308 - - - Q200410010001

Scientific Notebook No. 579: Fabrication Effects on Alloy 22 (02/26/2003 through 03/22/2004)

LABORATORY NOTEBOOK

CNWRA/SwRI

From Page No.

Initial Scientific Notebook Entry for Fabrication Effects on Alloy 22

Title: Fabrication Effects

Tests preformed by: Darrell S. Dunn, Div 20; Brian Derby, Div. 18; other Southwest Research Institute staff to be identified.

Welding processes performed by: Southwest Research Institute staff to be identified.

Objectives: Determine the effect of waste package fabrication processes on the mechanical properties, localized corrosion susceptibility, stress corrosion cracking resistance, and uniform corrosion rate of Alloy 22.

Welding equipment: Identified using make, model, and serial number. Calibration records, if applicable, will be provided.

Equipment for corrosion tests: Laboratory oven for exposure of test specimens at 600 to 900 °C, Thermocouple and thermocouple meter. Keithley 614/617. Solartron 1287 Potentiostat and CorrView Software or equivalent, Electrochemical test cell.

Materials: Alloy C-22, heat 2277-1-3164. Alloy 622 filler metals XX2147BG11 (0.125"), XX1973BG12 (0.094") XX1832BG (0.045"). Other materials and heats to be added and identified prior to testing.

Welding process specifications: Fabrication processes such as welding will be specified in accordance with the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. Weld procedure specification, welder qualifications, and weld procedure qualification records, welding records, and weld joint dimensions will be included as part of the welding process specifications

Corrosion specimen specifications: Specimens for crevice corrosion susceptibility will be equivalent to 20.01402.571.006 unless otherwise specified. Specimens location with respect to special features such as weld fusion line and weld heat affected zone will be specified as necessary. Other test specimens will be identified prior to testing.

Measurement parameters for welding processes: As required by American Society of Mechanical Engineers Boiler and Pressure Vessel Code.

Measurement parameters for corrosion tests: Temperature and time of exposure for thermally aged spaced specimens, Potential and Current of specimen during test. Measurement parameters for other tests will be identified prior to testing

Required level of accuracy in corrosion tests : Temperature ± 2 °C, Time of exposure ± 1 minute for thermally aged specimens, Potentials ± 1mV, Current ± 1 microamp.

Uncertainty and sources of error: Current measurement error can occur for localized corrosion processes because the actively corroding area is not the same as the surface area of the test specimen.

CONTINUED FROM NOTEBOOK # 503

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Darrell Dunn	2/26/2003

From Page No.____

PURCHASING

PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE™

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
1/7/03			637644

SUGGESTED OR PREVIOUS SUPPLIER: Industrial Mechanical Company
CITY, STATE:
ATTN: A.E. Sonny Rogers, Jr.
PHONE: 662-4596 FAX: 662-4503

DELIVER TO: Darrell Dunn/bldg. 57
SHIP VIA:
F.O.B.:
TERMS:
PURCHASING SELECTED SUPPLIER
SUPPLIER CODE: PHONE: FAX:

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	4	EA	C22 weld specimens CNWRA drawing						
			20-06002-01-081-001	20	06002.	01.081	100	1/17/03	337.50
B	1	EA	Delivery of machined specimens	20	06002.	01.081	100	1/17/03	90.00
			Quality & Technical Requirements: Specimens machined as per CNWRA drawing 20-06002-01-081-001. Dimensional inspection per dimensions and tolerances identified in CNWRA drawing 20-06002-01-081-001 is required. Specimens cut from Alloy 22 plate [illegible].						
			Attached drawings and quotes.						

INTERNAL NOTES TO BUYER | SPECIAL INSTRUCTIONS TO SUPPLIER | TOTAL

1. Government Project? [YES] [NO]
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
a [ ] G-1 CONSUMABLE
b [ ] G-2 DELIVERABLE
c [ ] G-3 ACCOUNTABLE / NEXCHTABLE
d IS GOVT PROPERTY BEING SENT TO SUPPLIER?
[X] YES
[ ] NO

2. QUALITY ASSURANCE? [YES] [NO]
a ASL REQUIRED [YES] [NO]
b C A CODES Q11, Q20
c INSPECTION CRITERIA 16 TO Appendix QA-016.
d [illegible]

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? [YES] [NO]
IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
REQUESTOR'S SIGNATURE: Darrell Dunn EXT. NO. 6090
DEPT / DIVISION APPROVAL DATE 1/7/03
ADMIN. APPROVAL DATE

4. REPAIRS
a IS THIS REQ. FOR A REPAIR? [YES] [NO]
b IS THE REPAIR ON OR OFF CAMPUS? [ON] [OFF]
c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO. _____

CONTRACT REVIEW APPROVAL DATE 4/3/2003 DATE

SEE INSTRUCTIONS ON REVERSE SIDE

To Page No.____

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by Darrell Dunn 2/26/2003

From Page No.____

IMC
INDUSTRIAL MECHANICAL COMPANY
A DIVISION OF CCC GROUP, INC.
5797 Dietrich Road
San Antonio, Texas 78219
Phone: 210-662-1690, 662-4596
Fax: 210-662-4503, 661-6060

SWRI

January 7, 2003

Attention: Darrell S. Dunn (Quote Ref. # 03-003) Revision A

Industrial Mechanical Company is pleased to furnish the following quotation for your review and consideration.

	Each	Total
(4ea.) Alloy 22 Weld Specimen CNWRA Drawing 20-06002-01-081-001	$337.50ea.	$1,350.00

Work Scope:
Provide labor, equipment, and perishable tooling as required to machine the aforementioned in accordance with print specifications and instructions.
NOTES: 1) SWRI to provide all material.
2) A 63RMS finish required on weld surfaces (Detail A).
3) Q.C. reports on all dimensions per SWRI drawings will be provided.

Delivery: 2 – 3 working days from receipt of material. IMC can deliver these parts to SWRI when completed @ $90.00/trip if you so desire.

Terms: 1) Prices are applicable for 90 days.
2) Net 30. Prices do not include any tax that may apply.

Thank You for considering Industrial Mechanical for your machining requirements.
Any questions about this bid may be directed to me @ 210-662-4596.

Respectfully Submitted,

A. E. "Sonny" Rogers Jr.
IMC Machine Shop Superintendent

To Page No.____

Witnessed & Understood by me, | Date | Invented by | Date

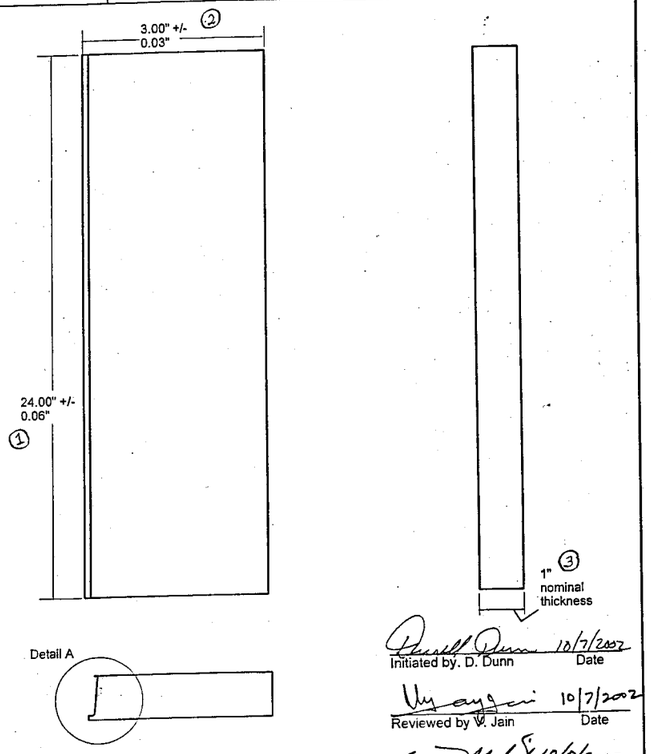
Recorded by Darrell Dunn 2/26/2003

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

Alloy 22 Weld Specimen
CNWRA Drawing 20-06002-01-081-001
Dimensional tolarances as specified
Note: Detail A on Page 2

Page 1 of 2

To be completed at time of order:
Material:_____
Heat:_____
Specimen Orientation:_____
Other:_____



Initiated by. D. Dunn 10/7/2002 Date

Reviewed by V. Jain 10/7/2002 Date

QA Approval B. Mabrito 10/7/2002 Date

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Darrell Dunn	2/26/2003

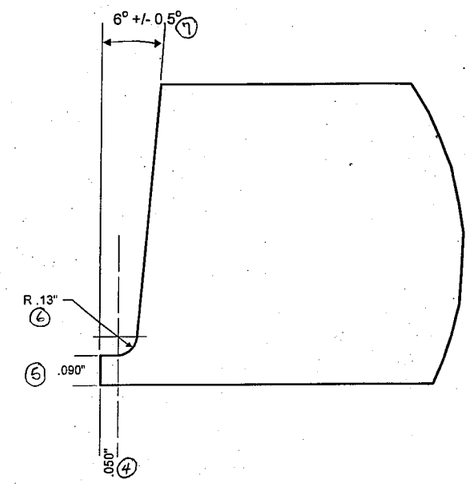
Darrell S. Dunn
SwRI-CNWRA
Phone: (210) 522-6090
Fax: (210) 522-5184
e-mail: ddunn@swri.org

Alloy 22 Weld Specimen
CNWRA Drawing 20-06002-01-081-001
All Dimensions ± 0.005"
unless otherwise specified
Detail A identified on Page 1

Page 2 of 2

To be completed at time of order:
Material:_____
Heat:_____
Specimen Orientation:_____
Other:_____

Detail A



HEAT NO:
2277-1-3164
ASME SB-575-98-N06022
27-341417-01

Initiated by. D. Dunn 10/7/2002 Date

Reviewed by V. Jain 10/7/2002 Date

QA Approval B. Mabrito 10/7/2002 Date

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Darrell Dunn	2/26/2003

IMC
INDUSTRIAL MECHANICAL COMPANY
A DIVISION OF CCC GROUP, INC.
5797 Dietrich Road
San Antonio, Texas 78219
Phone: 210-662-1690, 662-4596
Fax: 210-662-4503, 661-6060

Modifications to (4ea.) Alloy 22 Plates

Amount of bow in plates prior to straightening: A) .096
(The bow is along the 24" length) B) .060
(Plates are identified A thru D) C) .030
D) .020

Procedure used to straighten plates: Plates were straightened on a small hydraulic press (80-ton). As each plate was supported @ each end on press plates, pressure was applied to the center with a piece of aluminum under the push rod for no marring.

Amount of bow taken out after straightening: A) .081
B) .050
C) .030
D) .020

Amount machined from bottom face for flatness: A) .005 - .015
B) .010 - .015
C) .030
D) .020

Final thickness after machining: A) 1.020 - 1.025
B) .993 - 1.030
C) .975 - 1.000
D) 1.020 - 1.030

NOTE: This necessary work was not included in the quote. approval to proceed was given by Darrell Dunn via a phone conversation 1/10/03. A.E. "Lonny" Rogers

Industrial Mechanical Company
A Division of CCC Group, Inc.
5797 Dietrich Rd.
San Antonio, Texas 78220-0350

IMC Machine Shop (210)662-1690
IMC Machine Shop Manager (210)662-1696
IMC Machine Shop Superintendent (210)662-4596

COMPONENT INSPECTION REPORT

Part Name	Part Number	Dwg. No.
ALLOY 22 WELD SPECIMEN	A	20-06002-01-081-001

Heat No.	P.O. No.	IMC Job No.	Inspection Date
2277-1-3169 ASME SB-575-98-NO6022 27-391917-01	382894S	1173	1-15-03

No.	Feature	Qty. Accepted	Qty. Rejected	Actuals	Meas. Tool I.D.#	Remarks
1	24.00" ± .06"	✓	0	24.048"	IMC 200-048	
2	3.00" ± .03"	✓	0	3.018"	IMC 200-007	
3	1" NOMINAL THICKNESS	✓	0	SEE MODIFICATIONS SHEET		
4	.1050" ± .005"	✓	0	.054"	IMC 200-052	
5	.090" ± .005"	✓	0	.094/.087	IMC 200-052	
6	R .13" ± .005"	✓	0	OK	Radius Gauge	Inspected on Machine
7	6° ± 0°30"	✓	0	OK		

CHECKED BY: Lewis Torres DATE: 1-15-03 PAGE 1 OF 1

Industrial Mechanical Company
A Division of CCC Group, Inc.
5797 Dietrich Rd.
San Antonio, Texas 78220-0350

IMC Machine Shop (210)662-1690
IMC Machine Shop Manager (210)662-1696
IMC Machine Shop Superintendent (210)662-4596

COMPONENT INSPECTION REPORT

Part Name	Part Number	Dwg. No.
ALLOY 22 WELD SPECIMEN	B	20-06002-01-081-001

Heat No.	P.O. No.	IMC Job No.	Inspection Date
2277-1-3169 ASME SB-575-98-N06022 27-341417-01	3828945	1173	1-15-03

No.	Feature	Qty. Accepted	Qty. Rejected	Actuals	Meas. Tool I.D.#	Remarks
1	24.00" ± .06"	✓	0	24.046"	IMC 200-048	
2	3.00" ± .03"	✓	0	3.015"	IMC 200-007	
3	1" NOMINAL THICKNESS	✓	0	SEE MODIFICATIONS SHEET		
4	.050" ± .005	✓	0	.053"	IMC 200-052	
5	.090" ± .005	✓	0	.088"/.095"	IMC 200-052	
6	R.13" ± .005"	✓	0	OK	Radius Gauge	
7	6° ± 0°30"	✓	0	OK	Indicated on Machine	

CHECKED BY: JESUS TORRES DATE: 1-15-03 PAGE 1 OF 1

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	2/26/2003

Industrial Mechanical Company
A Division of CCC Group, Inc.
5797 Dietrich Rd.
San Antonio, Texas 78220-0350

IMC Machine Shop (210)662-1690
IMC Machine Shop Manager (210)662-1696
IMC Machine Shop Superintendent (210)662-4596

COMPONENT INSPECTION REPORT

Part Name	Part Number	Dwg. No.
ALLOY 22 WELD SPECIMEN	C	20-06002-01-081-001

Heat No.	P.O. No.	IMC Job No.	Inspection Date
2277-1-3169 ASME SB-575-98-N06022 27-341417-01	3828945	1173	1-15-03

No.	Feature	Qty. Accepted	Qty. Rejected	Actuals	Meas. Tool I.D.#	Remarks
1	24.00" ± .06"	✓	0	24.032"	IMC 200-048	
2	3.00" ± .03"	✓	0	3.015"	IMC 200-007	
3	1" NOMINAL THICKNESS	✓	0	SEE MODIFICATIONS SHEET		
4	.050" ± .005	✓	0	.054"	IMC 200-052	
5	.090" ± .005			.090 / .097	IMC 200-052	.002 out of tolerance Specified on drawing discussed with D. Dunn on phone @ 2:15 1/15/03.
6	R .13" ± .005"	✓	0	OK	Radius Gauge	
7	6° ± 0°30"	✓	0	OK	Indicated on Machine	

CHECKED BY: JESUS TORRES DATE: 1-15-03 PAGE 1 OF 1

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	2/26/2003

Industrial Mechanical Company
A Division of CCC Group, Inc.
5797 Dietrich Rd.
San Antonio, Texas 78220-0350

IMC Machine Shop (210)662-1690
IMC Machine Shop Manager (210)662-1696
IMC Machine Shop Superintendent (210)662-4596

COMPONENT INSPECTION REPORT

Part Name	Part Number	Dwg. No.
ALLOY 22 WELD SPECIMEN	D	20-06002-01-081-001

Heat No.	P.O. No.	IMC Job No.	Inspection Date
2277-1-3169 ASME SB-575-98-N06022 27-341417-01	382894S	1173	1-15-03

No.	Feature	Qty. Accepted	Qty. Rejected	Actuals	Meas. Tool I.D.#	Remarks
1	24.00" ± .06"	✓	0	24.035"	IMC 200-043	
2	3.00" ± .03"	✓	0	3.014"	IMC 200-007	
3	1" NOMINAL THICKNESS	✓	0	SEE MODIFICATIONS SHEET		
4	.050" ± .005"	✓	0	.054"	IMC 200-052	
5	.090" ± .005"			.093" / .100"	IMC 200-053	.005 out of tolerance specified on drawing. Discussed with D. Dunn on phone @ 2:15 1/15/03.
6	R-.13" ± .005"	✓	0	OK	Radius Gauge	
7	6° ± 0°30"	✓	0	OK	Illustrated on Machine	

CHECKED BY: Jesus Torres DATE: 1-15-03 PAGE 1 OF 1

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

NONCONFORMANCE REPORT

Project No. 20.06002.01.081 NCR No. 2003-01

PART 1: DESCRIPTION OF NONCONFORMANCE:
Alloy 22 weld specimens CNWRA Drawing 20-06002-01-081-001 machined by Industrial Mechanical are not within the tolerances. Modifications to the dimensions specified on the drawing were necessary because the Alloy 22 plate supplied to Industrial Mechanical was bowed. Part of the bow was removed by pressing and part was removed by machining the plate surfaces. A detailed description of the non conformance items is provided below:

1. Thickness of machined specimens was reduced by 0.005 to 0.030" to remove bow in plate. Final thickness after machining has been provided in documentation provided by Industrial Mechanical. (all 4 specimens) (rec'd 1/24/03
2. Plate C: The 0.090" land thickness measures 0.090 to 0.097"
3. Plate D: The 0.090" land thickness measures 0.093 to 0.100"

Initiated by: Darrell S. Dunn DSD Date: 1/23/2003

PART 2: PROPOSED DISPOSITION AND CORRECTIVE ACTION

Disposition:
Accept specimens as is.

Basis of Disposition:
The variation in the thickness of the land will not affect weldability of the plate. Integrity of the weld joint will be assessed by non destructive examination including penetrant testing of the root pass and radiographic testing of the completed weld. .

Action to Correct Nonconformance:
None.

Target date for completion: 2/28/2003

Proposed by: Darrell S. Dunn DSD Date: 1/23/2003

PART 3: APPROVAL

Element Manager: [signature] Date: 1/28/03

Director of QA: [signature] Date: 1/28/2003

Comments/Instructions:

PART 4: CLOSE OUT

Comments: No further action required.

Verified by: [signature] Date: 3/6/03

Distribution:

CNWRA FORM QAP 9-1

PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE™

PURCHASING

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
2/19/03			637651

SUGGESTED OR PREVIOUS SUPPLIER: IHI Southwest

CITY, STATE

ATTN: Fred Anderson

PHONE: 256-4108 FAX: 521-2311

DELIVER TO: D. Dunn/bldg. 57

SHIP VIA

F.O.B.

TERMS

PURCHASING SELECTED SUPPLIER

SUPPLIER CODE ATTN

PHONE FAX

LN	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	1	EA	Radiographic inspection of Alloy 22 weld	20	06002	01.081	100	2/25/03	$440.00

Quality & Technical Requirements: Quality affecting item, test procedures must be compliant with ASME code. NDE certifications required for individuals performing and reviewing radiographic inspection.

"Quality Affecting Purchase"

TOTAL

INTERNAL NOTES TO BUYER: Call D. Dunn with P.O. #

SPECIAL INSTRUCTIONS TO SUPPLIER

1. Government Project? [XX] YES [ ] NO

IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)

a [XX] G-1 CONSUMABLE
b [ ] G-2 DELIVERABLE
c [ ] G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? [ ] YES [XX] NO

2. QUALITY ASSURANCE? [YES] [ ] NO

a ASL REQUIRED? [YES] [ ] NO

b QA CODES: Q20, Q12

c INSPECTION CRITERIA: R.I. To inspect per SAP1016

d QA APPROVAL (IF REQUIRED) DATE 2/19/03

3. SOURCING NOTES

IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? [ ] YES [NO]

IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.

REQUESTOR'S SIGNATURE: Darrell Dunn EXT. NO. 6090

DEPT. / DIVISION APPROVAL DATE 2/19/03

ADMIN. APPROVAL DATE

4. REPAIRS

a IS THIS REQ. FOR A REPAIR? [ ] YES [ ] NO

b IS THE REPAIR ON OR OFF CAMPUS? [ ] ON [ ] OFF

c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO.

CONTRACT REVIEW APPROVAL DATE | BUYER SIGNATURE | DATE

SEE INSTRUCTIONS ON REVERSE SIDE

INCORRECT ENTRY
SEE PAGE 16 FOR
CORRECT PURCHASE REQUISITION
FOR PENETRANT TEST OF ROOT
PASS

2/26/2003

To Page No.

Witnessed & Understood by me, | Date | Invented by | Date 2/26/2003

Recorded by

ISwT LIQUID PENETRANT EXAMINATION RECORD

PROJECT No.: 03-0298	SITE: SwRI	DATE: (DAY - MONTH - YEAR) 17 FEB 2003	Lo LOCATION N/A	SHEET No: VM0001
EXAMINATION AREA (SYST / COMP) C22 GTAW	LINE / SUBASSEMBLY CORROSION SPECIMEN #3	IDENTIFICATION PLATE A TO PLATE D	Wo LOCATION WELD E	WELD TYPE (FLOW→) PLATE TO PLATE
EXAMINER: Vic MORTON	SNT LEVEL III	PROCEDURE NO. ISwT-NN-PT1 REV 0	SURFACE TEMP °F 68.9	PENETRANT TEMP °F 71.7
EXAMINER: N/A	SNT LEVEL N/A	CHG 0 ICN [✓] N/A	SURFACE FINISH AS WELDED	THERMOMETER SERIAL NUMBER 78700032
				WELD LENGTH 24"

	PRE CLEANER	PENETRANT	REMOVER	DEVELOPER
BRAND	MAGNAFLUX	MAGNAFLUX	MAGNAFLUX	MAGNAFLUX
TYPE	SKC-S	SKL-SP	SKC-S	SKD-S2
BATCH No.	96M02K	97J01K	96M02K	97M01K
CLEANING COMPLETED	0901	TIME APPLIED 0910	REMOVAL COMPLETED 0940	TIME APPLIED 0945
		TIME REMOVED 0930		TIME READ 0952

INDICATION No.	L	W	LOCATION UP OR DOWN STREAM	TYPE ROUND OR LINEAR	SIZE DIAMETER OR LENGTH	REMARKS	INITIALS
	NO RECORDABLE INDICATIONS					EXAMINED ROOT PASS AND WELD PREP FACES ONLY	

EXAMINATION AREA LIMITATION - IF NONE, SO STATE: NONE (N)

REVIEWED BY | SNT LEVEL III | DATE: 17 FEB. 03 | PAGE 1 OF 1

ISwT Form PT-01 (Rev. 07/99)

PLATE 784

PURCHASE REQUISITION ON PAGE 16

2/26/2003

To Page No.

