Wu

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072
Cal: 3/6/03 Due: 9/6/03

Initial Weight: 40.14553g **Model:** Sartorius Genius SN: 12809099
Final Weight: 40.13124g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 8M of Cl^- + DI water to 2000 mL
1627.56g of $Mg(Cl)_2 \cdot 6H_2O$ Lot # 030320

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/04 ^{8/10/04} _{3/10/04}

Initial pH: 4.332 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 5.320 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 80°C **Measured with Hg Thermometer SN:** C96-377
Cal: 7/15/03 **Due:** 1/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -0.265V **Model:** Keithley 614 SN: 467374
Ept: -0.380V **Cal:** 10/28/02 **Due:** 10/28/03

Potentiostat: EG&G Model 273 SN: 10120

Last Verification Date: 3/4/03 **Verification Due:** 9/4/03

Number of Crevice Corrosion Sites: 18 / 24 (24 max.)

Data: C22R171

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

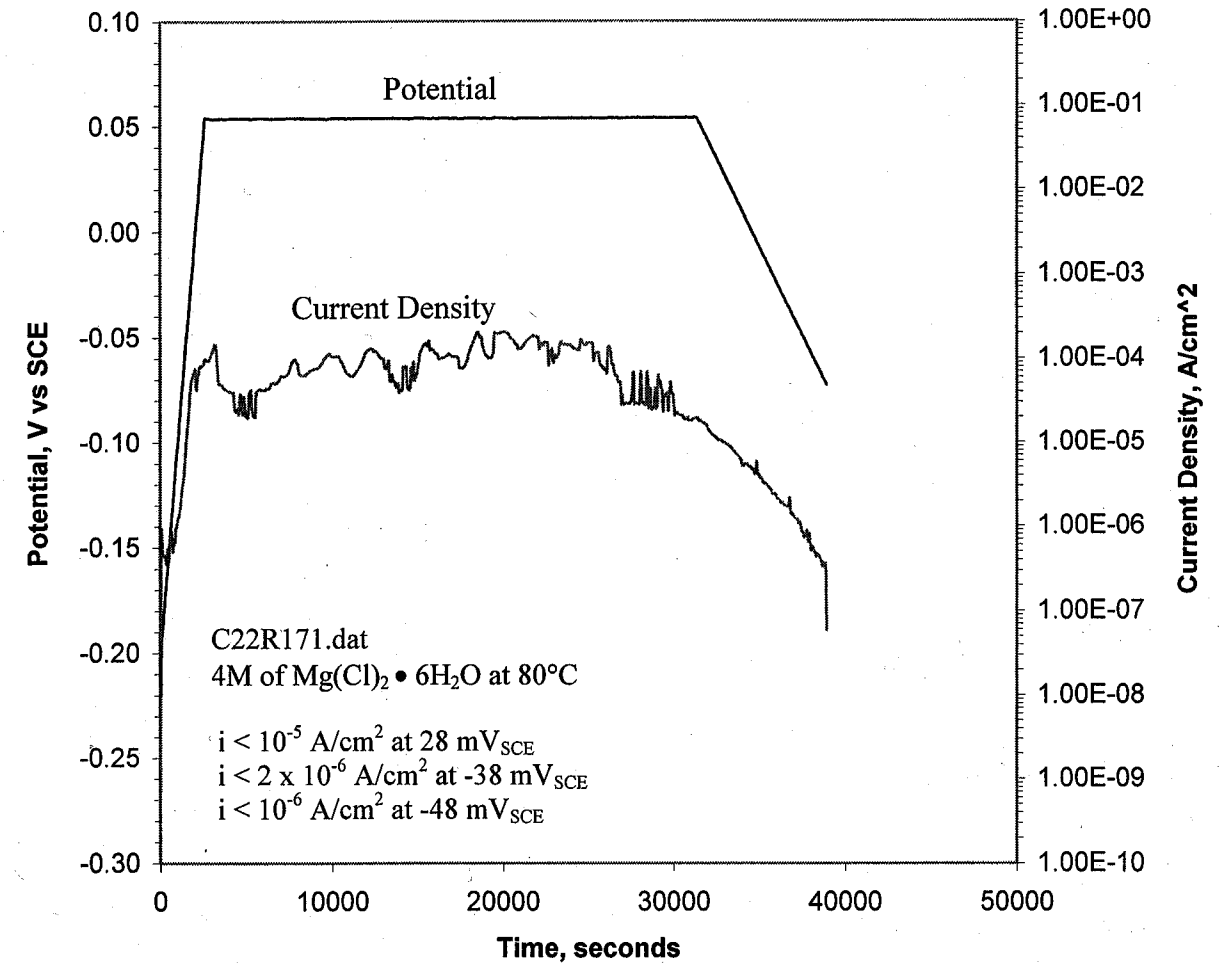
Date _____

Recorded by _____

9/9/03

Chung Che Wu

From Page No. _____



To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

9/12/03

Chung Che Wu

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Cal: 3/6/03 Due: 9/6/03
Initial Weight: 41.05084g Model: Sartorius Genius SN: 12809099
Final Weight: 41.04531g Cal: 5/15/03 Due: 11/15/03

Solution: 0.05M of Cl- + 0.015M of NO3- + DI water to 2000 ml
5.846g of NaCl Lot # 034103
2.553g of NaNO3 Lot # 020809

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/04
Initial pH: 5.809 Model: Fisher Accumet 950 Meter SN: 3340
Final pH: 7.018 Cal: 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-377 Cal: 7/15/03 Due: 1/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -0.554 V Model: Keithley 614 SN: 467374
Ept: -0.100 V Cal: 10/28/02 Due: 10/28/03

