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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT # 2277-3-3266 W/ C-22 HT# 2277-3-3266 Nut/Bolt And Crevice Washers

C-22 Plate HT# 2277-3-3266

Torque Screwdriver: True Craft 75 In-lbs **SN:** 69400069
Cal: 7/22/05 **Due:** 7/21/06

Initial Weight: 23.74580g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 23.74584g **Cal:11/14/05** **Due:5/12/06**

SOLUTION: 4.0 M $MgCl_2 \cdot 6H_2O$
1626.48g $MgCl_2 \cdot 6H_2O$ Lot# 050439
+ DI To 2000 mls

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal:1/5/06 **Due:7/05/06**

Initial pH: 2.943 **Model:** Orion EA 940 **SN:**2330
Final pH: not taken **Cal:7/25/05** **Due:7/25/06**
(solution used for next test, p. 110) **pH Probe:** #13-620-296 **SN:** 4065196

TEST TEMPERATURE: 95°C **Thermometer:** Fisher **SN:** 415 23645
Cal: 6/7/05 **Due:** 6/7/06
TC #333 cal: 1/12/06 Due: 7/12/06

Reference Electrode: Fisher SCE # 13-620-52 **SN:** 9252105

GAS: Zero Air

(CREVICE)
Ecorr: -252 **mV vs SCE**

(PLATE) **Model:** Keithley 614 **SN#:0704936**
Ecorr: -105 **mV vs SCE** **Cal:5/27/05** **Due:5/26/06**

Potentiostat:Solartron 1480 **SN#:00240053 Cal: 8/23/05 Due:2/23/06**

TEST ID: MA22MA22MA22a
DATA FILES: C22C22I0310_Un1Ch7, C22C22I0313_Un1Ch7, C22C22E0313_Un1Ch8, C22C22E0310_Un1Ch8

Specimen Examination: Crevice Corrosion on 20/24 feet of C-22 Crevice Washers
No Corrosion on C-22 Crevice Washers or Hardware
No Corrosion on C-22 Plate. Mild Surface Staining on C-22 Specimen And C-22 Plate

Test time: 4.64×10^5 seconds = 5.37 days
3/10/06 — 3/15/06

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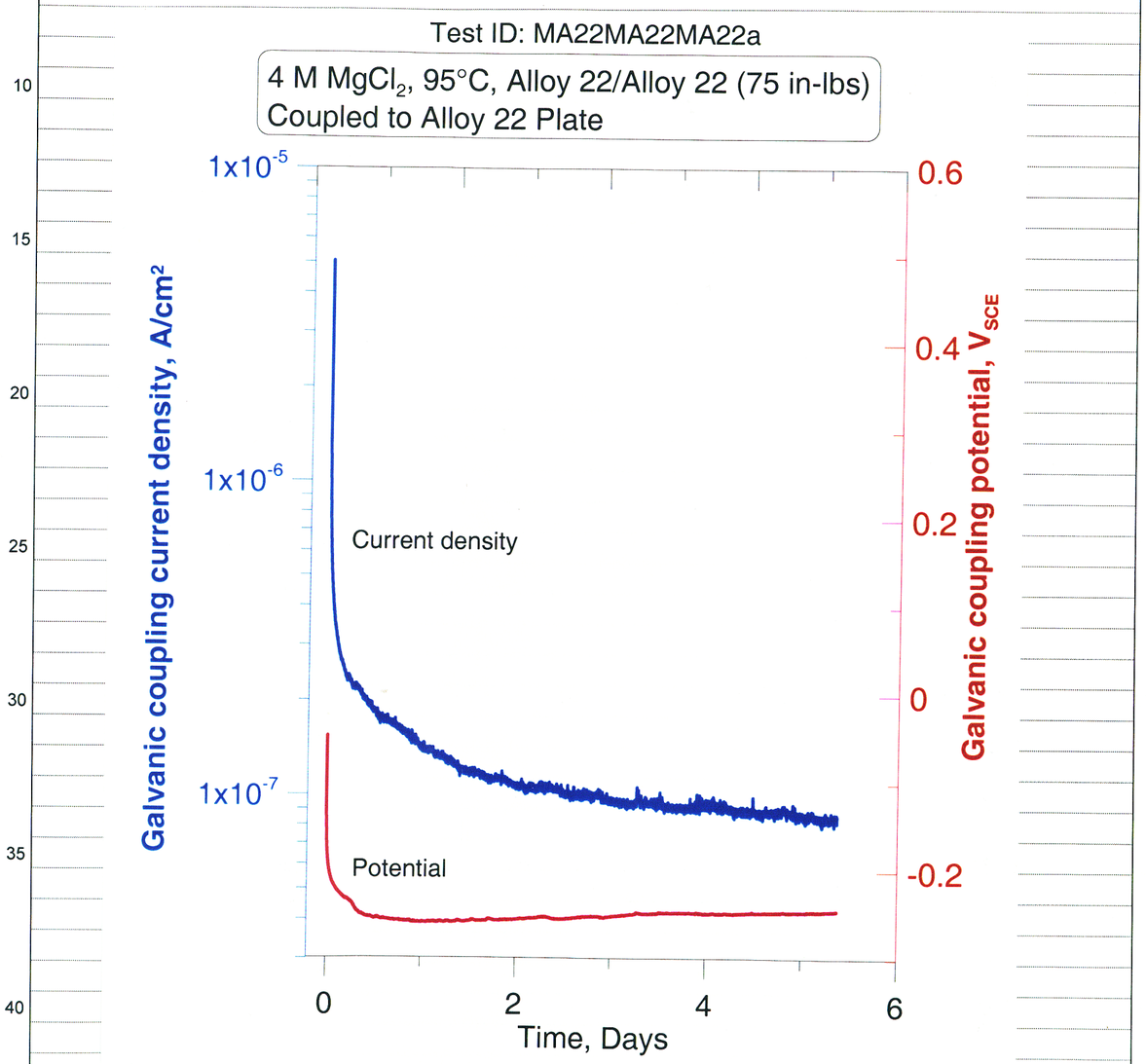
Maximum penetration depth of corroded sites: All the sites are too shallow to measure

Measured with Olympus Metallurgical Microscope PME3 Cal: 12/13/05 Due: 6/13/06



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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT# 2277-3-3266 w/276 Nut/Bolt PTFE Crevice Washers

C-22 HT# 2277-3-3266 Plate

Torque Screwdriver: Proto 6104 100 In-Oz SN: 139072
Cal: 10/24/05 Due: 4/24/06

Initial Weight: 24.11039g Model: Sartorius Genius SN: 12809099
Final Weight: 23.95978g Cal:11/14/05 Due:5/12/06

SOLUTION: from Pg # 104 Same Solution

4.0 m $MgCl_2 \cdot 6H_2O$
1626.52g $MgCl_2 \cdot 6H_2O$ Lot #030439
+DI to 2000mls

Reagents measured with Model: OHAUS SN: 2883
Cal:1/5/06 Due:7/05/06

Initial pH: 2.873 Model: Orion EA 940 SN:2330
Final pH: Not Taken Cal:7/25/05 Due:7/25/06
pH Probe: #13-620-296 SN: 4065196

(Solution is being used continuously for Test MA22PTFEMA22C, p. 150)

TEST TEMPERATURE: 95°C Thermometer: Fisher SN: C96-833
Cal: 3/2/06 Due: 9/1/06

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

GAS: Zero Air

(CREVICE)
Ecorr: -181 mV vs SCE

(PLATE) Model: Keithley 614 SN#:0704936
Ecorr: -230 mV vs SCE Cal:5/27/05 Due:5/26/06

3/2/06 9/2/06

Potentiostat:Solartron 1480 SN#:00240053 Cal: ~~8/23/05~~ Due:~~2/23/06~~

TEST ID: MA22PTFEMA22b X.H 4/3/06 X.H 4/3/06
DATA FILES: C22PTFE0327_Unit3, C22PTFE0327_Unit4, 0328, 0331, 0403, 0406, 0409, 0412, 0415, 0418, 0421, 0424, 0427, 0501, 0502

Specimen Examination: No crevice Corrosion 0/24 feet of Crevice washer. Very Mild Tint Surface Staining
A Small Area of Surface Etching Under Specimen Holder on One Side of C-22 Specimen

* Replished for further Testing

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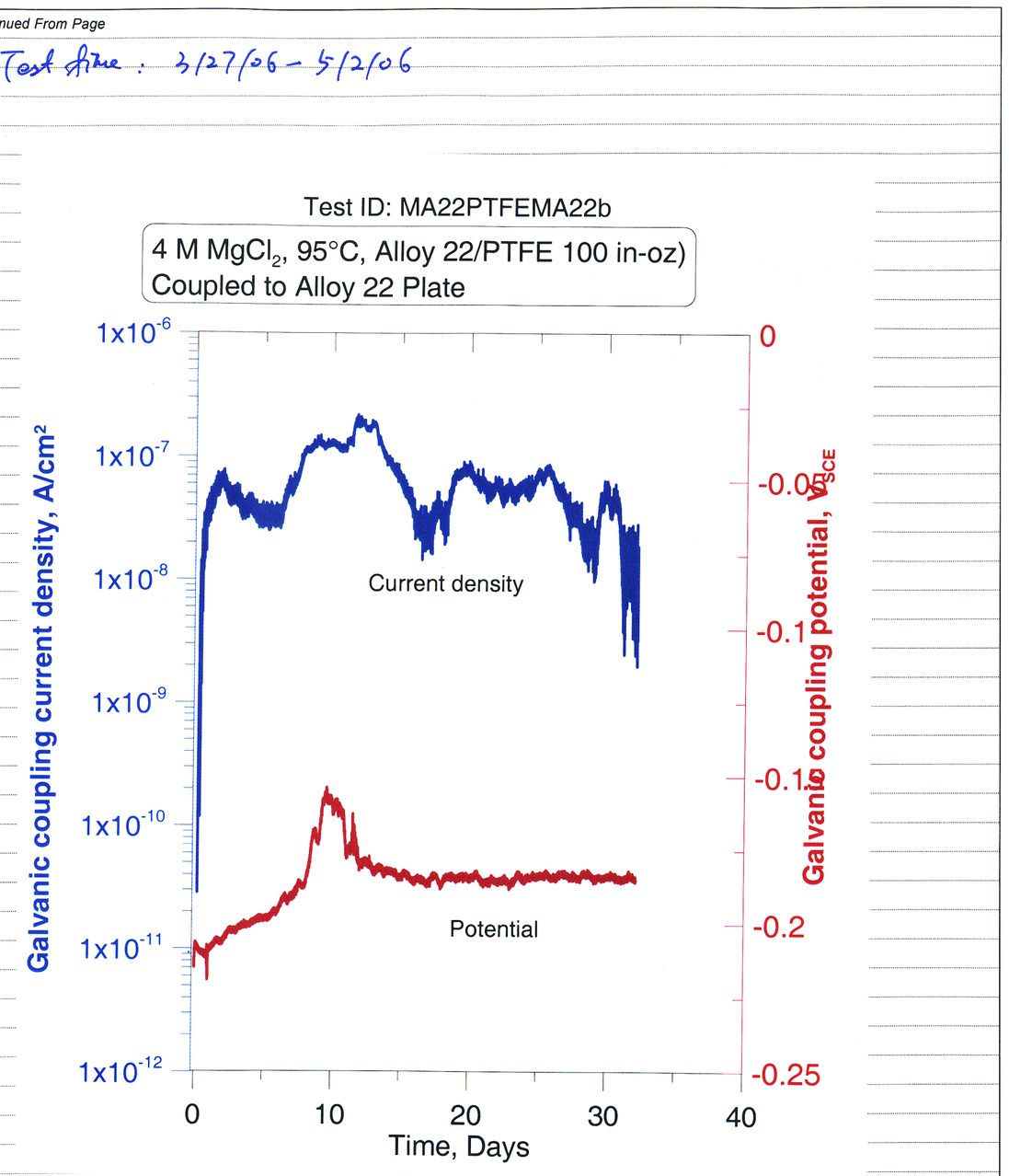
Test time: 3/27/06 – 5/2/06



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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT# 2277-3-3266 w/c-22 HT# 2277-3-3266 Nut/Bolt & Crevice Washers

C-22 Plate HT# 2277-3-3266

Torque Screwdriver: True Craft 75" In-oz **SN:** 694000691
Cal: 7/22/05 **Due:** 7/21/06

Initial Weight: 23.66701g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 23.66325g **Cal:11/14/05** **Due:5/12/06**

SOLUTION: from pg #106 same solution — 4.0 m $MgCl_2 \cdot 6H_2O$
1626.48g $MgCl_2 \cdot 6H_2O$ Lot# 050439 + DI To 2000 mls

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal:1/5/06 **Due:7/05/06**

Initial pH: 2.943 **Model:** Orion EA 940 **SN:**2330
Final pH: Not Taken **Cal:7/25/05** **Due:7/25/06**
C solution is being used continuously for Test MA22MA22MA22C, P.152) **pH Probe:** #13-620-296 **SN:** 4065196

TEST TEMPERATURE: 95°C **Thermometer:** Fisher **SN:** C98-132
Cal: 9/9/05 **Due:** 9/8/06

Reference Electrode: Fisher SCE **# 13-620-52** **SN:** 9252105

GAS: Zero Air

(CREVICE)
Ecorr: -230 **mV vs SCE**

(PLATE) **Model:** Keithley 614 **SN#:0704936**
Ecorr: +390 **mV vs SCE** **Cal:5/27/05** **Due:5/26/06**

Potentiostat:Solartron 1480 **SN#:00240053 Cal:** ~~8/23/05~~ **Due:** ~~2/23/06~~ 3/24/06 9/21/06

TEST ID: MA22MA22MA22b XH 4/3/06 XH 4/3/06

DATA FILES: C22C22I0327a - Unich7, C22C22E0327a - Unich8, 0327, 0328, 0331, 0403, 0406, 0409, 0412, 0415, 0418, 0421, 0424, 0427, 23, 0501, 0502

Specimen Examination: Crevice Corrosion on 24 feet of C-22 Crevice Washers - Also Surface Etching on C-22 Crevice washers - Repolished Easy with 600 Grit Milo Surface staining on C-22 washers And Specimen C-22 plate No Corrosion Milo Surface Staining

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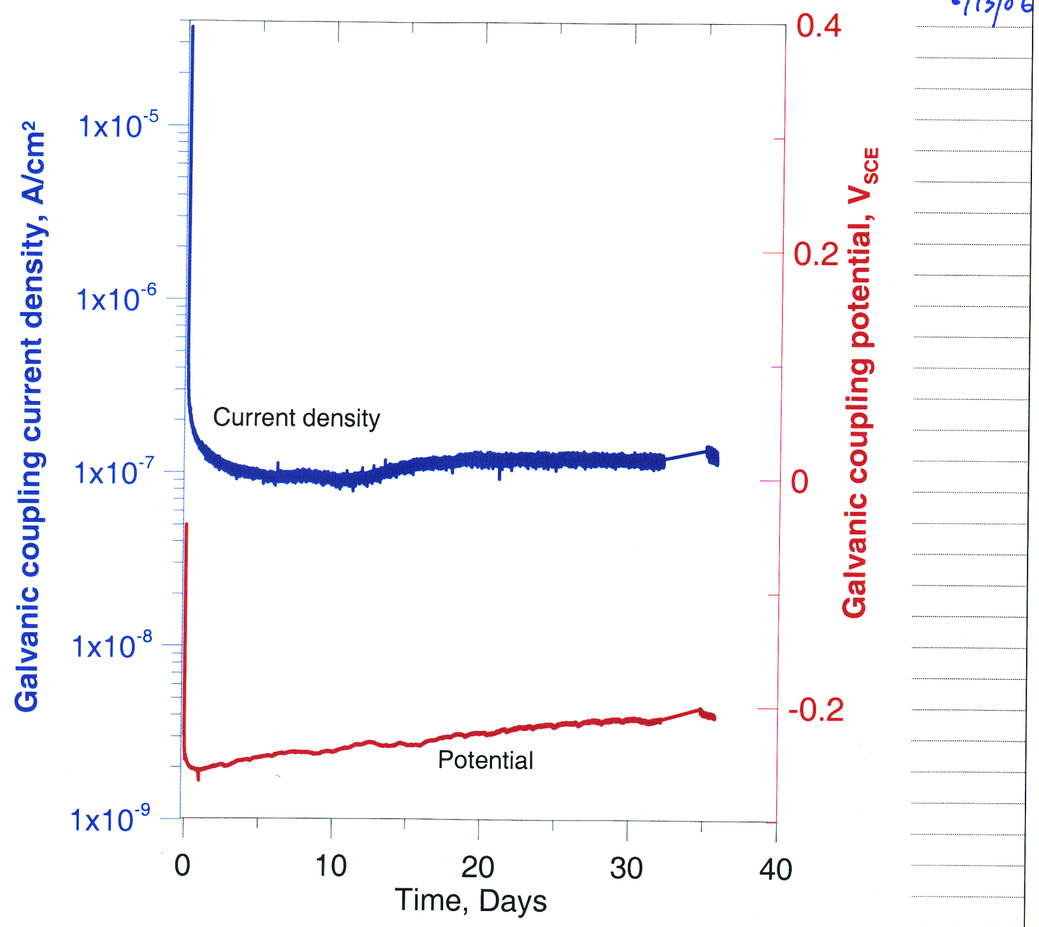
Test length: 3/27/06 ~ 5/2/06
3.09×10^6 seconds = 35.8 days

Penetration depth:
maximum 60 μm
Most corroded teeth are too shallow to measure
Measured with Olympus Metallurgical Microscope PMG3
Cal: 12/13/05, Due: 6/13/06

Test ID: MA22MA22MA22b

4 M $MgCl_2$, 95°C, Alloy 22/MA22 (75 in-lbs) Coupled to Alloy 22 Plate



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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT# 2277-3-3266 Crevice Specimen

Ti 7 HT# CN 2775 Plate

Ti 7 HT# CN 2775 Crevice washers Nut/Bolt

Torque Screwdriver: Trve Craft 75 In-lbs **SN:** 69400069/ **Cal:** 7/22/05 **Due:** 7/21/06

Initial Weight: 23.75935g **Final Weight:** 23.75719g **Model:** Sartorius Genius **SN:** 12809099 **Cal:**11/14/05 **Due:**5/12/06

SOLUTION: 4.0 m $MgCl_2 \cdot 6H_2O$ 1626.55g $MgCl_2 \cdot 6H_2O$ Lot# 050439 + DI To 2000 mls

Reagents measured with **Model:** OHAUS **SN:** 2883 **Cal:**1/5/06 **Due:**7/05/06

Initial pH: 2.73 **Model:** Orion EA 940 **SN:**2330

Final pH: Not Taken **Cal:**7/25/05 **Due:**7/25/06

(solution is being used continuously) P.146 **pH Probe:** #13-620-296 **SN:** 4065196

TEST TEMPERATURE: 95°C **Thermometer:** Fisher **SN:** A2000-130 **Cal:** 1/12/06 **Due:** 7/12/06

Reference Electrode: Fisher SCE **# 13-620-52** **SN:** 3329075

GAS: Zero Air

(CREVICE)
Ecorr: -0.5 mV vs SCE

(PLATE)
Ecorr: 48 mV vs SCE **Model:** Keithley 614 **SN#:**0704936 **Cal:**5/27/05 **Due:**5/26/06

Potentiostat:Solartron 1480 **SN#:00240053 Cal: 3/21/06 Due:9/21/06**

TEST ID: MA22Ti7Ti7e

DATA FILES: Started 3/28/06

C22Ti7I0329-Unich1, C22Ti7E0329-Unich2, 0331a, 0331, 0401, 0404, 0407, 0410, 0413, 0416, 0419, 0422, 0425, 0428, 0501, 0502-Unich2