Witnessed & Understood by me, | Date | Invented by | Date 2/26/2003

Recorded by

IHI SOUTHWEST TECHNOLOGIES, INC.

STATEMENT OF NDE CERTIFICATION

The President of IHI Southwest Technologies, Inc. certifies that

Victor Morton

is qualified as **Level III** in **LIQUID PENETRANT** testing
in accordance with the requirements of
ISwT Nuclear Projects Operating Procedure 2.0-NDES-001.

EDUCATION: Graduated GED, San Antonio, Texas, 1978.

EXPERIENCE (Initial certification): 48 months.

TEST SCORES:

	Weight	Score	Date
Basic	.33	100.00	03/04/02
Specific	.33	96.88	03/01/02
Method	.33	88.57	03/01/02
Composite (Average)		95.15	

VISUAL ACUITY AND COLOR PERCEPTION: This individual has been tested for visual acuity and color perception in accordance with Nuclear Projects Operating Procedure 2.0-NDES-001.

Correction Required: Yes Date: 01/22/03

CERTIFICATION HISTORY:

Date of Employment: 1 June 1999

Date of Initial Level I Certification: 5 December 1980

Date of Initial Level II Certification: 11 August 1981

Date of Initial Level III Certification: 9 January 1989

Date of Most Recent Recertification: 4 March 2002

Date of Expiration: 1 March 2007

REMARKS: NDE Instructor

** *Certification based on prior certification while employed by SwRI.* **

SIGNED: _____
President, IHI Southwest Technologies, Inc.

01/27/03

ISwT Form QA-2-02 (Rev. 07/99)

PURCHASING

PURCHASE REQUISITION
SOUTHWEST RESEARCH INSTITUTE™

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
2/19/03			637651

SUGGESTED OR PREVIOUS SUPPLIER: IHI Southwest
CITY, STATE:
DELIVER TO: D. Dunn/bldg. 57
SHIP VIA:
F.O.B.:
TERMS:
PURCHASING SELECTED SUPPLIER:
SUPPLIER CODE:
ATTN:
PHONE:
FAX:
ATTN: Fred Anderson
PHONE: 256-4108
FAX: 521-2311

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	1	EA	Radiographic inspection of Alloy 22 weld	20	06002	01.081	100	2/25/03	$440.00
			Quality & Technical Requirements: Quality affecting item, test procedures must be compliant with ASME code. NDE certifications required for individuals performing and reviewing radiographic inspection. "Quality Affecting Purchase."						

INTERNAL NOTES TO BUYER: Call D. Dunn with P.O. #
SPECIAL INSTRUCTIONS TO SUPPLIER:
TOTAL

1. Government Project? YES NO
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
a [X] G-1 CONSUMABLE
b [ ] G-2 DELIVERABLE
c [ ] G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER?
[ ] YES
[X] NO
CONTRACT REVIEW APPROVAL DATE

2. QUALITY ASSURANCE? YES NO
a ASL REQUIRED? YES NO
b QA CODES: Q20, Q12
c INSPECTION CRITERIA: A.I. To inspect per QAP 10.16
d QA APPROVAL (IF REQUIRED) DATE 2/19/03
BUYER SIGNATURE DATE

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? YES NO
IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
REQUESTOR'S SIGNATURE: Darrell Dunn EXT. NO. 6090
DEPT. / DIVISION APPROVAL DATE 2/19/03
ADMIN. APPROVAL DATE

4. REPAIRS
a IS THIS REQ. FOR A REPAIR? YES NO
b IS THE REPAIR ON OR OFF CAMPUS? ON OFF
c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO.

SEE INSTRUCTIONS ON REVERSE SIDE

PLATE 784

PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE™

PURCHASING

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
2/13/03			637650

SUGGESTED OR PREVIOUS SUPPLIER: IHI Southwest	DELIVER TO: D. Dunn/bldg. 57	PURCHASING SELECTED SUPPLIER	
CITY, STATE	SHIP VIA		
ATTN: Fred Anderson	F.O.B.	SUPPLIER CODE	ATTN
PHONE: 256-4108 FAX: 521-2311	TERMS	PHONE	FAX

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	1	EA	Penetrant test root pass of Alloy 22						
			weld	20	06002	01.081	100	2/14/03	200.00
			Quality & Technical Requirements: Quality affecting item test procedures must be compliant with Section V of the ASME code. NDE certifications are required for the individuals performing penetrant examinations and reviewing the examination records. Certifications needed on all materials used.						

INTERNAL NOTES TO BUYER

SPECIAL INSTRUCTIONS TO SUPPLIER

TOTAL

1. Government Project? YES NO
   IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
   a ☐ G-1 CONSUMABLE
   b ☐ G-2 DELIVERABLE
   c ☐ G-3 ACCOUNTABLE / REPORTABLE
   d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? ☐ YES ☐ NO

2. QUALITY ASSURANCE? YES NO
   a ASL REQUIRED? YES NO
   b QA CODES: Q20, Q12
   c INSPECTION CRITERIA
   d QA APPROVAL (IF REQUIRED) DATE 3/13/03

3. SOURCING NOTES
   IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? YES NO
   IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
   REQUESTOR'S SIGNATURE: Darrell Dunn EXT. NO.: 6090
   DEPT. / DIVISION APPROVAL DATE 2/13/03.
   ADMIN. APPROVAL DATE

4. REPAIRS
   a IS THIS REQ. FOR A REPAIR? YES NO
   b IS THE REPAIR ON OR OFF CAMPUS? ON OFF
   c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO. _____

CONTRACT REVIEW APPROVAL DATE | BUYER SIGNATURE DATE

SEE INSTRUCTIONS ON REVERSE SIDE

OSM PR 1 (0501)

PLATE 784

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	2/26/2003

ISwT RADIOGRAPHIC EXAMINATION RECORD

SITE: SwRI | SHEET No: WA-01-224-01 | ICN: ☑ N/A

PROJECT No.: 03-0300 | DATE: (DAY - MONTH - YEAR) 24-Feb-03 | REV: 0 | CHG: 0

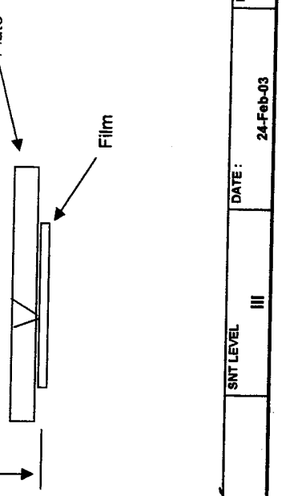
MATERIAL THICKNESS: 1.0" | MATERIAL DIAMETER: Plate | MATERIAL TYPE: S.S | WELD CROWN HEIGHT: 1/16 | WELD TYPE: Butt | PROCEDURE: SWR-NN-RT1 | FILM TECHNIQUE: ☑ SINGLE WALL ☐ DOUBLE WALL

ISOTOPE: n/a | DIA. X LENGTH: n/a | CURIES: n/a | DISTANCE: n/a | TIME: n/a | EFFECTIVE SHARPNESS: n/a | FILM SIZE: 4.5 X 17" | FILM BRAND: Kodak T

X-RAY: Sperry | Kv: 290 | MA: 10 | DISTANCE: 36" | TIME: 12min | FOCAL SPOT SIZE: .19" | EXAMINER: William Angell | SNT LEVEL: III

QUALITY LEVEL: 2T | PENETRAMETER ID: 20 ASTM | FILM PROCESSING: Manual | SHIM MATERIAL: S.S. | SHIM THICKNESS: .06"

SHOOTING SKETCH



1. No. of Views 1
2. Location of Radiation
   Source and Beam Angle 90
3. Location Markers 1-2, 2-3
4. Screen Typ Lead
5. Thickness (in.) Front: 0.01 Back: 0.01
6. Signal Load ☐ Double Load ☑
7. No. of Film 4

COMPONENT ID: Plate, alloy 22

PAGE 1 OF 1 | DATE: 24-Feb-03 | SNT LEVEL III

REVIEWED BY William Angell

ISwT Form RT-01 (Rev. 06/00)

PLATE 784

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	5/27/2003

Project No._____

Book No._____ TITLE _____

From Page No.___

ISwT RADIOGRAPHIC INTERPRETATION RECORD

SITE: SWRI

PROJECT No.: 03-0300

DATE: (DAY - MONTH - YEAR) 24-Feb-03

SHEET No: WA-02-224-01

COMPONENT IDENTIFICATION: Plate, ALLOY 22

FILM INTERPRETATION BY: William Angell

ACCEPTANCE STANDARD: ASME Sec. III

SNT LEVEL: III

FILM, SEAM OR JOINT NUMBER	FILM INTERVAL NUMBER	PENETRAMETER SIZE AND CONDITION	ACCEPT	REJECT	SLAG	POROSITY	CRACK	LACK OF PENETRATION	LACK OF FUSION	UNDERCUT	SURFACE	SHRINK	HOT TEAR	SAND	CHAPLETS	DATE FILM EXPOSED	REPAIR No.	REMARKS
	1-2	20 2T		X					X							24-Feb	no	
	2-3	20 2T		x					x							24-Feb	no	

REMARKS: NONE

REVIEWED BY: William Angell

SNT LEVEL III

DATE: 24-Feb-03

PAGE 1 of 1

ISwT Form RT -02 (Rev. 06/00)

PLATE 784

To Page No._____

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by 5/27/2003

Project No._____

TITLE _____ Book No._____

From Page No.___

Weld ~~specimen~~ 2D 5/27/03 specimen examination

PT showed no reportable indications

RT showed lack of fusion that was also observed with previous GTAW specimens

RT film indicates lack of fusion is not limited to discrete areas which could be avoided when producing test specimens from the welded material

Plate is rejected and weld will not be used in testing

To Page No._____

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by 5/27/03

From Page No.____

QW-482 SUGGESTED FORMAT FOR WELDING PROCEDURE SPECIFICATION (WPS)
(See QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)

Company Name Southwest Research Institute By: F. D. Caroline

Welding Procedure Specification No. C22-GTAW-GMAW Date 10-2-2002 Supporting PQR No. (s) C22-GTAW-GMAW-1

Revision No. 1 Date 11/05/2002

Welding Process(es) GTAW-GMAW Type(s) Semi-Auto
(Automatic, Manual, Machine, or Semi-Auto.)

JOINTS (QW-402)

Joint Design Single U

Backing (Yes) X (No) _____

Backing Material (Type) Commercially pure Argon
(Refer to both backing and retainers.)

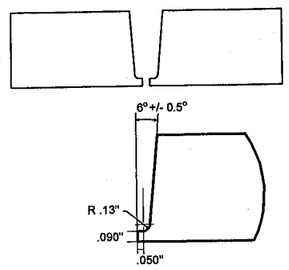
☐ Metal ☐ Nonfusing Metal

☐ Nonmetallic X Other

Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.

(At the option of the Mfgr., sketches may be attached to illustrate joint design, weld layers and bead sequence, e.g. for notch toughness procedures, for multiple process procedures, etc.)

Details



*BASE METALS (QW-403)

P-No. 44 Group No. N/A to P-No. 44 Group No. N/A

OR

Specification type and grade SB-575 UNS No. N06022

to Specification type and grade SB-575 UNS No. N06022

OR

Chem. Analysis and Mech. Prop. N/A

to Chem. Analysis and Mech. Prop. N/A

Thickness Range:

Base Metal: Groove 0.187" – 2.000" Fillet Unlimited

Pipe Dia. Range: Groove Over 2-7/8" (0.187" – 2.000") Fillet Unlimited

Other _____

*FILLER METALS (QW-404)		
Spec. No. (SFA)	A 5.14	A 5.14
AWS No. (Class)	ERNiCrMo-10	ERNiCrMo-10
F-No.	44	44
A-No.	N/A	N/A
Size of Filler Metals	3/32"	0.045"
Weld Metal Thickness Range:		
Groove	..50"	1.5"
Fillet	Unlimited	Unlimited
Electrode-Flux (Class)	N/A	N/A
Flux Trade Name	N/A	N/A
Consumable Insert	N/A	N/A
Other	N/A	N/A

*Each base metal-filler metal combination should be recorded individually.

SED 18.05-10a

GTAW GMAW WPS

To Page No.____

Witnessed & Understood by me, Date Invented by Date

Recorded by 5/20/03

From Page No.____

QW-482 (Back)

WPS No. C22-GTAW-GMAW Rev. 1

POSITIONS (QW-405)

Position(s) of Groove All

Welding Progression: Up X Down _____

Position(s) of Fillet All

PREHEAT (QW-406)

Preheat Temp. Min. 125 F

Interpass Temp. Max. 200 F

Preheat Maintenance None

(Continuous or special heating where applicable should be recorded)

POSTWELD HEAT TREATMENT (QW-407)

Temperature Range None

Time Range N/A

GAS (QW-408)

	Gas(es)	Percent Composition (Mixture)	Flow Rate
Shielding	Argon	100%	5-35 CFH
Trailing	N/A	N/A	N/A
Backing	Argon	100%	5-25 CFH

ELECTRICAL CHARACTERISTICS (QW-409)

Current AC or DC DC Polarity GTAW= Straight/GMAW=Reverse

Amps (Range) 75-175//110-440 Volts (Range) 12-22//22-36

(Amps and volts range should be recorded for each electrode size, position, and thickness, etc. This information may be listed in a tabular form similar to that shown below.)

Tungsten Electrode Size and Type 3/32" 2% Thoriated
(Pure Tungsten, 2% Thoriated, etc.)

Mode of Metal Transfer for GMAW Pulse
(Spray arc, short circuiting arc, etc.)

Electrode Wire feed speed range 180-280

TECHNIQUE (QW-410)

String or Weave Bead String

Orifice or Gas Cup Size #3L thru #7// 3/8" thru 3/4"

Initial and Interpass Cleaning (Brushing, Grinding, etc.) Brushing - Grinding

Method of Back Gouging None

Oscillation None

Contact Tube to Work Distance N/A

Multiple or Single Pass (per side) Multiple pass

Travel Speed (Range) 2 – 5 I.P.M.//4-8 I.P.M.

Peening None

Other N/A

Weld Layer(s)	Process	Filler Metal Class	Filler Metal Dia.	Current Type Polar.	Current Amp. Range	Volt Range	Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire, Addition, Technique, Torch Angle, Etc.)
1st	GTAW	ERNiCrMo-10	3/32"	Straight	75 – 120	12 – 16	2– 5I.P.M.	
2nd and remainder 1st and or remainder	GTAW	ERNiCrMo-10	3/32"	Straight	95 – 175	14 – 22	3 – 5I.P.M.	
	GMAW	ERNiCrMo-10	0.045"	Reverse	110-440	22-36	4-8 I.P.M.	

To Page No.____

Witnessed & Understood by me, Date Invented by Date

Recorded by 5/20/03

From Page No. ____

Witnessed & Understood by me, | Date | Invented by | Date | Recorded by | Date

Inspection of GTAW GMAW plate

PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE™

PURCHASING

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
11/19/02		370212N	624998

SUGGESTED OR PREVIOUS SUPPLIER: An-Tech Laboratories	DELIVER TO: D. Dunn/bldg. 57
CITY, STATE: Houston, TX	SHIP VIA:
ATTN: Donald Derrick	FOB:
PHONE: 713/644-7501 FAX: 713 644 1400	TERMS:

PURCHASING SELECTED SUPPLIER: SUPPLIER CODE: ATTN: PHONE: FAX:

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
			NDE & destructively test plate #751 for PQR C22-GTAW-GMAW per 1998						
			ASME Section IX as follows:						
A	1	EA	RT inspect	20	06002.01	.081	100	11/30/02	50.00
B	2	EA	Machining reduced section tensile specimens	20	06002.01	.081	100	11/30/02	60.00
C	4	EA	Machining side bend specimens	20	06002.01	.081	100	11/30/02	35.00
D	2	EA	Test tensile specimens yield by Extensometer	20	06002.01	.081	100	11/30/02	22.00
E	4	EA	Test side bend specimens	20	06002.01	.081	100	11/30/02	12.00
			Quality affecting purchase.						

INTERNAL NOTES TO BUYER

SPECIAL INSTRUCTIONS TO SUPPLIER

TOTAL

1. Government Project? YES [ ] NO [X]
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
a [ ] G-1 CONSUMABLE
b [ ] G-2 DELIVERABLE
c [XX] G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER?
[ ] YES
[ ] NO

2. QUALITY ASSURANCE? YES [X] NO [ ]
a ASL REQUIRED? YES [X] NO [ ]
b QA CODES: Q49, Q12, Q20
c INSPECTION CRITERIA
PI to inspect per QAP-016
d QA APPROVAL (IF REQUIRED) DATE 11/20/02

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? YES [ ] NO [ ]
IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
REQUESTOR'S SIGNATURE: Darrell Dunn 11/19 EXT. NO.: 6090
DEPT. / DIVISION APPROVAL DATE 11/19/02
ADMIN. APPROVAL DATE

4. REPAIRS
a IS THIS REQ. FOR A REPAIR? YES [ ] NO [ ]
b IS THE REPAIR ON OR OFF CAMPUS? ON [ ] OFF [ ]
c IF OFF CAMPUS PROVIDE SHIPPING TICKET
NO. ____

CONTRACT REVIEW APPROVAL DATE | BUYER SIGNATURE DATE

SEE INSTRUCTIONS ON REVERSE SIDE

To Page No. ____

Project No. ____ Book No. ____ TITLE ____

Witnessed & Understood by me, | Date | Invented by | Date | Recorded by | Date

INVOICE

An-Tech Laboratories, Inc.

Sold To:
Southwest Research Institute
Attn: Accounts Payable
P.O. Box 28510
San Antonio, Texas 78228-0510

Ship To:
Same

Customer	Slsmn.	Purchase Order No.	Shipped Via	Date Shipped	Terms	Invoice Date	Invoice No.
3600		370212N		12/18/02	NET 30	12/18/02	81766

Status*	Quantity	Item Number	Description	Unit Price	Disc.	Amount
	1	6010	RT INSPECTION	75.00		75.00

An-Tech Laboratories, Inc.

3204 Broadway (77017)
P.O. Box 262265
Houston, Texas 77207-2265

Phone: (713) 644-7501 Fax: (713) 644-1400
SC

Comments
02-2349
Darrell Dunn

SALES TOTAL	75.00
FREIGHT	
MISC. CHGS.	
SALES TAX	
INVOICE TOTAL	75.00

To Page No. ____

From Pa

GCT INSPECTION, INC.
1403 Illinois South Houston, Texas 77587-5420
Phone: 713-943-1760 Fax: 713-943-0433

RADIATION SURVEY AND WELD RADIOGRAPHIC REPORT

PAGE 1 OF 1

DATE 12/16/02 P.O. # 12-270-02 JOB NO. 02-2349
CUSTOMER An Tech JOB LOCATION ART Shop

RT ☑ UT ☐ ASME SEC. I ☐ V ☐ VIII ☐ IX ☐
PT ☐ MT ☐ API 1104 ☐ AWS D1.1 ☐
BH ☐ V ☐ ANSI B31.3 ☐ ANSI B31.4 ☐
OTHER OTHER

OFFICE USE ONLY
ST
OT
ST/TT
OT/TT
JOB #

TRAVEL TO JOB / TRAVEL TO SHOP / TOTAL HOURS TRAVELED
ARRIVE JOB 9:00A
LEAVE JOB 11:00A
TOTAL HOURS AT JOB 2 Hrs.
30 MIN. LUNCH ☐ YES NO ☑
IS THIS YOUR ONLY TICKET FOR THIS COMPANY TODAY? ☑ YES NO ☐
LEVEL II T. Torgerson
LEVEL I A Diehl
LEVEL I
4½ x 10 ⊖
4½ x 17 /
OTHER
TOTAL WELDS /
ACCEPTED
REPAIR
4½ x 10
4½ x 17
OTHER

							COMMENTS
4	751	✓	1F	1	2	1"	Plate

ACC - ACCUMULATION OF DISCONTINUIES
IP - INADEQUATE PENETRATION
IPD - INADEQUATE PENETRATION DUE TO HIGH-LOW
IC - INTERNAL CONCAVITY
IF - INCOMPLETE FUSION
IFD - INCOMPLETE FUSION DUE TO COLD LAP
BT - BURN THROUGH
ESI - ELONGATED SLAG INCLUSIONS
ISI - ISOLATED SLAG INCLUSIONS
GP - GAS POCKET
SP - SPHERICAL POROSITY
CP - CLUSTER POROSITY
WP - WORMHOLE POROSITY
HB - HOLLOW BEAD
C - CRACKED
CC - CRATER CRACK
IU - INTERNAL UNDERCUT
EU - EXTERNAL UNDERCUT
LS - LONG SEAM ALIGNMENT
AB - ARC BURN
R - ROOT PASS OR ADJACENT PIPEWALL
H - HOT PASS
F - FILLER PASS
C - COVER PASS OR ADJACENT PIPEWALL
RH - BETWEEN ROOT AND HOT PASS
RADIOGRAPHY PRODUCES TWO DIMENSIONAL IMAGES ONLY, DEPTH OF DEFECTS REPORTED ARE GOOD FAITH OPINIONS ONLY

CUSTOMER APPROVAL _____ DATE 12/17/02

By signing this report the client representative is certifying the hours and miles to be approved for payment by the client.

AN TECH LABORATORIES 713 8441400 05/20/03 09:43am P. 002

GTAW GMAW REPORT INDICATING INCOMPLETE FUSION

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	5/20/03

From Page No.

Closure of DIV 18 welding activities

Attempts to produce acceptable welds using staff from DIV 18 were not successful

Lack of fusion in the completed welds was documented in RT inspection and reports Attempts to correct technique did not eliminate lack of fusion defects.