Potentiostat: EG&G Model 273 SN: 10120

Last Verification Date: 3/4/03 Verification Due: 9/4/03

Number of Crevice Corrosion Sites: 0 / 24 (24 max.)
Heavy Surface Staining

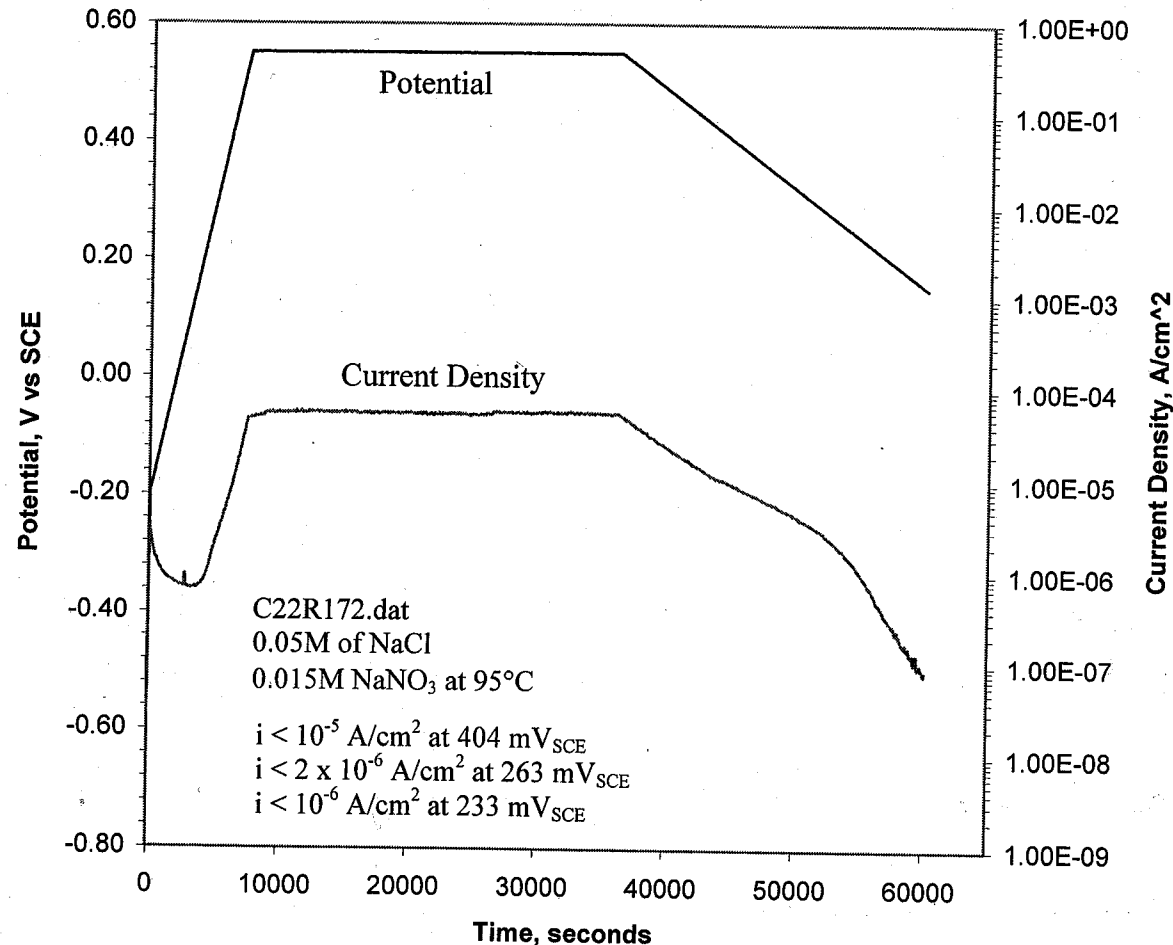
Note: Specimen repolished for further testing

Data: C22R172

To Page No. _____

Witnessed & Understood by me, Date Invented by Date
Recorded by Chung-Che Wu 9/10/03

From Page No. _____



Witnessed & Understood by me, Date Invented by Date
Recorded by Chung-Che Wu 9/12/03

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Proto #6104 SN: 139072 Due: 9/6/03
Cal: 3/6/03
Model: Sartorius Genius SN: 12809099 Due: 11/15/03
Cal: 5/15/03

Solution: 0.05M of Cl- + 0.0125M of NO3- + DI water to 2000 mL
5.847 g of NaCl Lot # 034103
2.130 g of NaNO3 Lot # 020809

Reagents measured with Model: OHAUS SN: 2883 Due: 1/29/03
Cal: 7/29/03
Model: Fisher Accumet 950 Meter SN: 3340 Due: 8/11/04
Cal: 8/11/03 pH Probe: #13-620-296 SN: 2291257P6 Due: 8/11/04

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-106 Due: 5/1/04
Cal: 5/1/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher 13-620-52 SN: 8219528

Gas: 99.999% Nitrogen Gas
Ecorr: -0.361 V Model: Keithley 614 SN: 467374 Due: 10/28/03
Ept: -0.054 V Cal: 10/28/02

Potentiostat: EG&G Model 273 SN: 10120
Last Verification Date: 3/4/03 Verification Due: 9/4/03

Number of Crevice Corrosion Sites: 0 / 24 (24 max.)
Heavy surface staining

Note: Specimen repolished for further testing.

Data: C22R173

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

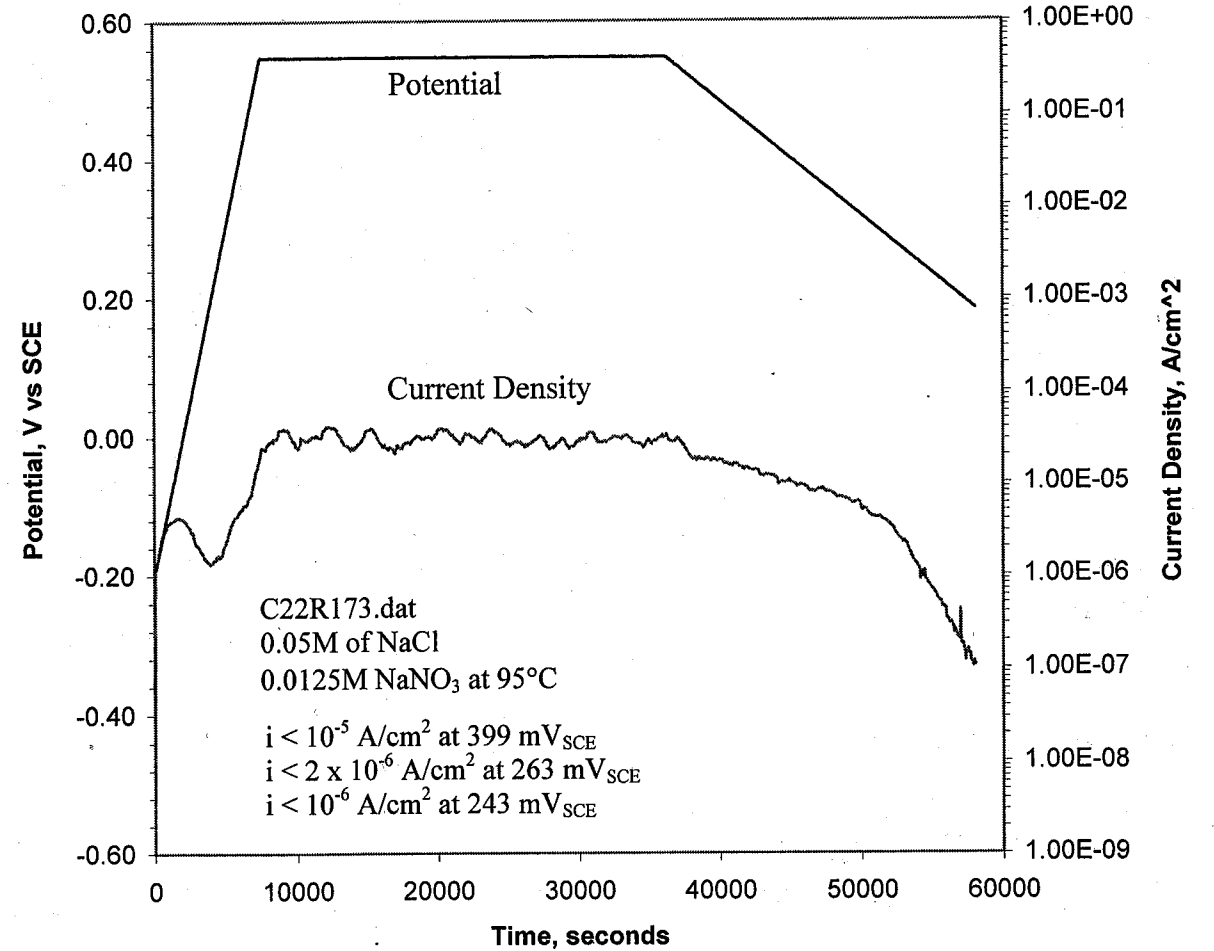
Date _____

Recorded by _____

Chung Che Wu

9/12/03

From Page No. _____



Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

Chung Che Wu

9/12/03

To Page No. _____

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 40.11479g **Model:** Sartorius Genius SN: 12809099
Final Weight: 40.11416g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 8M of Cl⁻ + 1.2M of NO₃⁻ + DI Water to 2000 mL
1626.81g of Mg(Cl)₂ · 6H₂O Lot # 030320
308.29g of Mg(NO₃)₂ · 6H₂O Lot # 033942

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/04

Initial pH: 4.023 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 4.639 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 110 °C **Measured with Hg Thermometer SN:** C76-377
Cal: 7/15/03 **Due:** 1/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -0.118 V **Model:** Keithley 614 SN: 467374
Ept: +0.119 V **Cal:** 10/28/02 **Due:** 10/28/03

Potentiostat: EG&G Model 273 SN: 10120

Last Verification Date: 3/4/03 **Verification Due:** 9/4/03

Number of Crevice Corrosion Sites: 0/24 (24 max.)

