

308

Q200409230003

Scientific Notebook No. 503: Fabrication
Effects on Alloy 22 (02/18/2002 through
02/19/2003)

LABORATORY NOTEBOOK

CNWRA/SwRI

CNWRA
CONTROLLED
COPY 503

NOTEBOOK NO. _____

ISSUED TO DARRELL PUNN *Darrell Punnett DP*

ON FEBRUARY 18, 2002

DEPARTMENT DIU 20 - CNWRA

RETURNED _____

—SCIENTIFIC NOTEBOOK CO.—
2831 LAWRENCE AVE.
P.O. BOX 238
STEVENSVILLE, MI 49127
616-429-8285

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TITLE _____

From Page No. _____

Initial Scientific Notebook Entry for Fabrication Effects on Alloy 22**Title:** Fabrication Effects**Tests performed 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 ± 1 mV, 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.

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

Darrell Dunn

2/18/2002

From Page No. _____

PURCHASE REQUISITION

PURCHASING

SOUTHWEST RESEARCH INSTITUTE

REQUISITION DATE: 12/14/01 ORDER DATE: _____ PURCHASE ORDER NUMBER: _____ REQ. NO.: 600521

SUGGESTED OR PREVIOUS SUPPLIER: Haynes International DELIVER TO: Doyle Smith, bldg. 137 PURCHASING SELECTED SUPPLIER: _____

CITY, STATE: _____ SHIP VIA: _____

ATTN: _____ F.O.B.: _____ SUPPLIER CODE: _____ ATTN: _____

PHONE: _____ FAX: _____ TERMS: _____ PHONE: _____ FAX: _____

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
1	1	EA	Alloy C-22 plate, 1-inch thick, 2 feet wide, and 4 ft long	20	01402	571	100	1/7/02	3730.00

QUALITY-AFFECTING PURCHASE

Is this order being placed with an ASL supplier?
 YES NO

Is confirmatory analysis required?
 YES NO

Quality & Technical Requirements: Material must meet the compositional specifications in ASTM B 575 for plate materials. 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.

Quality Affecting Purchase

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 O.A. CODES: Q4
c INSPECTION CRITERIA
d QA APPROVAL (IF REQUIRED) DATE: 12/14/01
PI To Perform Receipt Inspection

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 S. Dunn EXT. NO.: 6090
DEPT. / DIVISION APPROVAL: _____ DATE: 12/14/01
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: _____ BUYER SIGNATURE: _____ DATE: _____ SEE INSTRUCTIONS ON REVERSE SIDE

Witnessed & Understood by me, _____
Date: 2/18/2002
Recorded by: Darrell Dunn
Invented by: _____
ALLOY C-22 PLATE PURCHASE REQUISITION
To Page No. _____

From Page No. _____

Southwest Research Institute Purchase Order: 2856978

6220 Culebra Road Page: 1
San Antonio, TX 78238-5166 Date Printed: 02/06/02

Order To: HAYNES INTERNATIONAL, INC. 509360 Ship To: Southwest Research Institute
NORTHWOODS INDUSTRIAL PARK WEST 6220 Culebra Road
12241 F.M. 529 HOUSTON, TX 77041 San Antonio, TX 78238-5166

Contact: GLENDA Ph: 800-231-4548 Fax: 713-937-4596

ORDER DATE	BUYER	TERMS	FOB	SALES ORDER	SHIP VIA	DELIVER TO
01/02/02	Jimmie Silvers	NET 30	SHIPPING POINT		MOTOR FREIGHT	DOYLE SMITH/B 137

LINE	ITEM/DESCRIPTION	REV	U/M	DUE DATE	DESIRED DATE	QUANTITY	NET UNIT COST	EXTENDED COST
1	MISC ALLOY C-22 PLATE, 1-INCH THICK, 2 FEET WIDE, AND 4 FT. LONG NOTE: QUALITY & TECHNICAL REQUIREMENTS: MATERIAL MUST MEET THE COMPOSITIONAL SPECIFICATIONS IN ASTM B 575 FOR PLATE MATERIALS. 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 PERFORMED. ACCEPTANCE OF THE MATERIAL WILL BE DETERMINED BY THE OUTCOME OF THE INDEPENDENT CHEMICAL ANALYSES. QUALITY AFFECTING PURCHASE. Req: 600521 QC Insp Required Prime Contract #: NRC0297009 Priority: NONE AOP: 704-000 1.20 01402.571 SWRI QA RECEIVING INSPECTION CRITERIA: PI TO PERFORM RECEIPT INSPECTION. Bill To: Southwest Research Institute P.O. Drawer 28510 Attention: Accounts Payable San Antonio, TX 78228-0510		PCS	01/09/02	01/09/02	1.0000	3,506.2500	\$3,506.25

PO Total Amt: \$3,506.25

Witnessed & Understood by me, _____
Date: 2/18/2002
Recorded by: Darrell Dunn
Invented by: _____
ALLOY C-22 PLATE PURCHASE ORDER
To Page No. _____

INVOICE

Invoice No. 72277 Invoice Date 1/03/02 Complete X Partial Shipped From HF--Houston

HAYNES International 1020 West Park Avenue P.O. Box 9013 Kokomo, IN, 46904-9013 (765) 456-6000

Title Passage HOUSTON TX Freight Terms PP AND ADD Shipped Via 59267-CENTRAL FREIGHT COMPANY

RECEIVED
SHIPPED TO: JAN - 7 PM 2:56
58478 SOUTHWEST RESEARCH INSTITUTE 6220 CULEBRA RD SAN ANTONIO TX 782280510 USA

509366
10112500

Mail Remittance To: Haynes International, Inc. P.O. Box 5667 Indianapolis, IN 46255-5667

Terms: NET 30, US FUND

Order No. 354671 Federal ID# 06-1185400 Order Type W Order Class 100

Customer Purchase Order No. 2856975T Contract No. 90#2856975 Customer Part No. Customer Job No.

Item No.	Ordered Quantity	Description	Unit Price	Shipped Quantity	Amount
1	1.000 PC	HASTELLOY (R) C-22 (R) ALLOY-PLATE Gauge: 1.0000 Width: 24.0000 Length: 48.00 Haynes Item: 2227732AD248000 Haynes Order No: 354671-1 PLEASE SHIP BEST WAY PREPAY AND ADD. BUYER - JIM SILVER 210-522-2267. ***1-2-02 CHANGE DATE GKN	\$3,506.25	1.000 PC 377.000 LB 1.0000 PC	\$3,506.25
2		Freight Charge			\$46.28

PO 2856975

THE ABOVE ITEMS HAVE BEEN RECEIVED AND THE INVOICE APPROVED FOR PAYMENT.
BY _____
DATE 2/14/2002

We hereby certify that these goods were produced in compliance with all applicable requirements of section 6, 7, and 12 of the Fair Labor Standards Act as amended and of regulations and orders of the U.S. Department of Labor issued under Section 14 thereof.
GLENDA K NICHOLAS Reprinted 01/04/2002 15:15:29

TOTAL DUE \$3,552.53

INVOICE FOR ALLOY 22 PLATE

To Page No. _____

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____

Recorded by *Donnell Penn* Date 2/18/2002

From Page No. _____

HAYNES International 1020 West Park Avenue P.O. Box 9013 Kokomo, Indiana, 46902

Product Description • Description • Produkt • Material Beschreibung
HASTELLOY (R) C-22 (R) ALLOY - PLATE
NADCAP CERTIFICATE NUMBER 0089
S400D, S1000D

1 x 24 x 48

Quantity Ordered: 1 PC
Quantity Shipped: 1 PC
Quantity Expedit: 1 PC
Quantity Delivery: 1 PC

Quantity Ordered: 1 PC
Quantity Shipped: 1 PC
Quantity Expedit: 1 PC
Quantity Delivery: 1 PC

Chemical Analysis • Analyse Chimique • Chemische Analyse

Heat Number	AI	B	C	Co	Cr	Cu	Fe	Mn	Mo	NI	P	S	Si	Ti	V	W
2277 13164		0.003		1.27	21.15		3.93	0.23	13.47	BAL	0.007	0.003	0.02		0.11	3.26