Steve Matthews at Haynes International was contacted and the lack of fusion problems were discussed. Staff at Haynes International were contacted for a recommendation on a supplier to weld alloy 22. Two companies in Houston were identified: Mach and Offenhauser.

After contacting staff at both Mach an Offenhauser, a decision was made to use Offenhauser. Mach did not want to weld ~~alloy~~ DD 5/19/03 alloy 22 using the deep V-groove joint design.

Plates of alloy 22 were sent to Offenhauser to weld. Weld filler wire was also sent.

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	5/20/03

Project No._______
Book No._______ TITLE__________

From Page No.____

PURCHASING

PURCHASE REQUISITION
SOUTHWEST RESEARCH INSTITUTE™

90

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
4/7/03		BSHA 351243J	639544

SUGGESTED OR PREVIOUS SUPPLIER: Offenhauser Company	DELIVER TO: D. Dunn/bldg. 57
CITY, STATE: Houston, TX	SHIP VIA
ATTN: Pete Blackburn	F.O.B.
PHONE: 713/590-2531 FAX: 713/928-2465	TERMS

PURCHASING SELECTED SUPPLIER / SUPPLIER CODE / ATTN / PHONE / FAX

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	1	EA	Gas Tungsten arc weld Alloy C-22 plates per Offenhauser WPS P44-13	20	06002.01.	081	100	4/25/03	200.00

Quality & Technical Requirements: Weld will be performed in accordance with Offenhauser WPS P44-13 using ERNiCrMo-10 filler metal supplied by SwRI. Penetrant testing of the root pass shall be performed by qualified personnel. Documentation of the penetrant test results and all personnel qualifications will be provided. Offenhauser will notify SwRI of any reportable indications. Repairs shall not be performed without approval from SwRI. SwRI will supply Alloy 22 plates to be welded. *This is a practice weld piece for the purpose of determining the capability of Offenhauser Company. The results of this weld of Alloy C-22 material with a double-J groove joint will be evaluated using radiographic testing. The completed weld will not be used to produce specimens for corrosion or mechanical property tests.*

INTERNAL NOTES TO BUYER: Please call D. Dunn at x6090 when P.O. # is issued.

SPECIAL INSTRUCTIONS TO SUPPLIER

TOTAL

1. Government Project? [X] YES [ ] NO
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
a [X] G-1 CONSUMABLE
b [ ] G-2 DELIVERABLE
c [ ] G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? [X] YES [ ] NO

2. QUALITY ASSURANCE? [X] YES [ ] NO
a ASL REQUIRED? [ ] YES [X] NO
b Q A CODES: Q20
c INSPECTION CRITERIA: *Receiving inspection per QAP-016.*
d QA APPROVAL (IF REQUIRED) *[signature]* DATE *4/8/2003*

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? [ ] YES [X] NO
IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
REQUESTOR'S SIGNATURE: Darrell Dunn EXT. NO. 6090
DEPT. / DIVISION APPROVAL *[signature]* DATE *4/8/03*
ADMIN. APPROVAL DATE

4. REPAIRS
a IS THIS REQ. FOR A REPAIR? [ ] YES [ ] NO
b IS THE REPAIR ON OR OFF CAMPUS? [ ] ON [ ] OFF
c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO. ____

CONTRACT REVIEW APPROVAL / DATE / BUYER SIGNATURE / DATE

SEE INSTRUCTIONS ON REVERSE SIDE

ALLOY C-22 HEAT ~~2277-8~~ 2277-1-3164 20-01402-571-25 *(DD 5/20/03)*
NOTEBOOK 503 P40 SN 005/006 622 FILLER XX 2432 BG

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by *Darrell Dunn*	*5/20/03*

TITLE__________ Project No._______
Book No._______

From Page No.____

03/06/2003 15:42 7139282465 OFFENHAUSER PAGE 05/14

Offenhauser Company
2201 Telephone Road Houston, TX 77223
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No.: **P44-13** Date: 05/04/86 Revision No.: 4 Date: 10/31/94
Supporting PQRs: P44-13

BASE METAL (QW-403, QW-405)
P No. 44 to P No.: 44
Thickness range. 0.1875" to 1.5000"
Position(s). All positions
Progression. Vertical Up
notes

JOINT (QW-402)
Joint design Groove/Fillet(see pg 2)
Backing..... With backing only
Backing Matl Weld metal
Fillet Weld Size All (QW-451.4)
notes

PREHEAT (QW-406)
Minimum Temperature. 50 Degrees F.
Max. Interpass Temp. 300 Degrees F.
Preheat Maintenance. None

POSTWELD HEAT TREATMENT (QW-407)
Temperature range None
Time range None
notes

Process / type	All pass(es) GTAW / manual	None
Process thickness limit.	1.5000" Max.	None
GAS (QW-408)		
Shielding Gas / CFH.....	99.998% Argon / 35-40	None / -
Trailing Gas / CFH......	None / -	None / -
Backing Gas / CFH.......	99.998% Argon / 15-20	None / -
FILLER METAL (QW-404)		
AWS classification......	(F#44), Table, page 3	None
SFA Spec. No. & F No....	SFA#: 5.14 F#: 44	SFA#: None F#: -
A No. or Chem. Comp.....	(NiCrMo)	None
Filler metal trade name.	n/r	None
SAW flux trade name/type	N/A / -	None / -
Elec./Wire size (in) ...	1/16 | 3/32 | 1/8	- | - | -
ELECTRICAL (QW-409)		
Welding amperage range..	70-150 | 80-180 | 130-275	- | - | -
Welding voltage range...	n/r | n/r | n/r	- | - | -
Travel speed (ipm)......	Var. | Var. | Var.	- | - | -
Max. Heat Input (J/in)..	None	None
Tungsten Type/Size......	EWTh-2 / 1/16" - 3/16"	N/A / -
Current & Polarity......	DCEN (straight)	N/A
TECHNIQUE (QW-410)		
String / weave bead.....	String Bead	N/A
Orifice / gas cup.......	# 5 to # 10	None
Contact tube to work....	N/A	None
Oscillation.............	N/A	None
Mult./Single electrode..	Single Electrode	None
Other Technique Notes...		N/A

Multiple or Single Pass (per side).... Multiple Passes None
(n1) No peening done with this procedure.
(n2) No Pass > 1/2" t.
(n3) Pulsing current - None.
(n4) Filler metal bare (solid).
(n5) No supplementary filler metal will be used with this procedure.
(n6) No consumable insert will be used with this procedure.
(n7) No welding shall be performed without filler metal.

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by *Darrell Dunn*	*5/20/03*

WELDING PROCEDURE SPECIFICATION (WPS) Page 2 of 3

WPS No.: P44-13 Date: 05/04/86 Revision No.: 4 Date: 10/31/94

JOINT (QW-402)

Single-V groove
Backing : gouged & back welded
Root Opening: 1/4" max.
Groove Angle: 50 degree min.
Root Face : 3/16" max.

Double-Bevel groove
Backing : gouged & back welded
Root Opening: 1/4" max.
Groove Angle: 45 degree min.
Root Face : 3/16" max.

Double-V groove
Backing : gouged & back welded
Root Opening: 1/4" max.
Groove Angle: 45 degree min.
Root Face : 3/16" max.

Single-J groove
Backing : gouged & back welded
Root Opening: 1/8" max.
Groove Angle: see specs. or
Root Face : design drawing

Double-J groove
Backing : gouged & back welded
Root Opening: 1/8" max.
Groove Angle: see specs. or
Root Face : design drawing

Single/Double Fillet
Backing :
Root Opening: 3/16" max.
Weld Size : Required fillet plus root opening

Square groove
Backing : T-joint
Root Opening: 1/32" max.

Square groove
Backing : gouged & back welded
Root Opening: 3/16" min.

WELD JOINT DESCRIPTIONS SHOWN ARE NOT INCLUSIVE OF ALL OF THOSE FOUND ON A JOB SITE. WELD JOINT DESIGN REFERENCE IN AN ENGINEERING SPECIFICATION OR DESIGN DRAWING SHALL TAKE PRECEDENCE OVER WELD JOINTS SHOWN IN THIS WPS.

Initial cleaning With SS brush clean 2" both sides of weld joint.
Method of back gouging AIRARC AND/OR GRIND UNTIL ALL DEFECTS ARE REMOVED

(a)

(b)

(c)

(d)

(e)

We certify that the statements in this record are correct and in accordance with the requirements of Sections IX and VIII of the ASME Code.

Prepared By: Thomas Soltis (10/31/94) QC Manager

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Edward Dan	5/20/03

Welding Procedure Specification (WPS)

WPS No.: P44-13 Revision No.: 4 Page 3 of 3

SFA-5.14, F-NO. 44 FILLER METAL SELECTION	
ERNiMo-1	ERNiMo-2
ERNiMo-3	ERNiMo-7 (ALLOY B-2)
ERNiCrMo-4	ERNiCrMo-5
ERNiCrMo-7 (ALLOY C-4)	ERNiCrMo-10
ERNiCrMo-14	ERNiCrMo-17

* UNS #N06200 SFA 5.14 F#44 See code case CC2337 HASTELLOY C-2000

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Edward Dan	5/20/03

Offenhauser Company
2201 Telephone Road Houston, TX 77223
Procedure Qualification Record (PQR)

PQR No.: P44-13 Date: 05/04/84 WPS No.: P44-13

JOINT DESIGN (QW-402)
WELD JOINT CONFIGURATION
Single-V groove
Back-gouged & back welded
Groove Angle : 60 Degrees
Root Opening : 3/16" Inches
Root Face : 3/32" Inches

note: _____

POSITION (QW-405)
Position of Joint : 1G - Flat
Progression: N/A
note: _____

BASE METAL (QW-403)
Material form- Plate
Material Spec. SB-575, Annealed, N10276
To ..... SB-575, Annealed, N10276
P No. 44 to P No. 44
Thickness (in) 0.7500

HEAT TREATMENT (QW-406, QW-407)
Preheat Temperature: 50 Degrees F.
Preheat Maintenance: None
Max.Interpass Temp.: 300 Degrees F.
PWHT temperature: None Degrees F.
PWHT Holding time(hr): None
note: _____

	All pass(es) GTAW / manual	None
GAS (QW-408)		
Shielding Gas / CFH.....	99.998% Argon / 35-40	None / -
Trailing Gas / CFH.....	None / -	None / -
Backing Gas / CFH.....	99.998% Argon / 15-20	None / -
FILLER METAL (QW-404)		
AWS Classification.....	ERNiCrMo-4	None
SFA Spec. No. & F No....	SFA#: 5.14 F#: 44	SFA#: None F#: -
A No. or Chem. Comp.....	(NiCrMo)	None
Filler Metal Trade Name.	n/r	None
SAW Flux Trade Name/Type	N/A / -	None / -
Weld Deposit 't' (in)...	0.7500	None
Elec./Wire Size (in)....	3/32 | - | -	- | - | -
ELECTRICAL (QW-409)		
Amperage USED	90-175 | - | -	- | - | -
Voltage USED	16-23 | - | -	- | - | -
Travel Speed (ipm).....	2-5 | - | -	- | - | -
Max. Heat Input (J/in)..	None	None
Tungsten Type & Size....	EWTh-2 / 3/32"	N/A / -
Current Type/Polarity...	DCEN (straight)	N/A
TECHNIQUE (QW-410)		
String or Weave Bead....	String Bead	N/A
Orifice/Gas Cup Size....	# 8	None
Contact Tube to Work....	N/A	None
Oscillation.....	N/A	N/A
Mult./Single Electrodes.	Single Electrode	N/A
Other Technique Notes...		None

Multiple or Single Pass (per side).... Multiple Passes

(n1) Peening was not used with this weld test.
(n2) No Pass > 1/2" t.
(n3) Filler metal bare (solid).
(n4) No supplementary filler metal will be used with this procedure.
(n5) No consumable insert will be used with this procedure.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	5/20/03

Procedure Qualification Record (PQR)

PQR No.: P44-13 Page 2 of 2

TENSILE TEST (QW-150)

Specimen No.	Width (in.)	Thick. (in.)	Area (sq.in.)	Ultimate total load (lb)	Ultimate stress (psi)	Type of failure and location
247-1	1.5020	0.5710	0.8576	94200	109800	Base metal
247-2	1.501	0.5940	0.8916	97500	109400	Base metal

GUIDED BEND TEST (QW-160)

Figure No. and Type	Result	Figure No. and Type	Result
QW-462.2 Side bend	Acceptable	QW-462.2 Side bend	Acceptable
QW-462.2 Side bend	Acceptable	QW-462.2 Side bend	Acceptable

TOUGHNESS TEST (QW-170)

Spec. No.	Notch Location	Notch Type	Test Temp. (°F)	Impact Values (ft-lbs)	Lateral exp. Shear %	Lateral exp. Mils	Drop weight break
None							

HARDNESS TEST - No hardness test

Base metal -1- -2- -3- HAZ -1- -2- -3- WM -1 -2- -3-

(Heat Affected Zone=HAZ, Weld Metal=WM)

Notes: RADIOGRAPH ACCEPTABLE PENETRANT TEST ACCEPTABLE

Stamp: E Welder's Name: VERDE, VICTOR ID: 120
Tests conducted by: BODYCOTE-Metallon Lab. Laboratory Test No: 700-84
PQR was done & welding of coupon was witnessed by : Offenhauser Company

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: _____ (05/04/84) QC Manager

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	5/20/03

Witnessed & Understood by me, Date

Invented by

Recorded by

Date 5/20/03

To Page No.

From Page No.

Project No.

Book No.

TITLE

PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE™

PURCHASING

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
5/9/03			639551

SUGGESTED OR PREVIOUS SUPPLIER	DELIVER TO	PURCHASING SELECTED SUPPLIER
IHI Southwest	D. Dunn/bldg. 57	
CITY, STATE	SHIP VIA	
ATTN: Fred Anderson	F.O.B.	SUPPLIER CODE / ATTN
PHONE 256-4108 / FAX 521-2311	TERMS	PHONE / FAX

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	1	EA	Radiographic inspection of Alloy 22						
			weld	20	06002.01.	081	100	5/16/03	440.00
			Quality & Technical Requirements: Quality affecting item. Test procedures must be compliant						
			with ASME code. NDE certifications required for individuals performing and reviewing radiographic						
			inspection.						

INTERNAL NOTES TO BUYER: Call Darrell Dunn at x6090 with P.O. #

SPECIAL INSTRUCTIONS TO SUPPLIER

TOTAL

1. Government Project? YES [X] NO [ ]

IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)

a [X] G-1 CONSUMABLE
b [ ] G-2 DELIVERABLE
c [ ] G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER?
[ ] YES
[X] NO

2. QUALITY ASSURANCE? YES [X] NO [ ]

a ASL REQUIRED? YES [X] NO [ ]
b Q A CODES: Q20, Q12
c INSPECTION CRITERIA: RECEIVING INSPECTION PER QAP-016.
d QA APPROVAL (IF REQUIRED) DATE 5/9/2003

3. SOURCING NOTES

IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? YES [ ] NO [X]

IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.

REQUESTOR'S SIGNATURE: Darrell Dunn — EXT. NO.: 6090
DEPT. / DIVISION APPROVAL — DATE: 5/9/03
ADMIN. APPROVAL — DATE

4. REPAIRS

a IS THIS REQ. FOR A REPAIR? YES [ ] NO [ ]
b IS THE REPAIR ON OR OFF CAMPUS? ON [ ] OFF [ ]
c IF OFF CAMPUS PROVIDE SHIPPING TICKET
NO. _____

CONTRACT REVIEW APPROVAL — DATE — BUYER SIGNATURE — DATE

SEE INSTRUCTIONS ON REVERSE SIDE

ISwT RADIOGRAPHIC INTERPRETATION RECORD

PROJECT No. :	SITE :	DATE : (DAY - MONTH - YEAR)	SHEET No:
03-0313	SWRI	13-May-03	WA-02-513-01

COMPONENT IDENTIFICATION:	FILM INTERPRETATION BY:	SNT LEVEL:	ACCEPTANCE STANDARD:
Plate 2277-1-3164, S/N 005/006	William Angell	III	ASME Sec. III

FILM, SEAM OR JOINT NUMBER	FILM INTERVAL NUMBER	PENETRAMETER SIZE AND CONDITION	ACCEPT	REJECT	SLAG	POROSITY	CRACK	LACK OF PENETRATION	LACK OF FUSION	UNDERCUT	SURFACE	SHRINK	HOT TEAR	SAND	CHAPLETS	DATE FILM EXPOSED	REPAIR No.	REMARKS
	1-2	20 2T		X		X			X							13-May	no	Area of L.F. 2.5" from 2 side by .3" length
																		Porosity appears to be on crown pass

REMARKS

REVIEWED BY	SNT LEVEL	DATE :	PAGE
William Angell	III	13-May-03	1 of 1

ISwT Form [illegible]02 (Rev. 08/00)

Project No._____

Book No._____ TITLE_____

From Page No.____

ISwT RADIOGRAPHIC EXAMINATION RECORD

PROJECT No.: 03-0313 | SITE: SwRI | DATE: (DAY - MONTH - YEAR) 12-May-03 | REV: 0 | SHEET No: WA-01-512-01 | CHG: 0 | ICN: ☑ N/A

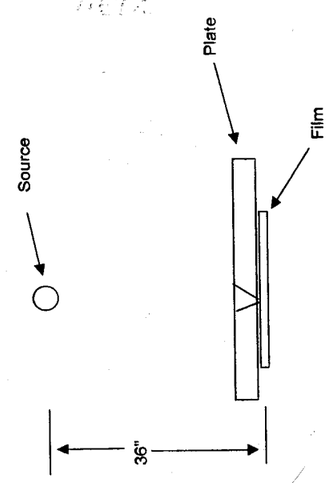
MATERIAL THICKNESS: 1.0" | MATERIAL DIAMETER: Plate | MATERIAL TYPE: S.S | WELD CROWN HEIGHT: 1/16 | WELD TYPE: Butt | PROCEDURE: SWR-NN-RT1 | FILM TECHNIQUE: ☑ SINGLE WALL ☐ DOUBLE WALL

ISOTOPE: n/a | DIA. X LENGTH: n/a | CURIES: n/a | DISTANCE: n/a | TIME: n/a | EFFECTIVE SHARPNESS: 0.016 | FILM BRAND: Kodak T | FILM SIZE: 4.5 X 17"

X-RAY: Sperry | Kv: 290 | MA: 10 | DISTANCE: 36" | TIME: 12min | FOCAL SPOT SIZE: .19" | EXAMINER: William Angell | SNT LEVEL: III

QUALITY LEVEL: 2T | PENETRAMETER ID: 20 ASTM | FILM PROCESSING: Manual | SHIM MATERIAL: S.S. | SHIM THICKNESS: .06"

SHOOTING SKETCH



1. No. of Views 1
2. Location of Radiation Source and Beam Angle 90
3. Location Markers 1-2
4. Screen Typ Lead
5. Thickness (in.) Front: 0.01 Back: 0.01
6. Signal Lead ☐ Double Lead ☑
7. No. of Film 2

COMPONENT ID : Plate 2277-1-3164, S/N 005/006

REVIEWED BY William Angell

PAGE 1 OF 1 | DATE: 12-May-03 | SNT LEVEL III

ISwT Form RT-01 (Rev. 06/00)

To Page No._____

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by 5/20/03

Project No._____

TITLE_____ Book No._____

From Page No.____

07/22/2003 13:30 7135902557 OFFENHAUSER PAGE 01

OFFENHAUSER COMPANY
LIQUID PENETRANT TEST CERTIFICATE

CLIENT: SOUTHWEST RESEARCH INST. JOB # 3769

PENETRANT TYPE: CHEMETALL-OAKITE LOT # P6R

DEVELOPER TYPE: CHEMETALL-OAKITE LOT # 9D1B

DATE OF TEST: 4-28-2003

ITEM INSPECTED: 1" TEST PLATE 12'X 12" FINAL PASS ON C-22 MATERIAL WELDED WITH ERNiCrMo-10

✓ ACCEPTED ___ REJECTED

RESULTS: NO RELEVENT INDICATION NOTED

Performed in accordance with ASME Section VIII and Offenhauser Procedure PT-2

PERFORMED BY: OFFENHAUSER COMPANY DATE: 04-28-2003

Q. C. INSP: DATE: 04-28-2003

Q. C. MANAGER: DATE: 04-28-2003

CLIENT INSP: _____ DATE:_____

04/23/96

To Page No._____

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by 7/22/03

From Page No.____

07/22/2003 13:30 7135902557 OFFENHAUSER PAGE 02

OFFENHAUSER COMPANY
LIQUID PENETRANT TEST CERTIFICATE

CLIENT: SOUTHWEST RESEARCH INST. **JOB #** 3769

PENETRANT TYPE: CHEMETALL-OAKITE **LOT #** P6R

DEVELOPER TYPE: CHEMETALL-OAKITE **LOT #** 9D1B

DATE OF TEST: 4-24-2003

ITEM INSPECTED: 1" TEST PLATE 12'X 12" ROOT PASS ON C-22 MATERIAL WELDED WITH ERNiCrMo-10

✓ **ACCEPTED** ___ **REJECTED**

RESULTS: NO RELEVENT INDICATION NOTED

Performed in accordance with ASME Section VIII and Offenhauser Procedure PT-2

PERFORMED BY: OFFENHAUSER COMPANY **DATE:** 04-24-2003

Q. C. INSP: _____ **DATE:** 04-24-2003

Q. C. MANAGER: _____ **DATE:** 04-24-2003

CLIENT INSP: _____ **DATE:** _____

04/23/96

To Page No._____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	7/22/03

From Page No.____

OFFENHAUSER COMPANY

CERTIFICATE OF QUALIFICATION

We hereby certify that employee Gene E. Estes is qualified to perform the duties and assume the responsibilities of Level II in Liquid Penetrant Testing nondestructive test method, effective August 11, 19 02 to August 11, 20 05 . (**Original Examination 09/20/88**)
This certification is based on the following, as checked.