Heavy Surface Staining 9/12/03 CW

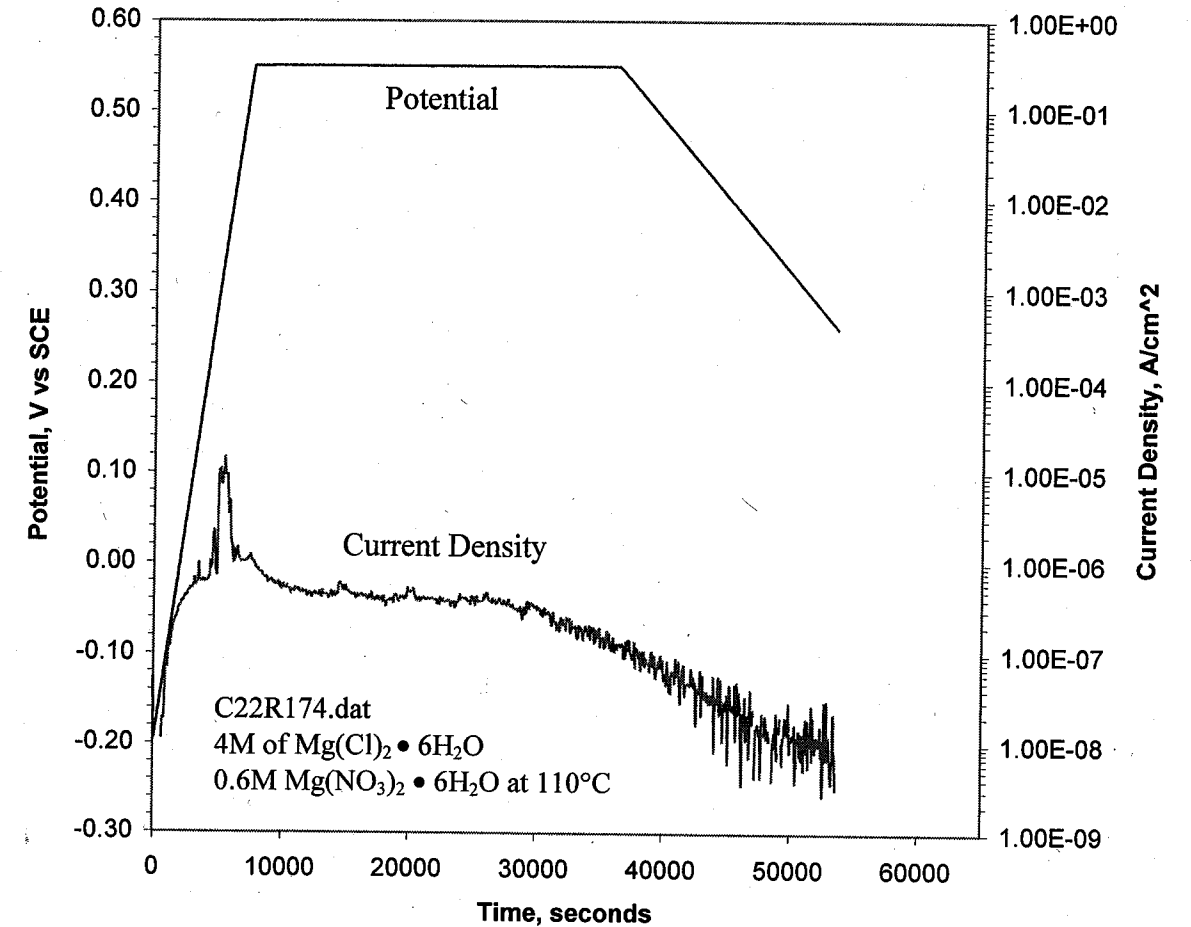
Note: Specimen repolished for further testing

Data: C22R174

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date 9/11/03
Recorded by *Chung Che Wen*

To Page No. _____

From Page No. _____



Data Invalid. Temperature controller off due to power outage.

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date 9/12/03
Recorded by *Chung Che Wen*

To Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.19122g Model: Sartorius Genius SN: 12809099
Final Weight: 41.19098g Cal: 5/15/03 Due: 11/15/03

Solution: 8M of Cl^- + 1.6M of NO_3^- + DI Water to 2000mL
1627.07g of $Mg(Cl)_2 \cdot 6H_2O$ Lot # 030320
410.84g of $Mg(NO_3)_2 \cdot 6H_2O$ Lot # 033942

Reagents measured with Model: OHAUS SN: 2883
Cal: 7/29/03 Due: 1/29/03
1/29/04 3/10/04

Initial pH: 4.062 Model: Fisher Accumet 950 Meter SN: 3340
Final pH: 4.473 Cal: 8/11/04 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 110°C Measured with Hg Thermometer SN: C96-106
Cal: 5/1/03 Due: 5/1/04

Counter Electrode: Platinum Flag
Reference Electrode: Fisher 13-620-52 SN: 8210528

Gas: 99.999% Nitrogen Gas
Ecorr: -0.093V Model: Keithley 614 SN: 467374
Ept: +0.051V Cal: 10/28/02 Due: 10/28/03

Potentiostat: EG&G Model 273 SN: 10120
Last Verification Date: 3/4/03 **Verification Due:** 9/4/03

Number of Crevice Corrosion Sites: 0 / 24 (24 max.)