Specimen Examination: Crevice Corrosion on 2/24 feet of Ti 7

Crevice washers - Very Mild Surface Staining on C-22

Ti 7 plate - Crevice washers Nut And Bolt No Corrosion Dull Tint surface Staining

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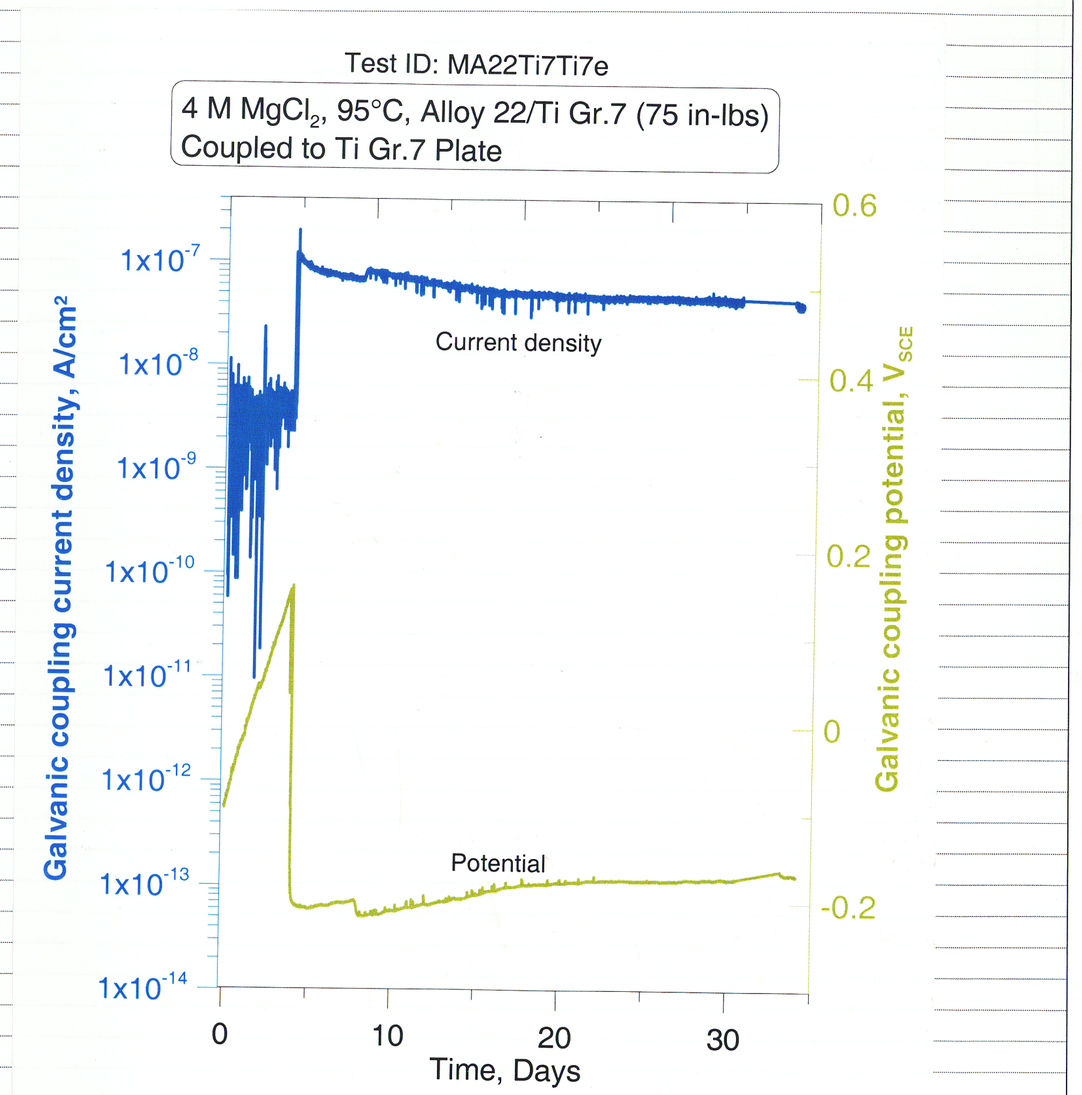
Test length: 3/28/06 ~ 5/12/06

2.95×10^6 seconds = 34.1 days

Penetration depth: 77 μm, 62 μm, measured with Olympus Metallurgical Microscope PME3 Cal: 12/13/05, Due: 6/13/06



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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone
C-22 HT# 2277-3-3266 Crevice Specimen
Ti 7 Plate HT# CN2775
C 276 Bolt/nut w/PTFE Crevice Washers

Torque Screwdriver: Snap ON Q Driver 100 In-oz **SN:** 100/20319 **Cal:** 11/2/05 **Due:** 5/2/06

Initial Weight: 23.88320g **Final Weight:** 23.90752g **Model:** Sartorius Genius **SN:** 12809099 **Cal:**11/14/05 **Due:**5/12/06

SOLUTION: 4 m $MgCl_2 \cdot 6H_2O$ 1626.5g $MgCl_2 \cdot 6H_2O$ Lot# 030439 + DI To 2000 mls

Reagents measured with **Model:** OHAUS **SN:** 2883 **Cal:**1/5/06 **Due:**7/05/06

Initial pH: 2.51 **Final pH:** Not taken **Model:** Orion EA 940 **SN:**2330 **Cal:**7/25/05 **Due:**7/25/06 **pH Probe:** #13-620-296 **SN:** 4065196
(solution is being used continuously for Test MA22PTFETi7e, p. 168)

TEST TEMPERATURE: 95°c **Thermometer:** Fisher **SN:** E98-273 **Cal:** 1/9/06 **Due:** 7/7/06

Reference Electrode: Fisher SCE **# 13-620-52** **SN:** 402801

GAS: Zero Air

(CREVICE)
Ecorr: 24 **mV vs SCE**

(PLATE) **Model:** Keithley 614 **SN#:**0704936
Ecorr: -25 **mV vs SCE** **Cal:**5/27/05 **Due:**5/26/06

Potentiostat:Solartron 1480 **SN#:00240053 Cal: 3/21/06 Due:9/21/06**

TEST ID: MA22PTFETi7d
DATA FILES: started 3/28/06
C22PTFETi7I0329_Unich5, C22PTFETi7E0329-Unich6, 0331a, 0331, 0401, 0404, 0407, 0410, 0413, 0416, 0419, 0422, 0425, 0428, 0501 0502

Specimen Examination: No Crevice Corrosion 0/24 feet of Crevice Washers- Mild Surface staining on Specime

* will Repolish for further Testing

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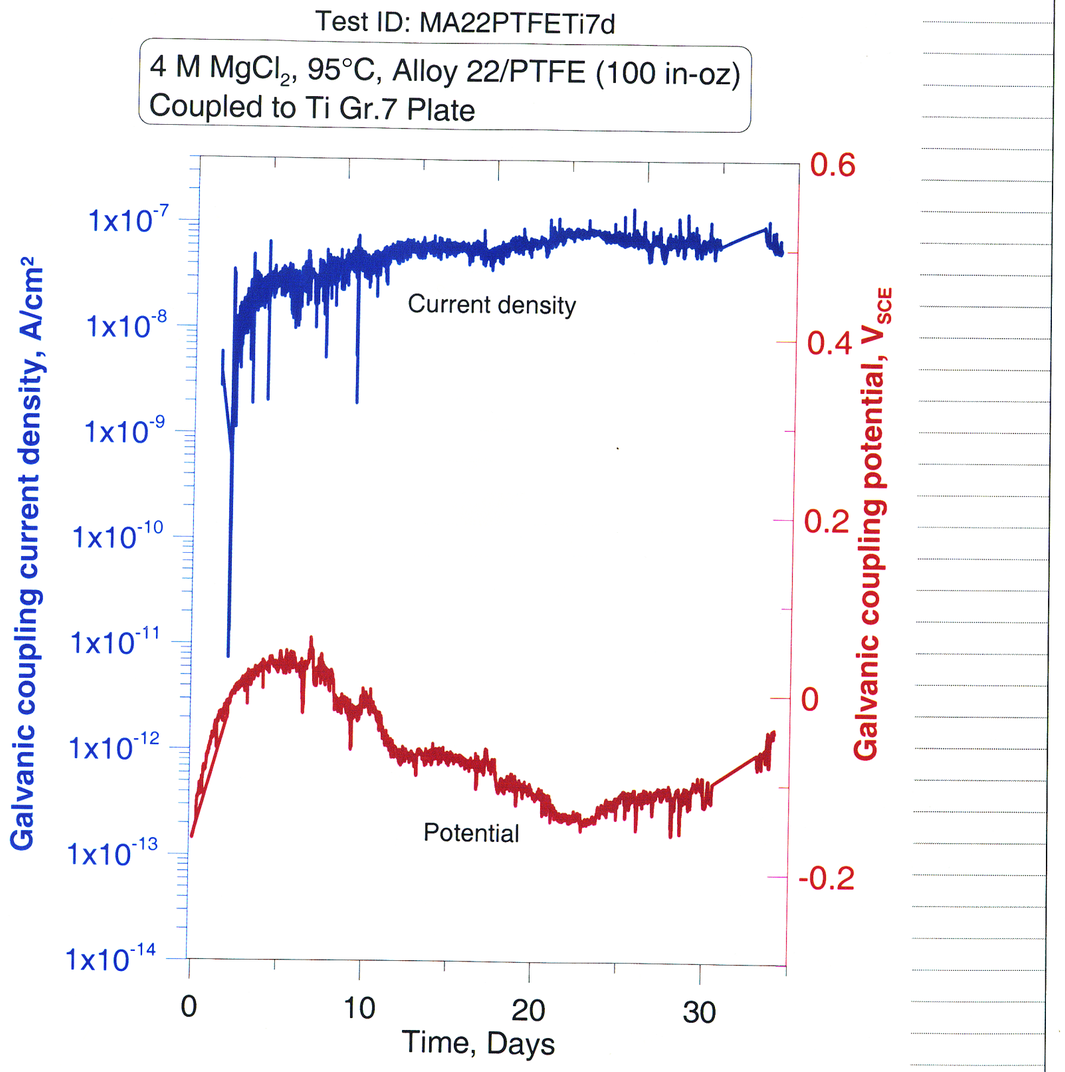
Test length: 3/28/06 — 5/2/06
2.95×10^6 seconds = 34.1 days



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POTENTIAL SCAN AND HOLD

Crevice washers and Bolt, nut were pre-oxidized

Zr4 HT# 1223217-243687 nut/bolt
Zr702 HT# 845645 Crevice washers
} See #100 for forming oxide on hardware

Objective: See page 1.

Alloy / Heat No. : C-22 HT#2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: **Model# &Torque:** Proto 6104 50In-Oz **SN:** 139072
Cal: 4/4/06 **Due:** 10/4/06

Initial Weight: 23.59010 g
Final Weight: 23.59037 g
Model: Sartorius Genius **SN:** 12809099
Cal: 11/14/05 **Due:** 5/12/06

Solution:

4.0 m NaCl.
467.50g NaCl Lot #052761
+ DI To 2000 mls

Reagents measured with
Model: OHAUS **SN:** 2883
Cal: 1/5/06 **Due:** 7/5/06

Initial pH: 8.23
Final pH: 5.12
Model: Orion EA 940 **SN:** 2330
Cal: 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 40651%

Test Temperature: 95°c **Measured with Hg Thermometer** **SN:** N98-182
Cal: 5/6/05 **Due:** 5/5/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 4028036

Gas: Zero Air for OCP then 99.999% N_2 for E Repassivation

Ecorr: −186 mV_{SCE}
Ept: 125 mV_{SCE} } in N_2 deaerated
Model: Keithley 614 **SN:** #0704936
Cal: 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1287 SN# 00148500 **SN:** 00148500
Cal 11/17/05
Due 5/17/06

Test ID: MA22ZrOxide-a

DATA FILE: C22ZrOxideAIR, C22ZrOxideN2a, C22ZrOxideSUa, C22ZrOxideSUa-b, C22ZrOxideSHa, C22ZrOxideSUa-c, C22ZrOxideSHa-c, C22ZrOxideSDa, C22ZrOxideSUa-d, C22ZrOxideSHa-d.

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

No Crevice Corrosion on C-22 Specimen - Slight Staining And Buildup on Surface of Specimen

Zr 4 And Zr 702 Hardware
Zr702 Crevice Washers Both Have Corrosion on Washer feet
Zr 4 Nut And Bolt Both Have Pitting on Surface
* Note specimen Repolished for further Testing

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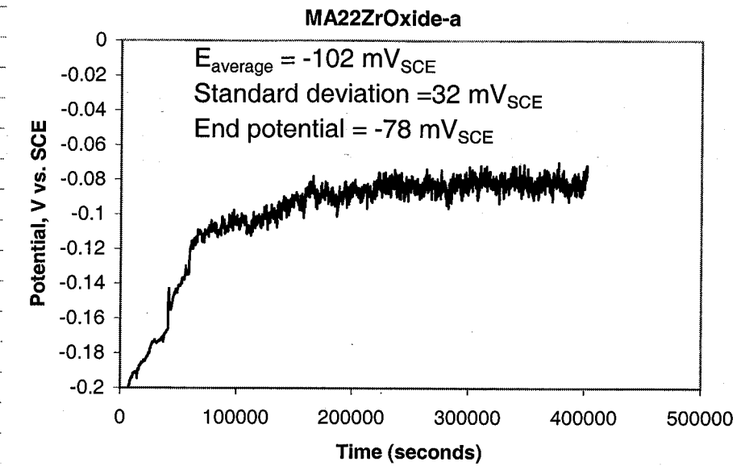

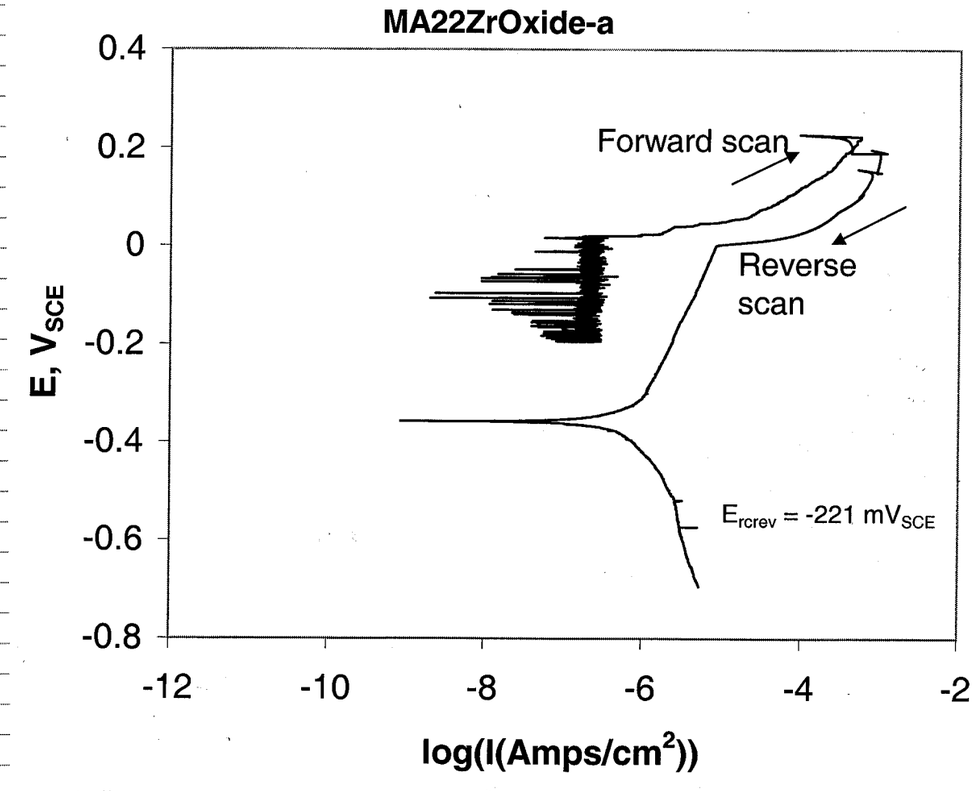

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POTENTIAL SCAN AND HOLD

Surface Oxidized crevice washers and bolt, nut

Objective: See page 1.

Alloy / Heat No. : C-22 HT# 2277-3-3266 Zr 4 HT# 1223217-243687 Nut/bolt > See Pg #100
Zr 702 HT# 945645 Crevice washers

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: **Model# &Torque:** Proto 6104 50 In-oz **SN:** 179072 **Cal:** 4/4/06 **Due:** 10/4/06

Initial Weight: 23.17285g
Final Weight: 23.17234g

Model: Sartorius Genius **SN:** 12809099 **Cal:** 11/14/05 **Due:** 5/12/06

Solution: 4.0 M NaCl
467.67g NaCl Lot# 052761
+ DI To 2000 mls

Reagents measured with

Initial pH: 6.77
Final pH: 6.35

Model: OHAUS **SN:** 2883 **Cal:** 1/5/06 **Due:** 7/5/06

Model: Orion EA 940 **SN:** 2330 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 4065196

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** 4084 **Cal:** 7/25/05 **Due:** 7/25/06

Counter Electrode: Platinum Flag **SN:** 3328225

Reference Electrode: Fisher 13-620-52

Gas: Zero Air for OCP then 99.999% N_2 for $E_{Repassivation}$

Ecorr: −106 mV_{SCE} **Model:** Keithley 614 **SN:** #3704936
Ept: 189 mV_{SCE} in N_2 deaerated **Cal:** 5/27/05 **Due:** 5/26/06
Potentiostat: Solartron 1287 SN#G0153550 Cal: 11/17/05 Due: 5/17/06 **SN:** 00153550

Test ID
~~**DATA FILE:**~~ MA22ZrOxide-b
XH 4/18/06

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

No Crevice Corrosion on C-22 Specimen - Mild surface staining.