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

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

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

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

Charles J. Stansell

MILL TEST REPORT FOR ALLOY 22 PLATE
HEAT 2277-1-3164 PAGE 1 OF 4

To Page No. _____

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____

Recorded by *Donnell Penn* Date 2/18/2002

From Page No. _____

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIE • WERKSZEUGNIS																	
Invoice No No. De Facture Rechnungs Nr 354671001-0		Date Entered Date De Commande Bestelldatum 01/02/02		Customer Reference Reference Client Kundenbestelldaten 2856975T		Report No. Rapport No Zeugnis Nr 20020103044		Pages of Pages Page de Pages Anzahl der Seiten 2 Of 4		HAYNES International Haynes International 1020 West Park Avenue PO Box 9013 Kokomo, Indiana, 46902							
Sold To • Client • Bestellerschrift SOUTHWEST RESEARCH INSTITUTE 6220 CULEBRA RD SAN ANTONIO TX 782280510 USA				Ship To • Destinataire • Bestellemenge SOUTHWEST RESEARCH INSTITUTE 6220 CULEBRA RD SAN ANTONIO TX 782280510 USA				Product Description • Description Produit • Material Beschreibung 1 x 24 x 48 HASTELLOY(R) C-22 (R) ALLOY - PLATE NADCAP CERTIFICATE NUMBER 0089 S400D,S1000D									
Specification • Specification • Spezifikation ASTM-B-575 Rev 99a N06022 ASME-SB-575 Rev 99a N06022						Quantity Ordered Quantite Commandee Bestellemenge 1 PC		Quantity Shipped Quantite Expediee Liefermenge 1 PC									
Tensile Test at Room Temperature • Essai De Traction A Temp. Ambiante • Zugversuch Bei Raum Temp.						Tensile Test at Elevated Temperature • Essai De Traction A Hte. Temp. Warm Zugversuch						Stress Rupture Temperature • Essai A Charge De Rupture Zeitanstandversuch					
Ultimate Zugfestigkeit	1% Yield Lin. Elast. A 1% 1% Strieckgrenze	0.2% Yield Lin. Elast. A 0.2% 0.2% Strieckgrenze	% Elong In % Allong EN % Dehnung 4D	%RA %RA	(1) (A)	Test Essai Versuch Temp:	Ultimate Zugfestigkeit	1% Yield Lin. Elast. A 1% 1% Strieckgrenze	0.2% Yield Lin. Elast. A 0.2% 0.2% Strieckgrenze	% Elong In % Allong EN % Dehnung	%RA %RA	Test Essai Versuch Temp:	Stress Constraime Spannung	Hours Heures Stunden	% Elong In % Allong EN % Dehnung	%RA %RA	
108000 PSI	51000 PSI	48300 PSI	69 %	80 %	(1) (A)												
Certified By • Certifie Par • Bescheinigt Durch: Chuck Stansell Certification Supervisor/Technician						01/03/02		(1) 2734141701									
<p>THE DATA CONTAINED HEREIN WERE OBTAINED FROM SAMPLES CONSIDERED TO BE REPRESENTATIVE OF THE PRODUCTS IN THE SUBJECT SHIPMENT AND ARE BELIEVED TO BE RELIABLE. WE DISCLAIM ANY LEGAL LIABILITY FROM USE OF THIS CERTIFICATE. LES RENDUS CONTENUS ICI ONT ETE OBTENUS A PARTIR D'ESSEMPLONS REPRESENTATIFS DES PRODUITS EXPEDIES ET SONT CONSIDERES COMME ETANT FIDELIERS. NOUS NE SOMES PAS RESPONSABLES LEGALEMENT QUANT A L'UTILISATION DE CE CERTIFICAT. DIE VORGEMANTEN ANGABEN BASIEREN AUF PROBEEN DIE ALS REPRESENTATIV GELTEN FUR DIE PRODUKTE DIE DIESER LIEFERUNG ZUGEHOREN UND ALS GUTERLEBENDIG UND ZUFUERASSICHT ANGESEHEN WERDEN. WIR LEHNEN JEDE RECHTLICHE VERANTWORTLICHKEIT FUR DIE VERWENDEUNG DIESER ZEUGNISSE AB. THIS MATERIAL MEETS THE REQUIREMENTS OF THE LISTED SPECIFICATIONS, MODIFIED BY ANY EXCEPTIONS OR PURCHASE ORDER REQUIREMENTS. SPECIFICATION MARKING REQUIREMENTS MAY BE WAIVED ON ORDERS REQUIRING MULTIPLE MATERIAL SPECIFICATIONS.</p>																	

MISC TEST REPORT FOR ALLOY C-22 PLATE
 NFAT 2277-1-3164
 PAGE 2 OF 4
 Witnessed & Understood by me, _____ Date 2/18/2002
 Recorded by *Charles Stansell*
 Invented by _____ Date 2/18/2002
 To Page No. _____


From Page No. _____

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIE • WERKSZEUGNIS																								
Invoice No No. De Facture Rechnungs Nr 354671001-0		Date Entered Date De Commande Bestelldatum 01/02/02		Customer Reference Reference Client Kundenbestelldaten 2856975T		Report No. Rapport No Zeugnis Nr 20020103044		Pages of Pages Page de Pages Anzahl der Seiten 3 Of 4		HAYNES International Haynes International 1020 West Park Avenue PO Box 9013 Kokomo, Indiana, 46902														
Sold To • Client • Bestellerschrift SOUTHWEST RESEARCH INSTITUTE 6220 CULEBRA RD SAN ANTONIO TX 782280510 USA				Ship To • Destinataire • Bestellemenge SOUTHWEST RESEARCH INSTITUTE 6220 CULEBRA RD SAN ANTONIO TX 782280510 USA				Product Description • Description Produit • Material Beschreibung 1 x 24 x 48 HASTELLOY(R) C-22 (R) ALLOY - PLATE NADCAP CERTIFICATE NUMBER 0089 S400D,S1000D																
Specification • Specification • Spezifikation ASTM-B-575 Rev 99a N06022 ASME-SB-575 Rev 99a N06022						Quantity Ordered Quantite Commandee Bestellemenge 1 PC		Quantity Shipped Quantite Expediee Liefermenge 1 PC																
Annealed Hardness Durete Recuit Geglueht Haerte				Grain Size Grossur De Grain Korngruesse				IGA		Uniformity		Corrosion Rate		Oxidation Rate		Charpy Impact Test				Creep Rupture				
				Grain Size	Prodominant Grain Size	Recry Grain	Unrecry. Grain %	ALA	Attack Depth		Corrosion		Test Method			Toughness Avg	Toughness 1	Toughness 2	Toughness 3	Test Essai Versuch Temp.	Stress Constraime Spannung	Hours Heures Stunden	% Elong In % Allong EN % Dehnung	% Elong @ 15 Hrs
93 HRB				3.5							MPY													
Certified By • Certifie Par • Bescheinigt Durch: Chuck Stansell Certification Supervisor/Technician						01/03/02		(1) 2734141701																
<p>THE DATA CONTAINED HEREIN WERE OBTAINED FROM SAMPLES CONSIDERED TO BE REPRESENTATIVE OF THE PRODUCTS IN THE SUBJECT SHIPMENT AND ARE BELIEVED TO BE RELIABLE. WE DISCLAIM ANY LEGAL LIABILITY FROM USE OF THIS CERTIFICATE. LES RENDUS CONTENUS ICI ONT ETE OBTENUS A PARTIR D'ESSEMPLONS REPRESENTATIFS DES PRODUITS EXPEDIES ET SONT CONSIDERES COMME ETANT FIDELIERS. NOUS NE SOMES PAS RESPONSABLES LEGALEMENT QUANT A L'UTILISATION DE CE CERTIFICAT. DIE VORGEMANTEN ANGABEN BASIEREN AUF PROBEEN DIE ALS REPRESENTATIV GELTEN FUR DIE PRODUKTE DIE DIESER LIEFERUNG ZUGEHOREN UND ALS GUTERLEBENDIG UND ZUFUERASSICHT ANGESEHEN WERDEN. WIR LEHNEN JEDE RECHTLICHE VERANTWORTLICHKEIT FUR DIE VERWENDEUNG DIESER ZEUGNISSE AB. THIS MATERIAL MEETS THE REQUIREMENTS OF THE LISTED SPECIFICATIONS, MODIFIED BY ANY EXCEPTIONS OR PURCHASE ORDER REQUIREMENTS. SPECIFICATION MARKING REQUIREMENTS MAY BE WAIVED ON ORDERS REQUIRING MULTIPLE MATERIAL SPECIFICATIONS.</p>																								

ALLOY C-22 MILL TEST REPORT
 NFAT 2277-1-3164
 PAGE 3 OF 4
 Witnessed & Understood by me, _____ Date 2/18/2002
 Recorded by *Charles Stansell*
 Invented by _____ Date 2/18/2002
 To Page No. _____

From Page No. _____		Product Description • Description Produit • Material Beschreibung HAYNES International 1020 West Park Avenue PO Box 9013 Kokomo, Indiana, 46902	
HAYNES International		1 x 24 x 48 HASTELLOY(R) C-22 (R) ALLOY - PLATE NADCAP CERTIFICATE NUMBER 0089 S400D,S1000D	
Customer Reference Kundenreferenz 2856975T	Report No. Rapport No. 20020103044	Ship To • Destinataire • Bestimmung SOUTHWEST RESEARCH INSTITUTE 6220 CULEBRA RD SAN ANTONIO TX 782280510 USA	Quantity Shipped Quantité Expédiée Liefermenge 1 PC
Date Entered Date de saisie 01/02/02	Reference Client Kundenreferenz 2856975T	Quantity Ordered Quantité Commandée Bestellmenge 1 PC	
Invoice No. N° de Facture 354671001-0	Customer Reference Kundenreferenz 2856975T	Ship To • Destinataire • Bestimmung SOUTHWEST RESEARCH INSTITUTE 6220 CULEBRA RD SAN ANTONIO TX 782280510 USA	
Date Entered Date de saisie 01/02/02	Reference Client Kundenreferenz 2856975T	Ship To • Destinataire • Bestimmung SOUTHWEST RESEARCH INSTITUTE 6220 CULEBRA RD SAN ANTONIO TX 782280510 USA	
Specifications • Spécifications • Spezifikation ASTM-B-575 Rev 99a N06022 ASME-SB-575 Rev 99a N06022			
This material is free of mercury contamination. Mill Orders Used: 2734141701 (1 PC) (A) 2000 °F to 2100 °F			
Certified By • Certifié Par • Bescheinigt Durch: Chuck Stansell Certification Supervisor/Technician 01/03/02 <i>Chuck Stansell</i>			
<p style="text-align: center;"><small>THE INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE. IT IS THE PROPERTY OF THE UNITED STATES GOVERNMENT AND IS LOANED TO YOU. IT AND ITS CONTENTS ARE NOT TO BE DISTRIBUTED OUTSIDE YOUR AGENCY. IF YOU ARE NOT AN EMPLOYEE OF THE UNITED STATES GOVERNMENT, YOU ARE NOT TO DISSEMINATE THIS INFORMATION TO ANY OTHER PERSON. THIS INFORMATION IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE.</small></p>			
MILL TEST REPORT FOR ALLOY 22 PLATE HEAT 2277-1-3164		PAGE 4 of 4	
To Page No. _____			

Witnessed & Understood by me,	Date	Invented by	Date
		<i>Darrell Dunn</i>	2/18/2002
Recorded by		Date	
<i>Darrell Dunn</i>		2/18/2002	