1. _____ Record of education, experience and training (attached)
2. _____ Qualification Examinations (attached)
3. X Recertified per SNT-TC-1A, 1984 Edition, Paragraphs 9.7.1(1) & 10.2

SECTION	GRADE	PERCENTILE	SCORE
GENERAL	86.60	0.3	25.98
SPECIFIC	96.60	0.3	28.98
PRACTICAL	100.00	0.4	40.00
			94.96

The above individual has satisfactorily completed the physical, training, and certification requirements of WP-001, Rev 0. Support documents are maintained by Offenhauser Company and may be examined by authorized client and insurance company representatives.

Signed: _____ Date: August 11, 2002
Gene E. Estes, Quality Control Manager

Vision Examination Dates and Results

Expiration Date	Results	Examiner
04 / 16 / 2000	Acceptable 04 / 16 / 99	Thomas O. Bates
04 -16 / 2005	Acceptable 04 /16 / 02	Gene E. Estes

Results of Periodic Evaluation

Date	Results	Active During Proceeding 12 months	Evaluator
04 / 16 / 99	Acceptable	Yes	Thomas O. Bates
04 / 16 /02	Acceptable	Yes	Gene E. Estes

P.O. BOX 230068, 2201 TELEPHONE ROAD, HOUSTON, TEXAS 77223-0068
PHONE 713/928-2981 / FAX 713/928-2465

To Page No._____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	7/23/03

From Page No.______

PURCHASE REQUISITION
SOUTHWEST RESEARCH INSTITUTE
PURCHASING

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
5/21/03		383579S	624837

DELIVER TO: Darrell Dunn/bldg. 57
SHIP VIA:
F.O.B.:
TERMS:

SUGGESTED OR PREVIOUS SUPPLIER: Welders Supply
CITY, STATE:
ATTN:
PHONE: 684-0232
FAX:

PURCHASING SELECTED SUPPLIER:
ATTN:
SUPPLIER CODE:
PHONE:
FAX:

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	20	lb	3/32" dia x 36" long bare electrodes ER NiCrMo-10 filler metal	20	06002.01	.081	100	5/30/03	21.49

Quality & Technical Requirements: Quality affecting purchase.

Material must meet the compositional specifications SFA A5.14 AWS classification ERNiCrMo-10 for weld filler metal. Vendor will provide a copy of the mill test report containing for the plate with the heat number. An independent chemical analyses of the material will be performed. Acceptance of the material will be determined by the outcome of the independent chemical analyses.

PI to inspect per QAP-016 upon receipt [initials]

TOTAL

SPECIAL INSTRUCTIONS TO SUPPLIER

INTERNAL NOTES TO BUYER: Call Darrell Dunn at x6090 with P.O.# when issued.

1. Government Project? [X] YES [ ] NO
   IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
   a [X] G-1 CONSUMABLE
   b [ ] G-2 DELIVERABLE
   c [ ] G-3 ACCOUNTABLE / REPORTABLE
   d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? [X] YES [ ] NO
2. QUALITY ASSURANCE? [X] YES [ ] NO
   a ASL REQUIRED? [X] YES [ ] NO
   b QA CODES: Q4
   c INSPECTION CRITERIA
   d QA APPROVAL (IF REQUIRED) [signature] DATE 5/21/03
3. SOURCING NOTES
   IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? [ ] YES [X] NO
   IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
4. REPAIRS
   a IS THIS REQ. FOR A REPAIR? [ ] YES [ ] NO
   b IS THE REPAIR ON OR OFF CAMPUS? [ ] ON [ ] OFF
   c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO. ______

REQUESTOR'S SIGNATURE: Darrell Dunn — EXT. NO. 6090 — DATE
DEPT./DIVISION APPROVAL: [signature] — DATE 5/21
ADMIN. APPROVAL — DATE
BUYER SIGNATURE — DATE
CONTRACT REVIEW APPROVAL — DATE

SEE INSTRUCTIONS ON REVERSE SIDE

To Page No.______

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	7/23/03

From Page No.______

06/10/2003 22:01 7136449628 AMERICAN FILLER META PAGE 02

8

THE LEADING MANUFACTURER OF STAINLESS STEEL, NICKEL ALLOYS AND WELDING PRODUCTS
EXECUTIVE OFFICES: 370 FRANKLIN TURNPIKE, MAHWAH, NJ 07430-2259 PHONE 201-529-0900 FAX 201-529-1074 E-MAIL: sales@techalloy.com

UNION, IL 815-923-2131 FAX 815-923-2126
UNION, IL (WELDING) 815-923-2131 FAX 815-923-7242
TECHALLOY Company, Inc. Arcelor Group
BALTIMORE, MD 410-633-9300 FAX 410-633-2033
HOUSTON, TX 713-466-1000 FAX 713-466-7425
PERRIS, CA 909-657-2105 FAX 909-943-6061

BALTIMORE WELDING DIVISION
2310 CHESAPEAKE AVE. BALTIMORE, MD 21222-4098
TEL: 410-633-9300 FAX: 410-633-2033

CERTIFIED MATERIAL TEST REPORT

SOLD TO:
SHIP TO:

CUSTOMER'S PO NO.	TYPE OF CERT	CUSTOMER	TECHALLOY ORDER NO.	WORK ORDER	DATE SHIPPED
	Actual/Lot			4013936	0/00/00

SPECIFICATIONS:
AWS/SFA 5.14
CERTIFIED BY CWB

ITEM DESCRIPTION

DESCRIPTION	SPEC. CLASS	HEAT	QTY SHIP	SHIP FROM
Techalloy 622 .0938 36"Printed	ERNICRMO10	WN813		006

CHEMICAL ANALYSIS

NI	C	MN	P	S	SI	CR
57.50	.003	.34	.003	.001	.02	22.24
MO	FE	V	CU	CO	W	
13.70	2.37	.01	.01	.41	3.13	

MECHANICAL PROPERTIES

AS WELDED PROPERTIES:

POST WELD HEAT TREAT PROPERTIES:

I certify the chemical analysis and physical and mechanical test results reported above are correct as contained in the records of the company.
Very truly yours,
TECHALLOY
Perry Canning [signature]
AUTHORIZED SIGNATURE

Form: 401/CERTNICAT, 01/38/02

To Page No.______

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	7/23/03

From Page No.____

WELDERS SUPPLY COMPANY

5406 Jackwood
San Antonio, Texas 78238
Telephone 210-684-0232 Fax 210-684-1445

NUMBER
WS 17842

DELIVERY TICKET
PAGE 1 OF 1

SOLD TO: 181000

SOUTHWEST RESEARCH INST.
ATTN: ACCTS PAYABLE
P.O. BOX 28510
SAN ANTONIO, TX 78228

SHIP TO: 181000

SOUTHWEST RESEARCH INST.
ATTN: ACCTS PAYABLE
P.O. BOX 28510
SAN ANTONIO, TX 78228

210-684-

ORDERED DATE/TIME	SHIPPED DATE/TIME	ORDER ENTERED BY	HARDGOODS P.O.#	GAS P.O.#	SHIP VIA	SALESMAN	TERMS
5/29/2003	6-02-03	DONAD JAMES	3835795		O T	HOUSE ACCOUNT	NET 10TH

H M	DESCRIPTION	HAZ CLASS	ID#	QUANTITY SHIPPED	UNIT	QUANTITY ORDERED	LOC	PRODUCT NUMBER	CYLINDER SHIP	CYLINDER RET	UNIT PRICE	DISCOUNT	AMOUNT
	3/32 X 36" ERNICRMO-10			20	LB	20	1	AFM ERNICRMO-10 3/32			19.4500		

Delivered By:_____

57
20
Darrell Dunn
6/2/03

DO NOT USE GREASE, OIL OR LUBRICANT OF ANY KIND ON CYLINDER VALVES, GAUGES, REGULATORS, OR OTHER FITTINGS WHICH COME IN CONTACT WITH OXYGEN AS SUCH IS DANGEROUS AND MAY CAUSE EXPLOSIONS.

ORDER PLACED BY

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION

EMERGENCY CONTACT NUMBER FOR ACCIDENTS OR SPILLS ONLY
1-800-633-8253

SUBTOTAL
HAZ MAT CHARGE
DELIVERY CHARGE
SALES TAX
TOTAL

THE PURCHASER, BY ACCEPTANCE AND USE OF THE GOODS SPECIFIED HEREIN, ACCEPTS AND AGREES TO BE BOUND BY THE CONDITIONS PRINTED ON THE REVERSE SIDE OF THIS RECEIPT.

RECEIVED BY D. Kostrin

To Page No._____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	7/23/03

From Page No.____

To Page No._____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	7/23/03

PURCHASING

PURCHASE REQUISITION

REQUISITION DATE: 6/12/03 | ORDER DATE | THIS / HSE ORDER NUMBER: 376238N | REQ. NO: 639557

SOUTHWEST RESEARCH INSTITUTE™

DELIVER TO: Darrell Dunn/bldg. 57 | PURCHASING SELECTED SUPPLIER

SUGGESTED OR PREVIOUS SUPPLIER: Staveley Services Materials Testing

SHIP VIA | F.O.B. | TERMS

CITY, STATE: Glendale Heights, IL 60139 | ATTN: | SUPPLIER CODE | PHONE | FAX

ATTN: Frank Doumez | PHONE: 630/681-0008 | FAX: 630/871-5520

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	1	EA	Chemical analyses of ER NiCrMo-10 filler metal	20	06002.01.	081	100	6/23/03	120.00

Quality & Technical Requirements:

Attachments: See attached documentation.

TOTAL

SPECIAL INSTRUCTIONS TO SUPPLIER

INTERNAL NOTES TO BUYER: Call D. Dunn at x6090 when P.O.# is issued.

1. Government Project? YES NO
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
a ☐ G-1 CONSUMABLE
b ☐ G-2 DELIVERABLE
c ☐ G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? ☐ YES ☐ NO

2. QUALITY ASSURANCE? YES NO
a ASL REQUIRED? YES NO
b QA CODES: Q20, Q12
c INSPECTION CRITERIA: Receiving inspection per QAP-016
d QA APPROVAL (IF REQUIRED) DATE 6/19/03

CONTRACT REVIEW APPROVAL DATE

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? YES NO
IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
REQUESTOR'S SIGNATURE: Darrell Dunn | EXT. NO. 6090 | DATE 6/12/03
DEPT. DIVISION APPROVAL | DATE
ADMIN APPROVAL | DATE

4. REPAIRS
a IS THIS REQ. FOR A REPAIR? YES NO
b IS THE REPAIR ON OR OFF CAMPUS? ON OFF
c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO.

BUYER SIGNATURE | DATE

SEE INSTRUCTIONS ON REVERSE SIDE

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by 7/23/03

ACCREDITED Certificate # 2900.01 Certificate # 2900.02

staveleyservices MATERIALS TESTING

192 Intermountain Blvd
Glendale Heights, IL 60139
Telephone 630-681-0008
Facsimile 630-871-5520
www.staveleynet.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 06/11/03 ALLOY 622 WELD
FILLER MTS HT# WN813 3/32"
PER AWS A5.14 ERNiCrMo-10
REPORT DATE: 06/26/2003

LAB NO: 0623-043 / 01 RECEIVED DATE: 06/23/2003 JOB NO: 06/24 #13

CHEMICAL ANALYSIS

Si	.03	Mn	.28	C	.015
P	.008	S	.001	Ni	BASE
Cr	22.40	Mo	13.68	Cu	.01
V	<.01	Co	.26	Fe	2.84
W	2.81	Others Total	<.50		

TEST METHODS: ASTM E-1024 LATEST REVISION ; ASTM E-1019 LATEST REVISION ;

ICP* ;

MEETS REQUIREMENTS OF AWS A5.14 FOR ERNiCrMo-10

7/23/03

Q.A. INSPECTOR

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

PAGE 1 OF 1

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by 7/23/03

From Page No.____

PURCHASING

PURCHASE REQUISITION
SOUTHWEST RESEARCH INSTITUTE™

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
3/10/03		383260 S	637663

SUGGESTED OR PREVIOUS SUPPLIER: Texas Toolmakers
CITY, STATE:
ATTN: Mike Ridgway
PHONE: 494-3651 FAX: 494-6139
DELIVER TO: D. Dunn/bldg. 57
SHIP VIA:
F.O.B.:
TERMS:
PURCHASING SELECTED SUPPLIER:
SUPPLIER CODE: ATTN:
PHONE: FAX:

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	3	EA	Wire EDM welded specimens into two pieces along length of weld	20	06002.01.	081	100	3/21/03	288.00
			Quality & Technical Requirements: Specimens cut in half along 24 inch length using wire EDM to conserve material.						
			"Quality Affecting Purchase"						

INTERNAL NOTES TO BUYER: Call D. Dunn at x6090 with P.O. number
SPECIAL INSTRUCTIONS TO SUPPLIER:
TOTAL

1. Government Project? [X] YES [ ] NO
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
a [X] G-1 CONSUMABLE
b [ ] G-2 DELIVERABLE
c [ ] G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? [XX] YES [ ] NO

2. QUALITY ASSURANCE? [X] YES [ ] NO
a ASL REQUIRED? [X] YES [ ] NO
b QA CODES: Q20
c INSPECTION CRITERIA: P.I. To inspect per QAP-016
d QA APPROVAL (IF REQUIRED) [signature] DATE 3/10/03

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? [ ] YES [X] NO
IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
REQUESTOR'S SIGNATURE: Darrell Dunn EXT. NO. 6090
DEPT. / DIVISION APPROVAL: [signature] DATE 3/10/03
ADMIN. APPROVAL: DATE

4. REPAIRS
a IS THIS REQ. FOR A REPAIR? [ ] YES [ ] NO
b IS THE REPAIR ON OR OFF CAMPUS? [ ] ON [ ] OFF
c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO. ____

CONTRACT REVIEW APPROVAL DATE BUYER SIGNATURE DATE
SEE INSTRUCTIONS ON REVERSE SIDE

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	7/24/03

From Page No.____

Cutting of Plates 759, 760 and 784

Plates 759, 760 and 784 (NOTEBOOK ~~73~~ 503 p73 and 579 page 15) [DD 7/24/03] were cut in half along the centerline of the weld. Welds were cut in half because extensive lack of fusion prevented useful testing. A new weld joint will be machined in the plates and plates will be rewelded.

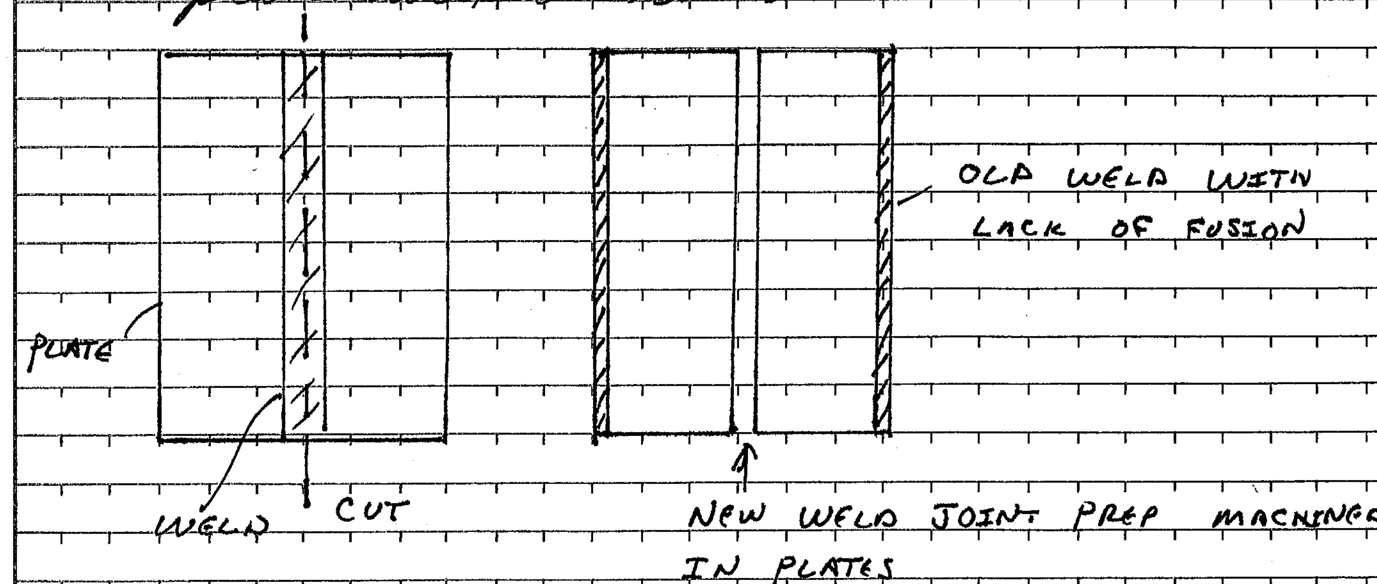


PLATE INFORMATION

PLATE 759 AND 760 — HEAT 2277-1-3164 (NOTEBOOK 503 PAGE 5)
FILLER 622 HEAT XX1973 BG 12 (P 18 NOTEBOOK 503)
WPS C22-GTAW-1 NOTEBOOK 503 P78)

PLATE 784 — HEAT 2277-1-3164 (NOTEBOOK 503 PAGE 5)
FILLER 622 HEAT XX 2432 BG (NOTEBOOK 503 p 86)
WPS C22-GTAW-1 (NOTEBOOK 503 P 71)

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	7/24/03

From Page No.____

SOUTHWEST RESEARCH INSTITUTE™
PURCHASE REQUISITION

REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.
5/21/03		3836745	624836

DELIVER TO: Darrell Dunn/bldg. 57

SUGGESTED OR PREVIOUS SUPPLIER: Industrial Mechanical Company

CITY, STATE:

ATTN: A.E. Sonny Rogers, Jr.

PHONE: 662-4596 FAX: 662-4503

PURCHASING SELECTED SUPPLIER / SUPPLIER CODE / ATTN / PHONE / FAX / SHIP VIA / F.O.B. / TERMS

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	4	EA	C-22 weld specimens CNWRA drawing 20-06002-01-081-001	20	06002.01	.081	100	6/16/03	337.50
B	1	EA	Delivery of machined specimens	20	06002.01	.081	100	6/16/03	90.00

Quality & Technical Requirements: Specimens machined as per CNWRA drawing 20-06002-01-081-001. Dimensional inspection per dimensions and tolerances identified in CNWRA drawing 20-06002-01-081-001 is required.
Specimens cut from alloy 22 plate per 20-06002-01-081-002.

Attached drawings and quotes.

P.I. to inspect per QAP-016 upon receipt dcc

TOTAL

INTERNAL NOTES TO BUYER: Call Darrell Dunn at x6090 with P.O. # when issued.

SPECIAL INSTRUCTIONS TO SUPPLIER

1. Government Project? [X] YES [ ] NO
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)
a [X] G-1 CONSUMABLE
b [ ] G-2 DELIVERABLE
c [ ] G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? [X] YES [ ] NO

2. QUALITY ASSURANCE? [X] YES [ ] NO
a ASL REQUIRED? [X] YES [ ] NO
b QA CODES: Q11, Q20
c INSPECTION CRITERIA

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? [ ] YES [X] NO
IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.