Zr 4 Nut & Bolt Both Have pitting on Surface
Zr 702 Crevice Washers Have Very Small pits Developed on outer Edge - One Crevice Washer Has staining on Facial Surface

* Repolished for further Testing

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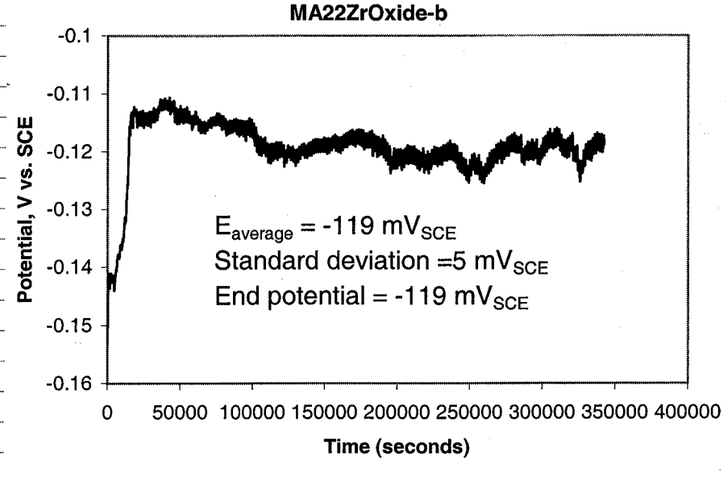
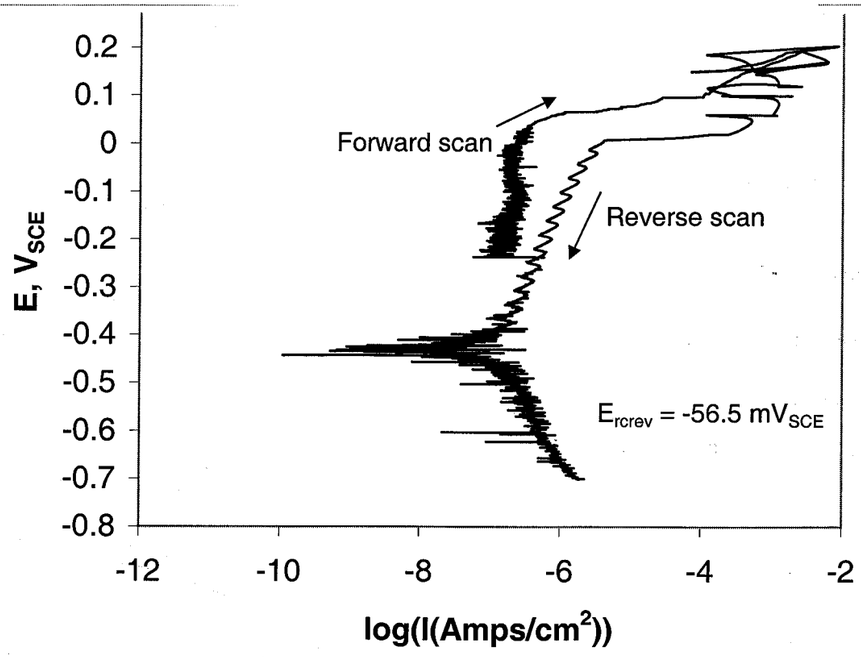
Data files: C22ZroxideAir, C22ZrOxideN2b, C22ZrOxideSub, C22ZroxideSub-b, C22ZrOxideSub-C, C22ZrOxideSub-d, C22ZrOxideSHb, C22ZroxideSub-e, C22ZroxideShb-e, C22ZrOxideSub-f C22ZrOxideShb-f, C22ZrOxideSub-g, C22ZrOxideSHb-g, C22ZrOxideSDb,





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POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No. : C-22 HT # 2277-3-3266 Ti 7 HT # CW2775 Hardware

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: **Model# &Torque:** Proto 6104 50 In-oz **SN:** 139072 **Cal:** 4/4/06 **Due:** 10/4/06

Initial Weight: 24.41459g **Final Weight:** 24.41419g

Model: Sartorius Genius **SN:** 12809099 **Cal:** 11/14/05 **Due:** 5/12/06

Solution:

0.5 M NaCl
58.47g NaCl Lot #052761
+ DI To 2000 mls

Reagents measured with

Model: OHAUS **SN:** 2883 **Cal:** 1/5/06 **Due:** 7/5/06

Initial pH: 4.65 **Final pH:** 7.30

Model: Orion EA 940 **SN:** 2330 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 4065196

Test Temperature: 95°C

Measured with Hg Thermometer **SN:** H98-187 **Cal:** 9/9/05 **Due:** 9/8/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 0199568

Gas: Zero Air for OCP then 99.999% N_2 for E Repassivation

Ecorr: −33 mV_{SCE} in N_2 deaerate **Model:** Keithley 614 **SN:** #0704936
Ept: 134 mV_{SCE} **Cal:** 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1480 sn# 00240053 cal: 3/21/06 Due: 9/21/06 **SN:** 00240053

Test ID
~~**DATA FILE:**~~ BA22Ti702g
XIH 4/18/06

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

No Crevice Corrosion on C-22 Specimen
Dull Tint staining on All Surfaces of Specime

Ti 7 Hardware. No Sign of Corrosion
Mild Surface Staining

* Note: Specimen Repolished for further Testing

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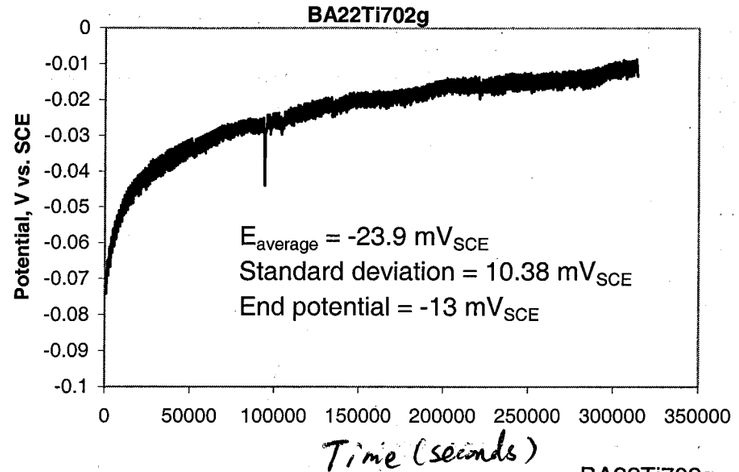
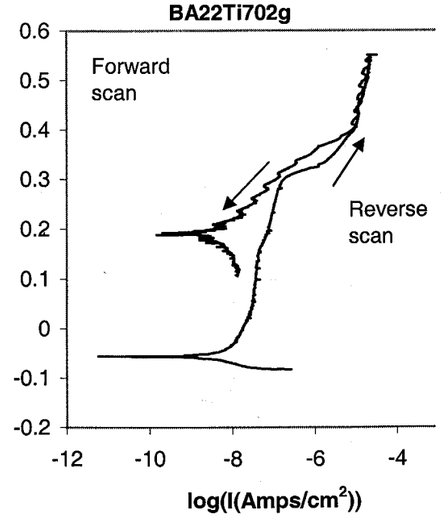
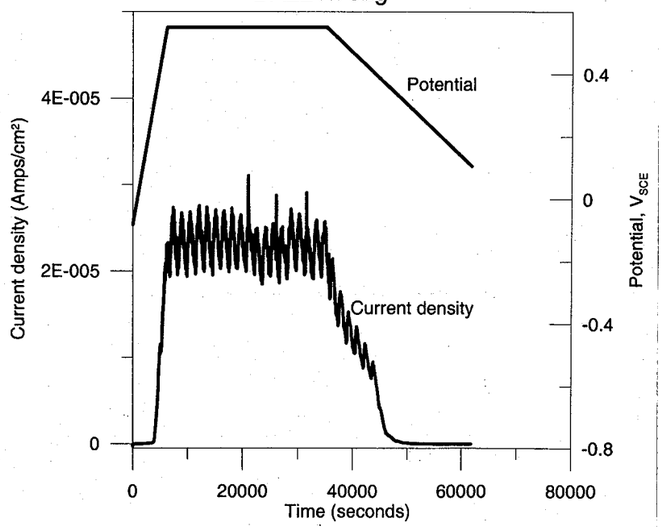
Data files: C22Ti7halfCl6-Un1Ch4, C22Ti7halfCN26-Un1Ch4
C22Ti7halfClSu6-Un1Ch4, C22Ti7halfClSH6, C22Ti7HalfClSD6







Mill annealed Alloy 22 to Ti Gr7 crevice, Ti7 bolt and nut
Specimen to crevice washer area ratio: ~1/3; Torque: 50 in-oz;
N_2 deaerated, 95 °C, 0.5 M NaCl solution
Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE} for 8 hours.
Reverse scan rate: 0.0167 mV/s
Using entire assembly area for current density calculation:
$i < 10^{-5}$ A/cm² at 424 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 372 mV_{SCE};
$i < 10^{-6}$ A/cm² at 359 mV_{SCE}
Using crevice specimen area for current density calculation:
$i < 10^{-5}$ A/cm² at 377 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 345 mV_{SCE};
$i < 10^{-6}$ A/cm² at 327 mV_{SCE}

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POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No. : C-22 HT# 2277-3-3266 Ti 7 HT# CN2775 Hanoware

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: **Model# &Torque:** Proto 6104 50In-oz **SN:** 139072
Cal: 4/4/06 **Due:** 10/4/06

Initial Weight: 24.23090g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 24.22678g **Cal:** 11/14/05 **Due:** 5/12/06

Solution: 0.5 m NaCl
58.47g NaCl Lot# 052761
+ DI To 2000mls

Test ID: BA22Ti702h

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal: 1/5/06 **Due:** 7/5/06

Initial pH: 4.76 **Model:** Orion EA 940 **SN:** 2330
Final pH: 7.79 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 4065196

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** H98-179
Cal: 5/6/05 **Due:** 5/5/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 3300328

Gas: Zero Air for OCP then 99.999% N_2 for E Repassivation

Ecorr: 64 mV_{SCE} } in N_2 **Model:** Keithley 614 **SN:** # 0704936
Ept: +89 mV_{SCE} } **Cal:** 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1480 SN# 00240053 cal 3/21/06 due 9/21/06 **SN:** 00240053

DATA FILE: C22Ti7halfCla, C22Ti7halfCN2a, C22Ti7halfCl5Ha, C22Ti7halfCl5Da_chch3

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

No Crevice Corrosion on C-22 Specimen
Gold tint Surface staining on specimen

Ti 7 Crevice Washers And Hardware No Corrosion
Mild Surface staining

* Repolished Specimen for fuether Testing

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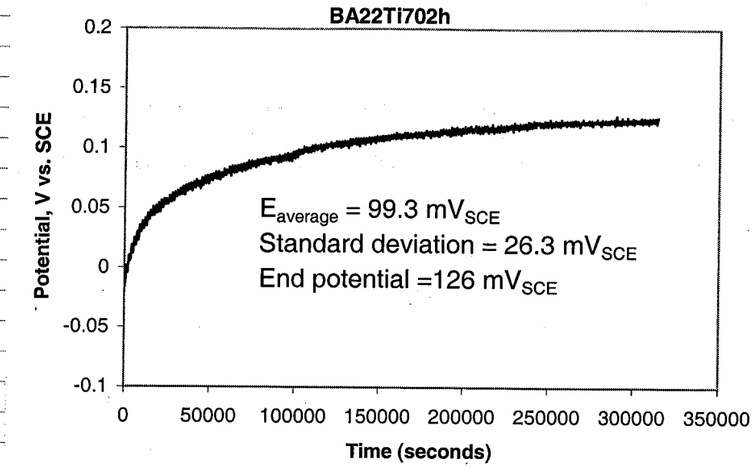

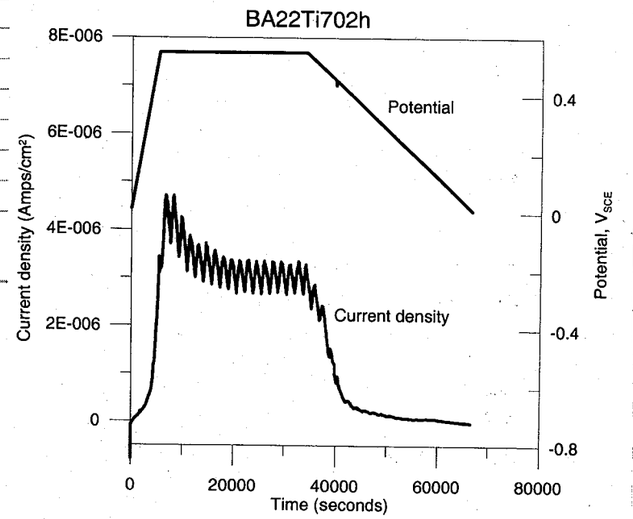

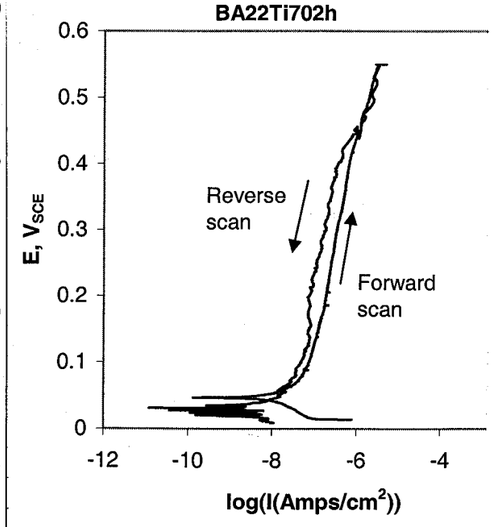

Mill annealed Alloy 22 to Ti Gr7 crevice, Ti7 bolt and nut
Crevice specimen to washer area ratio: ~1/3; Torque: 50 in-oz;
N_2 deaerated, 95 °C, 0.5 M NaCl solution
Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE} for 8 hours.
Reverse scan rate: 0.0167 mV/s
Using entire assembly area for current density calculation:
$i < 10^{-5}$ A/cm² at 550 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 486 mV_{SCE};
$i < 10^{-6}$ A/cm² at 438 mV_{SCE}
Using crevice specimen area for current density calculation:
$i < 10^{-5}$ A/cm² at 550 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 432 mV_{SCE};
$i < 10^{-6}$ A/cm² at 380 mV_{SCE}

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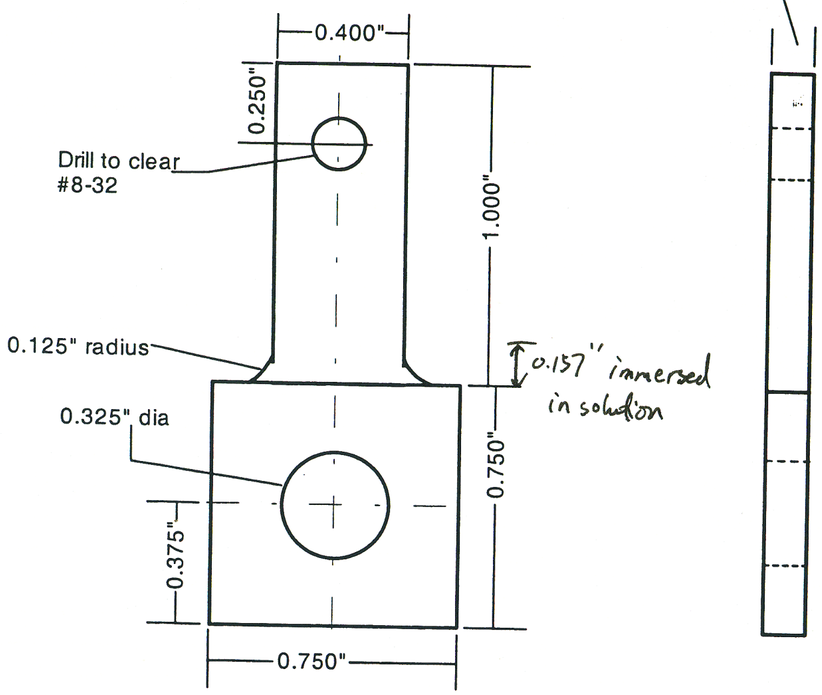
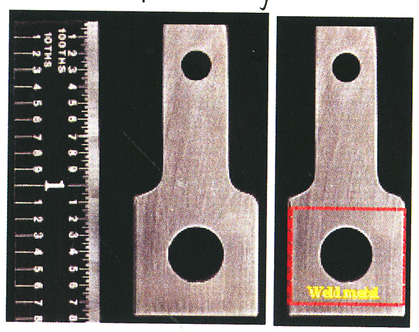
Drawing of flat crevice specimen Drawing # 20-06002-01-322-002



Optical picture of crevice specimen During tests



Surface area calculation.

Surface area immersed in solution

$= 0.4 \times 0.157 \times 2 + 0.157 \times 0.2 \times 2 + 0.75^2 \times 2$

$+ 0.75 \times 0.2 \times 3 - 2 \times 3.14 \times [(0.325/2)^2 + 3.14 \times 0.325 \times 0.2$

$= 1.8 \text{ in}^2 = 11.6 \text{ cm}^2$

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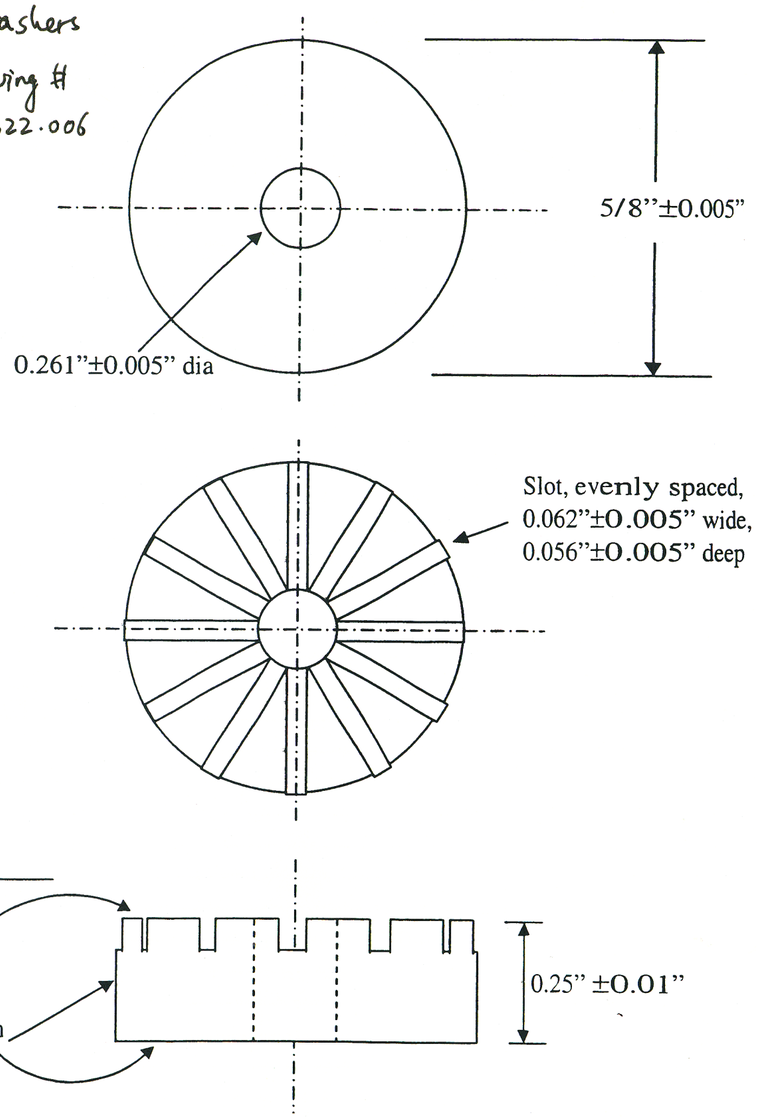
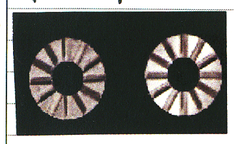
Crevice washers

CNWRA drawing #

20.06002.01.322.006



optical picture of washers



Surface area

$= 2\left(3.14 \times \left(\frac{0.625}{2}\right)^2\right) - 3.14 \times \left(\frac{0.261}{2}\right)^2 + 3.14 \times 0.625 \times \frac{1}{4}$

$+ 3.14 \times 0.261 \times \frac{1}{4}$

$= 1.2 \text{ in}^2 = 7.75 \text{ cm}^2$

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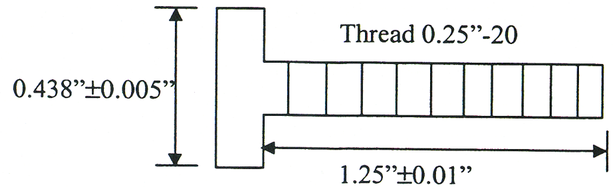
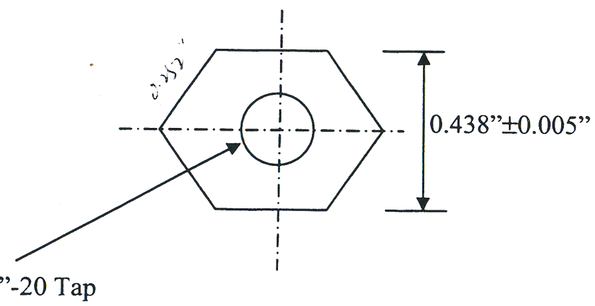
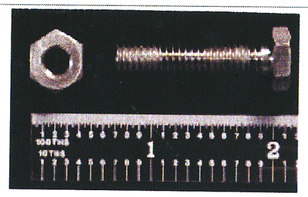
Bolts and nuts for multiple crevice assembly

CNWRA drawing # 20.06002.01.322.010



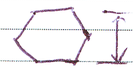


The hight of nut is ~0.125"



Approximated surface area of bolt.