From Page No. _____		 CNWRA A center of excellence in earth sciences and engineering 6220 Culebra Road · San Antonio · Texas, U.S.A. 78228-5166	
Darrell S. Dunn Bldg. 57 Phone: (210) 522-6090 Fax: (210) 522-5184 E-Mail: ddunn@swri.org		<p style="text-align: center;"><i>DOCUMENTATION SENT TO CONAM INSPECTION</i></p>	
Bill Scorzo Conam Inspection			
Dear Mr. Scorzo,			
Enclosed please find the heat of Alloy C-22 (heat # 2277-1-3164) submitted for chemical analyses. Per our previous phone conversation I need to have the specimen analyzed for the Ni, Cr, Mo, W, Fe, C, Co, Cu, Mn, P, S, Si, and V. According to the vendor, the material heats are within the chemical composition ranges specified in ASTM B-575-99a. The chemical composition of UNS 06022, specified in ASTM B575-99a and listed in the UNS, 6 th edition is provided below.			
<p>Cr: 20.0 - 22.5 Mo: 12.5 - 14.5 W: 2.5 - 3.5 Fe: 2.0 - 6.0 C: 0.015 max Co: 2.5 max Mn: 0.50 max P: 0.02 max S: 0.02 max Si: 0.08 max V: 0.35 max Ni: balance</p>			
I have provided a copy of ASTM B575-99a copy of the alloy composition listed in the UNS, 6 th edition, and copies of the mill test reports.			
The chemical analyses performed by Conam Inspection should provide the chemical composition of the alloy heats and should specify the heat number of the material. The analyses should conclusively determine if the heats submitted are within the specifications listed in ASTM B-575-99a. Any discrepancy between			
<p>COPY OF LETTER TO CONAM INSPECTION FOR CHEMICAL ANALYSES OF ALLOY C-22 HEAT 2277-1-3164</p>			
To Page No. _____			

Witnessed & Understood by me,	Date	Invented by	Date
		<i>Darrell Dunn</i>	2/18/2002
Recorded by		Date	
<i>Darrell Dunn</i>		2/18/2002	

From Page No. _____

B 575

TABLE 1 Chemical Requirements

Information potentially subject to copyright protection was redacted from this location. The redacted material is from the ASTM standard listed below.

COPY OF ASTM B 575-99a PROVIDING CHEMICAL REQUIREMENTS FOR N06022

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

Darrell Dunn

2/18/2002

From Page No. _____



CONAM KAWIN

194 Internationale Blvd., • Glendale Heights, IL 60139 • Telephone + 1 630-681-0008 • Facsimile + 1 630-871-5520

TEST REPORT

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

P. O. # 5013B
DESCR

REPORT DATE: 01/14/2002

LAB NO: 0111-025 / 01

JOB NO: 01/14 #21

ALLOY C-22 HT# 2277-1-3164

CHEMICAL ANALYSIS

Si	<.01 ✓	Mn	.24 ✓	C	.005 ✓
P	.006 ✓	S	.001 ✓	Ni	BALANCE ✓
Cr	21.46 ✓	Mo	13.60 ✓	Cu	.08 ✓
V	.10 ✓	Co	1.30 ✓	Fe	3.87 ✓
W	3.28 ✓				

TEST METHODS: ASTM E1024 ; ASTM E 1019 ; ASTM E 354 ; ICP ;

METS COMPOSITIONAL SPECIFICATION REQUIREMENTS FOR UNS N06022 AS SPECIFIED PER ASTM B 575-99a

REQ 609746

Bill Scopa
G. A. INSPECTOR

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

PAGE 1 OF 1

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF CONAM KAWIN, INC.

KNOWINGLY OR WILLFULLY FALSIFYING OR CONCEALING A MATERIAL FACT ON THIS FORM, OR MAKING FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR REPRESENTATIONS HEREIN COULD CONSTITUTE A FELONY PUNISHABLE UNDER FEDERAL STATUTES.

RESULTS OF INDEPENDENT CHEMICAL ANALYSIS

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

Darrell Dunn

2/18/2002

From Page No. _____

01/21/2002 22:52 7136449628

AMERICAN FILLER METALS

PAGE 01

ACTUAL MATERIAL TEST REPORT



AMERICAN FILLER METALS

6060 Donoho Street • Houston, Texas 77033

Phone: 713-649-8785 • 1-800-394-4550 • Fax: 713-644-9628 • www.amfiller.com

Customer: WELDERS SUPPLY COMPANY
5406 JACKWOOD
SAN ANTONIO, TX 78238

PO: 23908 Ship Date: 01/22/02 Net Weight: 10#
Product: NB 622 TE Dimensions: 3/32 X 36
Heat #: XX1973BG12 Specification: AWS A5.14 ERNiCrMo-10

C	Co	Cr	Cu	Fe	Mn
.002	.06	20.43	.1	2.48	.2
Mo	Ni	P	S	Si	V
14.16	59.37 REM	.007	.001	.05	.05
W	Tot Others				
3.09	.5 <				

This certification is provided by American Filler Metals Co. with the understanding that if the product covered does not confirm to the stated specifications, there shall be no personal liability of any kind by the undersigned. Furthermore, the obligation and liability of (such non-conformance) by American Filler Metals Co., will be limited to a) furnishing the purchaser with a product conforming to the correct specifications, at no additional charge or b) to refund to the full purchase price paid for such non-conforming product. American Filler Metals Co. will not be liable for consequential damage.

Kathy Cunningham

Authorized Representative



MATERIAL TEST REPORT FOR WELD FILLER WIRE
ALLOY 622 HEAT XX1973BG12 3/32 To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

2/18/2002

Daniel Dunn

From Page No. _____

01/21/2002 22:52 7136449628

AMERICAN FILLER METALS

PAGE 03

ACTUAL MATERIAL TEST REPORT



AMERICAN FILLER METALS

6060 Donoho Street • Houston, Texas 77033

Phone: 713-649-8785 • 1-800-394-4550 • Fax: 713-644-9628 • www.amfiller.com

Customer: WELDERS SUPPLY COMPANY
5406 JACKWOOD
SAN ANTONIO, TX 78238

PO: 23908 Ship Date: 01/22/02 Net Weight: 30.08#
Product: NB 622 MI Dimensions: .045 X 30
Heat #: XX1832BG Specification: AWS A5.14 ERNiCrMo-10

C	Co	Cr	Cu	Fe	Mn
.01 <	.03	20.49	.15	2.22	.21
Mo	Ni	P	S	Si	V
14.17	59.57 REM	.001 <	.001	.06	.05
W	Tot Others				
3.08	<				

This certification is provided by American Filler Metals Co. with the understanding that if the product covered does not confirm to the stated specifications, there shall be no personal liability of any kind by the undersigned. Furthermore, the obligation and liability of (such non-conformance) by American Filler Metals Co., will be limited to a) furnishing the purchaser with a product conforming to the correct specifications, at no additional charge or b) to refund to the full purchase price paid for such non-conforming product. American Filler Metals Co. will not be liable for consequential damage.

Kathy Cunningham

Authorized Representative



MATERIAL TEST REPORT FOR WELD FILLER WIRE
ALLOY 622 HEAT XX1832BG 0.045 To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

2/18/2002

Daniel Dunn

From Page No. _____

01/21/2002 22:52 7136449628

AMERICAN FILLER METAL

PAGE 02

ACTUAL MATERIAL TEST REPORT



6060 Donoho Street • Houston, Texas 77033

Phone: 713-649-8785 • 1-800-394-4550 • Fax: 713-644-9628 • www.amfiller.com

Customer: WELDERS SUPPLY COMPANY
5406 JACKWOOD
SAN ANTONIO, TX 78238

PO: 23908 Ship Date: 01/22/02 Net Weight: 20#
Product: NB 622 TF Dimensions: 1/8 X 36
Heat #: XX2147BG11 Specification: AWS A5.14 ERNiCrMo-10

C	Co	Cr	Cu	Fe	Mn
.003	.07	21.18	.07	2.2	.21
Mo	Ni	P	S	Si	V
14.09	58.85 REM	.006	.001 <	.05	.01
W	Tot Others				
3.26	.5 <				

This certification is provided by American Filler Metals Co. with the understanding that if the product covered does not confirm to the stated specifications, there shall be no personal liability of any kind by the undersigned. Furthermore, the obligation and liability of (such non-conformance) by American Filler Metals Co., will be limited to a) furnishing the purchaser with a product conforming to the correct specifications, at no additional charge or b) to refund to the full purchase price paid for such non-conforming product. American Filler Metals Co. will not be liable for consequential damage.

Kathy Bingham
Authorized Representative

P.O. 285778S

C22



MATERIAL TEST REPORT FOR WELD FILLER WIRE
ALLOY 622 HEAT XX2147BG11 1/8"

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by *Darrell Dunn* 2/18/2002

From Page No. _____



CNWRA A center of excellence in earth
sciences and engineering
6220 Culebra Road • San Antonio • Texas, U.S.A. 78228-5166

February 6, 2002

Darrell S. Dunn
Bldg. 57
Phone: (210) 522-6090
Fax: (210) 522-5184
E-Mail: ddunn@swri.org

*FILLER METAL
ANALYSES*

Bill Scorzo
Conam Inspection

Dear Mr. Scorzo,

Enclosed please find the heat of Alloy 622 weld filler metals heat numbers XX1832BG (0.045" diameter), XX1973BG12 (3/32" diameter) and XX2147BG11 (1/8" diameter) submitted for chemical analyses. Per our previous phone conversations, I need to have the specimen analyzed for the Ni, Cr, Mo, W, Fe, C, Co, Cu, Mn, P, S, Si, and V. According to the vendor, the material heats are within the chemical composition ranges specified in AWS A5.14 ERNiCrMo-10. The specified chemical composition is provided below.