REQUESTOR'S SIGNATURE: Darrell Dunn EXT. NO. 6090 DATE
DEPT./DIVISION APPROVAL: [signature] 5/21
QA APPROVAL (IF REQUIRED): [signature] DATE 5/21/03
ADMIN. APPROVAL DATE
BUYER SIGNATURE DATE
CONTRACT REVIEW APPROVAL DATE

4. REPAIRS
a IS THIS REQ. FOR A REPAIR? [ ] YES [ ] NO
b IS THE REPAIR ON OR OFF CAMPUS? [ ] ON [ ] OFF
c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO. ______

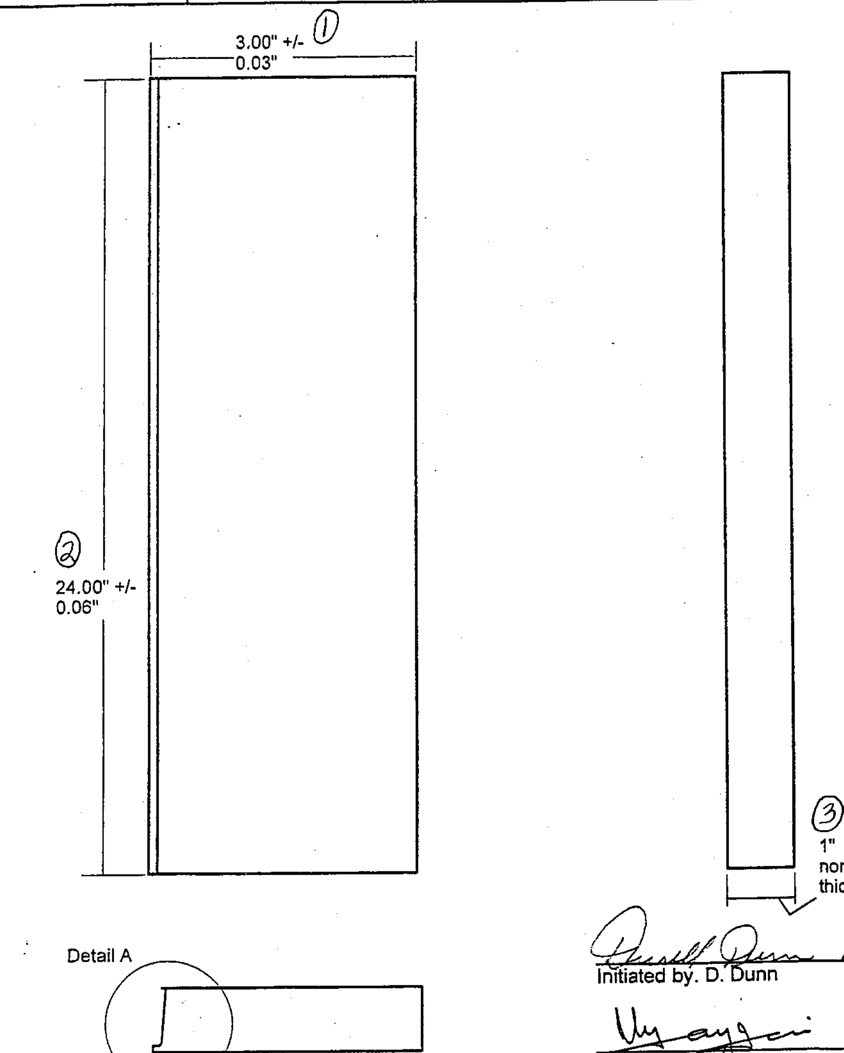
SEE INSTRUCTIONS ON REVERSE SIDE

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	7/24/03

From Page No.____

Darrell S. Dunn SwRI-CNWRA Phone: (210) 522-6090 Fax: (210) 522-5184 e-mail: ddunn@swri.org	Alloy 22 Weld Specimen CNWRA Drawing 20-06002-01-081-001 Dimensional tolarances as specified Note: Detail A on Page 2 Page 1 of 2	To be completed at time of order: Material:______ Heat:______ Specimen Orientation:______ Other:______



Initiated by. D. Dunn [signature] Date 10/7/2002
Reviewed by V. Jain [signature] Date 10/7/2002
QA Approval B. Mabrito [signature] Date 10/7/2002

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	7/24/03

From Page No.____

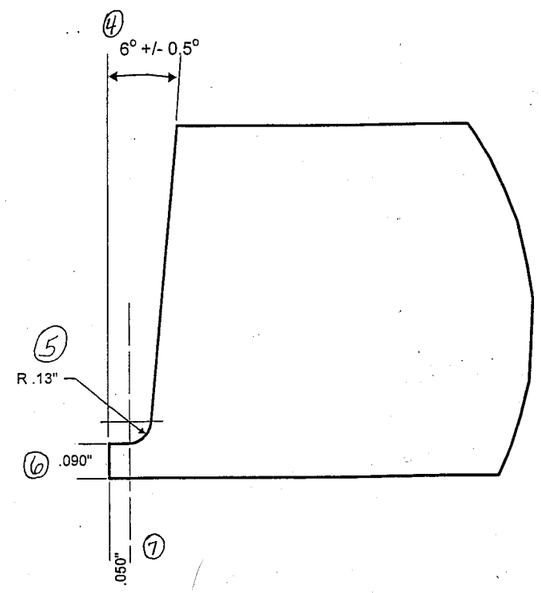
Darrell S. Dunn
SwRI-CNWRA
Phone: (210) 522-6090
Fax: (210) 522-5184
e-mail: ddunn@swri.org

Alloy 22 Weld Specimen
CNWRA Drawing 20-06002-01-081-001
All Dimensions ± 0.005"
unless otherwise specified
Detail A identified on Page 1

Page 2 of 2

To be completed at time of order:
Material:_____
Heat:_____
Specimen Orientation:_____
Other:_____

Detail A



Initiated by: D. Dunn 10/7/2002 Date

Reviewed by V. Jain 10/7/2002 Date

QA Approval B. Mabrito 10/7/2002 Date

To Page No._____

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by 7/24/03

From Page No.____

Industrial Mechanical Company
A Division of CCC Group, Inc.
5797 Dietrich Rd.
San Antonio, Texas 78220-0350

IMC Machine Shop (210)662-1690
IMC Machine Shop Manager (210)662-1696
IMC Machine Shop Superintendent (210)662-4596

COMPONENT INSPECTION REPORT

Part Name	Part Number	Dwg. No.
Alloy 22 weld specimen	P# 759 BB	20-06002-01-081-001

Heat No.	P.O. No.	IMC Job No.	Inspection Date
N/A	383745	1384	6-27-03

No.	Feature	Qty. Accepted	Qty. Rejected	Actuals	Meas. Tool I.D.#	Remarks
1	3.00" ± 0.03"	2	0	2.975"	200-059	
2	24.00" ± 0.06"	2	0	24.06"	200-011	
3	1" Nominal Thickness	2	0	1.045"	200-059	
4	6° ± 0.5°	2	0	6°	protractor	
5	R. 13"	2	0	R.13	radius gage	
6	.090"	2	0	.094"	200-059	
7	.050"	2	0	.055"	200-059	

CHECKED BY: _____ DATE: 6-27-03 PAGE 1 OF 1

To Page No._____

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by 7/24/03

From Page No.____

Industrial Mechanical Company
A Division of CCC Group, Inc.
5797 Dietrich Rd.
San Antonio, Texas 78220-0350

IMC Machine Shop (210)662-1690
IMC Machine Shop Manager (210)662-1696
IMC Machine Shop Superintendent (210)662-4596

COMPONENT INSPECTION REPORT

Part Name	Part Number	Dwg. No.
Alloy 22 Weld Specimen	#760 AA	20-060002-01-081-001

Heat No.	P.O. No.	IMC Job No.	Inspection Date
N/A	383674 S	1384	7-2-03

No.	Feature	Qty. Accepted	Qty. Rejected	Actuals	Meas. Tool I.D.#	Remarks
1	3.00" ± 0.03"	2	0	2.96"	200-059	NOTE: Both pieces have approximately a 1/8" twist and bow in them.
2	24.00" ± 0.06"	2	0	24.06"	200-011	
3	1" nominal Thickness	2	0	1.041"	200-059	
4	6° ± 0.5°	2	0	6°	Protractor	
5	R.13	2	0	R.13	Radius Gauge	
6	.090"	2	0	.094	200-059	
7	.050"	2	0	.051	200-059	

CHECKED BY: Randy Castleberry DATE: 7-2-03 PAGE 1 OF 1

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	7/24/03

From Page No.____

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	7/24/03

PURCHASING

REQUISITION DATE: 5/21/03 | ORDER DATE | PURCHASE ORDER NUMBER | REQ NO: 62483 Lo

DELIVER TO: Darrell Dunn/bldg. 57

SHIP VIA | PURCHASING AGENT'S INITIALS | SURPLUS/GOODS NOT NEEDED | ATTN:

F.O.B. | TERMS | SURPLUS/GOODS NEEDED | PHONE

PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE™

SUGGESTED OR PREVIOUS SUPPLIER: Offenhauser Company

CITY, STATE: Houston, TX

ATTN: Pete Blackburn

PHONE: 713/590-2531 FAX: 713/928-2465

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	1	EA	Gas tungsten arc weld Alloy C-22 plates per Offenhauser WPS: P44-13	20	06002.01	.081	100	6/27/03	400.00

Quality and Technical Requirements: SwRI will supply Alloy 22 plates to be welded. Weld will be performed in accordance with Offenhauser WPS P44-13 using ERNiCrMo-10 filler metal supplied by SwRI.
Penetrant testing of the root pass shall be performed by qualified personnel.
Documentation of the penetrant test results and all personnel qualifications will be provided.
Offenhauswer will notify SwRI of any reportable indications. Repairs shall not be performed without approval from SwRI.
Completed weld will be inspected using RT from a supplier on the SwRI ASL. Results of the RT will be used to determine acceptability of the completed weld. CWWRA 04 staff will be notified of results of RT inspection. All indications from RT inspection will be documented in Scientific Notebook #579.

RT to inspect per QAP 6.6 upon receipt

TOTAL

SPECIAL INSTRUCTIONS TO SUPPLIER

INTERNAL NOTES TO BUYER: Call Darrell Dunn with P.O. # when issued.

1. Government Project? YES NO — If yes, check the appropriate property type(s) and mark (for explanation of property types)
a XX G-1 CONSUMABLE
b G-2 DELIVERABLE
c G-3 ACCOUNTABLE / REPORTABLE
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? YES NO

2. QUALITY ASSURANCE? YES NO
a ASL REQUIRED? YES NO
b QA CODES: Q20
c INSPECTION CRITERIA
d QA APPROVAL (IF REQUIRED) DATE

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? YES NO
IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.
REQUESTOR'S SIGNATURE | EXT. NO. 6090
Darrell Dunn | DATE 5/21
DEPT. / DIVISION APPROVAL | DATE
ADMIN. APPROVAL | DATE

4. REPAIRS
a IS THIS REQ. FOR A REPAIR? YES NO
b IS THE REPAIR ON OR OFF CAMPUS? ON OFF
c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO.

SEE INSTRUCTIONS ON REVERSE SIDE

CONTRACT REVIEW APPROVAL | DATE
BUYER SIGNATURE | DATE

Mark K. Shelton 5/28/03

GTAW WELD PLATE 760

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	8/7/03

08/07/2003 16:21 7139282465 OFFENHAUSER PAGE 04/15

Offenhauser Company
2201 Telephone Road Houston, TX 77223
WELDER OR WELDING OPERATOR PERFORMANCE QUALIFICATION

Stamp: P Welder's Name: RETTA, HECTOR I.D.#: 185
WPS No: P44-13 Rev: 0 WPQ Number: Date: 10/22/89
Welding process used: GTAW / manual
Base material(s): SB-619, Annealed, N10276 to SB-619, Annealed, N10276

Welding variables (QW-350)	**Actual Values**	**Range Qualified**
Type of weld joint	Pipe Groove	Groove and Fillets
** Backing (QW-402)	No backing used	With or Without backing
P-No. to P-No. (QW-403)	44 to 44	P-1 thru P-11,P-34 & P-4X
Pipe diameter - groove (in.)	2.0000	1.00" minimum
Base metal thickness (in.)	0.3430	Unlimited
AWS classification (info)	ERNiCrMo-4	
Filler metal spec. (SFA No.)	5.14	5.XX
Filler metal F-Number	44	F 34 & F 4X
Consumable insert	No insert used	Without insert only
Weld deposit - groove (in.)	0.3430	0.6860" maximum
Welding position (QW-405)	6G - 45 Deg.	All positions
Weld progression	Vertical Up	Vertical Up (n4)
Backing gas (QW-408)	Backing gas used	With backing gas (n3)
GTAW welding current/polarity	DCEN (straight)	DCEN (straight) only
Machine welding (QW-360)	**Actual Values**	**Range Qualified**
Direct/Remote visual control	n.a.	n.a.
Automatic joint tracking	n.a.	n.a.
Single/multiple pass per side	n.a.	n.a.

Fillet Welds: All base material thicknesses, fillet sizes, and diameters.
** Welds with backing include fillets and double-welded joints.
Notes:
(n3) Also qualified without back gas for fillets and butt joints with backing.
(n4) The root pass, when removed to sound weld metal in preparation for welding the second side, and the cover or wash pass may be up or down.

Guided Bend Test Results

Figure No. and Type	Result	Figure No. and Type	Result
None		None	
None		None	

Radiographic test results: Acceptable per QW-302.2 and QW-191
Other test notes : Visual examination satisfactory per QW-302.4 and QW-194.
Welding test conducted by: Offenhauser Company
Radiographic test by : Offenhauser Company Lab test no. P

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME code.

Organization: Offenhauser Company
Prepared By: Charles D. Patrick (10/22/89) QC Manager

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	8/7/03

08/07/2003 16:21 7139282465 OFFENHAUSER PAGE 02/15

OFFENHAUSER COMPANY
LIQUID PENETRANT TEST
CERTIFICATE

CLIENT: SOUTHWEST RESEARCH INST. JOB # 3829

PENETRANT TYPE: CHEMETALL-OAKITE LOT # P6R

DEVELOPER TYPE: CHEMETALL-OAKITE LOT # 9DIB

DATE OF TEST: 07-15-2003

ITEM INSPECTED: ROOT PASS OF 1" THK. C22 WELDMENT

✓ ACCEPTED ___ REJECTED

RESULTS: NO RELEVANT INDICATION NOTED.

Performed in accordance with ASME Section VIII and Offenhauser Procedure PT-2

PERFORMED BY: OFFENHAUSER COMPANY DATE: 07-15-2003

Q. C. INSP: [signature] DATE: 07-15-2003

Q. C. MANAGER: [signature] DATE: 07-15-2003

CLIENT INSP: _____ DATE: _____

04/23/96

PT ROOT PASS GTAW WELD PLATE 760

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	8/7/03

08/07/2003 16:21 7139282465 OFFENHAUSER PAGE 03/15

OFFENHAUSER COMPANY
LIQUID PENETRANT TEST
CERTIFICATE

CLIENT: SOUTHWEST RESEARCH INST. JOB # 3829

PENETRANT TYPE: CHEMETALL-OAKITE LOT # P6R

DEVELOPER TYPE: CHEMETALL-OAKITE LOT # 9DIB

DATE OF TEST: 07-18-2003

ITEM INSPECTED: FINAL WELD OF 1" THK. C22 WELDMENT

✓ ACCEPTED ___ REJECTED

RESULTS: NO RELEVANT INDICATION NOTED.

Performed in accordance with ASME Section VIII and Offenhauser Procedure PT-2

PERFORMED BY: OFFENHAUSER COMPANY DATE: 07-18-2003

Q. C. INSP: [signature] DATE: 07-18-2003

Q. C. MANAGER: [signature] DATE: 07-18-2003

CLIENT INSP: _____ DATE: _____

04/23/96

GTAW WELD PLATE 760
PT FINAL PASS

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	8/7/03

Witnessed & Understood by me, | Date | Invented by | Recorded by | Date

PLATE 760 RT WELD BY OFFEN NOUSER 169 CM PAGE 57

Requisition: 03001689
Requisitioner: Dunn, Darrell S.
Req Organization: 1.20.05.04
Phone: (210) 522-6090

SOUTHWEST RESEARCH INSTITUTE

Suggested Supplier: IHI Southwest
City/State: San Antonio, TX
Contact: Fred Anderson
Phone: 256-4108 Fax: 521-2311

Date Printed: 07/25/2003
Requisition Date: 07/25/2003

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs
1	Radiographic inspection of Alloy 22 weld	EA	8/1/2003	1.00	440.00	440.00

Deliver To: Darrell Dunn/bldg. 57
Account: 704-000 Organization: 1.20 Project: 06002.01.081 Allocation Pct: 100.00
Total Estimated Cost: $440.00

Special Instructions: Call Darrell Dun at x6090 when P.O. # is issued.

Government Project?: YES Property Type: G1 Is Govt. Property being sent to supplier?: NO

Quality Assurance?: YES ASL Required: YES

Sourcing Explanation: Vender has performed previous examinations. Identical procedures and test equipment are required for t his examination.

Your organization will provide services to the Center for Nuclear Waste Regulatory Analyses(CNWRA) in accordance with the re quirements of your quality system or that of the CNWRA Quality Assurance Manual. any special technical or QA procedures req uired in the performance of your staff members' work will be provided. Special CNWRA requirements apply to scientific and e ngineering software and must be followed. Your organization's product will be accepted based on an evaluation by the CNWRA Principal Investigator or technical staff member and will be returned for rework at Seller's expense if the product does n ot meet CNWRA requirements. If scientific notebooks are utilized, they are subject to periodic review and must be returned a t the conclusion of work to the CNWRA QA Records Room, or invoice remittance will be withheld. Additionaly, there shall be "right of access" to your facility to confirm effective implementation of the quality requirments with the possiblility of a udits, source inspections, or surveillances. Any special documentation requirements shll be specified in the purchaes order and will be supplied to the CNWRA with the product. The Seller shall notify CNWRA QA of any nonconformance to the requireme nts of this purchase order; further work shall not be done unless directed by CNWRA Director of QA at (210) 522-5149.

CERTIFIED INSPECTION/TEST DATA IS REQUIRED WITH SHIPMENT OF PARTS, MATERIALS, AND FOR SERVICES.

To Page No.

Witnessed & Understood by me, | Date | Invented by | Recorded by | Date

8/8/03

ISwT RADIOGRAPHIC INTERPRETATION RECORD

PROJECT No. :	SITE :	DATE : (DAY - MONTH - YEAR)	SHEET No:
03-0318	SWRI	30-Jul-03	WA-02-318-01

COMPONENT IDENTIFICATION:	FILM INTERPRETATION BY:	SNT LEVEL:	ACCEPTANCE STANDARD:
Plate 760	William Angell	III	ASME Sec. III

FILM, SEAM OR JOINT NUMBER	FILM INTERVAL NUMBER	PENETRAMETER SIZE AND CONDITION	ACCEPT	REJECT	SLAG	POROSITY	CRACK	LACK OF PENETRATION	LACK OF FUSION	UNDERCUT	SURFACE	SHRINK	HOT TEAR	SAND	CHAPLETS	DATE FILM EXPOSED	REPAIR No.	REMARKS
	1-2	20 2T		x		x			x							30-Jul	n/a	
	2-3	20 2T		x		x			x							30-Jul	n/a	

REMARKS GTAW Offen Hauser, 2277-1-316 & XX24328G

REVIEWED BY	SNT LEVEL	DATE :	PAGE
William Angell	III	30-Jul-03	1 of 1

ISwT Form RT -02 (Rev. 06/00)

To Page No.

Project No._____
Book No._____ TITLE _____

From Page No.____

ISwT RADIOGRAPHIC EXAMINATION RECORD

PROJECT No.: 03-0318
SITE: SwRI
DATE: (DAY - MONTH - YEAR) 30-Jul-03
SHEET No: WA-01-518-01
REV: 0
CHG: 0
ICN: ☑ N/A

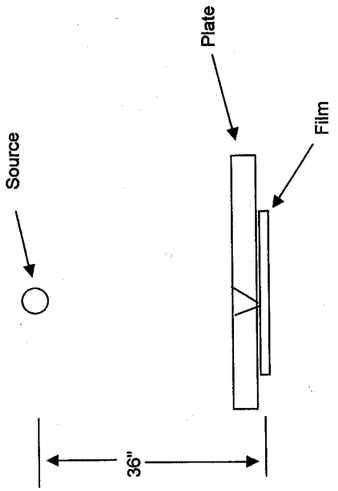
MATERIAL THICKNESS: 1.0"
MATERIAL DIAMETER: Plate
MATERIAL TYPE: S.S
WELD TYPE: Butt
WELD CROWN HEIGHT: 1/16
PROCEDURE: SWR-NN-RT1
FILM TECHNIQUE: ☑ SINGLE WALL ☐ DOUBLE WALL

ISOTOPE: n/a
DIA. X LENGTH: n/a
CURIES: n/a
DISTANCE: n/a
TIME: n/a
EFFECTIVE SHARPNESS:
FILM BRAND: Kodak T
FILM SIZE: 4.5 X 17"
SNT LEVEL: III

X-RAY: Sperry
Kv: 290
MA: 10
DISTANCE: 36"
TIME: 12min
FOCAL SPOT SIZE: .19"
EXAMINER: William Angell
SHIM MATERIAL: S.S.
SHIM THICKNESS: .06"

QUALITY LEVEL: 2T
PENETRAMETER ID: 20 ASTM
FILM PROCESSING: Manual

SHOOTING SKETCH



1. No. of Views 1
2. Location of Radiation
Source and Beam Angle 90
3. Location Markers 1-2 & 2-3
4. Screen Typ Lead
5. Thickness (in.) Front: 0.01 Back: 0.01
6. Signal Load ☐ Double Load ☑
7. No. of Film 4

COMPONENT ID: Plate 760
PAGE 1 OF 1
DATE: 30-Jul-03
SNT LEVEL III
REVIEWED BY William Angell
ISwT Form RT -01 (Rev. 06/00)

To Page No.____

Witnessed & Understood by me, | Date | Invented by | Date
Recorded by Darrell Dwyer | 8/8/03

TITLE _____ Project No._____
Book No._____

From Page No.____

OFFENHAUSER WELDING

GTAW weld produced by Offenhauser had lack of fusion in several areas. The lack of fusion was identified using RT at SwRI Southwest. Efforts to improve the quality of the welds were not successful because staff at Offenhauser were not responsive. Based on the quality of the weld and the responsiveness of Offenhauser no additional attempts were made to obtain additional welded material.

Staff at Haynes International (Steve Matthews and Greg Hoback) were consulted for identification of additional welding vendors. Roben Manufacturing in New Jersey was identified as a vendor with experience producing high quality welds on Ni base alloys.

Staff at Roben Manufacturing were contacted Path forward was determined to be as follows

1. Develop WPS for GTAW for 1" thick alloy C-22
2. Develop WPS for GTAW Root & GMAW fill for 1" thick alloy C-22
3. Weld 1" thick material for testing

Documentation on subsequent pages for work performed by Roben Manufacturing

To Page No.____

Witnessed & Understood by me, | Date | Invented by | Date
Recorded by Darrell Dwyer | 1/29/04

Requisition: **03004067**
Requisitioner: Dunn, Darrell S.
Req Organization: 1.20.05.04
Phone: (210) 522-6090

SOUTHWEST RESEARCH INSTITUTE

Suggested Supplier: Roben Manufacturing

Contact: Akhlesh K. Mathur
Phone: 732/346-6000 Fax: 732/905-9703

Date Created: 09/08/2003
Date Printed: 01/28/2004
Requisition Date: 09/10/2003

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs
1	C22 weld procedure qualification GTAW root GMAW fill	EA	9/29/2003	1.00	550.00	550.00
	Deliver To: Darrell Dunn/bldg. 57 Account: 704-000 Organization: 1.20 Project: 06002.01.081 Allocation Pct: 100.00					
2	C22 weld procedure qualification GTAW	EA	9/29/2003	1.00	550.00	550.00
	Deliver To: Darrell Dunn/bldg. 57 Account: 704-000 Organization: 1.20 Project: 06002.01.081 Allocation Pct: 100.00					
					Total Estimated Cost:	$1,100.00

Special Instructions: Quote attached. Quality & Technical Requirements: Vendor will weld procedure qualification record specimens and perform test necessary to qualify welding procedure in accordance with ASME Boiler and pressure vessel code Section IX. All tested material, procedure specifications will be provided to SwRI.