$= 0.166 \times 2 + 3.14 \times 0.25 \times 1.25$

0.166 is the surface area of 

Approximated surface area of nut.

$= 0.166 \times 2 + 0.126 \times 2 \times 0.125 \times 6 + 2 \times 3.14 \times 0.125 \times \frac{0.25}{2} - 3.14 \times \frac{0.125}{2}$

$= 0.57\ in^2 = 3.68\ cm^2$

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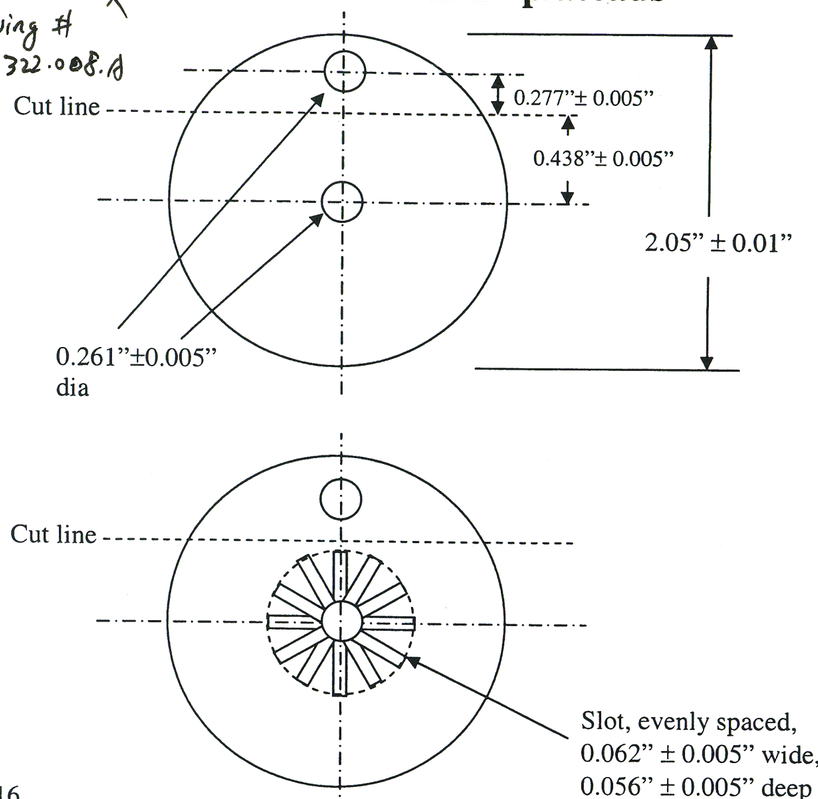
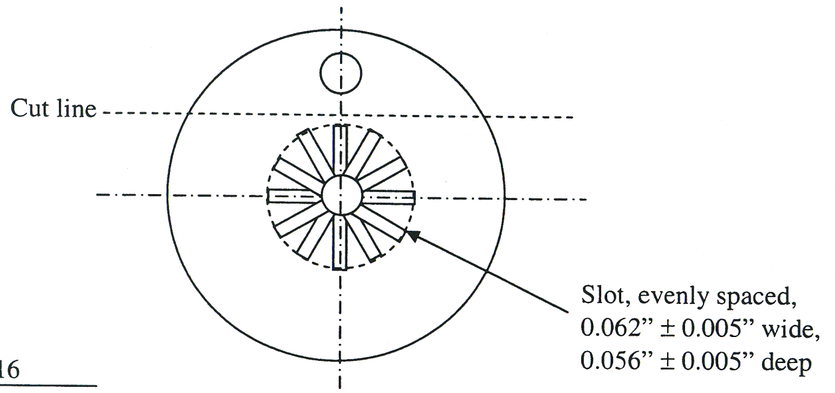
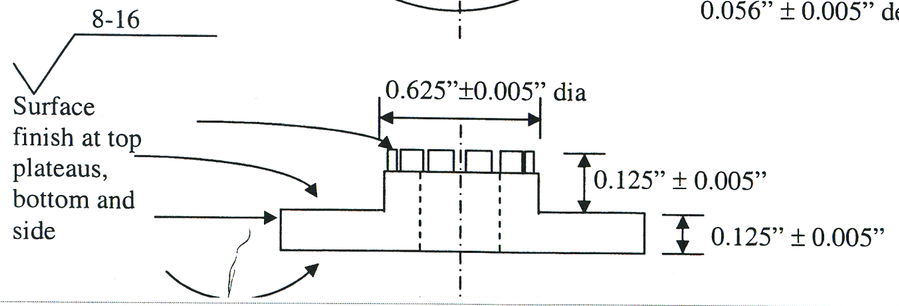
Serrated crevice washer with 24 plateaus

Alloy 22

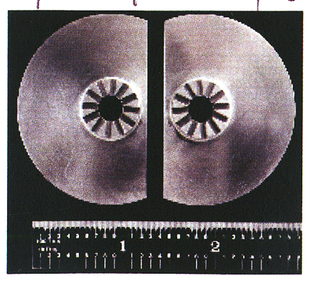
CNWRA drawing # 20.06002.01.322.008.A







Optical picture of Large Alloy 22 washers



Surface area $= 2 \times (3.14 \times (\frac{2.05}{2})^2) - 3.14 \times (\frac{0.261}{2})^2 + 3.14 \times 2.05 \times 0.125 + 3.14 \times \frac{5}{8} \times 0.125 - 0.78$

$= 6.76\ in^2 \approx 43.6\ cm^2$

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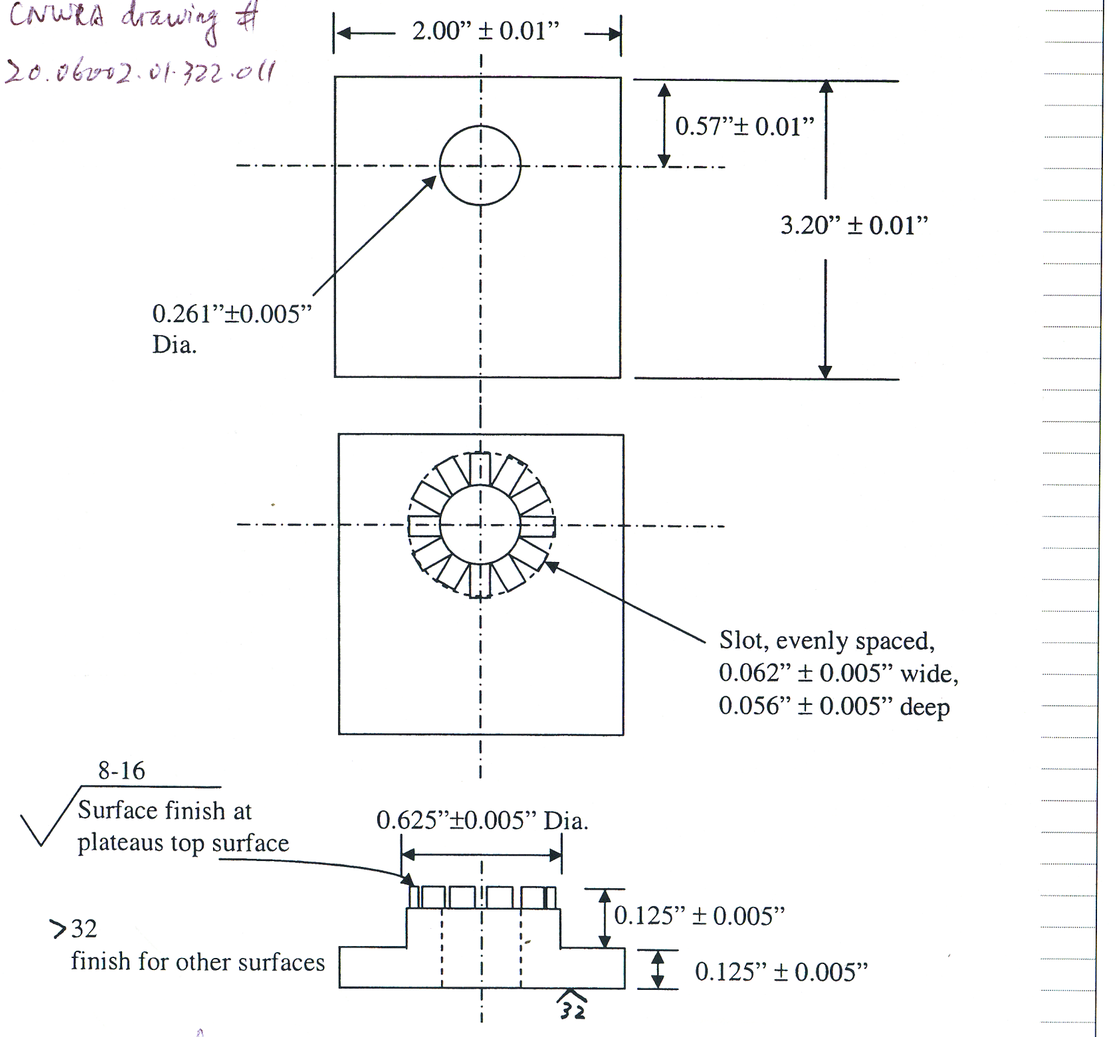
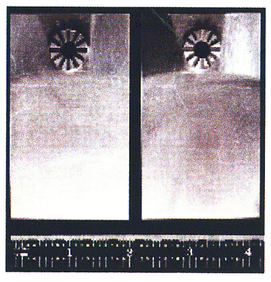
Titanium Grade 7

Large surface area serrated crevice washer with 24 plateaus

CANWEA drawing #
20.06002.01.322.011



Optical picture



Surface area =

$2\times(3.2\times2+3.2\times0.125+2\times0.125)-2\times3.14\times\left(\frac{0.261}{2}\right)^2$

$+3.14\times0.625\times0.125+3.14\times0.261\times0.25$

$=14.4\ in^2=93.2\ cm^2$

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Date: 11.05/03
Company: Tricor Industrial Corp
P.O. No.: 9951
S.O. No.: 120099
Item No : 2
SFC No. 1253557
Quantity: 2 pcs
Net Weight: 17.7 lbs

Page 1 of 2
Wah Chang
An Allegheny Technologies Company
P.O.Box 460
Albany, Oregon 97321-0136
(541)928-4211 FAX (541)967-6948

IN REGARD TO YOUR ORDER:
Description: Zircadyne® 702 Rod 0.625" Dia. x 19' R/L
Specifications: ASTM B550-01 (UNS R60702), ASME SB550, DIN 50049 3.1.B,
Specifications: 3.1.B EN 10204 and Purchase Order

Zr-702

WC INVENTORY: INFORMATION

Certified:	10/28/03
Quantity:	11 pcs.
Weight:	169 lbs.
S/O No.:	118494
Item No.:	4
Heat No.:	845645 Zr
SFC No.:	1253571

PCS/LBS/FT: 2 lbs.
DESCRIPTION: Zr. Bar .625" x 27.5" Lg
ASME SB550/ASTM B550
CUSTOMER: Southwest Research Institute
P.O.# 650283JB ORDER# 206538
DATE: 11 / 14 / 05
SIGNATURE: Krysten Neib

THE TEST REPORT FOLLOWS:

Material Condition: Annealed

INGOT CHEMISTRY ANALYSIS: RESULTS IN PERCENT

Element:	Spec. Min.	Top	Mid	Bot
Zr+Hf:	99.2	≥99.2	≥99.2	≥99.2
Element:	**Spec. Max.**			
Hf:	4.5	0.9	0.8	1.0
Fe+Cr:	0.20	0.08	0.07	0.08
H:	0.005	<0.0003	<0.0003	<0.0003
N:	0.025	0.005	0.007	0.005
C:	0.05	0.01	0.01	0.02
O:	0.16	0.13	0.13	0.14

PRODUCT CHEMISTRY ANALYSIS: RESULTS IN ppm

Element:	Spec. Max.	Results
H:	50	7
N:	250	75
O:	1600	1380

CERTIFIED BY: R. Louie, Quality Assurance Dept.: 10-28-03
mrc
WC: A Registered/Certified ISO 9002 Company.
Format: A1.01.01.09.Q702.6.F1-2
Document: C1.02.06.05

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X.H 5/23/06

Wah Chang
An Allegheny Technologies Company
P.O.Box 483
Albany, Oregon 97321-0136
(541)928-4211 FAX (541)967-6948

WC INVENTORY INFORMATION

S/O No.: 118494
Item No.: 4
Heat No.: 845645 Zr
SFC No.: 1253571

ROOM TEMPERATURE TENSILE TEST: RESULTS
Method: ASTM E8

Test:	Spec. Min.:	Long.
Tensile Strength - MPa:	379	497
Yield Strength (0.2% Offset) - MPa:	207	309
Elongation in 25.4 mm - (%):	16	30
Tensile Strength - Ksi:	55	72.1
Yield Strength (0.2% Offset) - Ksi:	30	44.8
Elongation in 1" - (%):	16	30

35

40

45

X.H 5/23/06

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X.Huang He

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POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No.: Alloy C-22 HT#2277-3-3292 WN813/Zr 4 Nut/Bolt Hydrothermally Ox. HT#1223217-243687 See Pg #100
Solution Annealed See Pg #58 NB#729 / Zr 702 Crevice Washers HT# 845645

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: Proto 6104 **Model# &Torque:** 50 In-oz **SN:** 139072 **Cal:** 4/4/06 **Due:** 10/4/06

Initial Weight: 23.57948g **Final Weight:** 23.57848g **Model:** Sartorius Genius **SN:** 12809099 **Cal:** 11/14/05 **Due:** 5/12/06

Solution:

4.0 M NaCl
467.59g NaCl Lot# 052761
+ DI To 2000mls

Reagents measured with **Model:** OHAUS **SN:** 2883 **Cal:** 1/5/06 **Due:** 7/5/06

Initial pH: 5.79 **Final pH:** 4.92 **Model:** Orion EA 940 **SN:** 2330 **Cal:** 7/25/05 **Due:** 7/25/06 **pH Probe:** #13-620-296 **SN:** 4065196

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** 4084 **Cal:** 7/25/05 **Due:** 7/25/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 3328225

Gas: Zero Air then 99.999% N_2 for E Repassivation

Ecorr: −106 mV_{SCE} } in N_2 **Ept:** 98 mV_{SCE} } **Model:** Keithley 614 **SN:** 704936 **Cal:** 5/2/05 **Due:** 5/26/06

Potentiostat: Solartron 1287 **SN:** 00153550 Cal 11/17/05 due 5/17/06

DATA FILE: ~~C22ZrOxideA2R, C22ZrOxideN2a~~ ~~C22ZrOxideSHa, C22ZrOxideSHa-b, C22ZrOxideSHa, C22ZrOxideSHa-d-e~~

Number of Crevice Corrosion Sites: XIH 4/26/06 0/24 (24 max.) ~~C22ZrOxideSHa-e~~ XIH 4/26/06 ~~C22ZrOxideSHa-d~~ ~~C22ZrOxideSHa-d~~ ~~C22ZrOxideSHa~~ XIH 4/26/06

No Crevice Corrosion on C-22 specimen
Milo Gold tint surface staining
Zr 4 & Zr 702 Material shows No Visual signs of Corrosion

Test ID WSA22ZrOxide-A * Specimen Repolished for further Tests

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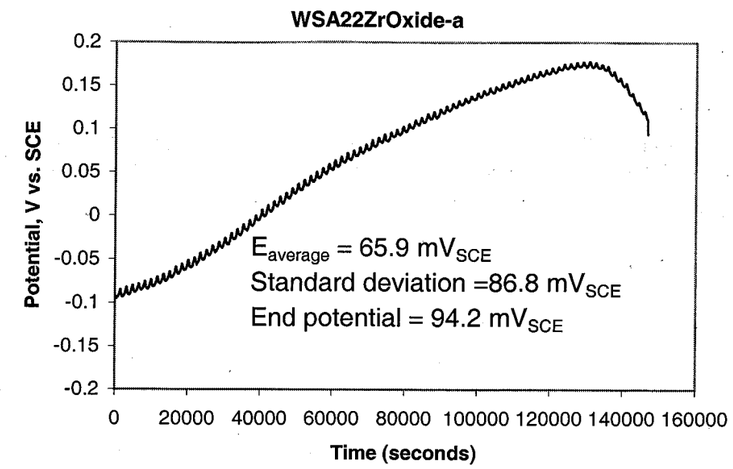
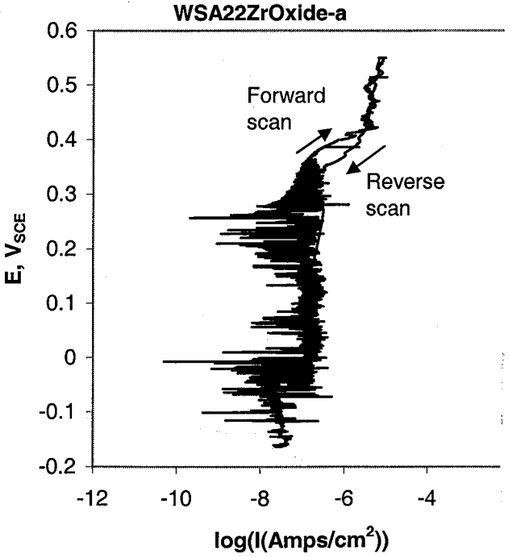
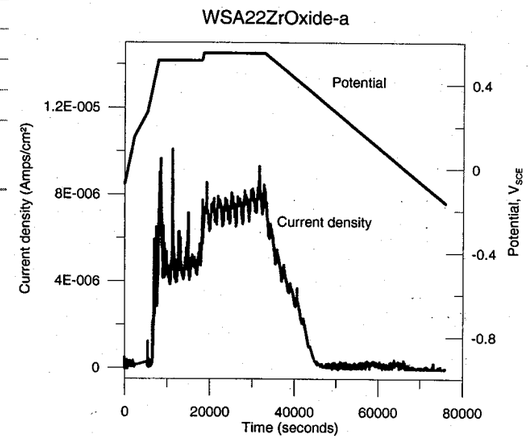


Data files: WSA22ZrOxideAIR
WSA22ZrOxideN2a
WSA22ZrOxideSHa
WSA22ZrOxideSHb
WSA22ZrOxideSHc
WSA22ZrOxideSHd
WSA22ZrOxideSHe





Welded plus solution annealed Alloy 22 (crevice specimen) to hydrothermally oxidized Zr 702 crevice washers,
Hydrothermally oxidized Zr-4 bolt and nut
Crevice specimen to crevice washer area ratio: ~1/3; Torque: 50 in-oz;
N_2 deaerated, 95 °C, 4 M NaCl solution
Forward scan rate: 0.1 mV/s, Potential hold: 515 mV_{SCE} for 3 hours and 550 mV_{SCE} for 4 hours
Reverse scan rate: 0.0167 mV/s
Using entire assembly area for current density calculation:
$i < 10^{-5}$ A/cm² at 550 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 392 mV_{SCE};
$i < 10^{-6}$ A/cm² at 376 mV_{SCE}
Using crevice specimen area for current density calculation:
$i < 10^{-5}$ A/cm² at 416 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 360 mV_{SCE};
$i < 10^{-6}$ A/cm² at 342 mV_{SCE}

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POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No. : Alloy C-22 HT#2277-3-3292 WN613 / Zr 4 Nut/Bolt HT# 122321T-243687 MA
Solution Annealed NA#729 pg #58 Zr 702 Crevice washers HT # 845645