Note: Specimen repolished for further testing

Data: C22R175

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

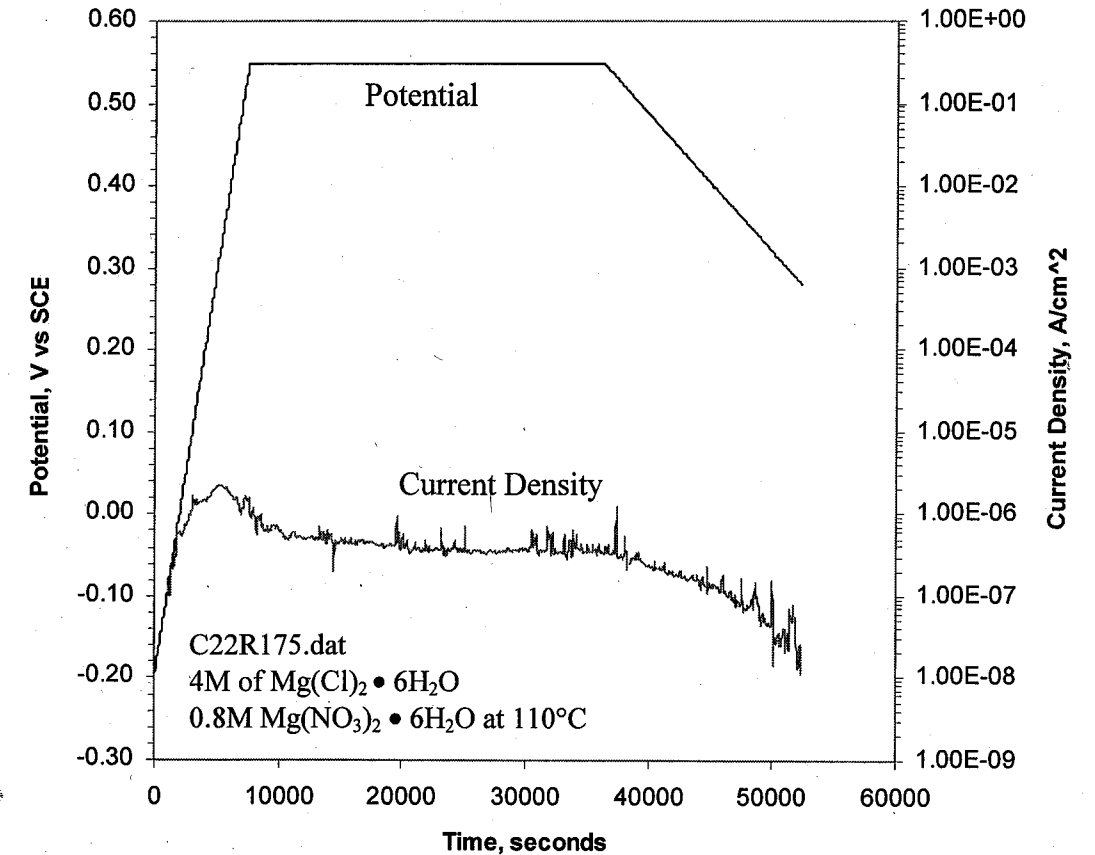
Date _____

Recorded by _____

9/11/03

Chung-Chen Wu

From Page No. _____



To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

9/12/03

Chung-Chen Wu

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: Alloy 625 / NX 9936AG

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319
Cal: 9/4/03 Due: 3/4/03

Initial Weight: 31.54026g Model: Sartorius Genius SN: 12809099
Final Weight: 31.54275g Cal: 5/15/03 Due: 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.90g of NaCl Lot # 034103

Reagents measured with Model: OHAUS SN: 2883
Cal: 7/29/03 Due: ~~1/29/03~~ 1/29/04 *8/10/04*

Initial pH: 8.407 Model: Fisher Accumet 950 Meter SN: 3340
Final pH: 7.619 Cal: 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C Measured with Hg Thermometer SN: C96-816
Cal: 6/3/03 Due: 12/3/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE #13-620-51 SN: 8027166

Gas: 99.999% Nitrogen
Ecorr: -0.318V Model: Keithley 614 SN: 0704934
Ept: +0.107V Cal: 6/09/03 Due: 6/09/04

Eapplied (vs SCE): -200 mV
Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: ~~2/1/03~~ 2/1/04 *6/10/04*

Number of Crevice Corrosion Sites: 0/24 (24 max.)
2/1/04 No crevice corrosion will continue testing specimen
m.l.b. Surface staining

Data: LT625P6

Next Test See NS# 611 P# 10 *Total 34.96 days total To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

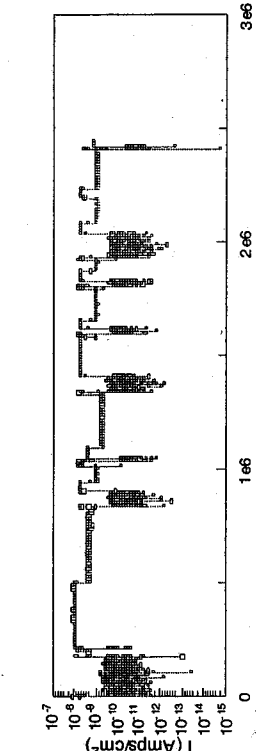
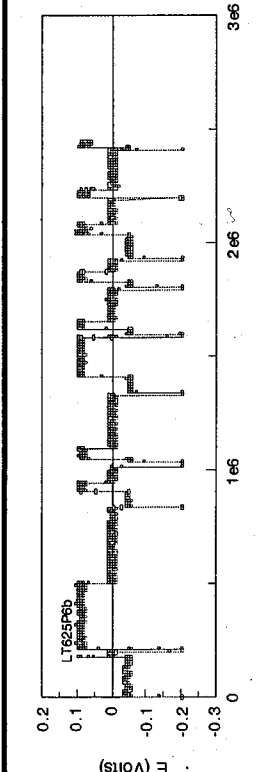
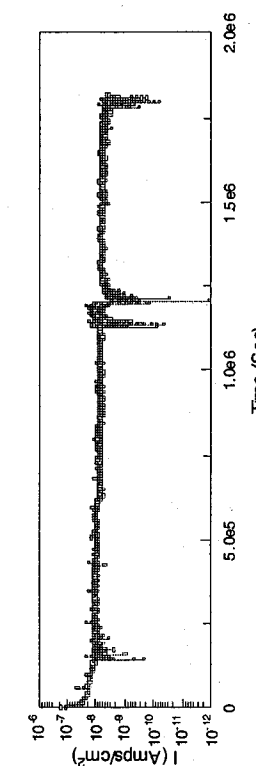
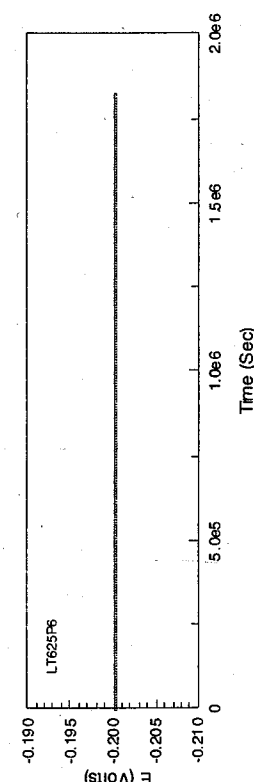
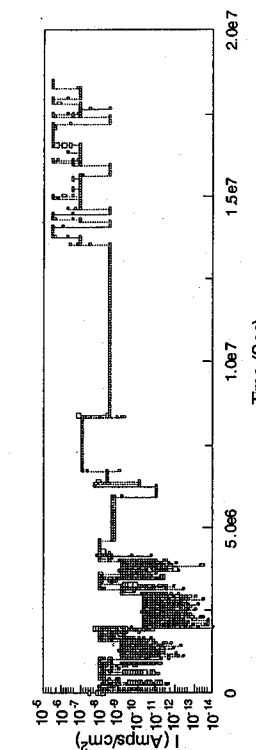
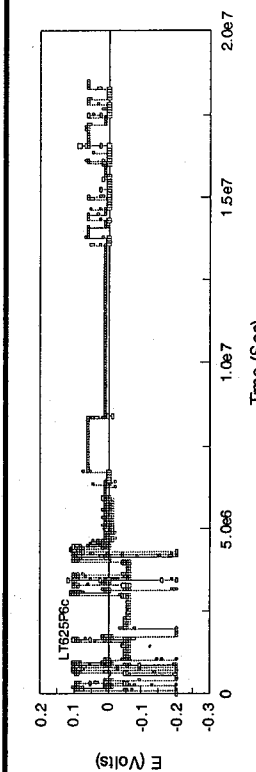
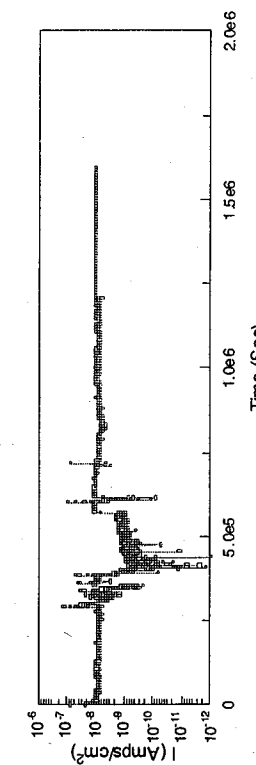
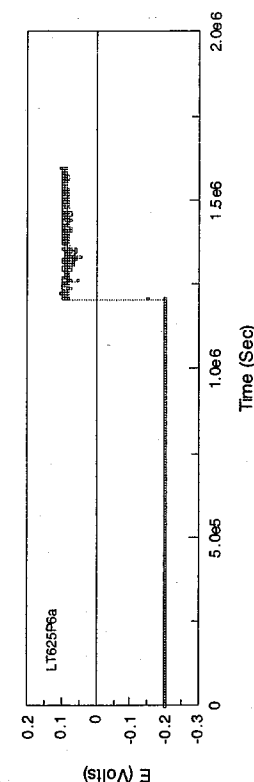
Date _____