- Cr: 20.0 - 22.5
- Mo: 12.5 - 14.5
- W: 2.5 - 3.5
- Fe: 2.0 - 6.0
- C: 0.015 max
- Co: 2.5 max
- Mn: 0.50 max
- P: 0.02 max
- S: 0.010 max
- Si: 0.08 max
- V: 0.35 max
- Cu: 0.50
- Others Elements Total: 0.5
- Ni: balance

A copy of the specification requirements in AWS A5.14 and copies of the mill test reports are included.

*COPY OF LETTER TO CONAM INSPECTION FOR
CHEMICAL ANALYSES OF WELD FILLER WIRE*

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by *Darrell Dunn* 2/18/2002

From Page No.	Weight-Percent ^{a,b}	AWS Classification ^m	UNS Number ^r	C	Mn	Fe	P	S	Si	Cu	Ni ^d	Co	Al	Ti	Cr	Nb plus Ta	Mo	V	W	Other Elements Total	

Table 1 (Continued)




Information potentially subject to copyright protection was redacted from this location. The redacted material is from material information listed below.

(continued)

AWS A5.14 CHEMICAL REQUIREMENTS FOR ERNiCrMo-10 FILLER WIRE

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Darrell Dunn</i>	2/18/2002

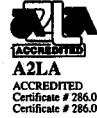
From Page No.	 		192 Internationale Blvd Glendale Heights, IL 60139 Telephone + 1 630-681-0008 Facsimile + 1 630-871-5520 http://www.conaminsp.com
	TEST REPORT Materials Analysis Group A Division of Staveley Services North America, Inc.		
	SOUTHWEST RESEARCH INST. 7010 6220 CULEBRA RD P. O. DRAWER 28510 SAN ANTONIO TX 78284 DARRELL DUNN	P. O. # 50138 DESCR 02/06/02 ALLOY 622 WELD FILLER AWS A5.14 ERNiCrMo-10 REPORT DATE: 02/15/2002	
	LAB NO: 0208-033 / 01 XX1832B0 (0.045" DIA)	JOB NO: 02/11 #28	
	CHEMICAL ANALYSIS		
	Si .08 ✓ P .001 ✓ Cr 20.47 ✓ V .07 ✓ W 3.07 ✓	Mn .19 ✓ S .001 ✓ Mo 14.20 ✓ Co .01 ✓ Others Total <.50 ✓	C .009 ✓ Ni BALANCE ✓ Cu .16 ✓ Fe 2.25 ✓
	TEST METHODS: ASTM E1024 ; ASTM E 1019 ; ASTM E 354 ; ICP ;		
	MEETS REQUIREMENTS OF ERNiCrMo-10		
	 QA INSPECTOR		
	ALL CHEMICAL TEST RESULTS ARE REPORTED IN WEIGHT PERCENT UNLESS OTHERWISE NOTED.		
	PAGE 1 OF 3		
	<small>*THIS TEST RESULT IS NOT COVERED BY OUR CURRENT A2LA ACCREDITATION THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF CONAM. KNOWINGLY OR WILLFULLY FALSIFYING OR CONCEALING A MATERIAL FACT ON THIS FORM, OR MAKING FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR REPRESENTATIONS HEREIN COULD CONSTITUTE A FELONY PUNISHABLE UNDER FEDERAL STATUTES.</small>		

Chemical analysis of weld filler wire

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Darrell Dunn</i>	3/29/2002

From Page No. _____



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Telephone + 1 630-681-0008
Facsimile + 1 630-871-5520
http://www.conaminsp.com

Materials Analysis Group
A Division of Staveley Services North America, Inc.

TEST REPORT

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

P. O. # 50138

DESCR 02/06/02
ALLOY 622 WELD FILLER
AWS A5.14 ERNiCrMo-10
REPORT DATE: 02/15/2002

LAB NO: 0208-033 / 02

JOB NO: 02/11 #29

XX
XX1973B012 (3/32" DIA)

CHEMICAL ANALYSIS

Si	.05 ✓	Mn	.19 ✓	C	.005 ✓
P	.005 ✓	S	.001 ✓	Ni	
Cr	20.50 ✓	Mo	14.23 ✓	Cu	
V	.04 ✓	Co	.05 ✓	Fe	
W	3.12 ✓	Others Total	<.50 ✓	BALANCE	2.50 ✓

TEST METHODS: ASTM E1024 ; ASTM E 1019 ; ASTM E 354 ; ICP ;

MEETS REQUIREMENTS
OF ERNiCrMo-10

Bill Senyo
QA INSPECTOR

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

PAGE 2 OF 3

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Chemical analysis of weld filler wire

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

3/29/2002

From Page No. _____



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Glendale Heights, IL 60139
Telephone + 1 630-681-0008
Facsimile + 1 630-871-5520
http://www.conaminsp.com

Materials Analysis Group
A Division of Staveley Services North America, Inc.

TEST REPORT

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

P. O. # 50138

DESCR 02/06/02
ALLOY 622 WELD FILLER
AWS A5.14 ERNiCrMo-10
REPORT DATE: 02/15/2002

LAB NO: 0208-033 / 03

JOB NO: 02/11 #30

XX
XX2147B011 (1/8" DIA)

CHEMICAL ANALYSIS

Si	.03 ✓	Mn	.22 ✓	C	.008 ✓
P	.003 ✓	S	.001 ✓	Ni	
Cr	21.25 ✓	Mo	14.20 ✓	Cu	
V	.01 ✓	Co	.05 ✓	Fe	
W	3.28 ✓	Others Total	<.50 ✓	BALANCE	2.18 ✓

TEST METHODS: ASTM E1024 ; ASTM E 1019 ; ASTM E 354 ; ICP ;

MEETS REQUIREMENTS
OF ERNiCrMo-10

Bill Senyo
QA INSPECTOR

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

PAGE 3 OF 3

*THIS TEST RESULT IS NOT COVERED BY OUR CURRENT A2LA ACCREDITATION
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FRAUDULENT STATEMENTS OR REPRESENTATIONS HEREIN COULD CONSTITUTE A FELONY PUNISHABLE UNDER FEDERAL STATUTES.

*Chemical analysis of weld filler wire
Darrell Dunn 3/29/2002*

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

3/29/2002

PURCHASING
PURCHASE REQUISITION

REQUISITION DATE: 1/11/02
ORDER DATE: _____
PURCHASE ORDER NUMBER: _____
REQ. NO.: 609729

SOUTHWEST RESEARCH INSTITUTE™
SUGGESTED OR PREVIOUS SUPPLIER: Welders Supply Co.
DELIVER TO: R. Doyle Smith, bldg. 137
PURCHASING SELECTED SUPPLIER: _____
CITY, STATE: San Antonio, TX
SHIP VIA: _____
ATTN: _____
F.O.B.: _____
SUPPLIER CODE: _____
ATTN: _____
PHONE: _____
FAX: _____
TERMS: _____
PHONE: _____
FAX: _____

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	10	lbs	3/32" x 36" ERNiCrMo-10 weld wire, ID'd, actual certs	20	01402	571	100	1/18/02	22.90
B	20	lbs	1/8" x 36" ERNiCrMo-10 weld wire, ID'd, actual certs	20	01402	571	100	1/18/02	22.70
C	30	lbs	0.045" ERNiCrMo-10 weld wire on 30-lb spool, actual certs	20	01402	571	100	1/18/02	23.70
D	10	EA	3/32" 2% thoriated tungsten	20	01402	571	100	1/18/02	1.62
E	25	EA	0.045" contact tip, P/N 14H-45	20	01402	571	100	1/18/02	
F	1	EA	0.045 wire conduit assembly, P/N 44-3545-15	20	01402	571	100	1/18/02	

QUALITY AFFECTING PURCHASE
Is this order being placed with an ASI supplier?
 YES NO

INTERNAL NOTES TO BUYER
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 Q.A. CODES: Q3; Q4
c INSPECTION CRITERIA
d QA APPROVAL (IF REQUIRED) DATE
Buyer Signature: [Signature] 1/14/02

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: R. Doyle Smith EXT. NO. 3976
DEPT. / DIVISION APPROVAL DATE: 1/14/02
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: _____

Purchase requisition for weld filler wire.

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date 3/29/2002

Recorded by [Signature]

To Page No. _____

PURCHASING
PURCHASE REQUISITION

REQUISITION DATE: 3/6/02
ORDER DATE: _____
PURCHASE ORDER NUMBER: _____
REQ. NO.: 609777

SOUTHWEST RESEARCH INSTITUTE™
SUGGESTED OR PREVIOUS SUPPLIER: Texas Toolmakers
DELIVER TO: R. Doyle Smith
PURCHASING SELECTED SUPPLIER: _____
CITY, STATE: San Antonio, TX
SHIP VIA: _____
ATTN: _____
F.O.B.: _____
SUPPLIER CODE: _____
ATTN: _____
PHONE: _____
FAX: _____
TERMS: _____
PHONE: _____
FAX: _____

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	8	EA	Machine carbon steel mock-up specimen per DWG 20-01402-571-20, Rev. 01	20	01402	571	100	4/1/02	288.00

Quality affecting purchase.
Quality & Technical Requirements: Vendor will supply a dimensional inspection and show conformance with dimensional tolerances shown in SwRI DWG 20-01402-571-20, Rev. 01

INTERNAL NOTES TO BUYER
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 Q.A. CODES: Q11
c INSPECTION CRITERIA
d QA APPROVAL (IF REQUIRED) DATE
Buyer Signature: [Signature] 3/6/02

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: R. Doyle Smith EXT. NO. 3976
DEPT. / DIVISION APPROVAL DATE: 3/6/02
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: _____

Purchase requisition for mockup specimen Carbon steel

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date 3/29/2002

Recorded by [Signature]

To Page No. _____

From Page No. _____

Mar 06 02 12:47p TEXAS TOOLMAKERS, INC 210-402-0369 P. 1

Texas Toolmakers, Inc.
11411 E. Coker Loop / San Antonio, TX 78216
Phone: (210) 494-3651
Fax: (210) 494-6139

CUSTOMER WORK ORDER / QUOTE

Job No.: _____ Quote No.: 1482 Date Opened: _____ Delivery Date: _____ Customer No.: 0111 Job Taken/Quoted by: MIKE RIDGWAY

Customer: SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA
SAN ANTONIO, TEXAS 78238

Quote Good For: 90 DAYS
Customer P.O.: _____
Phone No.: 210-684-5111

Terms: 1/2% 10 NET 30
Contact: JIM SILVERS
DARRELL DUNN
Fax No.: 522-3964
210-522-5184

Item	Qty	Part No.	Rev	Part Name	Price Ea.	Total
1	8	20-01402-572-20		CARBON STEEL MOCK-UP SPECIMENS	288.00	\$2,304.00
						\$ 0.00
						\$ 0.00
						\$ 0.00
						\$ 0.00
						\$ 0.00
						\$ 0.00
						\$ 0.00
						\$ 0.00
					Total	\$2,304.00

Work Instructions:
NOTE: MATERIAL SUPPLIED BY SWRI.