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: Proto 6104 **Model# &Torque:** 50 In-oz **SN:** 139072
Cal: 4/4/06 **Due:** 10/4/06

Initial Weight: 23.44819g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 23.44786g **Cal:** 11/14/05 **Due:** 5/12/06

Solution: 4.0 M NaCl
467.56g NaCl Lot # 052761

Test ID: WSA22Zr702-a

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal: 1/5/06 **Due:** 7/5/06

Initial pH: 4.98 **Model:** Orion, EA 940 **SN:** 2330
Final pH: 5.08 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 4065196

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** 498-182
Cal: 5/6/05 **Due:** 5/5/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 4028036

Gas: Zero Air then 99.999% N_2 for E Repassivation

Ecorr: −166 mV_{SCE} } in N_2 deaerated **Model:** Keithley 614 **SN:** 704936
Ept: 102 mV_{SCE} **Cal:** 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1287 Cal 11/17/05 Due 5/17/06 **SN:** 00148500

DATA FILE: WSA22Zr702A1R, WSA22Zr702N2, WSA22Zr702SU, WSA22Zr702SH, WSA22Zr702SU-b, WSA22Zr702SU-C, WSA22Zr702SH-b, WSA22Zr702SU-d, WSA22Zr702SH-C, WSA22Zr702SU

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

No Crevice Corrosion on C-22 Specimen
Zr 4 Nut/Bolt Have pitting on Surface
Zr 702 Crevice washers show No Visual Signs of Pitting - All Material Has Mild Surface Stain

*Note: Specimen Repolished for further Testing

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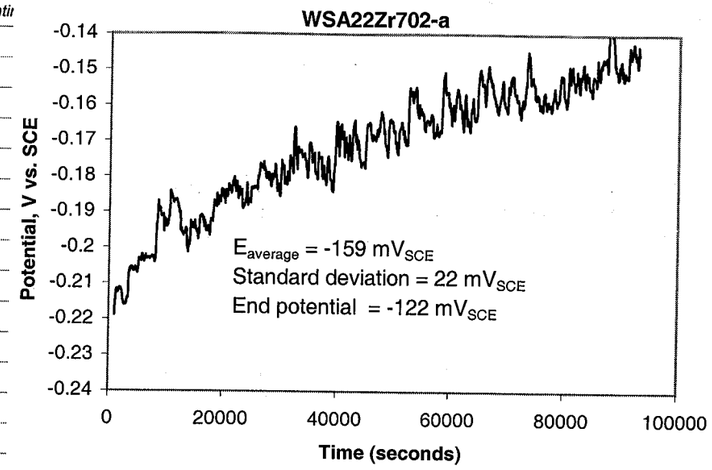
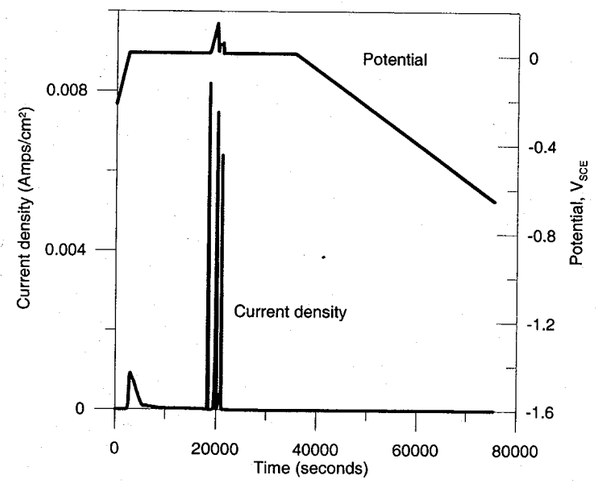
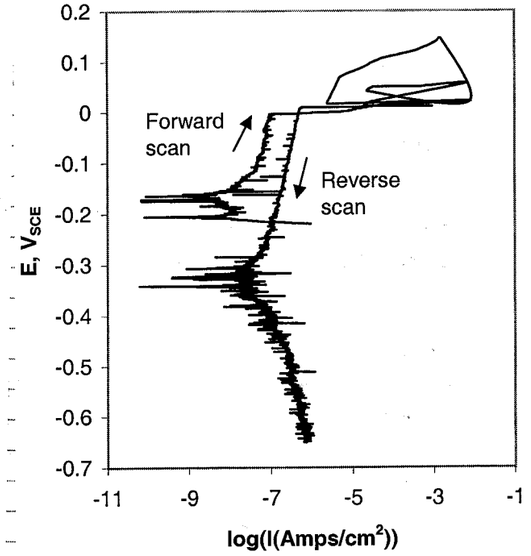
Contin







Welded plus solution annealed Alloy 22 (crevice specimen) to Zr 702 crevice washers, bolt, and nut
Crevice specimen to crevice washer area ratio: ~1/3; Torque: 50 in-oz;
N_2 deaerated, 95 °C, 4 M NaCl solution
Forward scan rate: 0.1 mV/s,
Reverse scan rate: 0.0167 mV/s
Using entire assembly area for current density calculation:
$i < 2*10^{-6}$ A/cm² at 10 mV_{SCE}

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POTENTIAL SCAN AND HOLD

Continued Fr

Objective: See page 1.

Alloy / Heat No.: C-22 HT#2277-3-3292 wN813 / Ti7 HT#CN2775
Solution Annealed See N8#729 & #58 / 3 Crevice Washers Nut/Bolt

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: Proto 6104 **Model# &Torque:** 50 In.-Oz **SN:** 139072
Cal: 4/4/06 **Due:** 10/4/06

Initial Weight: 23.44005g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 23.43197g **Cal:** 11/14/05 **Due:** 5/12/06

Solution: 0.5 m NaCl
58.46g NaCl Lot #052761
+DI To 2000mls

Test ID: WA22SATi702e

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal: 1/5/06 **Due:** 7/5/06

Initial pH: 4.77 **Model:** Orion EA 940 **SN:** 2330
Final pH: 6.13 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 406519L

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** H98-182
Cal: 5/6/05 **Due:** 5/5/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 0199568

Gas: Zero Air for E Repassivation 99.999% N_2

Ecorr: 22 mV_{SCE} } in N_2 **Model:** Keithley 614 **SN:** 0704936
Ept: 116 mV_{SCE} } deaerated solution **Cal:** 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1480 **SN:** 00240053
Cal: 3/21/06
Due: 9/21/06

DATA FILE: WSA22Ti7Half Cla-a
WSA22Ti7HalfCW2, WSA22Ti7HalfASU, WSA22Ti7HalfC(SH, WSA22Ti7HalfCA

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

No Crevice Corrosion on C-22 Specimen
Gold tint Surface Staining

Ti7 Crevice Washer And Hardware No Corrosion
Dull tint Surface Staining

* Note: will Repolish Specimen for Further Testing

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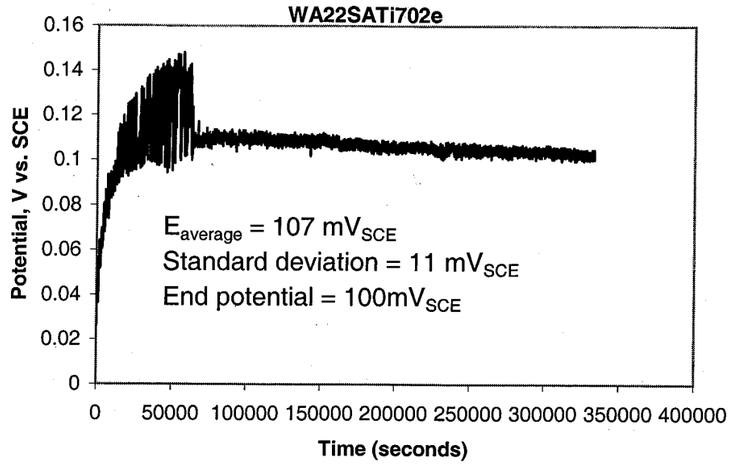
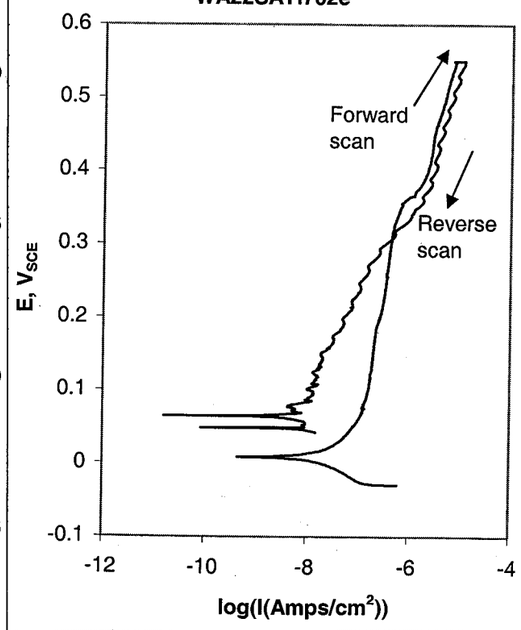
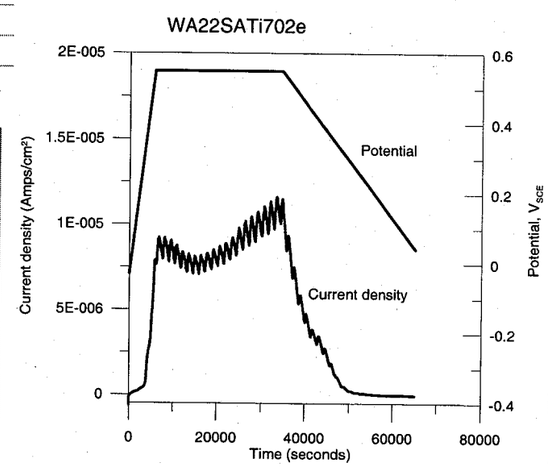
The titanium Grade 7 washers, bolt, and nut were descaled following procedure ASTM B600-91, see page# 29







Welded+Solution Annealed Alloy 22 (crevice specimen) to Ti Gr7 crevice
Crevice specimen to washer area ratio: ~1/3; Torque: 50 in-oz;
N_2 deaerated, 95 °C, 0.5 M NaCl solution
Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE} for 8 hours
Reverse scan rate: 0.0167 mV/s
Using entire assembly area for current density calculation:
$i < 10^{-5}$ A/cm² at 538 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 369 mV_{SCE};
$i < 10^{-6}$ A/cm² at 333 mV_{SCE}
Using crevice specimen area for current density calculation:
$i < 10^{-5}$ A/cm² at 396 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 321 mV_{SCE};
$i < 10^{-6}$ A/cm² at 298 mV_{SCE}

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POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No.: C-22 HT# 2277-3-3292 WN813 / Ti 7 HT# CN2775
Solution Annealed Sec NB #729 Pg #58 1/3 Crevice Washers Nut/Bolt

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: Proto 6104 **Model# &Torque:** 50 In-oz **SN:** 135072
Cal: 4/4/06 **Due:** 10/4/06

Initial Weight: 23.42181g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 23.42108g **Cal:** 11/14/05 **Due:** 5/12/06

Solution: 0.5 M NaCl
58.45g NaCl Lot# 052761
+ DI To 2000 mls

Test ID: ~~WA22~~ WA22SATi702f X.H 4/26/06

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal: 1/5/06 **Due:** 7/5/06

Initial pH: 5.06 **Model:** Orion EA 940 **SN:** 2330
Final pH: 7.38 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 4065196

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** H58-179
Cal: 5/6/05 **Due:** 5/5/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 3300328

Gas: Zero Air then 99.998% N_2 for E Repassivation

Ecorr: 93 mV_{SCE} **Model:** Keithley 614 **SN:** 0704936
Ept: 122 mV_{SCE} **Cal:** 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1480 **SN:** 0624 0053
Cal: 3/24/06 Due: 9/21/06

DATA FILE: WSA22Ti7HalfCLb-b-Un1Ch4, WSA22Ti7HalfCN2b, WSA22Ti7HalfCSub, WSA22Ti7HalfASH6, WSA22Ti7HalfCSDb

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

No Crevice Corrosion on C-22 Specimen
m/o Gold Tint Surface Staining

Ti 7 Crevice Washer And Hardware No Corrosion
Dull Tint Surface Staining

* Note: will Repolish Specimen for further Testing

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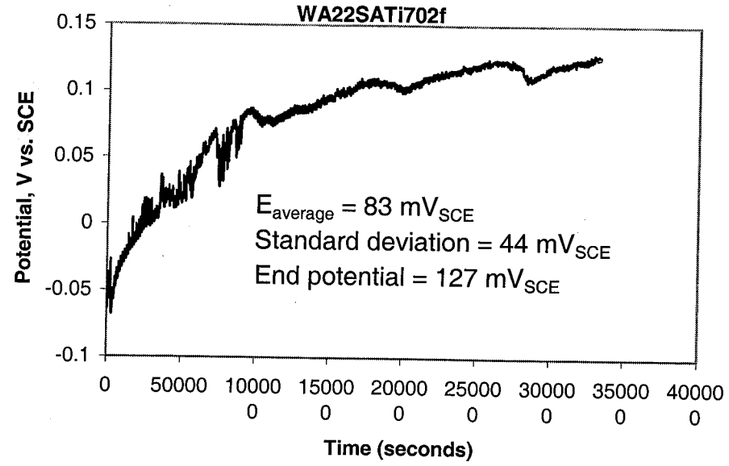
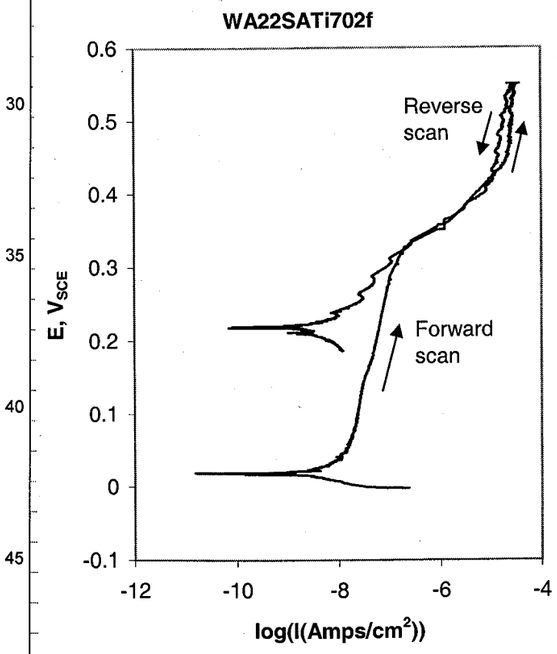
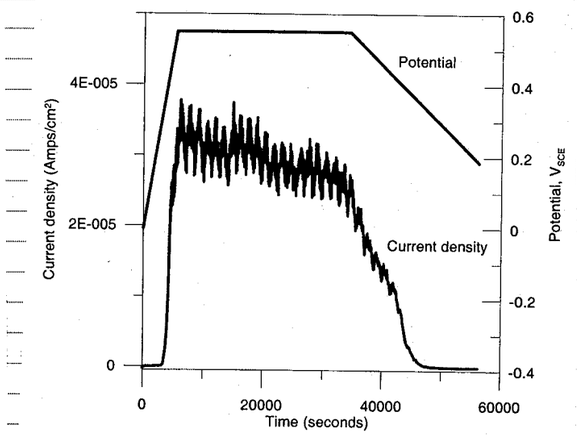
The titanium Grade 7 washers, bolt, and nut were descaled following procedure ASTM B600-91, see page #29







Welded+Solution Annealed Alloy 22 (crevice specimen) to Ti Gr7 crevice
Crevice specimen to washer area ratio: ~1/3; Torque: 50 in-oz;
N_2 deaerated, 95 °C, 0.5 M NaCl solution
Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE} for 8 hours
Reverse scan rate: 0.0167 mV/s
Using entire assembly area for current density calculation:
$i < 10^{-5}$ A/cm² at 415 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 371 mV_{SCE};
$i < 10^{-6}$ A/cm² at 358 mV_{SCE}
Using crevice specimen area for current density calculation:
$i < 10^{-5}$ A/cm² at 379 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 348 mV_{SCE};
$i < 10^{-6}$ A/cm² at 337 mV_{SCE}

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POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No. : C-22 HT# 2277-3-3246 Ti 7 HT# CN2775 Makeoware

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: Proto 6104 **Model# &Torque:** 50 In-oz **SN:** 139072
Cal: 4/4/06 **Due:** 10/4/06

Initial Weight: 24.20023g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 24.19710g **Cal:** 11/14/05 **Due:** 5/12/06

Solution: 0.5 M NaCl
58.52g NaCl Lot# 052761
+ DI To 2000mls

Test ID: BA22Ti702i

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal: 1/5/06 **Due:** 7/5/06

Initial pH: 5.51 **Model:** Orion EA 940 **SN:** 2330
Final pH: 7.97 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 4065196

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** H-98-179
Cal: 5/6/05 **Due:** 5/5/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 3300328

Gas: Zero Air then 99.999% N_2 for E Repassivation

Ecorr: 72 mV **Model:** Keithley 614 **SN:** 0704936
Ept: 174 mV **Cal:** 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1470 Cal: 11/17/05 **SN:** 00240053
Due: 5/17/06

DATA FILE: C22Ti7halfCl#1_UniCh3, C22Ti7HalfClN2#1, C22Ti7HalfClSH#1, C22Ti7HalfClSD#1, C22Ti7HalfClSD#1_UniCh3

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

No Corrosion on C-22 Specimen - Gold Tint staining on Surface of Specimen.