Recorded by _____

9/12/03

Chung Che Wan

From Page No. _____



Potential stability condition not maintained in tests b, c, & d

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

4/21/04

[Signature]

From Page No. _____

Potentiostatic Test

Objective: Investigate the time required to initiate localized corrosion under constant applied potential.

Alloy / Heat No.: 316 L / P80746

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/03

Initial Weight: 30.64864g Model: Sartorius Genius SN: 12809099

Final Weight: 30.66471g Cal: 5/15/03 Due: 11/15/03

Solution: 5.5M NaCl + DI Water to 2000mL
642.90g of NaCl Lot # 034103

Reagents measured with Model: OHAUS SN: 2883 Cal: 7/29/03 Due: 1/29/04

Initial pH: 8.200 Model: Fisher Accumet 950 Meter SN: 3340
Final pH: 7.839 Cal: 8/11/03 Due: 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 100C Measured with Hg Thermometer SN: E98-273 Cal: 3/27/03 Due: 9/27/03

Counter Electrode: Platinum Flag
Reference Electrode: Fisher SCE #13-620-52 SN: 0066110

Gas: 99.999% Nitrogen
Ecorr: -0.361V Model: Keithley 614 SN: 0704934
Ept: -0.594V Cal: 6/09/03 Due: 6/09/04
Eapplied (vs SCE): -400 mV

Potentiostat: Solartron 1480 SN: 00240053

Last Verification Date: 8/1/03 Verification Due: 2/1/04

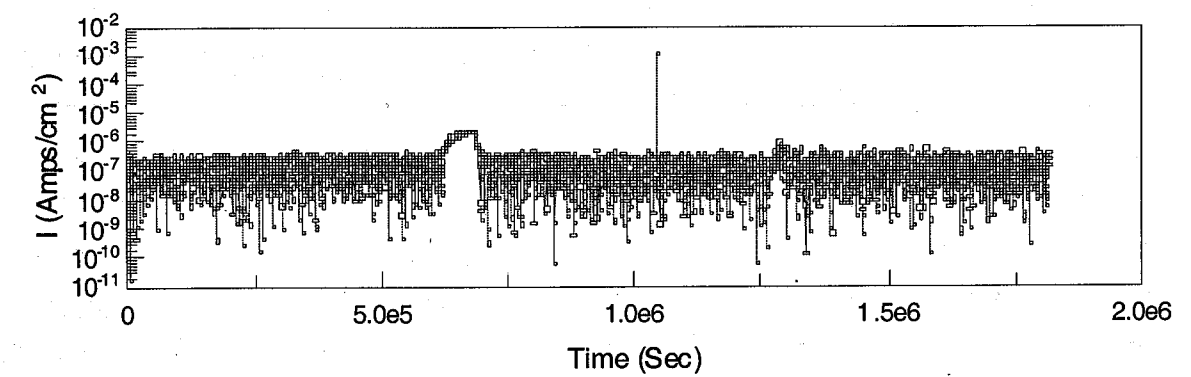
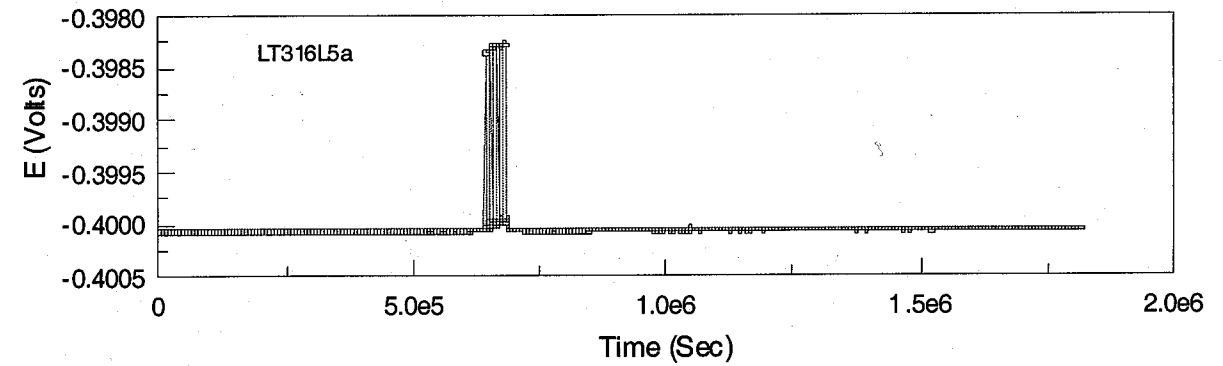
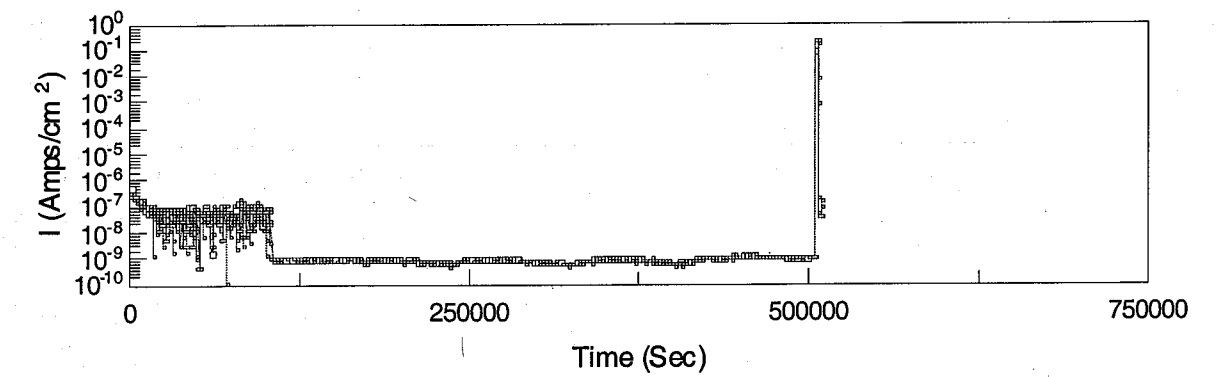
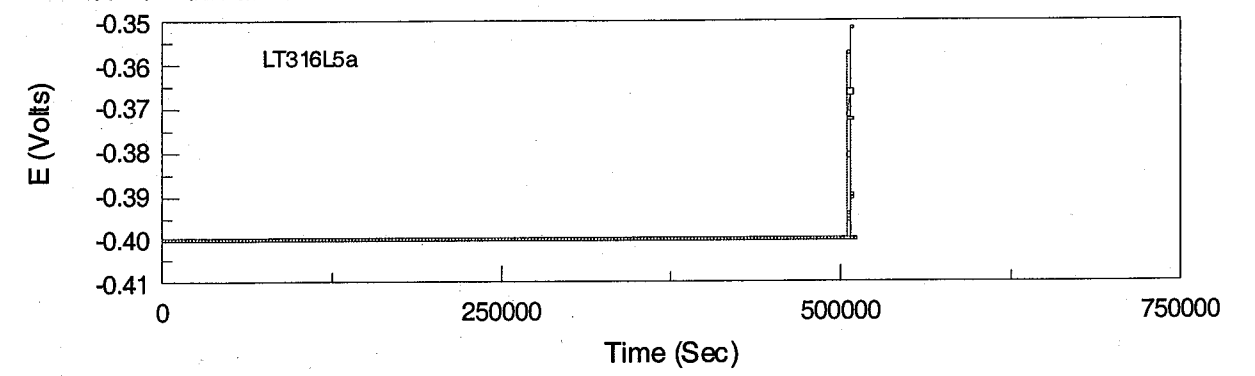
Number of Crevice Corrosion Sites: 24/24 (24 max.) All locations show mild crevice corrosion. At all feet of crevice washer - very mild surface staining.