All quotations and agreements are contingent upon strikes, fires, availability of materials, and all other causes beyond our control. Prices are subject to change by seller before final acceptance.
FOB: TEXAS TOOLMAKERS, INC.

Quality Requirements: None As noted below *Per RFA*

Material/Process Certification: Yes No | Certificate of Compliance: Yes No | Source Inspection Yes No

Documented Dimensional Inspection: Yes No; If Yes: 1) Specified Dimensions Only, 2) Sampling, OR 3) 100%

Authorized TTI Representative: *Mike Ridgway* Date: 3/6/02

Customer Acceptance: _____ Title: _____ Date: _____

Customer Comments (if applicable): _____

Note: price(s) may be affected if scope of work/inspection is deviated from that quoted.
— For TTI Use Only —

Reviewed by: _____ Date: _____ P.O. provided at time of review: Yes No

TTI Form QF-030101 Rev 2

To Page No. _____

*Quote for machining carbon steel mockup specimen
note incorrect part number*

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Darrell Dunn</i>	3/29/2002

From Page No. _____

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

Carbon Steel Mockup Specimen
CNWRA Drawing 20-01402-571-20 Rev. 01
All Dimensions ± 0.010"
unless otherwise specified
Note: Detail A on Page 2

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

Page 1 of 2

Detail A

Initiated by: *Darrell Dunn* 3/6/02 Date

Reviewed by: *V. Jain* 3/6/02 Date

QA Approval: *B. Mabrito* 3/6/2002 Date

To Page No. _____

Drawing for carbon steel mockup specimen

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Darrell Dunn</i>	3/29/2002

From Page No. _____

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

Carbon Steel Mockup Specimen
CNWRA Drawing 20-01402-571-20 Rev. 01
All Dimensions ± 0.005"
unless otherwise specified
Detail A identified on Page 1

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

Page 2 of 2

Detail A

Dimensions specified in
20-01402-571-20 Rev. 01 page 1

D. Dunn 3/6/02
Initiated by D. Dunn Date

V. Jain 3/6/02
Reviewed by V. Jain Date

B. Mabrito 3/6/2002
QA Approval B. Mabrito Date

To Page No. _____

Drawing for carbon steel mockup specimen

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>D. Dunn</i>	3/29/2002

From Page No. _____

DIMENSIONAL INSPECTION REPORT
TEXAS TOOLMAKERS, INC.

Job No.: 33126	Part No.: DWG 20-01402-571-20	Rev. No.: 01	P.O. No.: 609777
Customer: SWRI	Part Name: Carbon Steel Mock-Up	Log No.: 2071001-C	
Inspection Plan: <input type="checkbox"/> 100 % <input checked="" type="checkbox"/> Specified Dim. <input type="checkbox"/> 1st Article	Quantity: 8	Sample Size: 8	Accept No.: 8 Reject No.: 0 NR No.: 0

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1	6°		6°	TIE 085	
2	R.13		R.13	TIE 024	
3	.090		.090	TIE 102	
4	.050		.050	TIE 102	
5	5.75		5.735-5.750	TIE 102	
6	3.00		2.996	TIE 102	4 pl
9	12.00		12.00	TIE 083	
11	.250		.184-.260	TIE 023	
12	5.345		5.290	TIE 023	SEG NOTE
13	4.25		4.25-4.240	TIE 023	3 pl
14	.500		.404 .500 -.510	TIE 023	
15	5.095		5.043	TIE 023	SEG NOTE
17	.750		.743-.760	TIE 023	
18	4.845		4.774	TIE 023	SEG NOTE
20	Ø.128		.128	TIE 103	3 pl
21	.50		.500	TIE 102	
22	Ø.250		.255	TIE 103	3 pl
23	1.00		1.00	TIE 102	

* Recorded if not affected by tolerance block.

Inspection Performed by: *[Signature]* Date: 4/4/02 Customer (as applicable) _____ Date _____

Sheet _____ of _____

TTI Form QF-100201 Rev 2

DIMENSIONAL INSPECTION OF CARBON STEEL MOCKUP PLATES DIMENSIONS #12, 15, 18 WERE INCORRECT IN CNWRA DRAWING 20-01402-571 REV 01. SPECIMENS ACCEPTABLE FOR USE.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>D. Dunn</i>	4/22/2002

From Page No. _____

PURCHASE REQUISITION
PURCHASE ORDER NUMBER 609727

REQUISITION DATE 1/11/02 ORDER DATE PURCHASING ORDER NUMBER 609727

DELIVER TO R. Doyle Smith, bldg. 137 PURCHASING SELECTED SUPPLIER

SHIP VIA F.O.B. SUPPLIER CODE ATTN

TERMS PHONE FAX

TTN: Bruce

HOME 704-8342

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	1	EA	H.R. flat bar, 1" x 6" x 240"	20	01402	571	100	1/18/02	70.54

INTERNAL NOTES TO BUYER: NOT QUALITY AFFECTING

SPECIAL INSTRUCTIONS TO SUPPLIER: TOTAL

1. Government Project? YES NO
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROP. ENTRY 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 O A CODES: None
c INSPECTION CRITERIA
d QA APPROVAL (IF REQUIRED) DATE BUYER SIGNATURE
N/A

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: R. Doyle Smith EXT. NO. 3976
DEPT./DIVISION APPROVAL DATE: 1/14/02
ADMIN. APPROVAL

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

PURCHASE REQUISITION FOR NOT ROLLED CARBON STEEL USED FOR CARBON STEEL MOCKUP SPECIMENS To Page No. _____

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by *Chuck Du* 4/22/2002

From Page No. _____

PURCHASE REQUISITION
PURCHASE ORDER NUMBER 609761

REQUISITION DATE 2/7/02 ORDER DATE PURCHASING ORDER NUMBER 609761

DELIVER TO R. Doyle Smith, bldg. 137 PURCHASING SELECTED SUPPLIER

SHIP VIA F.O.B. SUPPLIER CODE ATTN

TERMS PHONE FAX

TTN: Chuck

HOME

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	2	EA	3/8" x 144" stainless steel sq. bar	20	01402	571	100	2/14/02	29.16
B	2	EA	1" x 1" x 144" stainless steel sq. bar	20	01402	571	100	2/14/02	173.17
C	3	EA	1/4" x 2" x 144" stainless steel flat bar	20	01402	571	100	2/14/02	45.22
D	1	EA	3/8" x 2" x 144" cold rolled flat bar	20	01402	571	100	2/14/02	45.57
E	1	EA	1/2" x 2" x 144" cold rolled flat bar	20	01402	571	100	2/14/02	51.25

INTERNAL NOTES TO BUYER: Quality & Technical Requirements: None; Material for test fixtures only.

SPECIAL INSTRUCTIONS TO SUPPLIER: TOTAL

1. Government Project? YES NO
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROP. ENTRY 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 O A CODES:
c INSPECTION CRITERIA
d QA APPROVAL (IF REQUIRED) DATE BUYER SIGNATURE
R.D. Smith 3976
DEPT./DIVISION APPROVAL DATE: 2/1/02
ADMIN. APPROVAL

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: R.D. Smith EXT. NO. 3976
DEPT./DIVISION APPROVAL DATE: 2/1/02
ADMIN. APPROVAL

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.

PURCHASE REQUISITION FOR STAINLESS STEEL FIXTURE MATERIAL WILL NOT BE USED FOR TESTING To Page No. _____

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by *Chuck Du* 4/22/2002

From Page No. _____

Page 1 of 2

FABRICATION OPERATION RECORD
C22 Distortion Control Mock-ups

Project No. 20.01402 Prepared by: R. D. Smith Date 02/08/02 Approval: _____
 Project Review: _____ Date 3/4/02 Quality Assurance: _____ Date 03/04/02
 Dept. Approval: _____ Date 3/4/02

Step No.	Fabrication Operation	Weld Joint No.	Init.	Date	AI Hold	Project Hold	Sponsor Hold	Date
1	Drawing review					R.D.S.	* RDS	4-4-02
2	Verify current calibration of equipment		R.D.S.	4-5-02		*		
3	Cut and machine carbon steel specimens per drawing 20-01402-571-20		R.D.S.	4-5-02				
4	Receipt inspect specimens per drawing 20-01402-571-20					RDS		4-8-02
5	Fabricate purge trough and restraint fixture		R.D.S.	4-10-02				
6	Set-up GTAW specimen with 1/4" back bend		R.D.S.	4-15-02				
7	Weld GTAW specimen using commercially pure Argon shielding and back purge gas, 3/32" & 1/8" ERNiCrMo-10 filler material and HASTELLOY C22 manufacturers recommended GTAW parameters and preheat/slow cool controls. Monitor and record plate temperature using thermocouples inserted in the holes drilled in the plate		R.D.S.	4-16-02		RDS		4-16-02
8	Remove specimen from restraint fixture		R.D.S.	4-17-02				
9	Record amount of distortion		R.D.S.	4-17-02		RDS		4-16-02
10	If necessary, repeat steps 6 thru 9 using a different amount of back bend		R.D.S.	5-20-02				
11	Set-up GTAW-GMAW specimen with 1/8" back bend		R.D.S.	6-14-02				
12	Weld GTAW-GMAW specimen using the same GTAW controls as well as commercially pure Argon shielding and back purge gas		R.D.S.	5-15-02		RDS		5-15-02