⅓ Ti 7 Crevice Washers And Nut/Bolt Dull Tint Staining - No Corrosion

* Specimen Repolished for Further Testing

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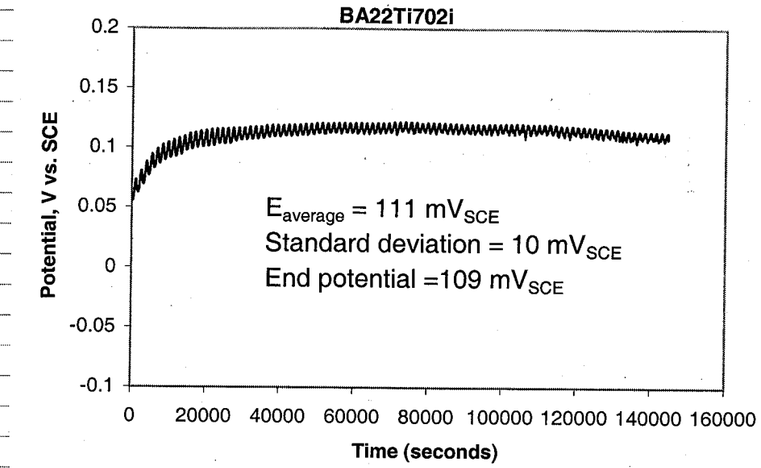

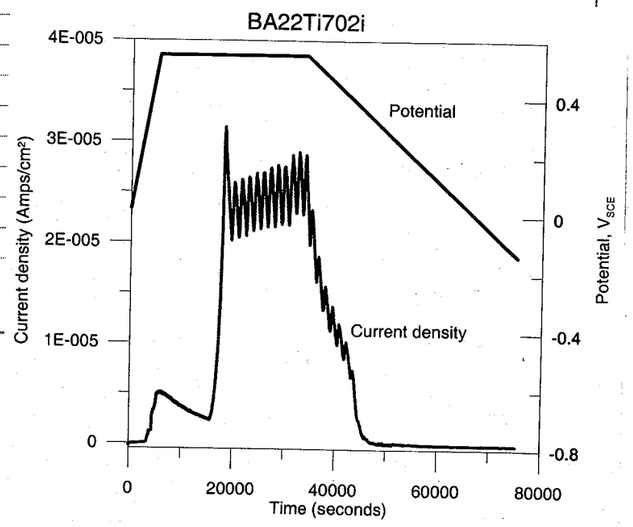

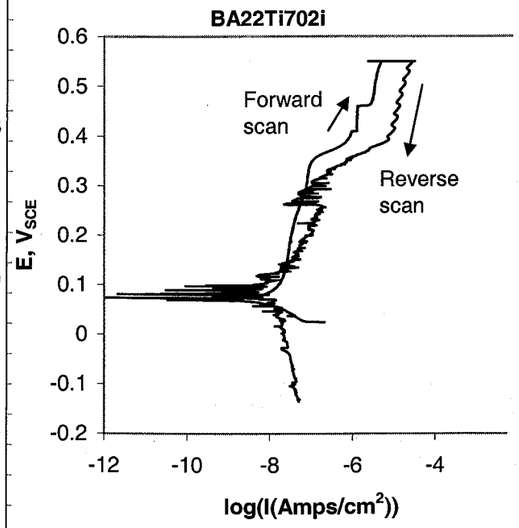

Mill annealed Alloy 22 to Ti Gr7 crevice, Ti7 bolt and nut
Crevice specimen to washer area ratio: ~1/3; Torque: 50 in-oz;
N_2 deaerated, 95 °C, 0.5 M NaCl solution
Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE} for 8 hours.
Reverse scan rate: 0.0167 mV/s
Using entire assembly area for current density calculation:
$i < 10^{-5}$ A/cm² at 428 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 368 mV_{SCE};
$i < 10^{-6}$ A/cm² at 358 mV_{SCE}
Using crevice specimen area for current density calculation:
$i < 10^{-5}$ A/cm² at 378 mV_{SCE}; $i < 2*10^{-6}$ A/cm² at 344 mV_{SCE};
$i < 10^{-6}$ A/cm² at 333 mV_{SCE}

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POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No. : C-22 MT# 2277-3 -3266 Ti 7 MT# CW2775 Hardware

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: Proto 6104 **Model# &Torque:** 50 In-oz **SN:** 135072
Cal: 4/4/06 **Due:** 10/4/06

Initial Weight: 23.15074 g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 23.14849 g **Cal:** 11/14/05 **Due:** 5/12/06

Solution: 0.5 m NaCl
58.47 g NaCl Lot # 052761
+ DI To 2000 ml

(Test ID : BA22Ti702)

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal: 1/5/06 **Due:** 7/5/06

Initial pH: 6.04 **Model:** Orion EA 940 **SN:** 2330
Final pH: 8.02 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 4065796

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** M 98-179
Cal: 5/6/05 **Due:** 5/5/06

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 330328

Gas: Zero Air than 99.999% N_2 for E Repassivation

Ecorr: 115 mV SCE X.H 6/14/06 **Model:** Keithley 614 **SN:** 0704936
Ept: 265 mV SCE **Cal:** 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1480 **SN:** 0024005?
Cal: 11/17/05
Due: 5/17/06

DATA FILE: C22Ti7halfCl#2, C22Ti7halfCl$_{N2}$#2
C22Ti7HalfCl$D#2-Un1Ch4, C22Ti7HalfClSH#2, C22Ti7HalfClSU#2

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

No Crevice Corrosion on C-22 Specimen - Gold tint Surface Staining on Specim

1/3 Ti 7 Crevice Washers And Nut/Bolt Dull tint Surface Staining. No Corrosion

* Note: Specimen Repolished for Further Testing

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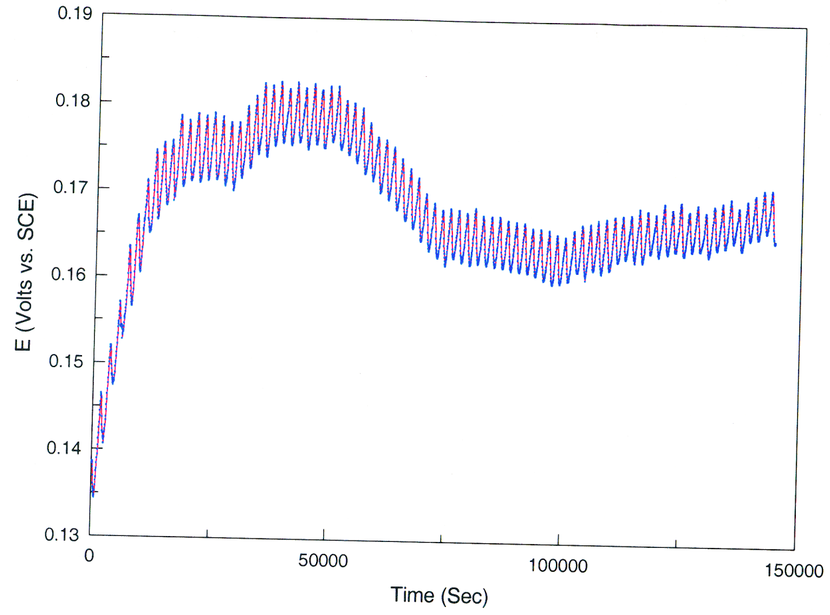

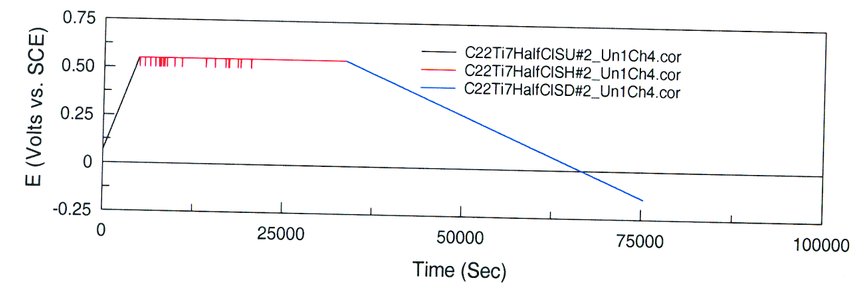

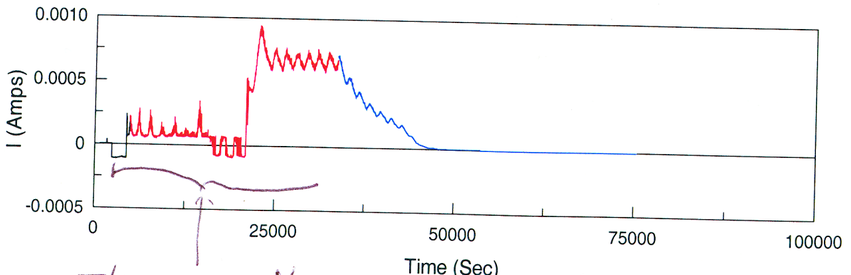

There was problem with RTD for temperature controller. The temperature dropped to ~80°C. Data will not be used.

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POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No. : C-22 MT#2277-3-72666 Zr 4 Nut/Bolt Thermally Ox. See Pg #100 MT# 1223217-243687 Zr 702 Crevice washer MT# 845645

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz.or 75 in lbs.

Torque Screwdriver: Proto 6104 **Model# &Torque:** 50 In-oz **SN:** 139072
Cal: 4/4/06 **Due:** 10/4/06

Initial Weight: 23.57390g **Model:** Sartorius Genius **SN:** 12809099
Final Weight: 23.57356g **Cal:** 11/14/05 **Due:** 5/12/06

Solution:

4.0 m NaCl
467.57g NaCl Lot #052761
+ DI To 2000mL

Reagents measured with **Model:** OHAUS **SN:** 2883
Cal: 1/5/06 **Due:** 7/5/06

Initial pH: 4.61 **Model:** Orion EA 940 **SN:** 2330
Final pH: 7.66 **Cal:** 7/25/05 **Due:** 7/25/06
pH Probe: #13-620-296 **SN:** 4065196

Test Temperature: 95°C **Measured with Hg Thermometer** **SN:** 498-170
Cal: 4/7/06 **Due:** 4/7/07

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 **SN:** 4028036

Gas: Zero Air thru 99.999% N_2 for E Repassivation
Ecorr: -166 mV SCE **Model:** Keithley 614 **SN:** 0704936
Ept: + 139 mV SCE K.H 6/14/06 **Cal:** 5/27/05 **Due:** 5/26/06
Potentiostat: Solartron 1287 Cal: 11/17/05 **SN:** 00148500
Test ID: MA22ZrOxide-C Due: 5/17/06
DATA FILE: C22ZrOxideAIRR, C22ZrOxide-C

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

No Crevice Corrosion on C-22 Specimen - M.b
Gold tint staining on Surface

Zr 4 Nut/Bolt Have Corrosion on Surface
Zr 702 Crevice Washers - M.b outside Surface Pitting

* Specimen Repolished for further Testing

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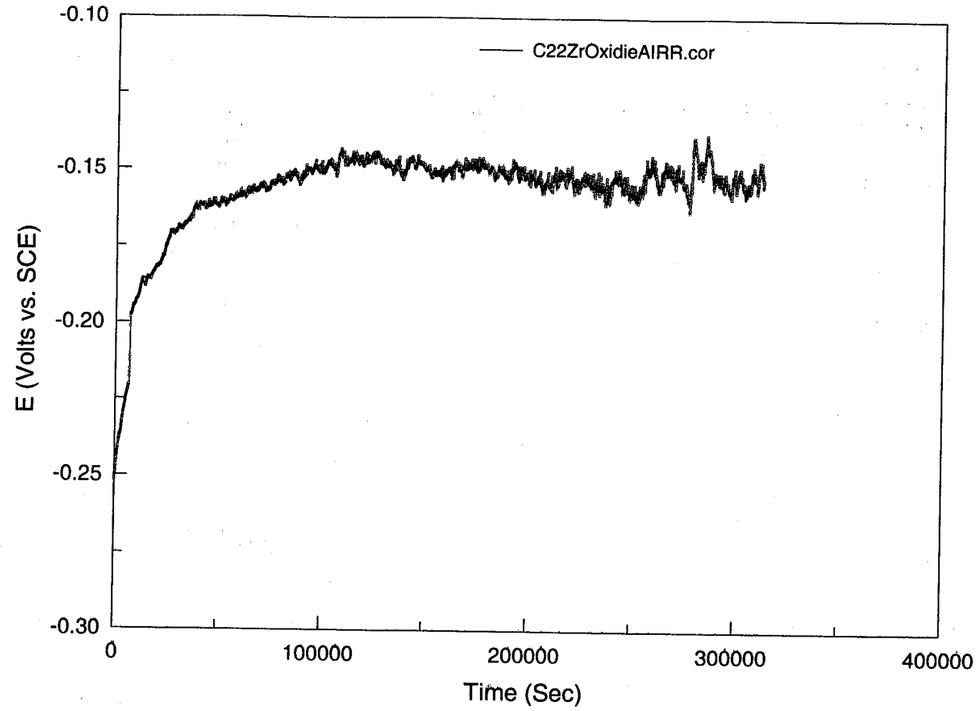

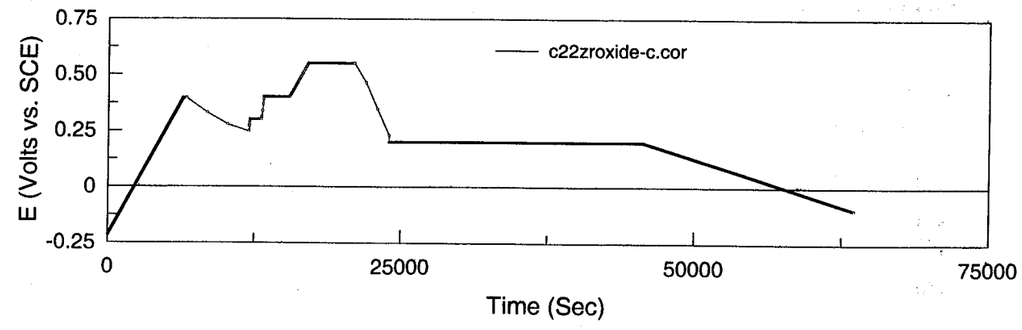

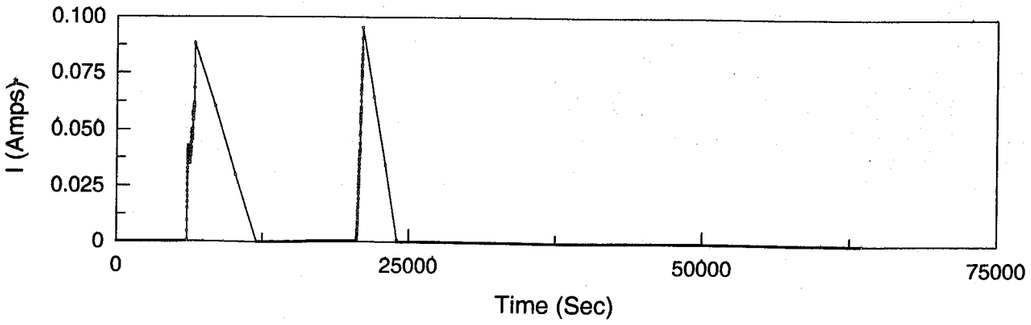

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PROPRIETARY INFORMATION

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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT#2277-3-3266 Crevice Specimen

Ti 7 HT# CW2775 Plate

Ti 7 HT# CW2775 Crevice washers nut/bolt

Torque Screwdriver: True Cest 75 In-lbs
Cal: 7/22/05
SN: 694000691
Due: 7/21/06

Initial Weight: 23.54513g
Final Weight: 23.53838g
Model: Sartorius Genius
Cal: 11/14/05
SN: 12809099
Due: 5/12/06

SOLUTION: Solution from Previous Test Pg#112

4.0 m $MgCl_2 \cdot 6H_2O$
1626.55g $MgCl_2 \cdot 6H_2O$ Lot# 05-0439

Reagents measured with
Model: OHAUS
Cal: 1/5/06
SN: 2883
Due: 7/05/06

Initial pH: 2.73
Final pH: 3.14
Model: Orion EA 940
Cal: 7/25/05
pH Probe: #13-620-296
SN: 2330
Due: 7/25/06
SN: 5003095

TEST TEMPERATURE: 95°C
Thermometer: Fisher
Cal: 1/12/06
SN: A2000-130
Due: 7/12/06

Reference Electrode: Fisher SCE # 13-620-52
SN: 3329075

GAS: Zero Air

(CREVICE)
Ecorr: -596 mV vs SCE

(PLATE)
Ecorr: -217 mV vs SCE
Model: Keithley 614
Cal: 5/27/05
SN#: 0704936
Due: 5/26/06

Potentiostat: Solartron 1480 sn# 0024055 1 cal: 5/1/06 Due: 11/1/06

TEST ID: MA22Ti7Ti7f
Test time: 5/4/06 – 7/19/06 75.72days
DATA FILES: Started 5/4/06 C22Ti7I0504a-Un1Ch1, C22Ti7E0504a-Un1Ch2,
0504, 0505, 0508, 0511, 0514, 0517, 0520, 0523, 0526, 0529, 0601, 0604, 0605, 0607, 0610, 0613, 0616, 0619, 0622, 0625, 0628, 0701, 0704, 0707, 0710, 0713, 0716

Specimen Examination:

Crevice Corrosion on 3/24 feet of Ti 7 Crevice washers on C-22 Specimen - Specimen Has M.lo Blue tint Surface staining on both Sides All Ti 7 Hardware show No Corrosion M.lo Dull tint Staining Ti 7 Plate OK

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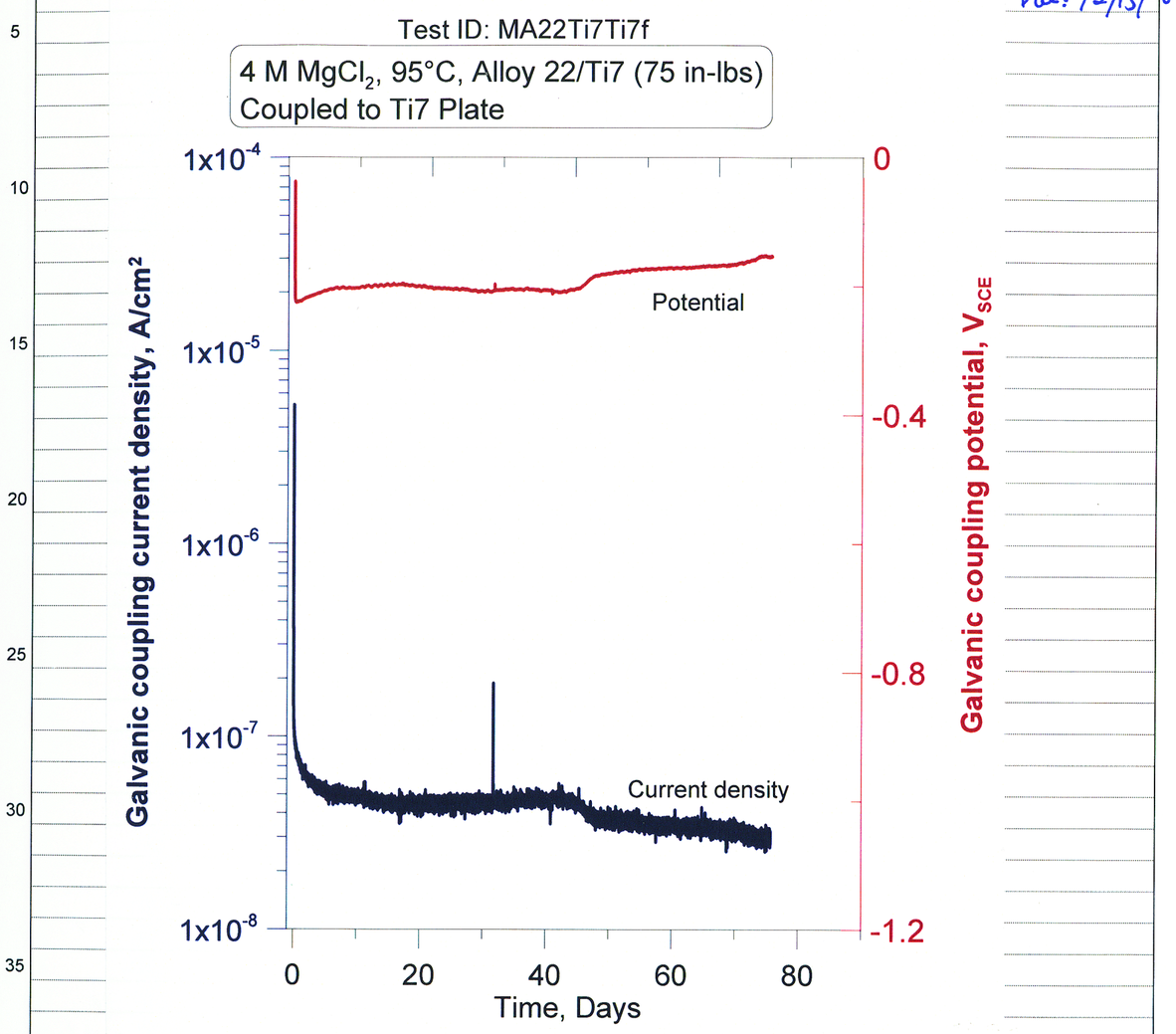
Penetration depth: 277, 68, 38 µm Measured with Olympus Metallurgical Microscope PME3 Cal: 6/15/06 Due: 12/15/06



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Galvanic Corrosion Test

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Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT#2277-3-3266 Crevice Specimen | Ti 7 Plate HT# CW 2775 | C276 Bolt/Nut w/PTFE Crevice Washers

Torque Screwdriver: Snap On QDriver 100 In-Oz **SN:** 100120319 **Cal:** 5/1/06 **Due:** 11/1/06