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

Quality Assurance?: YES ASL Required: NO

Approvals: Requestor: Darrell S Dunn 9/8/2003 4:25:05 PM Darrell S Dunn 9/8/2003 4:25:43 PM
Department/Division Management: Vijay Jain 9/8/2003 5:03:48 PM
Quality Assurance: Robert D Brient 9/8/2003 4:03:44 PM

Submitted By: Shirlee Garcia 9/10/2003 10:34:10 AM

Your organization will provide services to the Center for Nuclear Waste Regulatory Analyses(CNWRA) in accordance with the requirements of your quality system or that of the CNWRA Quality Assurance Manual. any special technical or QA procedures required in the performance of your staff members' work will be provided. Special CNWRA requirements apply to scientific and engineering software and must be followed. Your organization's product will be accepted based on an evaluation by the CNWRA Principal Investigator or technical staff member and will be returned for rework at Seller's expense if the product does n

Requisition: **03004067**
Requisitioner: Dunn, Darrell S.
Req Organization: 1.20.05.04
Phone: (210) 522-6090

SOUTHWEST RESEARCH INSTITUTE

Suggested Supplier: Roben Manufacturing

Contact: Akhlesh K. Mathur
Phone: 732/346-6000 Fax: 732/905-9703

Date Created: 09/08/2003
Date Printed: 01/28/2004
Requisition Date: 09/10/2003

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs

ot meet CNWRA requirements. If scientific notebooks are utilized, they are subject to periodic review and must be returned at the conclusion of work to the CNWRA QA Records Room, or invoice remittance will be withheld. Additionaly, there shall be "right of access" to your facility to confirm effective implementation of the quality requirments with the possiblility of audits, source inspections, or surveillances. Any special documentation requirements shll be specified in the purchaes order and will be supplied to the CNWRA with the product. The Seller shall notify CNWRA QA of any nonconformance to the requirements of this purchase order; further work shall not be done unless directed by CNWRA Director of QA at (210) 522-5149.

CERTIFIED INSPECTION/TEST DATA IS REQUIRED WITH SHIPMENT OF PARTS, MATERIALS, AND FOR SERVICES.

From Page No.____

Material sent to Roben Manufacturing

1/2" Thick alloy C-22 HEAT 2277-3-3266
Documentation on Page 9 notebook 607
(2) 12" x 12" plates

3/32" Alloy 622 filler wire ~~XX23~~ DP 1/29/04
Heat XX 2432 BG ER NiCrMo-10
Documentation Notebook 503 page 84

3/32" Alloy 622 filler wire Heat WN813
ER NiCrMo-10
Documentation Notebook 579 page 38 & 42

0.045 Alloy 622 filler wire Heat XX1977BG11
ER NiCrMo-10
Documentation Notebook 503 page 84

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

From Page No.____

QW-482 SUGGESTED FORMAT FOR WELDING PROCEDURE SPECIFICATION (WPS)
(See QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)

Company Name ROBEN MFG. CO., INC. By: AKHLESH MATHUR
Welding Procedure Specification No. 43-7-0 Date 10-10-2003 Supporting PQR No.(s) ✓ 62055A
Revision No._____ Date_____
Welding Process(es) GTAW Type(s) Manual (Automatic, Manual, Machine, or Semi-Auto.)

JOINTS (QW-402)
Joint Design Fillet, single Vee or other groove shown on engineering drawing.
Backing (Yes) X (No)_____
Backing Material (Type)_____ (Refer to both backing and retainers.)
Details
Rootspacing
single welded
double welded

☒ Metal ☐ Nonfusing Metal
☐ Nonmetallic ☒ Other Argon

Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.

(At the option of the Mfgr., sketches may be attached to illustrate joint design, weld layers and bead sequence, e.g. for notch toughness procedures, for multiple process procedures, etc.)

*BASE METALS (QW-403)
P-No. 43 Group No._____ to P-No. 43 Group No._____
OR
Specification type and grade SB575-C22 to SB575-C22 UNS# N06022
to Specification type and grade_____
OR
Chem. Analysis and Mech. Prop._____
to Chem. Analysis and Mech. Prop._____
Thickness Range:
Base Metal: Groove 3/16" to 1" Fillet All
Pipe Dia. Range: Groove_____ Fillet_____
Other_____

*FILLER METALS (QW-404)

Spec. No. (SFA)	5.14		
AWS No. (Class)	ERNiCrMO-10		
F-No.	43		
A-No.	N/A		
Size of Filler Metals	1/16", 3/32" & 1/8"		
Weld Metal Thickness Range: Groove	1"		
Fillet			
Electrode-Flux (Class)	N/A		
Flux Trade Name	N/A		
Consumable Insert	N/A		
Other			

*Each base metal-filler metal combination should be recorded individually.

(12/91) This form (E00006) may be obtained from the Order Dept., ASME, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300. REPRINT 5/92

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

QW-482 (Back)

WPS No. Rev.

POSITIONS (QW-405)
Position(s) of Groove 1G
Welding Progression: Up X Down
Position(s) of Fillet

POSTWELD HEAT TREATMENT (QW-407)
Temperature Range not required
Time Range

PREHEAT (QW-406)
Preheat Temp. Min. 50°F Prior to welding
Interpass Temp. Max. 250° F
Preheat Maintenance
(Continuous or special heating where applicable should be recorded)

GAS (QW-408)

	Gas(es)	Percent Composition (Mixture)	Flow Rate
Shielding	Ar & He	75% Ar/25%He	35
Trailing			
Backing			

ELECTRICAL CHARACTERISTICS (QW-409)
Current AC or DC DC Polarity Straight
Amps (Range) 15 to 180 Volts (Range) 9 to 24
(Amps and volts range should be recorded for each electrode size, position, and thickness, etc. This information may be listed in a tabular form similar to that shown below.)

Tungsten Electrode Size and Type 3/32", 2% Thoriated Electrod TIP 30 to 60 Finish 120 Girth (Pure Tungsten, 2% Thorlated, etc.)
Mode of Metal Transfer for GMAW N/A (Spray arc, short circuiting arc, etc.)
Electrode Wire feed speed range N/A

TECHNIQUE (QW-410)
String or Weave Bead String Bead
Orifice or Gas Cup Size 3/8" to 5/8"
Initial and Interpass Cleaning (Brushing, Grinding, etc.) Remove oil with cleaner, remove oxide with grinder
Method of Back Gouging Grind
Oscillation
Contact Tube to Work Distance
Multiple or Single Pass (per side) multipass
Multiple or Single Electrodes single
Travel Speed (Range)
Peening
Other

Weld Layer(s)	Process	Filler Metal Class	Filler Metal Dia.	Current Type Polar.	Current Amp. Range	Volt Range	Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire Addition, Technique, Torch Angle, Etc.)
	GTAW	ERN1CRMO-10	.040"	Straight	15-80	9-15	9-12	
	GTAW	ERNICRMO-10	.062"	Straight	50-115	9-18	9-12	
	GTAW	ERNICRMO-10	.094"	Straight	75-180	9-24	10-13	

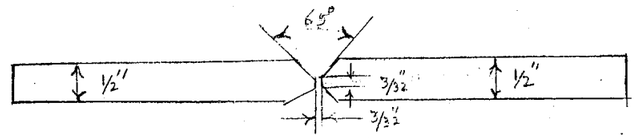
To Page No.

Witnessed & Understood by me, | Date | Invented by | Date 1/29/04
Recorded by

QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORD (PQR)
(See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code)
Record Actual Conditions Used to Weld Test Coupon.

Company Name ROBEN MFG. CO., 760 Vassar Ave., Lakewood, NJ 08701
Procedure Qualification Record No. 62055A Date October 20, 2003
WPS No. 43-7-0
Welding Process(es) GTAW
Types (Manual, Automatic, Semi-Auto.) Manual

JOINTS (QW-402)



Groove Design of Test Coupon
(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used.)

BASE METALS (QW-403)
Material Spec. SB575-C22 to SB575-C22
Type or Grade UNS# NO6022 to UNS# NO6022
P-No. 43 to P-No. 43
Thickness of Test Coupon 1/2"
Diameter of Test Coupon
Other Plate

POSTWELD HEAT TREATMENT (QW-407)
Temperature
Time None
Other

GAS (QW-408)

	Gas(es)	Percent Composition (Mixture)	Flow Rate
Shielding	Ar & He	75% + 25 He	35CFM
Trailing			
Backing	Argon		

FILLER METALS (QW-404)
SFA Specification 5-14
AWS Classification N/A
Filler Metal F-No. ERNICRMO-10
Weld Metal Analysis A-No. n/a
Size of Filler Metal 3/32"
Other
Weld Metal Thickness 1/2"

ELECTRICAL CHARACTERISTICS (QW-409)
Current DC
Polarity Straight
Amps. 160 to 170 Volts 20 to 23
Tungsten Electrode Size 3/32" 2% Thoriated
Other

POSITION (QW-405)
Position of Groove 1G
Weld Progression (Uphill, Downhill)
Other

TECHNIQUE (QW-410)
Travel Speed 10 IPM
String or Weave Bead String
Oscillation
Multipass or Single Pass (per side) Multipass
Single or Multiple Electrodes Single
Other

PREHEAT (QW-406)
Preheat Temp. 50° F
Interpass Temp. 150° F
Other

(12/91) This form (E00007) may be obtained from the Order Dept., ASME, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300. REPRINT 5/92

To Page No.

Witnessed & Understood by me, | Date | Invented by | Date 1/29/04
Recorded by

From Page No.____

QW-483 (Back)

Tensile Test (QW-150) PQR No._____

Specimen No.	Width	Thickness	Area	Ultimate Total Load lb	Ultimate Unit Stress psi	Type of Failure & Location
Fig. QW-462.1(a) 1	.750	.515	.3862	44,600	115,500	P/M R/A Ductile
Fig. QW-462.1(a) 2	.750	.510	.3825	44,350	116,000	P/M R/A Ductile

Guided-Bend Tests (QW-160)

Type and Figure No.	Result
Side 1 (Fig. QW-462.2)	Satisfactory
Side 2 (Fig. QW-462.2)	Satisfactory
Side 3 (Fig. QW-462.2)	Satisfactory
Side 4 (Fig. QW-462.2)	Satisfactory

Toughness Tests (QW-170)

Specimen No.	Notch Location	Notch Type	Test Temp.	Impact Values	Lateral Exp. % Shear	Lateral Exp. Mils	Drop Weight Break	Drop Weight No Break

Fillet-Weld Test (QW-180)

Result — Satisfactory: Yes ____ No ____ Penetration into Parent Metal: Yes ____ No ____
Macro—Results _____

Other Tests

Type of Test _____
Deposit Analysis _____
Other _____

Welder's Name Chandradutt Harilal Clock No. _____ Stamp No. #5
Tests conducted by: Spectrum Lab, Inc. Laboratory Test No. 62055A
We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer ROBEN MFG. CO., INC.
Date 10-27-2003 By Akhlesh Mathur
(Detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by the Code.)

To Page No._____

Witnessed & Understood by me, | Date | Invented by | Date 1/29/04
Recorded by

From Page No.

ROBEN MFG. CO., INC.

760 Vassar Avenue Lakewood, NJ 08701

WELDER OR WELDING OPERATOR PERFORMANCE QUALIFICATION (QW-484)

Welder's name Chandradat Harilal ID/SS number 5 Stamp no. 5
Welding process(es) used GTAW Type Manual
Identification of WPS followed by during welding of test coupon 43-7-0
Base material(s) welded SB575-C22 to SB575-C22 Thickness 1/2" Plate
Other WPS's qualified to weld under _____

Welding Variables for Each Process (QW-350)	Actual Values	Range Qualified
Backing (metal, weld metal, welded from both sides, flux, etc.) (QW-402)	Weld Metal	With Backing
ASME P-No. 43 to ASME P-No. (QW-403)	P43 to P43	QW423.1 P4X
(☒) Plate (☐) Pipe (enter diameter, if pipe)	1/2"	1" Max
Filler metal specification (SFA): 5.14 Classification (QW-404)	ERNICRMO-10	QW33 F4x
Filler metal F-no.	43	41, 43, 44
Consumable insert for GTAW or PAW		
Weld deposit thickness for each welding process	1/2"	1" max
Welding position (1G, 5G, etc.) (QW-405)	1G	Flat
Progression (uphill/downhill)	N/A	N/A
Backing gas for GTAW, PAW, or GMAW; fuel gas for OFW (QW-408)		
GMAW Transfer mode (QW-409)	N/A	N/A
GTAW welding current type/polarity		

Machine Welding Variables for the Process Used (QW-360)	Actual Values	Range Qualified
Direct/remote visual control	DC/Straight	DC/Straight
Automatic voltage control (GTAW)	N/A	N/A
Automatic joint tracking	N/A	N/A
Welding position (1G, 5G, etc.)	N/A	N/A
Consumable insert	N/A	N/A
Backing (metal, weld metal, welded from both sides, flux, etc.)	N/A	N/A

Notes:

Guided Bend Test Results

Guided Bend Tests Type ☐ QW-462.2 (Side) Results ☐ QW-462.3(a) Trans. R & F) Type ☐ QW-462.3(b) (long. R & F) Results

Fig. QW462.2 Side	Acceptable	Fig. QW462.2 Side	Acceptable
Fig. QW462.4 Side	Acceptable	Fig. QW462.4 Side	Acceptable

Visual examination results (QW-302.4) Acceptable
Radiographic test results (QW-304 and QW-305) _____
(For alternative qualification of groove welds by radiography)
Fillet Weld - Fracture test _____ Length and percent of defects _____ in.
Macro fusion test _____ Fillet leg size _____ in. x _____ in. Concavity/convexity _____ in.
Welding test conducted by Spectrum Lab Date of Test _____ Lab Test No. 62055A
Mechanical tests conducted by Spectrum Lab Test Specimens Evaluated by Spectrum Lab
We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Organization ROBEN MFG. CO., INC.

Date 10-27-2003 By Akhlesh Mathur
Akhlesh K. Mathur

Form prepared by: Guy Mulee Weld Tech Consulting AWS CWI 92121061 May 1999 Rev 1

To Page No._____

Witnessed & Understood by me, | Date | Invented by | Date 1/29/04
Recorded by

From Page No.

[redacted]
spectrumschanck@aol.com

(732) 752-1400 FAX (732) 752-6529
SPECTRUM LABORATORIES INC.
524 PELHAM AVE. PISCATAWAY, NEW JERSEY 08854

ROBEN MANUFACTURING CO. INC.
760 Vassar Avenue
Lakewood, NJ 08701

REPORT OF MECHANICAL TESTS

DATE October 20 20 03

ORDER NO. CNWRA-912

LABORATORY NO. 62055A

The following results were obtained from our tests of this material.

Welders Qualification Tests in accordance with ASME Code Section IX

2001 Edition

PROCEDURE 1G Flat PERFORMANCE

Material Size: – One (1) 1/2"TH x 10" x 12" Test Plate

Material Type: – SB575 NO6022 to SB575 NO6022

Client Specification No. Group No.P 43 To P 43

Manual or Machine GTAW Filler Metal ER NiCrMo-10

Welders Name: Chandra Dutt Stamp No. 5

Remarks:

Reduced Section Tensile Test Figs. QW-462.1 a,b,c,d,e

Specimen No.	Dimensions Width	Thickness	Area	Tensile Load Lbs	Tensile Strength PSI	Failure Location
Fig.QW-462.1(a) 1	.750	.515	.3862	44,600	115,500	P/M R/A Ductile
Fig.QW-462.1(a) 2	.750	.510	.3825	44,350	116,000	P/M R/A Ductile

Guided Bend Tests Figs. QW-462.2 QW-462.3(a)

Type & Fig. No.	Result	Type & Fig. No.	Result
Side 1 (Fig. QW-462.2)	SATISFACTORY	Side 3 (Fig. QW-462.2)	SATISFACTOR
Side 2 (Fig. QW-462.2)	SATISFACTORY	Side 4 (Fig. QW-462.2)	SATISFACTOR

No defects in excess of 1/8" in any direction in accordance with Par. QW-163, present at testing time.

Samples returned upon request only. Held for a period of 30 days maximum. The liability of this laboratory relative to this report shall not exceed the amount of the invoice. This report shall not be reproduced unless in full. Tests were performed in accordance with QA Manual 5th Edition, Rev. 3 3/7/00 complying with MIL-I-45208A, ASTM E-548, ASME Sec. III, Par. NCA-3800 and ISO/IEC Guide 25.

MEMBER ACIL

We certify this is a true report of results obtained from our tests of this material.

SPECTRUM LABORATORIES INC.

Mr. Harold C. Schanck, P.E.
State of New Jersey
License No. GE 17358
CWI#86050351

CORROSION & METALLURGICAL TESTING
PROFESSIONAL ENGINEERING

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

From Page No.

QW-482 SUGGESTED FORMAT FOR WELDING PROCEDURE SPECIFICATION (WPS)
(See QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)

Company Name ROBEN MFG. CO., INC. By: AKHLESH MATHUR
Welding Procedure Specification No. 43-7-0 & 43-3-0 Date Supporting PQR No.(s) 62055B
Revision No. Date
Welding Process(es) GTAW & GMAW Type(s) (Automatic, Manual, Machine, or Semi-Auto.)

JOINTS (QW-402) Details
Joint Design Fillet, Single Vee or other groove shown on engineering drawing.
Backing (Yes) X (No) Root spacing
Backing Material (Type) Single Welded
(Refer to both backing and retainers.) Double Welded

☒ Metal ☐ Nonfusing Metal
☐ Nonmetallic ☒ Other Argon

Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.

(At the option of the Mfgr., sketches may be attached to illustrate joint design, weld layers and bead sequence, e.g. for notch toughness procedures, for multiple process procedures, etc.)

*BASE METALS (QW-403)
P-No. 43 Group No. to P-No. 43 Group No.
OR
Specification type and grade SB575-C22 to SB575-C22, UNS #N06022
to Specification type and grade
OR
Chem. Analysis and Mech. Prop.
to Chem. Analysis and Mech. Prop.
Thickness Range:
Base Metal: Groove 3/16" to 1" Fillet
Pipe Dia. Range: Groove Fillet
Other

*FILLER METALS (QW-404)

Spec. No. (SFA)	5.14	
AWS No. (Class)	ERNiCrMo-10	
F-No.	43	
A-No.	N/A	
Size of Filler Metals	GTAW 1/16"	
Weld Metal	GMAW .045"	
Thickness Range:	GTAW Max 1/8"	
Groove	GMAW Max 7/8"	
Fillet	N/A	
Electrode-Flux (Class)	N/A	
Flux Trade Name	N/A	
Consumable Insert		
Other		

*Each base metal-filler metal combination should be recorded individually.

(12/91) This form (E00006) may be obtained from the Order Dept., ASME, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

From Page No.____

QW-482 (Back)

WPS No._____ Rev._____

POSITIONS (QW-405)
Position(s) of Groove 1G
Welding Progression: Up x Down
Position(s) of Fillet

POSTWELD HEAT TREATMENT (QW-407)
Temperature Range None
Time Range

PREHEAT (QW-406)
Preheat Temp. Min. 50° F
Interpass Temp. Max. 250° F
Preheat Maintenance
(Continuous or special heating where applicable should be recorded)

GAS (QW-408)

	Gas(es)	Percent Composition (Mixture)	Flow Rate
Shielding (GTAW & GMAW)	Ar & He	75%Ar & 25% He	25
Trailing			
Backing			

ELECTRICAL CHARACTERISTICS (QW-409) Straight (GTAW)
Current AC or DC DC Polarity Reverse (GMAW)
Amps (Range) GTAW 15-80 GMAW 148-160 Volts (Range) 9-15 22-130
(Amps and volts range should be recorded for each electrode size, position, and thickness, etc. This information may be listed in a tabular form similar to that shown below.)

Tungsten Electrode Size and Type 3/32" 2% Thoriated
(Pure Tungsten, 2% Thoriated, etc.)
Mode of Metal Transfer for GMAW Pulsed Arc Mig
(Spray arc, short circuiting arc, etc.)
Electrode Wire feed speed range

TECHNIQUE (QW-410)
String or Weave Bead Either
Orifice or Gas Cup Size 3/8 to 5/8
Initial and Interpass Cleaning (Brushing, Grinding, etc.) Remove oil with cleaner, remove oxide with grinder
Method of Back Gouging Grind
Oscillation
Contact Tube to Work Distance 1/2" to 3/4" visible stick out
Multiple or Single Pass (per side) multipass
Multiple or Single Electrodes single electrode
Travel Speed (Range) 9-12 for GTAW & 4-18 IPM for GMAW
Peening
Other

Weld Layer(s)	Process	Filler Metal Class	Filler Metal Dia.	Current Type Polar.	Current Amp. Range	Volt Range	Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire Addition, Technique, Torch Angle, Etc.)
Root	GTAW	ERNICVMO-10	.062	Straight	50-115	9-18	9-12 IPM	
Filled Up	GMAW	ERNICVMO-10	.045	Reverse	140-160	22-32	4-18 IPM	

To Page No.____

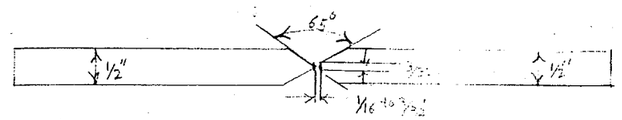
Witnessed & Understood by me, | Date | Invented by | Date
Recorded by | 1/29/04

From Page No.____

QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORD (PQR)
(See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code)
Record Actual Conditions Used to Weld Test Coupon.

Company Name ROBEN MFG. CO., 760 Vassar Ave., Lakewood, NJ 08701
Procedure Qualification Record No. 62055B Date 10-20-2003
WPS No. 43-3-0
Welding Process(es) GTAW (Root) GMAW (Fill)
Types (Manual, Automatic, Semi-Auto.) Semi -automatic

JOINTS (QW-402)



Groove Design of Test Coupon
(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used.)