SED 18.05-15a

Fabrication operation record for carbon steel mockups page 1 of 2

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____

Recorded by _____ Date 7/15/2002

To Page No. _____

From Page No. _____

Page 2 of 2

FABRICATION OPERATION RECORD
C22 Distortion Control Mock-ups

Project No. 20.01402 Prepared by: R. D. Smith Date 02/08/02 Approval: _____
 Project Review: _____ Date 3/4/02 Quality Assurance: _____ Date 03/04/02
 Dept. Approval: _____ Date 3/4/02

Step No.	Fabrication Operation	Weld Joint No.	Init.	Date	AI Hold	Project Hold	Sponsor Hold	Date
	& 0.045" ERNiCrMo-10 filler material and HASTELLOY C22 manufacturers recommended GMAW parameters. Monitor and record plate temperature using thermocouples inserted in the holes drilled in the plate							
13	Remove specimen from restraint fixture							
14	Record amount of distortion							
15	If necessary, repeat steps 11 thru 14 using a different amount of back bend							

SED 18.05-15a

Fabrication operation record for carbon steel mockup specimens page 2 of 2 GMAW was not completed focus shifted to GTAW

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____

Recorded by _____ Date 7/15/2002

To Page No. _____

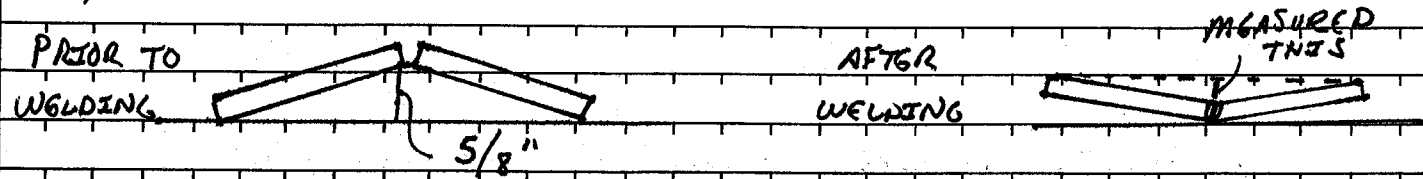
From Page No. _____

WELDER Frank Garcia C-22 MOCK-UP WELDING DATE 4-16-2002

PLATE NO.'S 1 & 2 BACK BEND 5/8" TUNGSTEN DIA. 3/32"

RESTRAINED	PROCESS	LAYERS	FILLER DIA.	AMPS	VOLTS	TRAVEL SPEED
No	GTAW	Root	3/32"	125	17	3"
No	GTAW	2nd	3/32"	175	21	3"
No	GTAW	2nd	3/32"	175	21	3"
No	GTAW	3rd	1/8"	231	24.5	3"
No	GTAW	3rd	1/8"	231	24.5	3"
No	GTAW	4th	1/8"	231	24.5	3"
No	GTAW	4th	1/8"	240	26	3"
No	GTAW	5th	1/8"	240	26	3"
No	GTAW	5th	1/8"	240	26	3"
No	GTAW	6th	1/8"	241	25	3"
No	GTAW	6th	1/8"	241	25	3"
No	GTAW	7th	1/8"	241	25	3"
No	GTAW	7th	1/8"	241	25	3"
No	GTAW	8th	1/8"	241	25	3"
No	GTAW	8th	1/8"	241	25	3"
3/32 FILLER XX1973BG12				PLATE NOT ROLLED		
1/8 FILLER XX2147BG11				CARBON STEEL		

Welding parameters for Carbon steel mockup plates 1 & 2 INITIAL BACK BEND 5/8"



MEASUREMENTS AFTER WELDING IN THREE LOCATIONS
 ≈ 1 INCH FROM EACH END AND AT CENTER OF PLATE
 END 0.138" MEASUREMENTS W/ MITUTOYO ODGP
 MIDDLE 0.138" SWRI CAL MAR 23 2002 DUE SEPT 25, 2002
 END 0.128"

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by Bernell Dunn 7/17/2002

TITLE _____

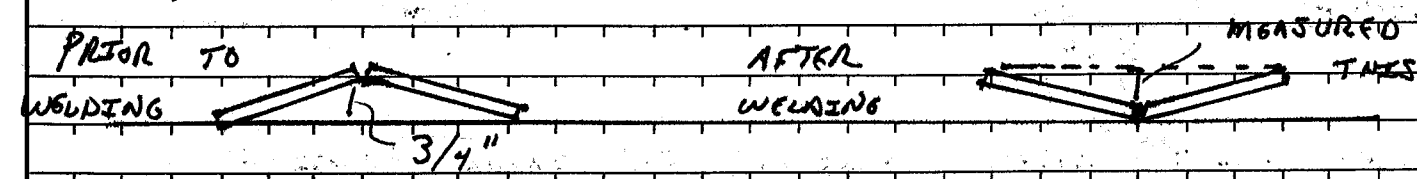
From Page No. _____

WELDER Frank Garcia C-22 MOCK-UP WELDING DATE 4-19-2002

PLATE NO.'S 3 & 4 BACK BEND 3/4" TUNGSTEN DIA. 3/32"

RESTRAINED	PROCESS	LAYERS	FILLER DIA.	AMPS	VOLTS	TRAVEL SPEED
No	GTAW	Root	3/32"	95	15.5	3"
No	GTAW	2nd	3/32"	175	22	3"
No	GTAW	2nd	3/32"	175	22	3"
No	GTAW	3rd	1/8"	240	26	3"
No	GTAW	3rd	1/8"	240	26	3"
No	GTAW	4th	1/8"	240	26	3"
No	GTAW	4th	1/8"	240	26	3"
No	GTAW	4th	1/8"	240	26	3"
No	GTAW	5th	1/8"	240	26	3"
No	GTAW	5th	1/8"	240	26	3"
No	GTAW	6th	1/8"	240	26	3"
No	GTAW	6th	1/8"	240	26	3"
No	GTAW	7th	1/8"	240	26	3"
No	GTAW	7th	1/8"	240	26	3"
No	GTAW	8th	1/8"	240	26	3"
3/32 FILLER XX1973BG12			PLATE NOT ROLLED			
1/8 FILLER XX2147BG11			CARBON STEEL			

Welding parameters for Carbon steel mockup plates 3 & 4 INITIAL BACK BEND 3/4"



MEASUREMENT AFTER WELDING IN THREE LOCATIONS
 ≈ 1 INCH FROM EACH END AND AT CENTER OF PLATE

END 0.110" MITUTOYO ODGP
 CENTER 0.1105" SWRI CAL MAR 23 2002 CAL
 END 0.118" DUE SEPT 25 2002

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by Bernell Dunn 2/17/2002

From Page No. _____

WELDER Frank Garcia

C-22 MOCK-UP WELDING

DATE 4-23 5-20-2002

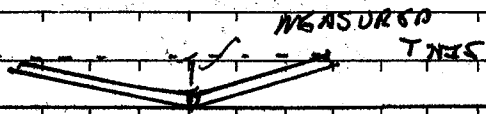
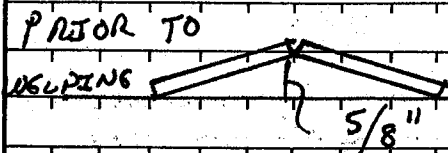
PLATE NO.'S 5 & 6

BACK BEND 5/8"

TUNGSTEN DIA. 3/32"

RESTRAINED	PROCESS	LAYERS	FILLER DIA.	AMPS	VOLTS	TRAVEL SPEED
No	GTAW	Root	3/32"	95	16.2	3.5"
No	GTAW	2nd	3/32"	125	17.5	3.5"
No	GTAW	2nd	3/32"	130	18	3.5"
No	GTAW	3rd	3/32"	130	18	3.5"
Yes	GTAW	3rd	3/32"	140	19	3.5"
Yes	Pulse GMAW	1st	0.045"	400-122	--- 25	4.5"
Yes	Pulse GMAW	2nd	0.045"	400-122	--- 25	4.5"
Yes	Pulse GMAW	3rd	0.045"	400-122	--- 25	4.5"
Yes	Pulse GMAW	4th	0.045"	400-122	--- 25	4.5"
			<u>3/32 FILLER XX1973 BG 12</u>	<u>PLATE NOT ROLLED</u>		
			<u>0.045" FILLER XX1832 BG</u>	<u>CARBON STEEL</u>		

*Welding parameters for carbon steel mockup plates
S&6 INITIAL BACK BEND 5/8"*



MEASUREMENT AFTER WELDING IN THREE LOCATIONS
~ 1 INCH FROM EACH END AND IN CENTER OF PLATE

END 0.082" MITUTOYO ODGP
 CENTER 0.078" SWRI CAL MARCH 23, 2002
 END 0.058" CAL DUE SEPT 25, 2002

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

7/17/2002

[Signature]

From Page No. _____

WELDER Frank Garcia

C-22 MOCK-UP WELDING

DATE 4-22-2002

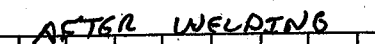
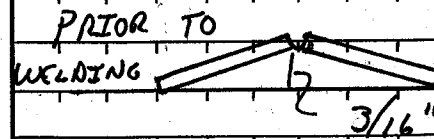
PLATE NO.'S 7 & 8