Data: LT316LS & LT316LSa

To Page No. _____

Witnessed & Understood by me, Date Invented by Date Recorded by 9/12/03

From Page _____



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Witnessed & Understood by me, Date Invented by Date Recorded by 9/21/04

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.12054 g **Model:** Sartorius Genius SN: 12809099

Final Weight: 41.11576 g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 0.05M Cl⁻ + 0.0075M NO₃⁻ + DI water to 2000ml
5.849g of NaCl #034103
1.282g of NaNO₃ Lot # 020809

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/04

Initial pH: 5.690 **Model:** Fisher Accumet 950 Meter SN: 3340

Final pH: 7.468 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C **Measured with Hg Thermometer SN:** C96-397
Cal: 7/15/03 **Due:** 1/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -0.554 V **Model:** Keithley 614 SN: 467374
Ept: -0.094 V **Cal:** 10/28/02 **Due:** 10/28/03

Potentiostat: EG&G Model 273 SN: 10120

Last Verification Date: 3/4/03 **Verification Due:** 9/4/03

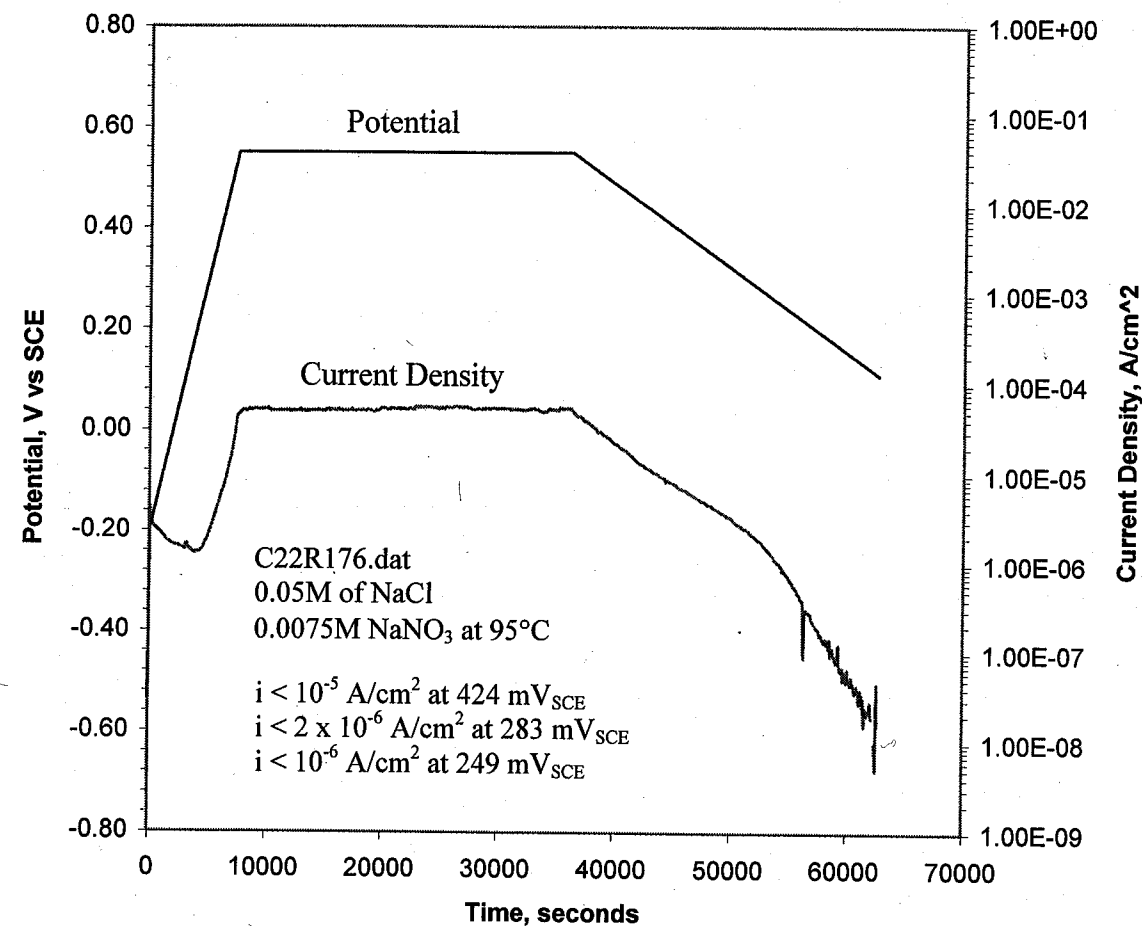
Number of Crevice Corrosion Sites: 0/24 (24 max.)
Heavy surface staining

Note: Specimen repolished for further testing.