BASE METALS (QW-403)
Material Spec. SB575-C22 to SB575
Type or Grade UNS# N06022 to UNS N06022
P-No. 43 to P-No. 43
Thickness of Test Coupon 1/2" plate
Diameter of Test Coupon
Other

POSTWELD HEAT TREATMENT (QW-407)
Temperature
Time N/A
Other

GAS (QW-408)

	Gas(es)	Percent Composition (Mixture)	Flow Rate
Shielding	Ar & He	75% Ar + 25% He	25 CFM
Trailing			
Backing	Argon		

FILLER METALS (QW-404)
SFA Specification 5-14
AWS Classification ERNICRMO-10
Filler Metal F-No. 43
Weld Metal Analysis A-No. N/A
Size of Filler Metal 3/32 TIG & .045"
Other
Weld Metal Thickness 1/16" GTAW 7/16" GMAW

ELECTRICAL CHARACTERISTICS (QW-409)
Current DC
Polarity Straight/Reverse
Amps. 90-95/152-160 Volts 18-21/24-28
Tungsten Electrode Size 3/32 2% Thoriated
Other

POSITION (QW-405)
Position of Groove
Weld Progression (Uphill, Downhill)
Other

TECHNIQUE (QW-410)
Travel Speed 10 IPM
String or Weave Bead String
Oscillation
Multipass or Single Pass (per side) multipass
Single or Multiple Electrodes single
Other

PREHEAT (QW-406)
Preheat Temp. 50° F Min.
Interpass Temp. 200° F Max.
Other

(12/91) This form (E00007) may be obtained from the Order Dept., ASME, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300. REPRINT 5/92

To Page No.____

Witnessed & Understood by me, | Date | Invented by | Date
Recorded by | 1/29/04

From Page No.____

QW-483 (Back)

Tensile Test (QW-150) PQR No._____

Specimen No.	Width	Thickness	Area	Ultimate Total Load lb	Ultimate Unit Stress psi	Type of Failure & Location
Fig. QW 462.1(a)	.750"	.515	.3862	44,800	116,000	P/M RA Ductile
Fig. QW462.1(a)	.750	.515	.382	44,650	115,500	

Guided-Bend Tests (QW-160)

Type and Figure No.	Result
Fig. QW-462.2(a) Side 1	Satisfactory
Fig. QW-462.2(a) Side 2	Satisfactory
Fig. QW-462.2(a) Side 3	Satisfactory
Fig. QW-462.2(a) Side 4	Satisfactory

Toughness Tests (QW-170)

Specimen No.	Notch Location	Notch Type	Test Temp.	Impact Values	Lateral Exp. % Shear	Lateral Exp. Mils	Drop Weight Break	Drop Weight No Break

Fillet-Weld Test (QW-180)

Result — Satisfactory: Yes ____ No ____ Penetration into Parent Metal: Yes ____ No ____

Macro—Results _____

Other Tests

Type of Test _____

Deposit Analysis _____

Other _____

Welder's Name Chandradutt Harilal No. _____ Stamp No. 5

Tests conducted by: Spectrum Lab, Inc. Laboratory Test No. 6255B

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer ROBEN MFG. CO., INC.

Date 10-22-003 By Akhlesh Mathur

(Detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by the Code.)

To Page No._____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

From Page No

ROBEN MFG. CO., INC.

760 Vassar Avenue Lakewood, NJ 08701

WELDER OR WELDING OPERATOR PERFORMANCE QUALIFICATION (QW-484)

Welder's name Chandradat Harilal ID/SS number 5 Stamp no. 5

Welding process(es) used GMAW Type Manual

Identification of WPS followed by during welding of test coupon 43-3-0

Base material(s) welded SB575-C22 to SB575-C22 Thickness 1/2"

Other WPS's qualified to weld under _____

Welding Variables for Each Process (QW-350)	Actual Values	Range Qualified
Backing (metal, weld metal, welded from both sides, flux, etc.) (QW-402)	Weld Metal	With Backing
ASME P-No. to ASME P-No. (QW-403)	P43 to P43	QW431P4X
([X]) Plate ([ ]) Pipe (enter diameter, if pipe)	1/2"	1"
Filler metal specification (SFA): 5.14 Classification (QW-404)	ERNICRMO-10	
Filler metal F-no.	43	QW433 F4X
Consumable insert for GTAW or PAW	N/A	N/A
Weld deposit thickness for each welding process	1/2"	1" Max
Welding position (1G, 5G, etc.) (QW-405)	1G	Flat
Progression (uphill/downhill)	N/A	N/A
Backing gas for GTAW, PAW, or GMAW; fuel gas for OFW (QW-408)		
GMAW Transfer mode (QW-409)	N/A	N/A
GTAW welding current type/polarity	DC/Reverse	DC/Reverse

Machine Welding Variables for the Process Used (QW-360)	Actual Values	Range Qualified
Direct/remote visual control	N/A	N/A
Automatic voltage control (GTAW)	N/A	N/A
Automatic joint tracking	N/A	N/A
Welding position (1G, 5G, etc.)	N/A	N/A
Consumable insert	N/A	N/A
Backing (metal, weld metal, welded from both sides, flux, etc.)	N/A	N/A

Notes:

Guided Bend Test Results

Guided Bend Tests Type ☐ QW-462.2 (Side) Results ☐ QW-462.3(a) Trans. R & F) Type ☐ QW-462.3(b) (long. R & F) Results

Fig. QW462.2 Side	Acceptable	Fig. QW462.2 Side	Acceptable
Fig. QW462.2 Side	Acceptable	Fig. QW462.2 Side	Acceptable

Visual examination results (QW-302.4) Acceptable

Radiographic test results (QW-304 and QW-305)

(For alternative qualification of groove welds by radiography)

Fillet Weld - Fracture test _____ Length and percent of defects _____ in.

Macro fusion test _____ Fillet leg size _____ in. x _____ in. Concavity/convexity _____ in.

Welding test conducted by Spectrum Lab Date of Test _____ Lab Test No. 62055B

Mechanical tests conducted by Spectrum Lab Test Specimens Evaluated by Spectrum Lab

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Organization ROBEN MFG. CO., INC.

Date 10-27-2003 By Akhlesh Mathur
Akhlesh K. Mathur

Form prepared by: Guy Mulee Weld Tech Consulting AWS CWI 92121061 May 1999 Rev 1

To Page No._____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

From Page No.

spectrumschanck@aol.com

(732) 752-1400 FAX (732) 752-6529

SPECTRUM LABORATORIES INC.

524 PELHAM AVE. PISCATAWAY, NEW JERSEY 08854

ROBEN MANUFACTURING CO. INC.
760 Vassar Avenue
Lakewood, NJ 08701

REPORT OF MECHANICAL TESTS

DATE October 20 20 03

ORDER NO. CNWRA-912

LABORATORY NO. 62055B

The following results were obtained from our tests of this material.

Welders Qualification Tests in accordance with ASME Code Section IX

2001 Edition

PROCEDURE 1G Flat PERFORMANCE

Material Size: - One (1) 1/2"TH x 10" x 12" Test Plate

Material Type: - SB575 NO6022 to SB575 NO6022

Client Specification No. Group No.P 43 To P 43

Manual or Machine Root:- GTAW Fill:- GMAW Filler Metal ER NiCrMo-10

Welders Name: Chandra Dutt Stamp No. 5

Remarks:

Reduced Section Tensile Test Figs. QW-462.1 a,b,c,d,e

Specimen No.	Dimensions Width	Thickness	Area	Tensile Load Lbs	Tensile Strength PSI	Failure Location
Fig.QW-462.1(a) 1	.750	.515	.3862	44,800	116,000	P/M R/A Ductile
Fig.QW-462.1(a) 2	.750	.515	.3862	44,650	115,500	P/M R/A Ductile

Guided Bend Tests Figs. QW-462.2 QW-462.3(a)

Type & Fig. No.	Result	Type & Fig. No.	Result
Side 1 (Fig. QW-462.2)	SATISFACTORY	Side 3 (Fig. QW-462.2)	SATISFACTORY
Side 2 (Fig. QW-462.2)	SATISFACTORY	Side 4 (Fig. QW-462.2)	SATISFACTORY

No defects in excess of 1/8" in any direction in accordance with Par. QW-163, present at testing time.

Samples returned upon request only. Held for a period of 30 days maximum. The liability of this laboratory relative to this report shall not exceed the amount of the invoice. This report shall not be reproduced unless in full. Tests were performed in accordance with QA Manual 5th Edition, Rev. 3 3/7/00 complying with MIL-I-45208A, ASTM E-548, ASME Sec. III, Par. NCA-3800 and ISO/IEC Guide 25.

MEMBER ACIL

We certify this is a true report of results obtained from our tests of this material.

SPECTRUM LABORATORIES INC.

Mr. Harold C. Schanck, P.E.
State of New Jersey
License No. GE 17358
CWI#86050351
CORROSION & METALLURGICAL TESTING
PROFESSIONAL ENGINEERING

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Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

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Roben Manufacturing

Pages 60-74 provide documentation on successful WPS development for alloy C22 using GTAW and GTAW Root with GMAW fill

Based on successful WPS development alloy C22 plate was sent to Roben to weld. The plate was 1" thick stock HEAT 2277-1-3164 2 sets of plates were supplied. Plate 759 after cutting and machining (see page 45) and a second pair of plates that had not been previously welded

Plates were machined in accordance with the specifications of CNWRA Drawing 20.06002.01.081.001 as shown on pages (47-49) and (2-10)

Filler wire sent included:

0.045" dia XX1977BG11 alloy 622 ERNiCrMo-10 Notebook 503 page 84

3/32" dia WN813 alloy 622 ERNiCrMo-10

Documentation on following pages

Modification to weld joint design shown on page 78. Modification was necessary to allow adequate clearance for weld gun/torch

PT Documentation on pages 90 & 91

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

Requisition: **04005315**
Requisitioner: Dunn, Darrell S.
Req Organization: 1.20.05.04
Phone: (210) 522-6090

SOUTHWEST RESEARCH INSTITUTE

Suggested Supplier: Roben Manufacturing

Contact: Akhlesh K. Mathur
Phone: 732/346-6000 Fax: 732/905-9703

Date Created: 12/18/2003
Date Printed: 01/28/2004
Requisition Date: 12/19/2003

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs
1	Weld 1" C22 plate using GTAW root and GMAW fill per WPS 43-7-0 and 43-3-0 Deliver To: D. Dunn/bldg. 57 Account: 704-000 Organization: 1.20 Project: 06002.01.081 Allocation Pct: 100.00	EA	1/16/2004	1.00	2,425.00	2,425.00
2	Weld 1" C22 plate using GTAW WPS 43-7-0 Deliver To: D. Dunn/bldg. 57 Account: 704-000 Organization: 1.20 Project: 06002.01.081 Allocation Pct: 100.00	EA	1/16/2004	1.00	2,425.00	2,425.00
					Total Estimated Cost:	$4,850.00

Special Instructions: Quote attached. Quality & Technical Requirements: Plates will be secured to minimize distortion from welding. Welder qualifications and the actual welding parameter used will be documented and provided to SwRI. Penetrant testing will be performed on the root pass and the final pass. Penetrant examination sheets and PT examiner qualifications will be provided to SwRI. Radiographic testing will be performed on the completed weld. Radiographic films, reader sheets and RT examiner qualifications will be provided to SwRI. All unacceptable indications will be documented, repaired, and reexamined. Completed welds will be shipped to SwRI with all requested documentation.

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

Quality Assurance?: YES ASL Required: NO

Sourcing Explanation: Sole source justification is attached.

Approvals: Requestor: Darrell S Dunn 12/18/2003 6:02:19 PM
Department/Division Management: Vijay Jain 12/19/2003 9:47:42 AM Budhi Sagar 12/19/2003 11:36:05 AM
Quality Assurance: Robert D Brient 12/18/2003 1:11:28 PM

Submitted By: Shirlee Garcia 12/19/2003 11:45:47 AM

1/29/04

Requisition: **04005315**
Requisitioner: Dunn, Darrell S.
Req Organization: 1.20.05.04
Phone: (210) 522-6090

SOUTHWEST RESEARCH INSTITUTE

Suggested Supplier: Roben Manufacturing

Contact: Akhlesh K. Mathur
Phone: 732/346-6000 Fax: 732/905-9703

Date Created: 12/18/2003
Date Printed: 01/28/2004
Requisition Date: 12/19/2003

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs

Your organization will provide services to the Center for Nuclear Waste Regulatory Analyses(CNWRA) in accordance with the requirements of your quality system or that of the CNWRA Quality Assurance Manual. any special technical or QA procedures required in the performance of your staff members' work will be provided. Special CNWRA requirements apply to scientific and engineering software and must be followed. Your organization's product will be accepted based on an evaluation by the CNWRA Principal Investigator or technical staff member and will be returned for rework at Seller's expense if the product does not meet CNWRA requirements. If scientific notebooks are utilized, they are subject to periodic review and must be returned at the conclusion of work to the CNWRA QA Records Room, or invoice remittance will be withheld. Additionaly, there shall be "right of access" to your facility to confirm effective implementation of the quality requirments with the possiblility of audits, source inspections, or surveillances. Any special documentation requirements shll be specified in the purchaes order and will be supplied to the CNWRA with the product. The Seller shall notify CNWRA QA of any nonconformance to the requirements of this purchase order; further work shall not be done unless directed by CNWRA Director of QA at (210) 522-5149.

CERTIFIED INSPECTION/TEST DATA IS REQUIRED WITH SHIPMENT OF PARTS, MATERIALS, AND FOR SERVICES.

1/29/04

DEC-03-03 11:24 FROM: CNWRA LAB. 57/51 ID: 5125225184 PAGE 3

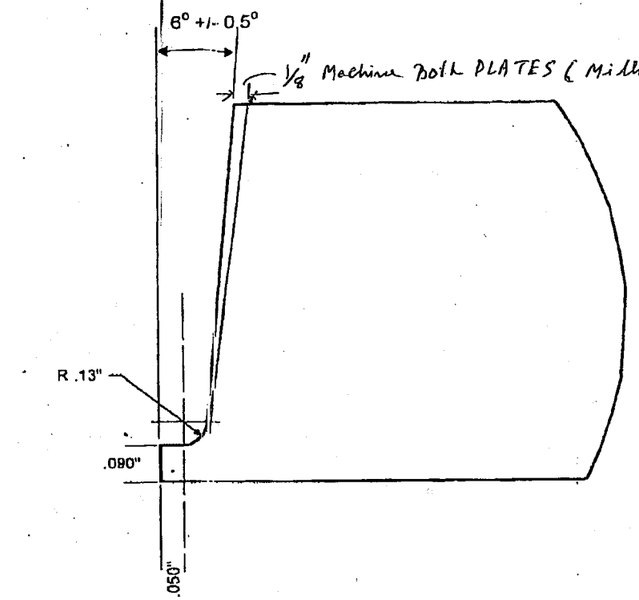
Darrell S. Dunn
SwRI-CNWRA
Phone: (210) 522-6090
Fax: (210) 522-5184
e-mail: ddunn@swri.org

Alloy 22 Weld Specimen
CNWRA Drawing 20-06002-01-081-001
All Dimensions ± 0.005"
unless otherwise specified
Detail A identified on Page 1

Page 2 of 2

To be completed at time of order.
Material: ALLOY C-22
Heat:
Specimen Orientation:
Other: ALLOY C22 FILLER.

Detail A



Initiated by, D. Dunn 10/7/2002 Date

Reviewed by V. Jain 10/7/2002 Date

QA Approval B. Mabrito 10/9/2002 Date

001 ROBEN MFG CO INC 01/12/04 MON 10:39 FAX 7329059703

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

DELIVERY RECEIPT

DATE 1/19/04

06389201

SOUTHWEST RESEARCH INST
6220 CULEBRA RD
BLDG 57
SAN ANTONIO, TX 78238

SHIPPING DATE 1/19/04 LOAD NO. 2301
SHIPPERS REF. NO. PRO # 06389201
CONSIGNEE REF. NO. TERMS
DRIVER NAME SCHAL PO # PPD 4500335
TRAILER NO. H533204 ADD PO#
APPOINTMENT 0/00/00 Blr: SDELROCINI

WEIGHT	ITEM	MILES	RATE	CHARGES
275				

SHIPPER
NEWCENTURY TRANSPORTATION, INC.®
45 EAST PARK DRIVE
WESTAMPTON, NJ 08060
1-877-870-4031

ROBEN MANUFACTURING CO 2137
760 VASSAR AVENUE
LAKEWOOD INDUSTRIAL PARK
LAKEWOOD, NJ 08701

BILL TO
ROBEN MANUFACTURING CO 2137
760 VASSAR AVENUE
LAKEWOOD INDUSTRIAL PARK
LAKEWOOD, NJ 08701

SDELROCINI 1/19/04 21:03
Door: 37 Appt Info:

HM	PCS	DESCRIPTION	TOTAL PCS	TOTAL WT.
	1	SKID OF MISC ITEM	1	275

Received by Signature:
Print Last Name: Denby

Driver Signature:
Date:

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	1/29/04

Witnessed & Understood by me, | Date | Invented by | Recorded by | Date | To Page No.

From Page No. | Project No. | Book No. | TITLE | 80

BRANCH TESTING LABS, INC.

32 SOUTH AVENUE W.
CRANFORD, N.J. 07016
(908) 272-5743
FAX (908) 272-5773

PENNSVILLE AUBURN RD.
CARNEYS POINT, N.J. 08069
(856) 299-9501
FAX (856) 299-9336

RADIOGRAPHIC INSPECTION REPORT

FILM INTERPRETATION BY PAGE Level II

DATE JAN 16, 2004

CLIENT	DESCRIPTION
Roben	CNWRA-1 GTAM

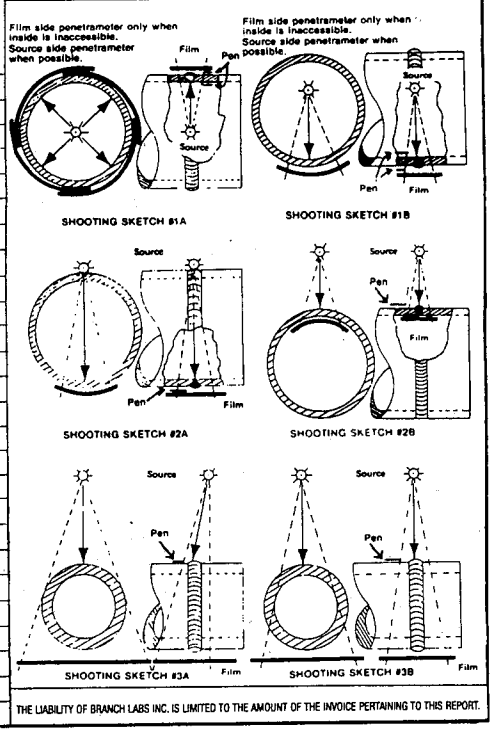
MATERIAL THICK.	MATERIAL DIAMETER/SIZE	MATERIAL SPEC.	GOVERNING SPECIFICATION	ACCEPTANCE STANDARD
1"	PLATE	SB575-C22	ASME SECT VIII	UW-51

ISOTOPE	CURIES	DIA. X LENGTH	S.T.F. DISTANCES S.T.O	EXP. TIME	TOTAL UNSHARPNESS	FILM DENSITY	SCREENS	FILM MFG. AND TYPE	FILM SIZE	FILM TECHNIQUE
IF-192	50	.10 X .10	20"	4:15	2090	2.3-2.7	F 005 Pb B	AGFA D7	4½x17	○SINGLE ~~○~~DOUBLE

X RAY	KV/MA	S.T.F. DISTANCES S.T.O	EXP. TIME	FOCAL SPOT SIZE	FILM PROCESSING	RADIOGRAPHER
—	—	—	—	—	MANUAL ~~○~~ AUTOMATIC ○	Robert Lacoriere L-II

FITTING SEAM OR JOINT NUMBER	FILM INTERVAL NUMBER	PENE TRAMETER	ACCEPT.	REJECT	INCLUSION	POROSITY	CRACK	LACK OF PEN	LACK FUSION	UNDERCUT	SURFACE	TUNGSTEN	BURN THRU	SUCK BACK	OTHERS	DATE FILM EXPOSED	REMARKS
GTAM	1-2 2-3	30	/													1/16/04	

SHOOTING SKETCH # 2B



THE LIABILITY OF BRANCH LABS INC. IS LIMITED TO THE AMOUNT OF THE INVOICE PERTAINING TO THIS REPORT.

FINAL SIGN OFF _____ CODE _____ DATE _____ CUSTOMER Robert Mahn DATE 1/16/2004

RR II-100

Witnessed & Understood by me, | Date | Invented by | Recorded by | Date | To Page No.

From Page No. | Project No. | Book No. | TITLE | 81

BRANCH TESTING LABS, INC.

32 SOUTH AVENUE W.
CRANFORD, N.J. 07016
(908) 272-5743
FAX (908) 272-5773

PENNSVILLE AUBURN RD.
CARNEYS POINT, N.J. 08069
(856) 299-9501
FAX (856) 299-9336

RADIOGRAPHIC INSPECTION REPORT

FILM INTERPRETATION BY PAGE Level II

DATE JAN 16, 2004

CLIENT	DESCRIPTION
Roben	CNWRA-2 GMAW

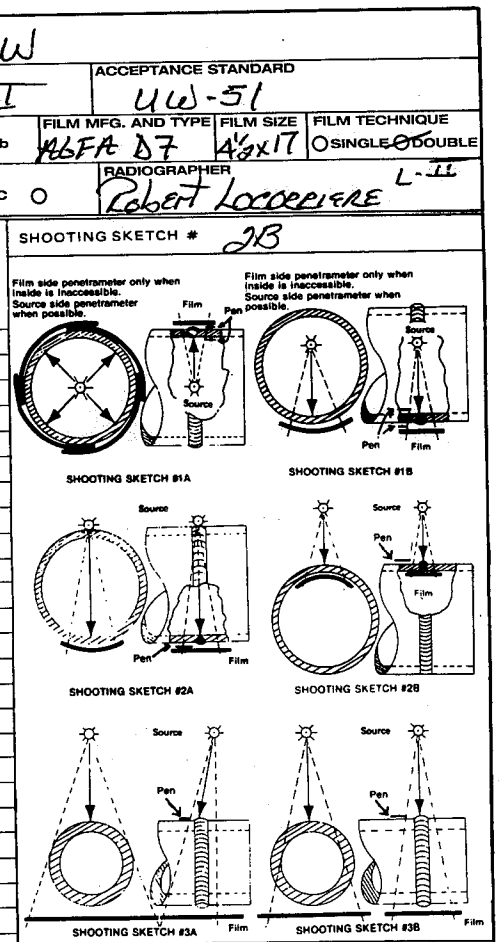
MATERIAL THICK.	MATERIAL DIAMETER/SIZE	MATERIAL SPEC.	GOVERNING SPECIFICATION	ACCEPTANCE STANDARD
1"	PLATE	SB575-C-22	ASME Sect VIII	UW-51

ISOTOPE	CURIES	DIA. X LENGTH	S.T.F. DISTANCES S.T.O	EXP. TIME	TOTAL UNSHARPNESS	FILM DENSITY	SCREENS	FILM MFG. AND TYPE	FILM SIZE	FILM TECHNIQUE
IF-192	50	.10 X .10	20"	4:15	2090	2.3-2.7	F 005 Pb B	AGFA D7	4½x17	○SINGLE ~~○~~DOUBLE

X RAY	KV/MA	S.T.F. DISTANCES S.T.O	EXP. TIME	FOCAL SPOT SIZE	FILM PROCESSING	RADIOGRAPHER
—	—	—	—	—	MANUAL ~~○~~ AUTOMATIC ○	Robert Lacoriere L-II

FITTING SEAM OR JOINT NUMBER	FILM INTERVAL NUMBER	PENE TRAMETER	ACCEPT.	REJECT	INCLUSION	POROSITY	CRACK	LACK OF PEN	LACK FUSION	UNDERCUT	SURFACE	TUNGSTEN	BURN THRU	SUCK BACK	OTHERS	DATE FILM EXPOSED	REMARKS
GMAW	1-2 2-3	30	/													1/16/04	

SHOOTING SKETCH # 2B



THE LIABILITY OF BRANCH LABS INC. IS LIMITED TO THE AMOUNT OF THE INVOICE PERTAINING TO THIS REPORT.