BACK BEND 3/16"

TUNGSTEN DIA. 3/32"

RESTRAINED	PROCESS	LAYERS	FILLER DIA.	AMPS	VOLTS	TRAVEL SPEED
Yes	GTAW	Root	3/32"	95	15	3"
Yes	GTAW	2nd	3/32"	125	17	3"
Yes	GTAW	2nd	3/32"	140	18	3"
Yes	GTAW	3rd	3/32"	175	20.5	3"
Yes	GTAW	3rd	3/32"	175	20.5	3"
Yes	GTAW	4th	3/32"	175	20.5	3"
Yes	GTAW	4th	3/32"	175	20.5	3"
Yes	GTAW	5th	3/32"	175	20.5	3"
Yes	GTAW	5th	3/32"	180	21	3"
Yes	GTAW	6th	1/8"	210	23	3"
Yes	GTAW	6th	1/8"	225	23.5	3"
Yes	GTAW	7th	1/8"	225	23.5	3"
Yes	GTAW	7th	1/8"	225	23.5	3"
Yes	GTAW	8th	1/8"	225	23.5	3"
Yes	GTAW	8th	1/8"	225	23.5	3"
Yes	GTAW	9th	1/8"	225	23.5	3"
Yes	GTAW	9th	1/8"	225	23.5	3"
			<u>3/32 FILLER XX1973 BG 12</u>	<u>PLATE NOT ROLLED</u>		
			<u>1/8 FILLER XX2147 BG 11</u>	<u>CARBON STEEL</u>		

*Welding parameters for carbon steel mockup plates
INITIAL BACK BEND 3/16"*



MEASURED RESIDUAL BACK BEND IN PLATE AT THREE LOCATIONS
~ 1 INCH FROM END AND IN CENTER OF PLATE

END - 0.023" MITUTOYO ODGP
 CENTER - 0.019" SWRI CAL MAR 23 2002
 END - 0.016" CAL DUE SEPT 25 2002

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

7/17/2002

[Signature]

From Page No. _____

NOTES ON WELDING CARBON STEEL PLATES

WELDER GTAW MILLER XMT 300 CC/CV
SN KC308169
STOCK # 903227
SWRI TAG 25938

WELDER GMAW MILLER PHOENIX 456 CC/CV
SN KJ016700
STOCK # 903506
SWRI TAG 029802

WELDER AMP & VOLTS verified with AMP PROBE
AC DC 1000 CLAMP ON METER SN 821076 AN 000676
CALIBRATION JAN 9, 2002 DUE JULY 9 2002


Purpose of welding carbon steel plates with alloy 22 filler was to determine effect of weld metal shrinkage on plate distortion as the weld cooled. Fabrication operation Record on page 28 & 29 outlines steps in the fabrication of the welded plates.

Welding parameters used are documented on pages 30-33. Welding parameters recorded are not sufficient for a Weld Procedure Specification (WPS) or a Procedure Qualification Record (PQR). A WPS will be written and reviewed prior to welding alloy 22 weld procedure qualification plates. In addition a Procedure Qualification Record will document welding of the alloy 22 weld procedure qualification plates.

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	7/17/2002

From Page No. _____



Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78238
(210) 522-5215
Department of Quality Assurance
Calibration Laboratory

Certificate of Calibration

25 March 2002

Issued to: DOYLE SMITH DIV18 B137
Manufacturer/Model: MITUTOYO CD-6"P
Description: CALIPER
Serial Number: 06-DC-5
Asset Number: 002438
Work Order Number: 444047779

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request. This certificate is not to be reproduced, except in full, without the written approval of the Southwest Research Institute Department of Quality Assurance Calibration Laboratory.

The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.

Ambient Conditions: Temperature: 68.0 Degrees Fahrenheit Humidity: 35 % RH
Calibration Date: 25 Mar 02 Calibration Procedure: CL-11, MAY99
Condition as Received: IN TOLERANCE
Condition as Returned: IN TOLERANCE

Remarks:

Approved by:
[Signature]
Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:
[Signature]
Ken Harp, Technician

Page 1 of 1

COPY OF CALIBRATION CERTIFICATE FOR
MITUTOYO CALIPERS USED IN MEASUREMENTS
PAGE 30-33

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	7/17/2002

From Page No. _____



Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78238
(210) 522-5215
Department of Quality Assurance
Calibration Laboratory

Certificate of Calibration

9 January 2002

Issued to: DOYLE SMITH DIV18 B137
Manufacturer/Model: AMPROBE ACDC1000
Description: CLAMP-ON METER
Serial Number: 821076
Asset Number: 000676
Work Order Number: 444046380

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request. This certificate is not to be reproduced, except in full, without the written approval of the Southwest Research Institute Department of Quality Assurance Calibration Laboratory.

The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.

Ambient Conditions: Temperature: 72.0 Degrees Fahrenheit Humidity: 41 % RH

Calibration Date: 9 Jan 02 Calibration Procedure: CL-76, JUN 99

Condition as Received: SEE ATTACHED DATA

Condition as Returned: SEE ATTACHED DATA

Remarks:

Approved by:
Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:
Roger Dykstra, Technician

m:\nona2la.rpt Rev date 8 Jan 01

Page 1 of 1

*Copy of Calibrated Certificate for AMPROBE
Clamp on meter*

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

7/17/2002

From Page No. _____

Southwest Research Institute
Calibration Laboratory
Calibration Sheet.

Work Order: 444046380	Mfr. Amp Probe	Technician R Dykstra
Asset No. 000676	Model ACDC1000	Procedure CL-79, 6/99
Serial No. 821076	Type. Clamp-on Ampmeter	Cal Date. 1/8/02

Remarks: The reported uncertainty is based on a standard uncertainty multiplied by a coverage Factor of k=2, which provides a level of confidence of approximately 95 %. The test limits are specified in the Manual. The error is equal to TI reading - Std reading. The results can be Pass, Fail, or if blank "not determinable". If "not determinable" it is up to the end user to determine if results meet their needs.

Parameter	Test Point	As Found	Error	Test Limits	Uncertainty	Results
DCV Input	Volts	Volts	Volts	Volts	Volts	
	190.0	189.4	-0.800	2.400	0.115	Pass
	800.0	799	-1.000	13	1.155	Pass
	Parameter	Volts	Volts	Volts	Volts	
ACV Input	Volts	Volts	Volts	Volts	Volts	
	190.0	189.1	-0.900	2.400	0.116	Pass
	800.0	797	-3.000	13	1.157	Pass
	Parameter	Amps	Amps	Amps	Amps	
DCA Input	Amps	Amps	Amps	Amps	Amps	
	100.0	98.8	-1.200	1.500	0.046	Pass
	950.0	955	5.000	14.5	6.171	Pass
	Parameter	Amps	Amps	Amps	Amps	
ACA Input @ 60 Hz	Amps	Amps	Amps	Amps	Amps	
	100.0	98.8	-1.200	1.500	0.046	Pass
	950.0	942	-8.000	14.5	6.171	Pass
	Parameter	Ohms	Ohms	Ohms	Ohms	
Ohms Input	Ohms	Ohms	Ohms	Ohms	Ohms	
	100.00	100.4	0.400	0.29	0.116	
	950.00	948	-2.000	10.500	1.160	Pass

Page 1 of 1

*Data included with certificate for
AMPROBE clamp on meter*

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

7/17/2002

From Page No. _____

PURCHASING
PURCHASE ORDER NUMBER: 610121
REQUISITION DATE: 5/22/02
ORDER DATE: _____
DELIVER TO: Darrell Dunn/bldg. 57
SHP VIA: _____
FO.B: _____
TERMS: _____
SUGGESTED OR PREVIOUS SUPPLIER: SOUTHWEST RESEARCH INSTITUTE™
Texas Toolmakers
San Antonio, TX
ATTN: Mike Ridgway
PHONE: 494-3651
FAX: 494-6139

REC. NO.: 610121
PURCHASING SELECTED SUPPLIER
SUPPLIER CODE
PHONE
FAX

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	6	EA	C22 weld procedure qualification						
			specimens CNMRA drawing 20-01402-571-025	20	01402	571	100	6/12/02	749.00
			<p>Quality & Technical Requirements: Specimens as per CNMRA drawing 20-01402-571-025. Dimensional inspection per dimensions and tolerances identified in CNMRA drawing 20-01402-571-025 is required.</p>						

1. Government Property? 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 Q.A. CODES: Q11
c INSPECTION CRITERIA
P.L. To inspect upon receipt.
d QA APPROVAL (IF REQUIRED) DATE: 5/22/02
Paul R. Shusterman

3. SOURCING NOTES
IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEEDS? 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: _____
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. _____

TOTAL

SEE INSTRUCTIONS ON REVERSE SIDE

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by *Darrell Dunn* Date 8/5/2002

From Page No. _____

May 21 02 09:31a TEXAS TOOLMAKERS, INC 210-402-0369 P. 1

Texas Toolmakers, Inc.
11411 E. Coker Loop / San Antonio, TX 78216
Phone: (210) 494-3651
Fax: (210) 494-6139

CUSTOMER WORK ORDER / QUOTE

Job No.: _____ Quote No.: 1650 Date Opened: _____ Delivery Date: 2-3 WEEKS ARO Customer No.: 01111 Job Taken/Quoted by: MIKE RIDGWAY

Customer: SOUTHWEST RESEARCH INSTITUTE Quote Good For: 90 DAYS Terms: ½% 10 NET 30
6220 CULEBRA Customer P.O.: _____ Contact: DARRELL DUNN
SAN ANTONIO, TEXAS 78238 Phone No.: 210-684-5111 Fax No.: 210-522-5184

Item	Qty	Part No.	Rev	Part Name	Bid / 1st	Price Ea.	Total
1	6	20-01402-571-25		ALLOY 22 WELD SPECIMEN		749.00	\$4,494.00
							\$ 0.00
							\$ 0.00
							\$ 0.00
							\$ 0.00
							\$ 0.00
							\$ 0.00
							\$ 0.00
							\$ 0.00
						Total	\$4,494.00

Work Instructions:

All quotations and agreements are contingent upon strikes, fires, availability of materials, and all other causes beyond our control. Prices are subject to change by seller before final acceptance.
FOB: TEXAS TOOLMAKERS, INC.