Data: C22R176

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	9/12/03
		<i>Chung Che Wu</i>	

From Page No. _____



Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	9/15/03
		<i>Chung Che Wu</i>	

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.18670g **Model:** Sartorius Genius SN: 12809099
Final Weight: 41.18375g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 0.05M of Cl^- + 0.01M NO_3^- + DI water to 2000 mL
5.841 g of NaCl Lot# 034103
1.708 g of $NaNO_3$ Lot# 020809

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/03
Initial pH: 5.720 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 8.069 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C **Measured with Hg Thermometer SN:** C96-106
Cal: 5/1/03 **Due:** 5/1/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 8210528

Gas: 99.999% Nitrogen Gas

Ecorr: -0.393 V **Model:** Keithley 614 SN: 467374
Ept: -0.097 V **Cal:** 10/28/02 **Due:** 10/28/03

Potentiostat: EG&G Model 273 SN: 10120

Last Verification Date: 3/4/03 **Verification Due:** 9/4/03

Number of Crevice Corrosion Sites: 0 / 24 (24 max.)
Heavy surface staining

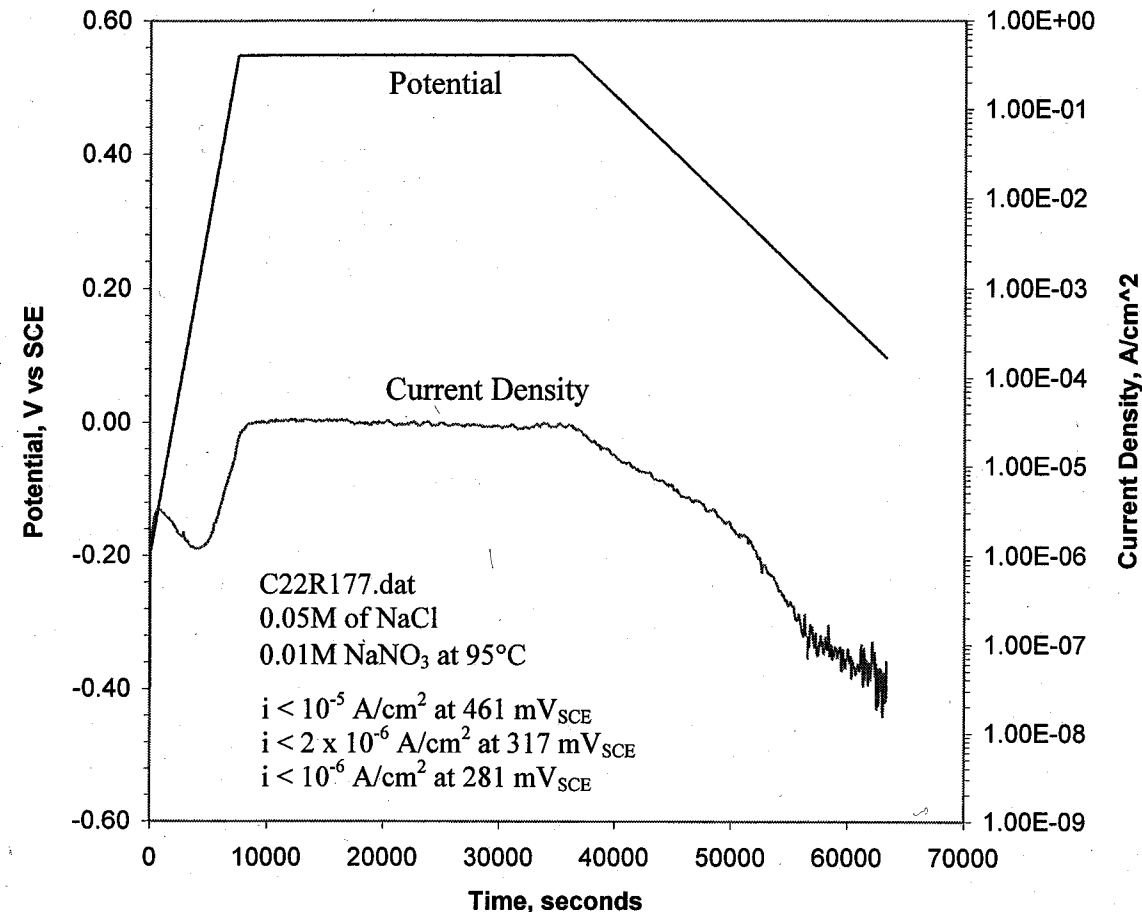
Note: Specimen repolished for further testing.

Data: C22R177

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung-Lee Wen</i>	9/12/03

From Page No. _____



Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Chung-Lee Wen</i>	9/15/03

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Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.10436g **Model:** Sartorius Genius SN: 12809099
Final Weight: 41.09891g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 0.05M of Cl⁻ + 0.005M NO₃⁻ + DI Water to 2000 mL
5.848g of NaCl Lot# 034103
0.857g of NaNO₃ Lot# 020809

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/04

Initial pH: 5.739 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 6.975 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C **Measured with Hg Thermometer SN:** C96-377
Cal: 7/15/03 **Due:** 1/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -0.524V **Model:** Keithley 614 SN: 467374
Ept: -0.092V **Cal:** 10/28/02 **Due:** 10/28/03

Potentiostat: EG&G Model 273 SN: 10120

Last Verification Date: 3/4/03 **Verification Due:** 9/4/03

Number of Crevice Corrosion Sites: 0 / 24 (24 max.)