Initial Weight: 24.07329 g **Final Weight:** 23.85752 g **Model:** Sartorius Genius **SN:** 12809099 **Cal:**11/14/05 **Due:**5/12/06

SOLUTION: Solution from Previous Test Pg#115 | 4 M $MgCl_2 \cdot 6H_2O$ 1626.51 g $MgCl_2 \cdot 6H_2O$ Lot#050439 + DI To 2000 mls

Reagents measured with **Model:** OHAUS **SN:** 2883 **Cal:**1/5/06 **Due:**7/05/06

Initial pH: 2.51 **Final pH:** 3.61 **Model:** Orion EA 940 **SN:**2330 **Cal:**7/25/05 **Due:**7/25/06 **pH Probe:** #13-620-296 **SN:** 5003095

TEST TEMPERATURE: 95°C **Thermometer:** Fisher **SN:** E 98-273 **Cal:** 1/9/06 **Due:** 7/7/06

Reference Electrode: Fisher SCE **# 13-620-52** **SN:** ~~4027657~~ 4028031 5/4/06

GAS: Zero Air

(CREVICE)
Ecorr: -524 mV vs SCE

(PLATE) **Model:** Keithley 614 **SN#:**0704936
Ecorr: -148 mV vs SCE **Cal:**5/27/05 **Due:**5/26/06

Potentiostat:Solartron 1480 sn# 00240551 cal: 5/1/06 Due: 11/1/06

TEST ID: MA22PTFETi7e Test time: 5/14/06 – 7/18/06 75.76 days
DATA FILES: Started 5/4/06 C22PTFETi7050 4a.unICh3, C22PTFETi7E0504a_unICh4, 0504, 0505, 0508, 0511, 0514, 0517, 0520, 0523, 0526, 0529, 0601, 0604, 0605, 0605a, 0607, 0610, 0613, 0616, 0619, 0622, 0625, 0628, 0701, 0704, 0707, 0710, 0713, 0716

Specimen Examination:

Crevice Corrosion on 1/24 face of PTFE Crevice Washer
Ti 7 Plate No Corrosion - mild Surface Staining - Some Etching Around C-22 Holes

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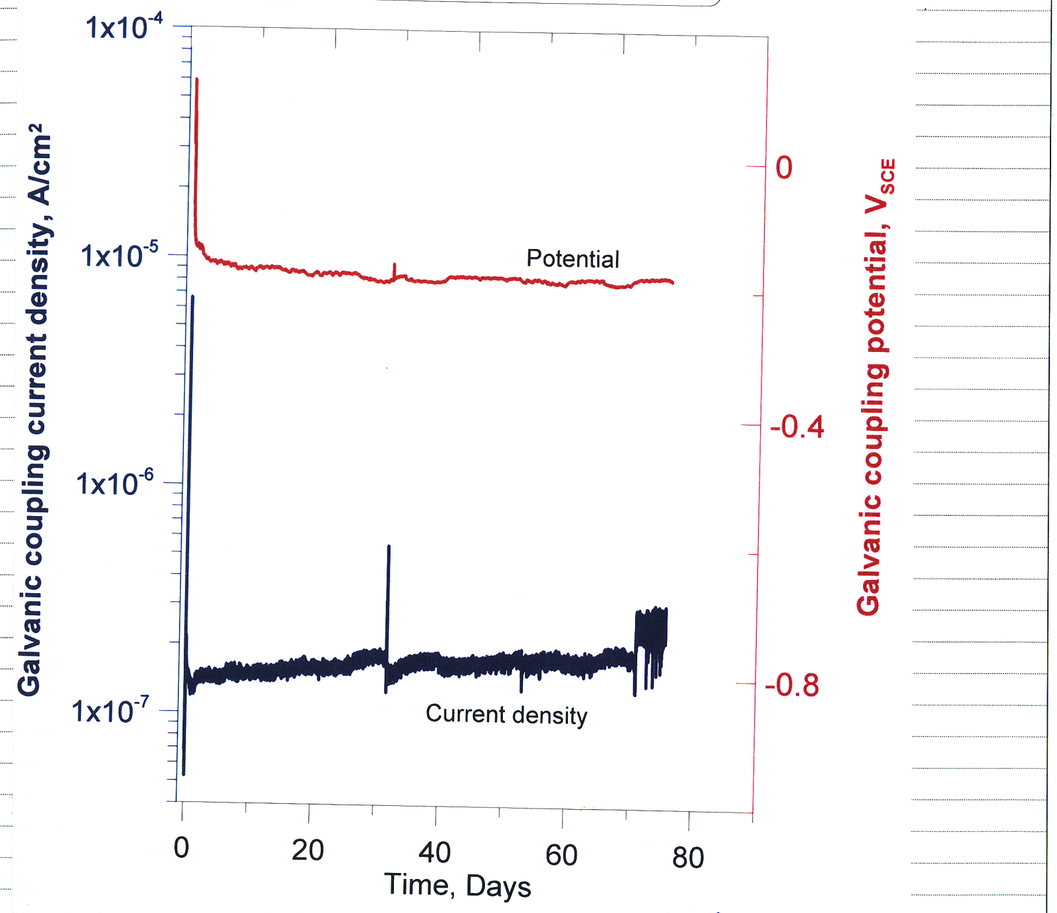
Penetration depth: 196 µm Measured with Olympus Metallurgical Microscope PME-3 Cal: 6/15/06 Due: 12/15/06



Xihua He 7/24/06

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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT# 2277-3-3266 Crevice Specimen

C-22 HT# 2277-3-3266 Plate

C276 nut/bolt w/PTFE Crevice Washers

Torque Screwdriver: Snap On QDriver 100 In-Oz **SN:** 100120319 **Cal:** 5/1/06 **Due:** 11/1/06

Initial Weight: 23.86933g **Model:** Sartorius Genius **SN:** 12809099

Final Weight: **Cal:**11/14/05 **Due:**5/12/06

SOLUTION: Solution from Previous Test Pg # 108

4.0 m $MgCl_2 \cdot 6H_2O$
1626.52g $MgCl_2 \cdot 6H_2O$ Lot #050439
+ DI To 2000mL

Reagents measured with **Model:** OHAUS **SN:** 2883 **Cal:**1/5/06 **Due:**7/05/06

Initial pH: 2.873 **Model:** Orion EA 940 **SN:**2330

Final pH: 2.61 **Cal:**7/25/05 **Due:**7/25/06

pH Probe: #13-620-296 **SN:** 5003095

TEST TEMPERATURE: 95°C **Thermometer:** Fisher **SN:** C96-833 **Cal:** 3/2/06 **Due:** 9/1/06

Reference Electrode: Fisher SCE # 13-620-52 **SN:** 0251439

GAS: Zero Air

(CREVICE)
Ecorr: 40 mV vs SCE

(PLATE) **Model:** Keithley 614 **SN#:**0704936
Ecorr: -108 mV vs SCE **Cal:**5/27/05 **Due:**5/26/06

Potentiostat:Solartron 1480 **sn#** 00240551 cal: 5/1/06 Due: 11/1/06

TEST ID: MA22PTFEMA22C
DATA FILES: Started 5/4/06 C22PTFE1050Ra - Unich5, C22PTFEE050Ra. Unich6, 0504, 0505, 0508, 0511, 0514, 0517, 0520, 0523, 0526, 0529, 0601, 0604, 0605a, 0607, 0610, 0613

Test time: 3.52×10^6 seconds = 40.7 days

Specimen Examination: 0/24

No Crevice Corrosion on C-22 specimen or C-22 Plate - Mild Surface Staining on Specimen And C-22 Plate - C276 Hardware
No Corrosion Mild Surface Staining

* Note will Repolish Specimen for Further Testing

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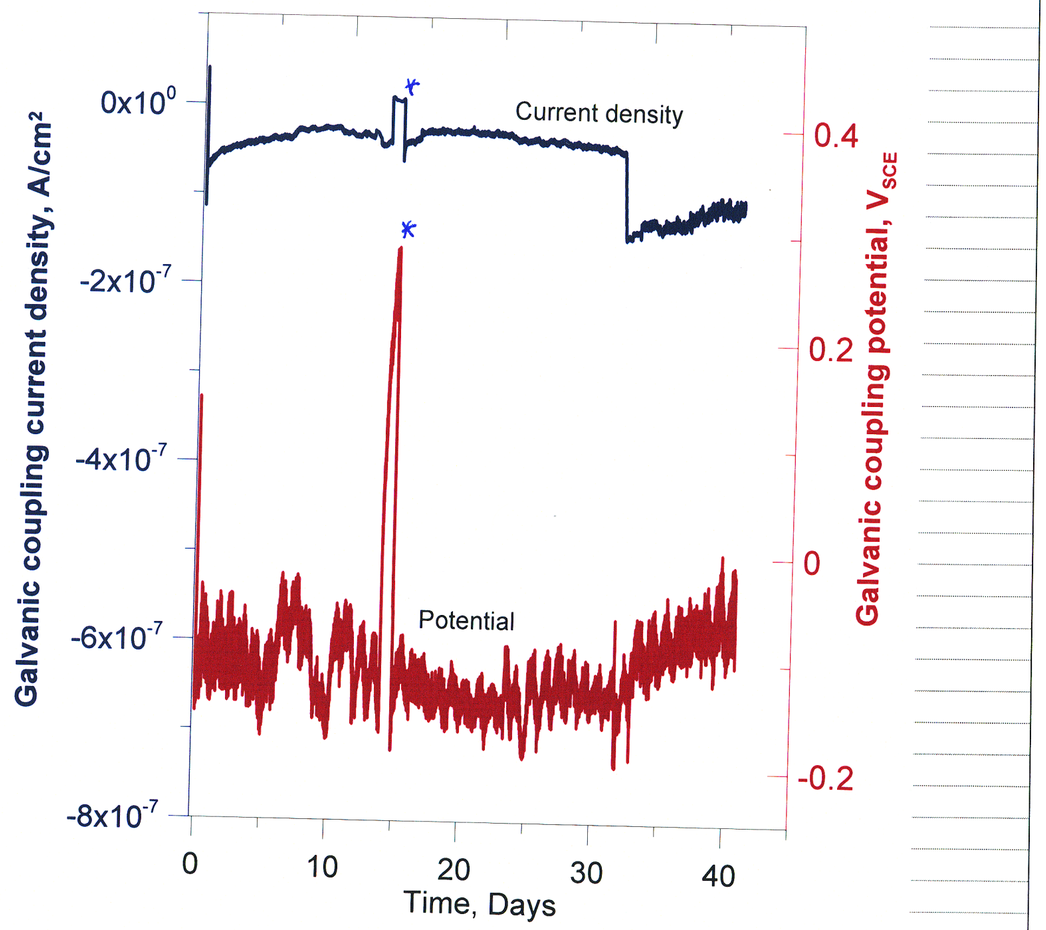

* The alligator clip was loose in connecting to the Alloy 22 counter electrode during the spike period. Clip was connected back tightly.

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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT#2277-3-3266 Crevice specimn

C-22 HT#2277-3-3266 Plate

C-22 HT#2277-3-3266 Nut/Bolt Crevice washers

Torque Screwdriver: Teve Craft 75 In-~~Oz~~ lbs **Cal:** 7/22/05 **SN:** 69400 691 **Due:** 7/21/06

Initial Weight: 24.17448g
Final Weight: 24.15715g

Model: Sartorius Genius **Cal:**11/14/05 **SN:** 12809099 **Due:**5/12/06

X.M 8/7/06

SOLUTION: Solution from Previous Test Pg #110

4.0 m $MgCl_2 \cdot 6H_2O$
1626.48g $MgCl_2 \cdot 6H_2O$ Lot #050439
+ DI To 2000 ml

Reagents measured with **Model:** OHAUS **Cal:**1/5/06 **SN:** 2883 **Due:**7/05/06

Initial pH: 2.93
Final pH: 3.27

Model: Orion EA 940 **Cal:**7/25/05 **pH Probe:** #13-620-296 **SN:**2330 **Due:**7/25/06 **SN:** 5003095

TEST TEMPERATURE: 95 °C **Thermometer:** Fisher **Cal:** 9/9/05 **SN:** 098-132 **Due:** 9/8/06

Reference Electrode: Fisher SCE **# 13-620-52** **SN:** 925205

GAS: Zero Air

(CREVICE)
Ecorr: -657 mV vs SCE

(PLATE)
Ecorr: -278 mV vs SCE

Model: Keithley 614 **Cal:**5/27/05 **SN#:**0704936 **Due:**5/26/06

Potentiostat: Solartron 1480 sn# 00240551 cal: 5/1/06 Due: 11/1/06

TEST ID: MA22MA22MA22C

Test time: 683×10^6 seconds = 79.06 days

DATA FILES: Started 5/4/06 C22C22I0504a-Un1Ch7, C22C22E0504a-Un1Ch8, 0504, 0505, 0508, 0511, 0514, 0517, 0520, 0523, 0526, 0529, 0601, 0604, 0605, 0607, 0610, 0613, 0616, 0619, 0622, 0625, 0628, 0701, 0704, 0707, 0710, 0713, 0716, Ended 7/22/06 0719,

Specimen Examination:

Crevice Corrosion on 23/24 feet of C-22 Specimen - C-22 Crevice washers on location Has Corrosion with Etching It matches up with the location that Has Deepen Corrosion on C-22 Specimen - C-22 Plate Surface Staining - M.lo Suction Staining

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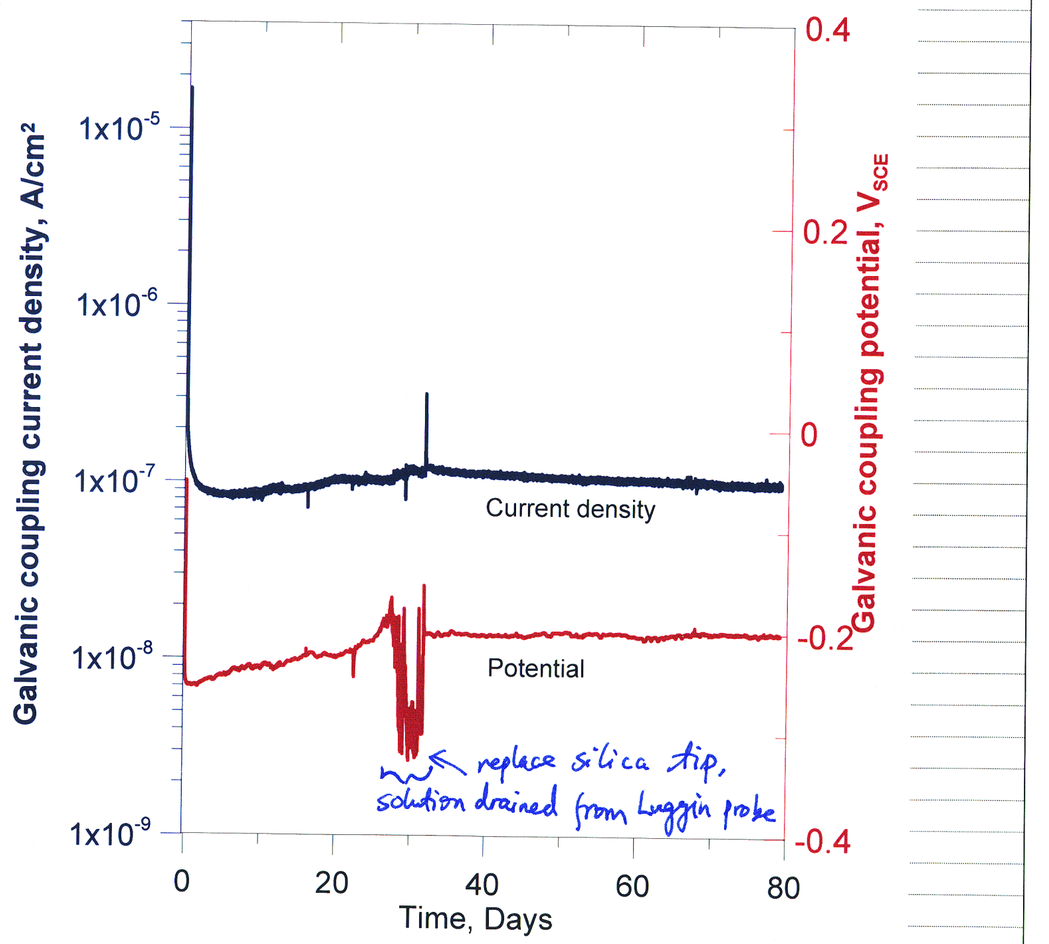
Penetration depth: 245, 77, 43, 38, 10, 68, 38, 48, 24, 44, 56, 0, 30, 42, 46, 20, 20, 13, 46, 42, 16, 26, 28, 40, 206 µm on the crevice washer

Measured with Olympus Metallurgical Microscope PME3

Cal: 6/15/06, Due: 12/15/06



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Cont

Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 Ht#2277-3-3266 Crevice Specimen

C-22 Ht# 2277-3-3266 Plate

C 276 Nut/Bolt w/PTFE Crevice Washers

Torque Screwdriver: Proto 6104 100 In-Oz **SN:** 139072 **Cal:** 4/4/06 **Due:** 10/4/06

Initial Weight: 24.36698g **Final Weight:** 24.36669g

Model: Sartorius Genius **SN:** 12809099 **Cal:** ~~11/14/05~~ SLW 6/15/06 5/9/06 **Due:** ~~5/12/06~~ SLW 6/15/06 11/9/06

SOLUTION: 4.0 m $MgCl_2 \cdot 6H_2O$ 1626.53g $MgCl_2 \cdot 6H_2O$ Lot# 050439 + DI To 2000 mls

Reagents measured with **Model:** OHAUS **SN:** 2883 **Cal:** 1/5/06 **Due:** 7/05/06

Initial pH: 3.29 **Final pH:** 2.96 **Model:** Orion EA 940 **SN:** 2330 **Cal:** 7/25/05 **Due:** 7/25/06 **pH Probe:** #13-620-296 **SN:** 5003095

TEST TEMPERATURE: 95°C **Thermometer:** Fisher **SN:** C96-533 **Cal:** 3/2/06 **Due:** 9/1/06

Reference Electrode: Fisher SCE **# 13-620-52** **SN:** 0251439

GAS: Zero Air

(CREVICE)
Ecorr: -11 mV vs SCE

(PLATE) **Model:** Keithley 614 **SN#:** 0704936
Ecorr: -85 mV vs SCE **Cal:** 5/27/05 **Due:** 5/26/06

Potentiostat: Solartron 1480 **sn#** 00240551 cal: 5/1/06 Due: 11/1/06

TEST ID: MA22PTFEMA22d Total test duration 78.0 days

DATA FILES: C22PTFE0615a-Un1Ch5, C22PTFE0615a-Un1Ch6, 0618, 0621, 0624, 0627, 0630, 0703, 0706, 0709, 0712, 0715, 0718, 0721, 0724, 0727, 0730, 0802, 0805, 0808, 0811, 0814, 0817, 0820, 0823, 0826, 0829

Start 6/15/06 Test Ended 9/1/06

Specimen Examination:

No Crevice Corrosion 3/4 feet of Specimen Plate M/O surface Staining & C-22 Specimen M/O staining