FINAL SIGN OFF _____ CODE _____ DATE _____ CUSTOMER Robert Mahn DATE 1/16/2004

RR II-100

From Page No.____

BRANCH RADIOGRAPHIC LABS., INC.
32 SOUTH AVENUE WEST, CRANFORD, NEW JERSEY 07016

VISION TEST RECORD

Employee LOCORRIERE (Last Name) ROBERT (First) R. (Middle)

Age 47 Social Security Number 153-46-8778

NEAR DISTANCE VISUAL ACUITY @ 12"

18. Jaeger J-1 Letters or Alternate Method

Uncorrected, Normal Yes ☐ No ☑

Corrected, Normal Yes ☑ No ☐

19. Far Distance Snellen Test Method: @ 30 Feet 20/20 Test Chart

Uncorrected, Normal Yes ☑ No ☐

Corrected, Normal Yes ☑ No ☐

COLOR PERCEPTION

18. Ishira Test Chart. State either "NORMAL" or what color deficiencies are present.

NORMAL

2. Color Contrast—Practical
(Check appropriate box of practical examination administered).

PT ☐ MT ☐ RT ☐ UT ☐ ET ☐ LT ☐ VT ☐

Administered By:_____ Date_____

20. VT-1 Grey Card (1/32" black line on 18% Neutral Grey Card at 24" Minimum)
Passed ☑ Failed ☐

This above named individual has successfully Passed ☑ or Failed ☐ Vision Test.

THIS CERTIFICATION IS VALID FOR ONE YEAR.

NAME [signature] TITLE QAM, V.P. DATE 3/10/03

Dec 31 03 11:08a Branch Labs Inc 908 272 5773 p.5

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	1/29/04

From Page No.____

BRANCH RADIOGRAPHIC LABS., INC.
32 SOUTH AVENUE WEST, CRANFORD, NEW JERSEY 07016

PERSONNEL QUALIFICATIONS

NAME: Robert R. Locorriere **SOCIAL SECURITY NUMBER:** 153-46-8778

DATE OF HIRE: 2/2000 **DATE ASSIGNED TO N.D.E.** 2/2000

This is to certify that ***Robert R. Locorriere*** has passed both the written and practical tests in accordance with ASNT-TC-1A for Non-Destructive Testing and Qualified 1980 thru 1996 Edition/1998 Addenda, ANSI N45.2.6 and Mil STD 410E.

Non-Destructive Method: **Percentile Weights Assigned:**
General = x 0.3 Specific = x 0.2 Practical = x 0.5
Composite Grade ÷ 3

Radiography Level II	**General** 100 **% Grade** 98	**Specific** 90 **Composite Grade** 96.7	**Practical** 100	**Date Certified** 02-17-2003 **Cert. Exp. Date** 02-17-2006
Ultrasonic Level II-TM	**General** 80 **% Grade** 94	**Specific** 100 **Composite Grade** 93.4	**Practical** 100	**Date Certified** 03-03-2003 **Cert. Exp. Date** 03-03-2006
Magnetic Particle Level II	**General** 80 **% Grade** 92	**Specific** 90 **Composite Grade** 90	**Practical** 100	**Date Certified** 02-21-2003 **Cert. Exp. Date** 02-21-2006
Liquid Penetrant Level II	**General** 90 **% Grade** 97	**Specific** 100 **Composite Grade** 96.7	**Practical** 100	**Date Certified** 02-21-2003 **Cert. Exp. Date** 02-21-2006
Visual Test Level II	**General** 94 **% Grade** 96.6	**Specific** 92.1 **Composite Grade** 95.4	**Practical** 100	**Date Certified** 03-26-2001 **Cert. Exp. Date** 03-26-2004

EYE EXAMINATION JAEGER I COLOR CONTRAST (SEE ATTACHED)

FORMAL EDUCATION: High School Graduate.

TECHNICAL EDUCATION: 40 Hrs. Radiation Safety Training 12-78 @ BRLI. 80 Hrs. RT L-I Training 2/79 @ BRLI. 40 Hrs. MT Training 4/79 @ BRLI. 32 Hrs. PT Training 6/79 @ BRLI. 20 Hr. Refresher Training RT Safety 12/80 @ BRLI. 40 Hrs. UT Training 2/81 @ BRLI. 12 Hrs. VT Inspection 1/89 @ BRLI. Qualified L-I RT 7/80 @ BRLI. Qualified L-II MT & PT 7/81 @ BRLI. Requalified L-II MT & PT 2/84 @ BRLI. Requalified L-II MT & PT 2/87 @ BRLI. Qualified L-II RT 1987 @ BRLI. Requalified RT, MT & PT 1990 @ BRLI. Left BRLI 3/93. Returned to BRLI 2/00. Requalified RT, MT & PT 2/00 @ BRLI. Qualified L-II UTTM 3/00 @ BRLI. Requalified L-II VT 3/01 @ BRLI. Requalified RT, MT & PT 2/03 @ BRLI. Requalified L-II UTTM 3/03 @ BRLI

RESUME EXPERIENCE: Performed RT, MT & PT Inspection of valves, castings, piping systems & vessels @ various customer sites from 12/78 thru 1993 for BRLI. Left BRLI in 3/93 continued in same field of work for Accurate Testing until 2/00. Returned to BRLI 2/00 as Lead Supervising Technician.

CERTIFYING AGENCY: **BRANCH RADIOGRAPHIC LABS., INC.**

EXAMINER [signature] TITLE: L-III, QAM DATE: 03-03-03

Dec 31 03 11:08a Branch Labs Inc 908 272 5773 p.4

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [signature]	1/29/04

Witnessed & Understood by me, | Date | Invented by | Recorded by | Date

From Page No.

Project No.
Book No.
TITLE

Requisition: **04007943**
Requisitioner: Dunn, Darrell S.
Req Organization: 1.20.05.04
Phone: (210) 522-6090

SOUTHWEST RESEARCH INSTITUTE

Suggested Supplier: IHI Southwest

Contact: Fred Anderson
Phone: 256-4108 Fax: 521-2311

Date Created: 01/28/2004
Date Printed: 01/29/2004
Requisition Date: 01/29/2004

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs
1	Radiographic inspection of Alloy 22 welds (Roben Manufacturing)	EA	2/3/2004	2.00	540.00	1,080.00

Deliver To: Darrell Dunn/bldg. 57
Account: 704-000 Organization: 1.20 Project: 06002.01.081 Allocation Pct: 100.00
Total Estimated Cost: $1,080.00

Special Instructions: Quality & Technical Requirements: Quality affecting item. Test procedure SWR-NN-RT1. Certifications required for individuals performing and reviewing radiographic inspection.

Government Project?: YES Property Type: G1 Is Govt. Property being sent to supplier?: NO

Quality Assurance?: YES ASL Required: YES

Approvals: Requestor: Darrell S Dunn 1/29/2004 7:42:36 AM
Department/Division Management: Vijay Jain 1/29/2004 8:55:43 AM
Quality Assurance: Robert D Brient 1/28/2004 3:52:09 PM

Submitted By: Shirlee Garcia 1/29/2004 10:47:33 AM

Your organization will provide services to the Center for Nuclear Waste Regulatory Analyses(CNWRA) in accordance with the requirements of your quality system or that of the CNWRA Quality Assurance Manual. any special technical or QA procedures required in the performance of your staff members' work will be provided. Special CNWRA requirements apply to scientific and engineering software and must be followed. Your organization's product will be accepted based on an evaluation by the CNWRA Principal Investigator or technical staff member and will be returned for rework at Seller's expense if the product does not meet CNWRA requirements. If scientific notebooks are utilized, they are subject to periodic review and must be returned at the conclusion of work to the CNWRA QA Records Room, or invoice remittance will be withheld. Additionaly, there shall be "right of access" to your facility to confirm effective implementation of the quality requirments with the possiblility of audits, source inspections, or surveillances. Any special documentation requirements shll be specified in the purchaes order

To Page No.

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From Page No.

TITLE

Requisition: **04007943**
Requisitioner: Dunn, Darrell S.
Req Organization: 1.20.05.04
Phone: (210) 522-6090

SOUTHWEST RESEARCH INSTITUTE

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Date Created: 01/28/2004
Date Printed: 01/29/2004
Requisition Date: 01/29/2004

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs

and will be supplied to the CNWRA with the product. The Seller shall notify CNWRA QA of any nonconformance to the requirements of this purchase order; further work shall not be done unless directed by CNWRA Director of QA at (210) 522-5149.

CERTIFIED INSPECTION/TEST DATA IS REQUIRED WITH SHIPMENT OF PARTS, MATERIALS, AND FOR SERVICES.

To Page No.

Project No.
Book No.

ISwT RADIOGRAPHIC INTERPRETATION RECORD

PROJECT No. :	SITE :	DATE : (DAY - MONTH - YEAR)	SHEET No:
04-336	SWRI .	29-Jan-04	290104-2

COMPONENT IDENTIFICATION:	FILM INTERPRETATION BY:	SNT LEVEL:	ACCEPTANCE STANDARD:
CNWRA 2, GMAW	William Angell	III	ASME Sec. III

FILM, SEAM OR JOINT NUMBER	FILM INTERVAL NUMBER	PENETRAMETER SIZE AND CONDITION	ACCEPT	REJECT	SLAG	POROSITY	CRACK	LACK OF PENETRATION	LACK OF FUSION	UNDERCUT	SURFACE	SHRINK	HOT TEAR	SAND	CHAPLETS	DATE FILM EXPOSED	REPAIR No.	REMARKS
	1-2	20 2T	✓													29-Jan	n/a	
	2-3	20 2T	✓			✓										29-Jan	n/a	

REMARKS

REVIEWED BY	SNT LEVEL	DATE :	PAGE
William Angell	III	29-Jan-04	1 of 1

ISwT Form RT -02 (Rev. 06/00)

Witnessed & Understood by me, Date

Invented by

Recorded by

1/29/04

To Page No.

ISwT RADIOGRAPHIC INTERPRETATION RECORD

PROJECT No. :	SITE :	DATE : (DAY - MONTH - YEAR)	SHEET No:
04-336	SWRI	29-Jan-04	290104-1

COMPONENT IDENTIFICATION:	FILM INTERPRETATION BY:	SNT LEVEL:	ACCEPTANCE STANDARD:
CNWRA 1, GTAW	William Angell	III	ASME Sec. III

FILM, SEAM OR JOINT NUMBER	FILM INTERVAL NUMBER	PENETRAMETER SIZE AND CONDITION	ACCEPT	REJECT	SLAG	POROSITY	CRACK	LACK OF PENETRATION	LACK OF FUSION	UNDERCUT	SURFACE	SHRINK	HOT TEAR	SAND	CHAPLETS	DATE FILM EXPOSED	REPAIR No.	REMARKS
	1-2	20 2T	✓		✓											29-Jan	n/a	
	2-3	20 2T	✓		✓											29-Jan	n/a	

REMARKS

REVIEWED BY	SNT LEVEL	DATE :	PAGE
William Angell	III	29-Jan-04	1 of 1

ISwT Form RT -02 (Rev. 06/00)

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Invented by

Recorded by

1/29/04

To Page No.

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ISwT RADIOGRAPHIC EXAMINATION RECORD

PROJECT No.: 04-0336
SITE: SwRI
DATE: (DAY - MONTH - YEAR) 29-Jan-04
SHEET No: 290104-1
REV: 0
CHG: 0
ICN: ☑ N/A

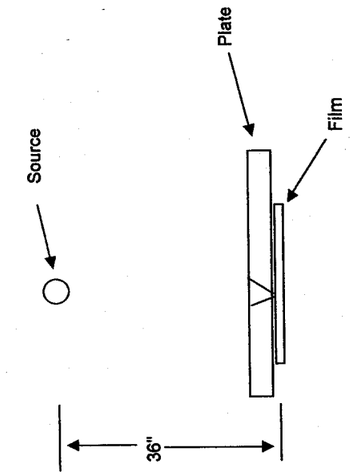
MATERIAL THICKNESS: 1.0"
MATERIAL DIAMETER: Plate
MATERIAL TYPE: S.S
WELD TYPE: Butt
PROCEDURE: SWR-NN-RT1
WELD CROWN HEIGHT: 1/16

ISOTOPE: n/a
DIA. X LENGTH: n/a
CURIES: n/a
DISTANCE: n/a
TIME: n/a
EFFECTIVE SHARPNESS:
FILM BRAND: Kodak T
FILM SIZE: 4.5 X 17"
FILM TECHNIQUE: ☑ SINGLE WALL ☐ DOUBLE WALL
SNT LEVEL: III

X-RAY: Sperry
KV: 290
MA: 10
DISTANCE: 36"
TIME: 12min
FOCAL SPOT SIZE: .19"
EXAMINER: William Angell

QUALITY LEVEL: 2T
PENETRAMETER ID: 20 ASTM
FILM PROCESSING: Manual
SHIM MATERIAL: S.S.
SHIM THICKNESS: .06"

SHOOTING SKETCH



1. No. of Views 1
2. Location of Radiation Source and Beam Angle 90
3. Location Markers 1-2 & 2-3 each plate
4. Screen Typ Lead
5. Thickness (in.) Front: 0.01 Back: 0.01
6. Signal Load ☐ Double Load ☑
7. No. of Film 8

COMPONENT ID: 2 Plates: CNWRA-1 & CNWRA-2

REVIEWED BY: William Angell

DATE: 29-Jan-04
PAGE 1 OF 1
SNT LEVEL III

ISwT Form RT-01 (Rev. 08/00)

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From Page No.

IRI Southwest INSPECTION OF ROBEN MANUFACTURING
WELDED ALLOY 22

RT inspection of alloy 22 plates was conducted by IRI Southwest
Reader sheets are shown on pages 86 & 87
Welds were found to be acceptable

Welded material will be cut into test specimens and tested

Plates are identified as follows

C-22 GTAW ROBEN - CNWRA-1
C-22 HEAT 2277-1-3164
FILLER HEAT WN 813 (ALLOY 622) ERNiCrMo-10
DIMENSIONS 1" x 6" x 24"

C-22 GTAW/GMAW ROBEN - CNWRA-2
C-22 HEAT 2277-1-3164
GTAW FILLER WN 813 (ALLOY 622) ERNiCrMo-10
GMAW FILLER XX 1977 DG11 (ALLOY 622) ERNiCrMo-10

To Page No.

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Recorded by Edward Dunn 1/29/04

ROBEN MANUFACTURING, INC.

760 VASSAR AVENUE
LAKEWOOD, NJ 08701
TEL (732) 364-6000
FAX (732) 905-9703

VISUAL ACUITY TEST

Inspector CHANDRADAT HARILAL, ID# 5 was tested for visual acuity on 12-10-2003.

His Uncorrected vision enables him to read the JAEGER TWO notations, at a distance of not less than 15 inches in Both eye(s).

Examiner 12-10-2003 Date

COLOR CONTRAST TEST

The above-named inspector has demonstrated the ability to distinguish contrast between colors associated with the various NDE methods in which he is involved. Making the examination and interpreting the result o f the use of procedure L.P.T.1.

Evaluator 12-10-2003. Date

REMARKS:

ROBEN MFG. CO., INC.

760 Vassar Avenue
Lakewood, NJ 08701

LIQUID PENETRANT EXAMINATION REPORT

JOB NO: CNWRA-1 & 2

DATE: 1-14-2004 CNWRA-1 GTAW & 1-15-2004 CNWRA-2, GTAW & GMAW Root FILL

TECHNICIAN: CHANDRADAT #5

PROCEDURE NO. LPT-1 REV. ____

BRAND NAME OF TESTING MATERIALS: MAGNAFLUX

TYPE:

PENETRANT SKL-SP1 CLEANER SKC-S DEVELOPER SKD-S2 SURFACE CONDITIONER Smooth radial

IDENTIFICATION	MAT'L TYPE	JOINT TYPE	REMARKS
LONG SEAM			
BUTT WELDED	SB575-C22	BUTT JOINT	Satisfactory
CNWRA-1	(N06022)		1/14/2004
Root & FINAL WELD			
LONG SEAM	SB575-C22	BUTT JOINT	Satisfactory
BUTT WELDED	(N06022)		1/15/2004
CNWRA-2			
Root & Final weld.			

1/15/2004
APPROVED

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIE • WERKSZEUGNIS

HAYNES International

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

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

Invoice No. / No. de Facture / Rechnungs Nr.: 3897450024-0
Date Entered / Date De Commande / Bestelldatum: 07/23/03
Customer Reference / Referenz Client / Kundenbestelldaten: 383908S
Report No. / Rapport No. / Zeugnis Nr.: 20030725051
Page of Pages / Page de Pages / Anzahl der Seiten: 1 Of 4

Sold To • Client • Rechnungsempfänger
SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA RD
SAN ANTONIO
TX 782280510 USA

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

Quantity Ordered / Quantité Commandée / Bestellmenge: 2 PC
Quantity Shipped / Quantité Expédiée / Lieferemenge: 2 PC

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

Chemical Analysis • Analyse Chimique • Chemische Analyse

Heat Number / Numéro De Coulée / Schmelz-Nr.	Al	B	C	Cb+Ta (Nb+Ta)	Co	Cr	Cu	Fe	La	Pb	Mg
2277 3 3266			0.005		1.19	21.40		3.75			
2277 3 3266											

Heat Number / Numéro De Coulée / Schmelz-Nr.	Mn	P	S	Si	Ti	V	W
2277 3 3266	0.23	0.008	0.004	0.03		0.14	2.81
2277 3 3266	13.30	BAL					

Heat Number / Numéro De Coulée / Schmelz-Nr.	Ta	Zr	Bi	Sc	La	Ce	Pb	Mg	Ag	Y	N	Ca	Al+Ti	Ni+Co
2277 3 3266														

07/25/03

Certified By: • Certifié Par • Bescheinigt Durch: Troy Reynolds
Certification Supervisor/Technician

Troy Reynolds

0.5" Alloy 22 Referenced on page 62 this notebook
Copied from notebook 607

To Page No.

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08/14/2003 14:57 FAX 6308715520 CONAM INC. @002

ACCREDITED
Certificate # 286.01
Certificate # 286.02

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 / 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

8/18/03

Q.A. INSPECTOR

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

PAGE 2 OF 2

*THIS TEST RESULT IS NOT COVERED BY OUR CURRENT A2LA ACCREDITATION
THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APROVAL OF STAVELEY SERVICES MATERIALS TESTING.
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FRAUDULENT STATEMENTS OR REPRESENTATIONS HEREIN COULD CONSTITUTE A FELONY PUNISHABLE UNDER FEDERAL STATUTES

0.5" Alloy 22 referenced on page 62
Copied from notebook 607

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Recorded by 3/22/04

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIE • WERKSZEUGNIS

Invoice No / No. De Facture / Rechnungs Nr: 38/9745(001)-0

Date Entered / Date De Commande / Bestelldatum: 07/23/03

Customer Reference / Référence Client / Kundenbestelldaten: 38/9008S

Report No. / Rapport No / Zeugnis Nr: 2003072S052

Pages of Pages / Page de Pages / Anzahl der Seiten: 1 Of 4

Sold To • Client • Rechnungsempfänger:
SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA RD
SAN ANTONIO
TX 78228051O USA

Ship To • Destinataire • Empfänger:
SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA RD
SAN ANTONIO
TX 78228051O USA

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

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

HAYNES International

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

Quantity Ordered / Quantité Commandée / Bestellmenge: 2 PC

Quantity Shipped / Quantité Livrée / Liefermenge: 2 PC

Chemical Analysis • Analyse Chimique • Chemische Analyse

Heat Number / Numéro De Coulée / Chargennummer	Al	B	C	Ce+La (Mm+La)	Co	Cr	Cu
2277 3 3292			0.004		1.32	21.22	

Heat Number / Numéro De Coulée / Chargennummer	Fe	Mn	Mo	Ni	P	S	Si	Ti	V	W
2277 3 3292	3.69	0.23	13.64	BAL.	0.005	0.003	0.02		0.13	2.96

Heat Number / Numéro De Coulée / Chargennummer	Nb+Ta	Pb	Mg	Y	Ag	N	Ca	Al+Ti	Ni+Co
2277 3 3292									

07/25/03

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

1" thick alloy 22 Copied from page 12
notebook 607

To Page No.

Witnessed & Understood by me, | Date | Invented by | Date

Recorded by

3/22/04

08/14/2003 14:57 FAX 6308715520 CONAM INC. 001

staveleyservices MATERIALS TESTING

ACCREDITED
Certificate # 286.01
Certificate # 286.02

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

8/18/03

Q.A. INSPECTOR

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

PAGE 1 OF 2

*THIS TEST RESULT IS NOT COVERED BY OUR CURRENT A2LA ACCREDITATION
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KNOWINGLY OR WILLFULLY FALSIFYING OR CONCEALING MATERIAL FACT ON THIS FORM, OR MAKING FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR REPRESENTATIONS HEREIN COULD CONSTITUTE A FELONY PUNISHABLE UNDER FEDERAL STATUTES.

1" thick alloy 22 Copied from page 14
notebook 607

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Recorded by

3/22/04

Project No._____

Book No._____ TITLE_____

From Page No.____

Continued in notebook 636

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.

9/29/04

To Page No.____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	