Heavy surface staining

Note: Specimen repolished for further testing

Data: C22R178

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

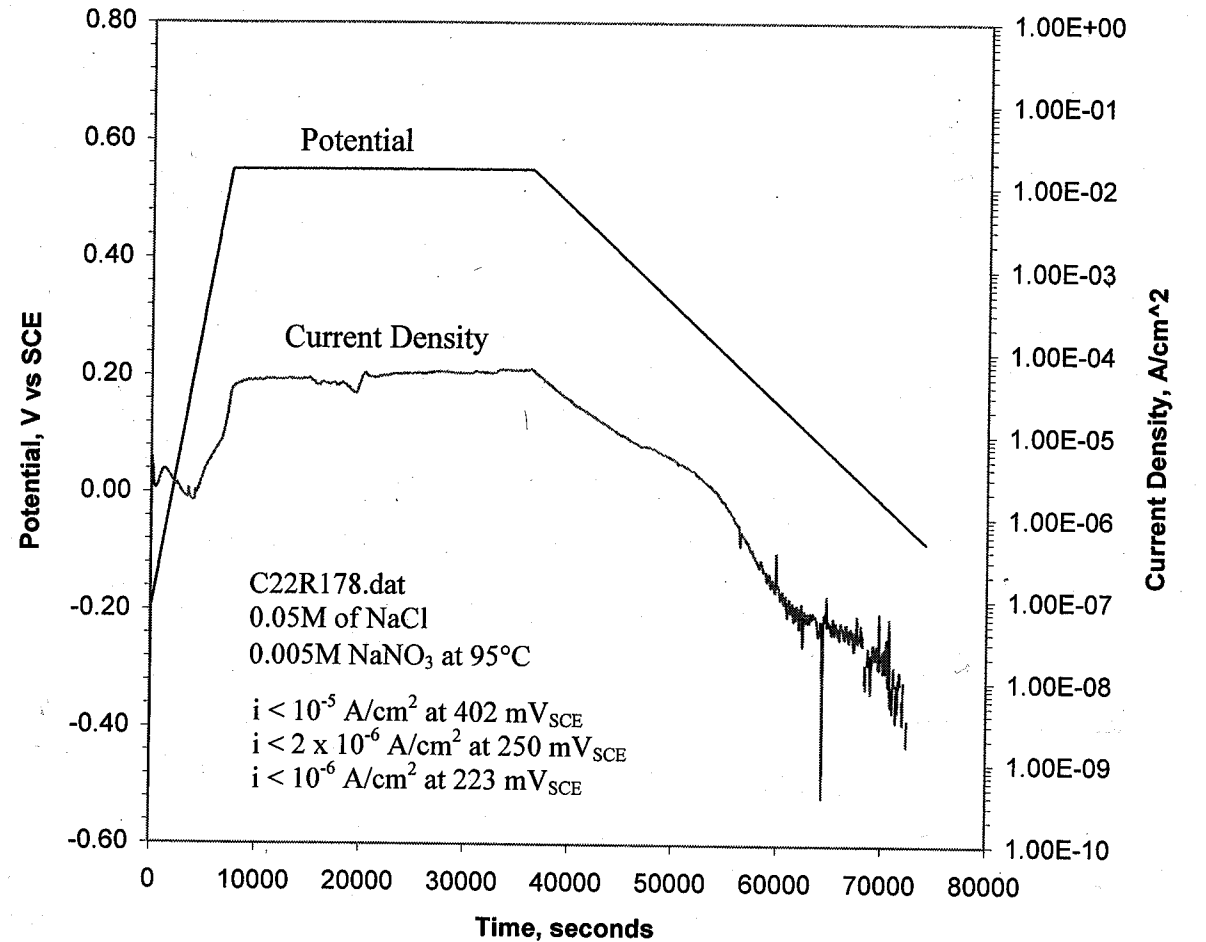
Date _____

Recorded by _____

Chung Che Wu

9/15/03

From Page No. _____



To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

Chung Che Wu

9/16/03

From Page No. _____

Repassivation Potential Test

Objective: Same as page 1.

Alloy / Heat No. : Thermally aged C-22 / 2277-8-3175 (see pg.52)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 40.77723 g **Model:** Sartorius Genius SN: 12809099
Final Weight: 40.77687 g **Cal:** 5/15/03 **Due:** 11/15/03

Solution: 0.05M of Cl^- + 0.0025M NO_3^- + DI water to 2000 mL
5.851g of NaCl Lot # 034103
0.431g of $NaNO_3$ Lot # 020809

Reagents measured with **Model:** OHAUS SN: 2883
Cal: 7/29/03 **Due:** 1/29/04
Initial pH: 5.913 **Model:** Fisher Accumet 950 Meter SN: 3340
Final pH: 7.407 **Cal:** 8/11/03 **Due:** 8/11/04
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C **Measured with Hg Thermometer SN:** C96-106
Cal: 5/1/03 **Due:** 5/1/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 8210528

Gas: 99.999% Nitrogen Gas

Ecorr: -0.171 V **Model:** Keithley 614 SN: 467374
Ept: +0.119V **Cal:** 10/28/02 **Due:** 10/28/03

Potentiostat: EG&G Model 273 SN: 10120

Last Verification Date: 3/4/03 **Verification Due:** 9/4/03

Number of Crevice Corrosion Sites: 0/24 (24 max.)
Light surface staining

Data: C22R179

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

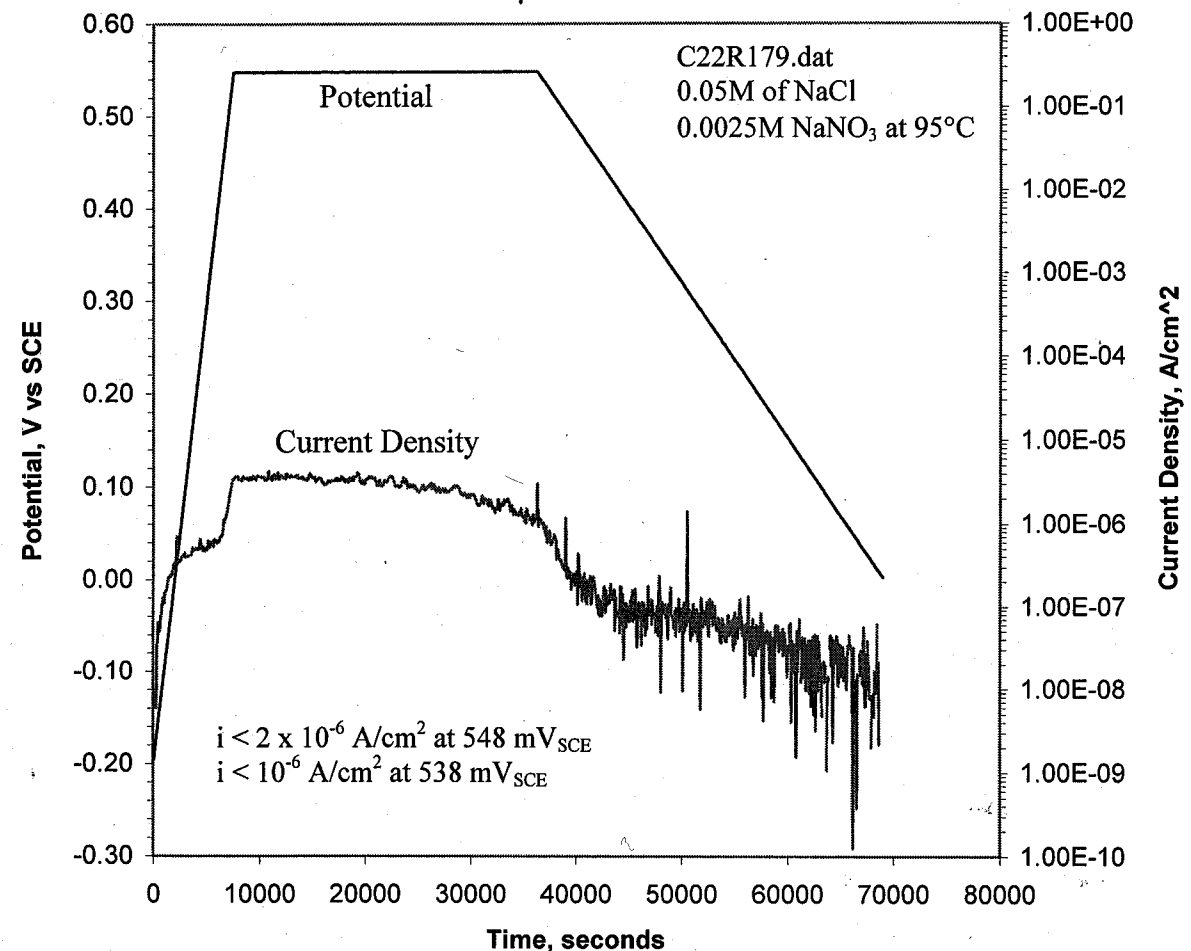
Date _____

Recorded by _____

9/15/03

Chung Che Wu

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To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

9/16/03

Chung Che Wu



From Page No. _____

Thermally Age Procedure for Alloy C-22 Specimens
for 10 min @ 870°C

Quantity = 8 C-22 specimens Heat 2277-8-3175

Oven = Lindberg SN# 909172 Model # 51333

Oven set point = 874°C

Oven Temperature = 891°C

Measurement taken with Omega Microprocessor thermometer
Model # HH22 SN# 7-94140 cal 5/5/03 acc 11/8
Thermocouple # 352 cal 7/21/03 Due 1/21/04

All specimens polished to a 600 Grit Finish before thermal Age
procedure and will be Repolished to 600 Grit prior to test
which is to be determined

B. D. J. 9/29/03

* Note:

Continue testing for NB # 611

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

B. D. J.

9/30/03

I have reviewed this scientific notebook and find it in compliance with QAP-001. There is sufficient information regarding procedures used for conducting tests, acquiring and analyzing data so that another qualified individual could repeat the activity.

[Signature] 9/21/2004