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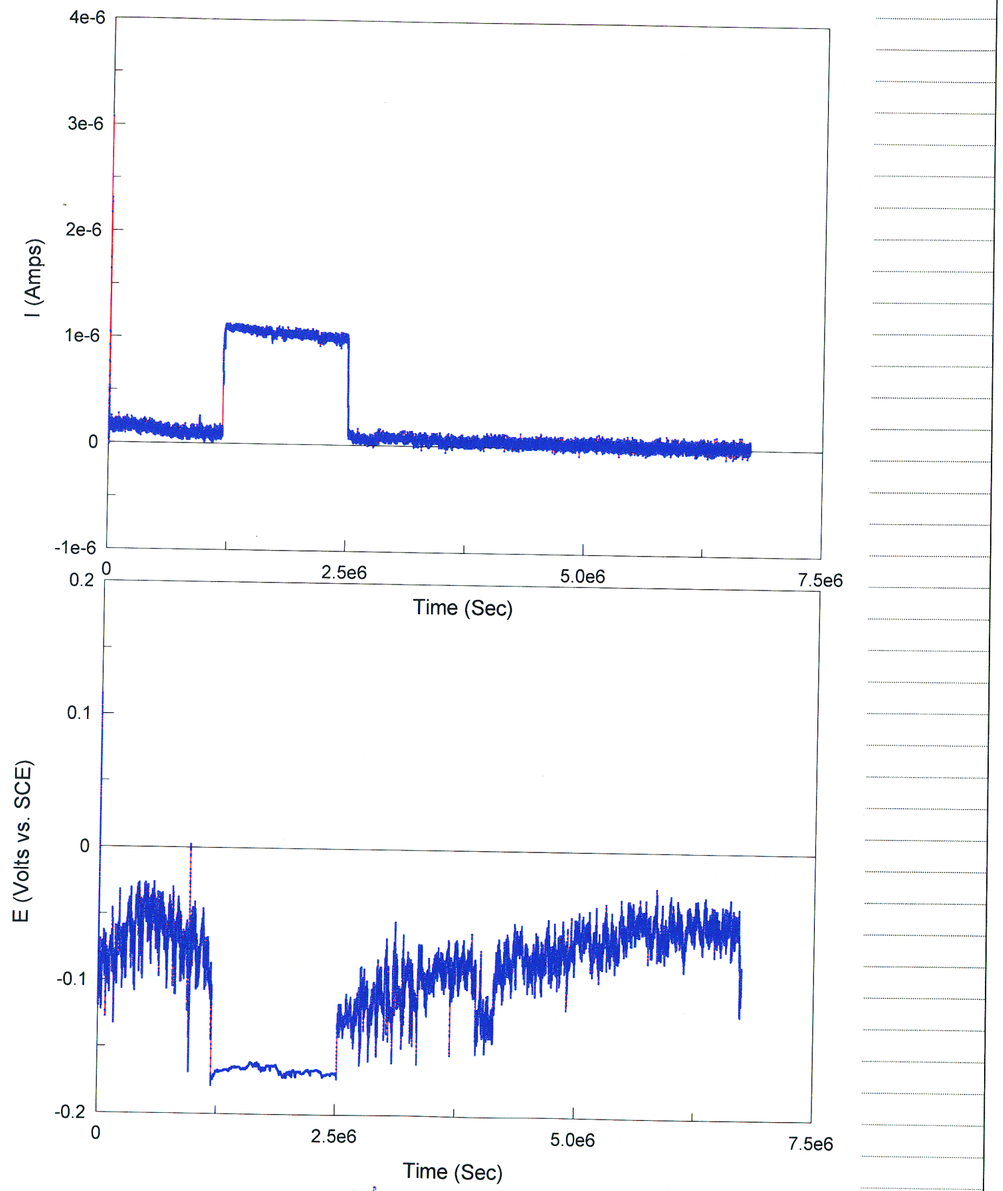

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Galvanic Corrosion Test

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Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT# 2277-3-3266 Crevice Specimen | C-22 HT# 2277-3-3266 Plate | C-22 HT# 2277-3-3266 Crevice Washers Nut/Bolt

Torque Screwdriver: Trve Cast 75 In-lbs — **SN:** 694000691 — **Cal:** 7/22/05 — **Due:** 7/21/06

Initial Weight: 24.39348g — **Model:** Sartorius Genius — **SN:** 12809099
Final Weight: 24.39320g — **Cal:** 5/9/06 — **Due** 11/9/06

SOLUTION: 4.0 m $CaCl_2 \cdot 2H_2O$ 1176.27g $CaCl_2 \cdot 2H_2O$ + DI to 2000 mls

Reagents measured with — **Model:** OHAUS — **SN:** 2883
Cal: 1/5/06 — **Due:** 7/5/06

Initial pH: 3.15 — **Model:** Orion EA 940 — **SN:** 2330
Final pH: Not Taken — **Cal:** 7/25/05 — **Due:** 7/25/06
(solution was used for test on pg. 158) — **pH Probe:** #13-620-296 — **SN:** 5003095

TEST TEMPERATURE: 95°c — **Thermometer:** Fisher — **SN:** 4418
Cal: 6/1/06 — **Due:** 6/1/07

Reference Electrode: Fisher SCE — **# 13-620-52** — **SN:** 3300328

GAS: Zero Air

(CREVICE)
Ecorr: -107 mV vs SCE

(PLATE) — **Model:** Keithley 614 — **SN#:** 467374
Ecorr: -153 mV vs SCE — **Cal:** 1/12/06 — **Due:** 1/12/07

Potentiostat: Solartron 1480 — **sn#** 00238265 — **cal:** 12/21/05 — **Due:** 6/21/06
X.H 7/21/06
TEST ID: ~~C22CaCl2a~~ MA22CaCl2a
Potentiostat Has been In Constant Use will cal. Performance Verification
DATA FILES:
C22C22703Ia-Unich1, C22C22703Ea-Unich2, C22C22703Ib, C22C22703Eb 706, 709, 712, 715, 718, X.H 7/21/06

Specimen Examination: Crevice Corrosion on 1/24 feet of C-22 Crevice Washers
No Corrosion on C-22 Plate or C-22 Washers / Hardware
Very mild surface staining Mostly By Crevice Corrosion Area

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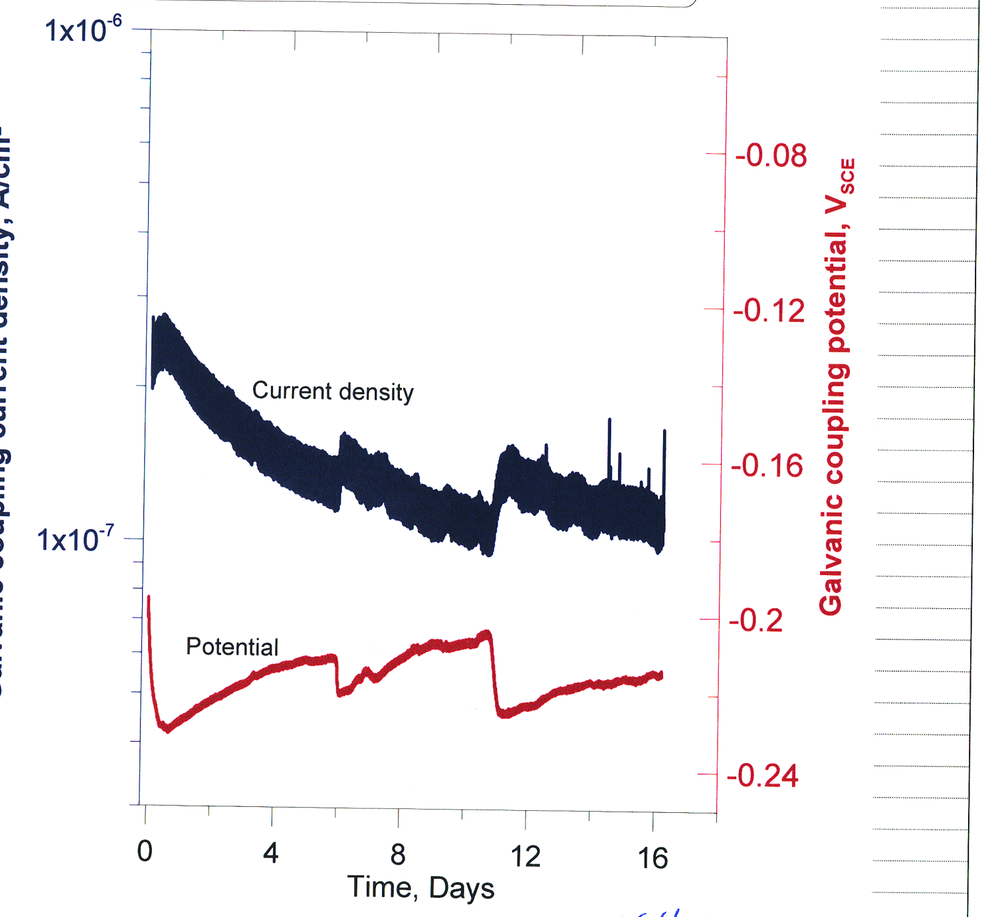
Test ID: MA22CaCl2a

4 M $CaCl_2$, 95°C, Alloy 22/Alloy 22 (75 in-lbs)
Coupled to Alloy 22 Plate



X.Huang 7/24/06

Penetration depth: 62 µm
Measured with Olympus Metallurgical Microscope PME3
Cal: 6/15/06, Due. 12/15/06

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Galvanic Corrosion Test

Objective: SEE PAGE #1

SPECIMENS: Crevice Specimen drawing # 20.06002.01.322.002 polished to 600 Grit finish then cleaned in acetone

C-22 HT# 2277-3-3266 Crevice Specimen

C-22 HT# 2277-3-3266 Plate

C-22 HT# 2277-3-3266 Crevice washers nut/bolt

Torque Screwdriver: True Craft 75 In-lbs
Cal: 7/22/05

SN: 694000691
Due: 7/21/06

Initial Weight: 23.60764g
Final Weight: 23.60228g

Model: Sartorius Genius
Cal: 5/9/06

SN: 12809099
Due 11/9/06

SOLUTION: Re Used Solution from pg #156

4.0 m $CaCl_2 \cdot 2H_2O$
1176.27g $CaCl_2 \cdot 2H_2O$
+ DI To 2000mls

Reagents measured with

Model: OHAUS
Cal: 1/5/06

SN: 2883
Due: 7/5/06

Initial pH: 3.15
Final pH: 4.72

Model: Orion EA 940
Cal: 7/6/06
pH Probe: #13-620-296

SN:2330
Due: 7/6/07
SN: 5003095

TEST TEMPERATURE: 95°C

Thermometer: Fisher
Cal: 6/1/06

SN: 4418
Due: 6/1/07

Reference Electrode: Fisher SCE

 # 13-620-52

SN: 3300328

GAS: Zero Air

(CREVICE) -240
Ecorr: ~~406~~ **mV vs SCE** x.rl 7/28/06

(PLATE) -41
Ecorr: ~~51~~ **mV vs SCE** x.rl 7/28/06

Potentiostat:Solartron 1480

Model: Keithley 614
Cal: 1/12/06

SN#: 467374
Due: 1/12/07

sn# 00238265 cal: 1/21/05 Due: 6/21/06

on 9/7/06, change it to another SI1480
Total time 106 days SN # 00240551 Cal: 5/1/06 Due: 11/1/06

TEST ID: MA22CaCl2b

DATA FILES:

C22C22719Ia_Unich1, C22C22719Ea_Unich2, 197b, 197b, 722I, E, 725I, 725E, 728I, 728E, 731I, 731E, 803I, 803E, 806I, 806E, 809I, 809E, 812I, 812E, 815I, 815E, 818I, 818E, 821I, 821E, 824I, 824E, 827I, E, 830I, E, 902I, E, 905I, E, 907I, E, 914I, E, 921I, E, 928I, E, 1005I, E, 1012I, E, 1019I, E, 1026I, E, 1102I, E

Specimen Examination:

Corrosion on 10/24 feet of C-22 Crevice Washer one site Etched C-22 Crevice washers Dark staining on facial surface of other feet, Mild Surface Staining - Darker Around Corrosion Areas - will Repolish washers other C-22 Plate And Additional Hardware OK

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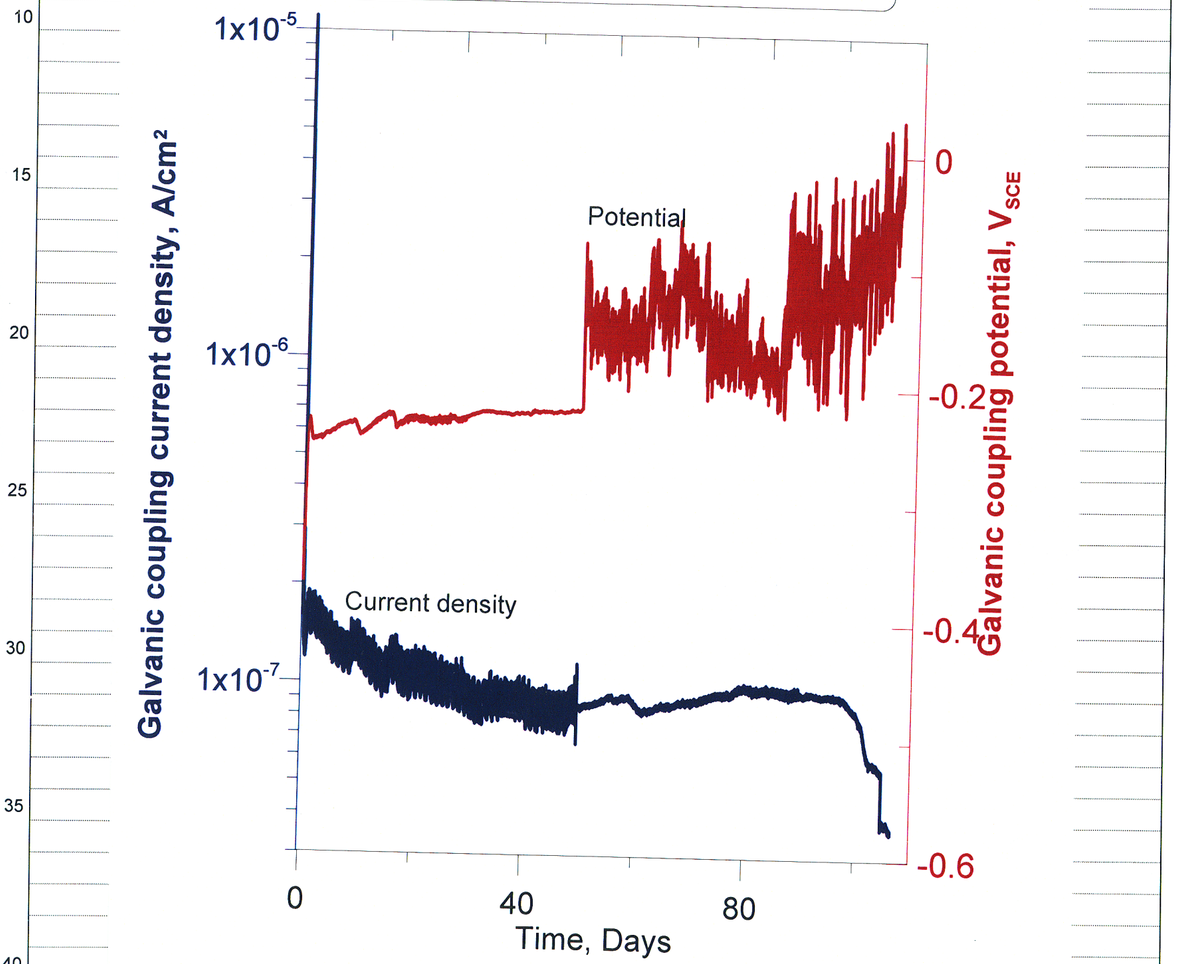
Penetration depth: 224 µm (deepest), other sites are very shallow
Measured with Olympus Metallurgical Microscope PM23
Cal: 6/05/06. Due: 12/15/06



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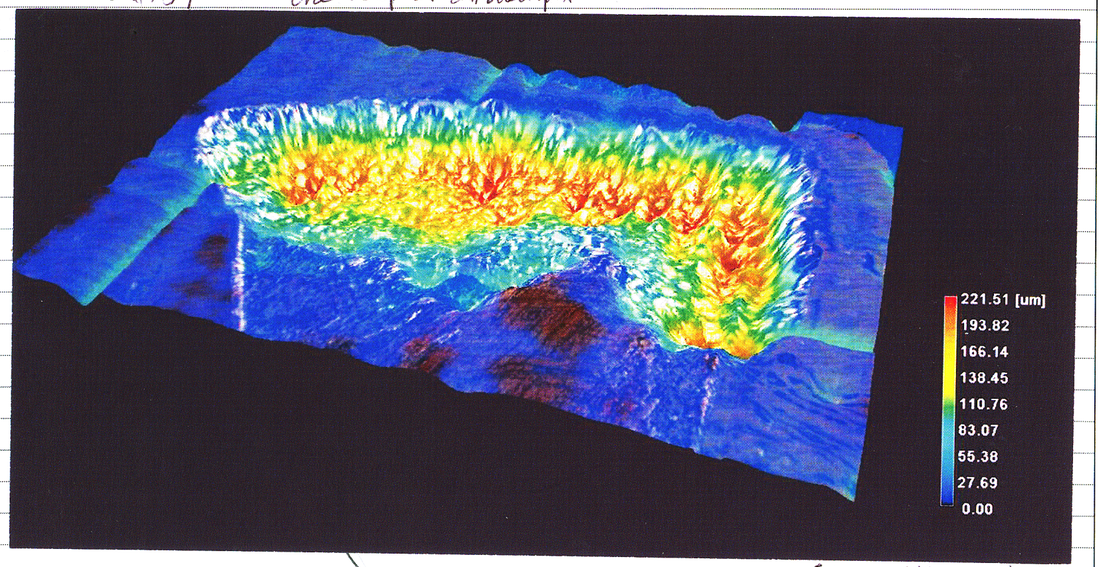
Continued From Page #159 One deepest corroded pit



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Testing

In

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ADDITIONAL INFORMATION FOR SCIENTIFIC NOTEBOOK NO. 774

Document Date:	09/13/2005
Availability:	Southwest Research Institute® Center for Nuclear Waste Regulatory Analyses 6220 Culebra Road San Antonio, Texas 78228
Contact:	Southwest Research Institute® Center for Nuclear Waste Regulatory Analyses 6220 Culebra Road San Antonio, TX 78228-5166 Attn.: Director of Administration 210.522.5054
Data Sensitivity:	■"Non-Sensitive" □ Sensitive □"Non-Sensitive - Copyright" □ Sensitive - Copyright
Date Generated:	04/19/2006
Operating System: (including version number)	Windows
Application Used: (including version number)	Excel
Media Type: (CDs, 3 1/2, 5 1/4 disks, etc.)	1 CD
File Types: (.exe, .bat, .zip, etc.)	grf, cor
Remarks: (computer runs, etc.)	Media contains: Data files for scientific notebook

GEOSCIENCES AND ENGINEERING DIVISION

SCIENTIFIC NOTEBOOK REVIEW CHECKLIST RECORD

Scientific Notebook No. 744 Project Numbers: 20.06002.01.322

Accomplished

✓	1. Initial entries per QAP-001
✓	2. Dating of entries
✓	3. Corrections (crossed out, one line through w/initials/date)
✓	4. No White out used
✓	5. Page number visible on copy or original notebook
✓	6. In process entries per QAP-001
✓	7. Figure information present
✓	8. Text readable
NA	9. Copyrighted material is identified
✓	10. Permanent ink or type only
✓	11. Signing of entries (not required on each page)
✓	12. Electronic media in the scientific notebook properly labeled
✓	13. NRC Supplementary Scientific Notebook Questions are addressed.
✓	14. The independent, two person verification required by AP-019, Section 5.2.1.2(b) is complete

Any discrepancies must be resolved before notebook closeout.

==========

I have reviewed this scientific notebook and find it in agreement with QAP-001.

K Apted 10-8-07

Manager's Signature Date

Attach this completed form to the last page of the notebook.

Form QAP-01 (03/2007)