Quality Requirements: None As noted below
 Material/Process Certification: Yes No Certificate of Compliance: Yes No Source Inspection Yes No
 Documented Dimensional Inspection: Yes No; If Yes: 1) Specified Dimensions Only, 2) Sampling, OR 3) 100%

Authorized TTI Representative: *Mike Ridgway* Date: 5/21/02
 Customer Acceptance: _____ Title: _____ Date: _____
 Customer Comments (if applicable): _____

Note: price(s) may be affected if scope of work/inspection is deviated from that quoted.
 For TTI Use Only

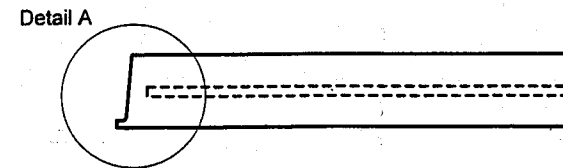
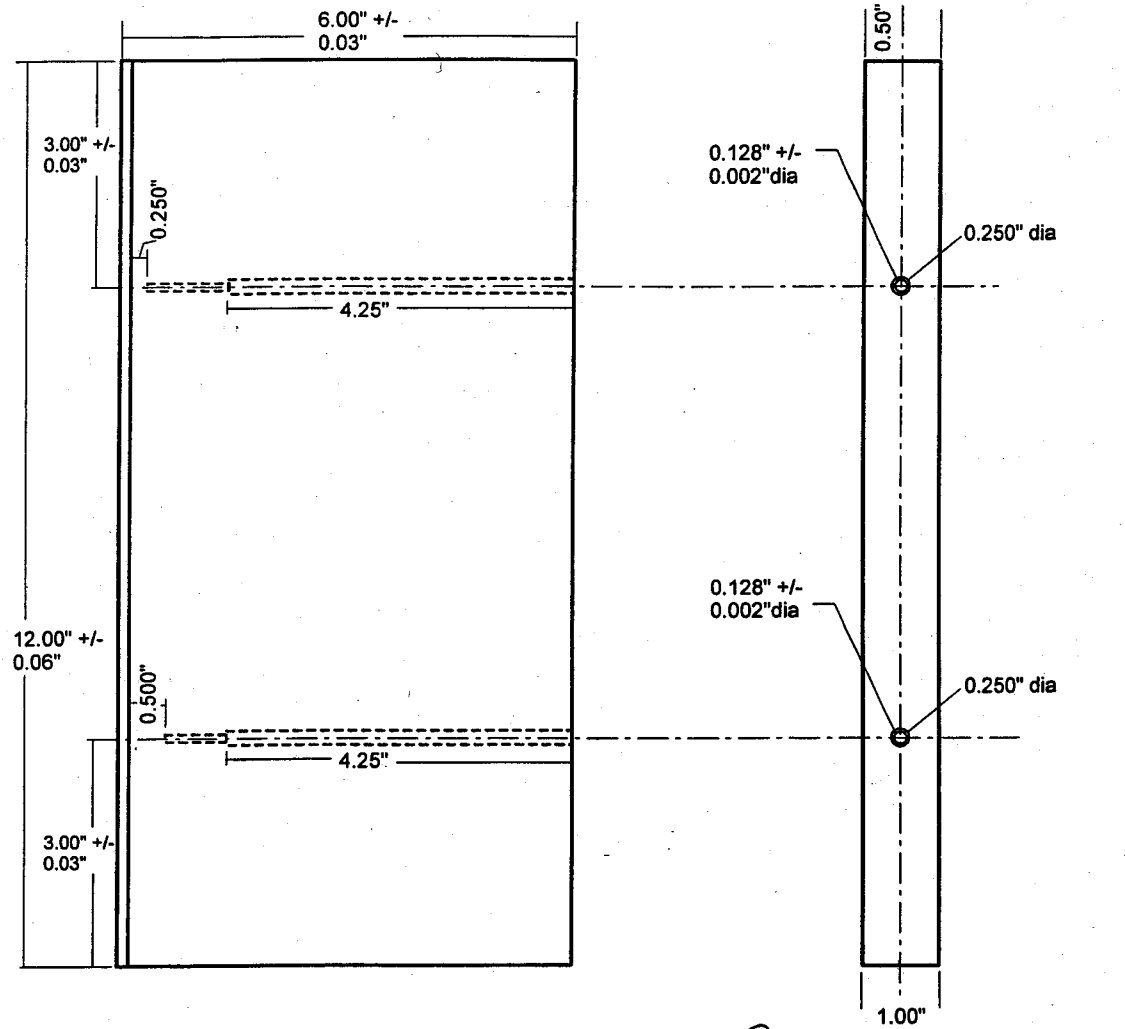
Reviewed by: _____ Date: _____ P.O. provided at time of review: Yes No

TTI Form QF-030101 Rev 2

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by *Darrell Dunn* Date 8/5/2002

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 20-01402-571-25 All Dimensions $\pm 0.010"$ unless otherwise specified Note: Detail A on Page 2	To be completed at time of order: Material: <u>ALLOY 22</u>
	Page 1 of 2	Heat: <u>2277-1-3164</u> Specimen Orientation: _____ Other: _____



Darrell Dunn 5/22/2002
Initiated by: D. Dunn Date

V. Jain 5/22/02
Reviewed by: V. Jain Date

B. Mabrito 5/22/2002
QA Approval B. Mabrito Date

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

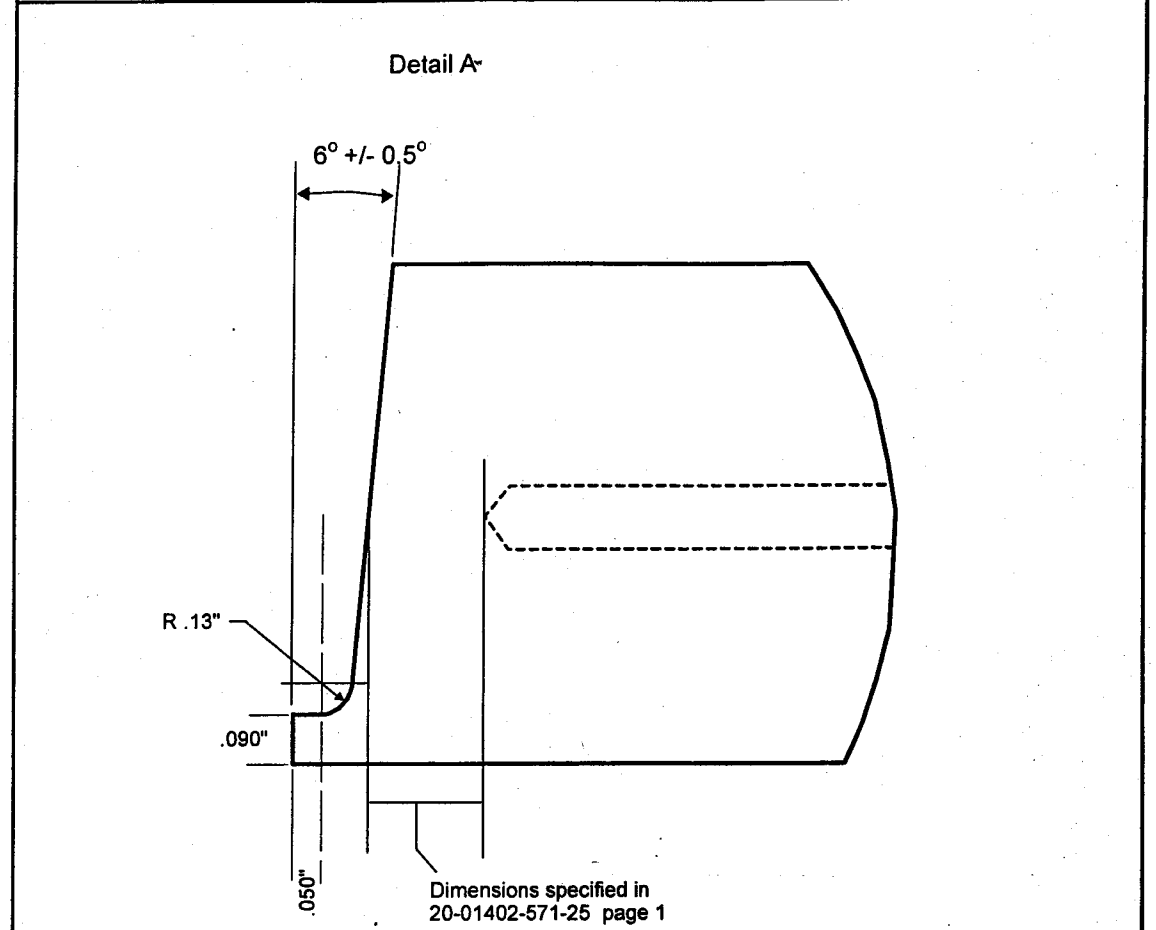
8/5/2002

Darrell Dunn

TITLE _____

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 20-01402-571-25 All Dimensions $\pm 0.005"$ unless otherwise specified Detail A identified on Page 1	To be completed at time of order: Material: <u>ALLOY 22</u>
	Page 2 of 2	Heat: <u>2277-1-3164</u> Specimen Orientation: _____ Other: _____



Darrell Dunn 5/22/2002
Initiated by: D. Dunn Date

V. Jain 5/22/02
Reviewed by: V. Jain Date

B. Mabrito 5/22/2002
QA Approval B. Mabrito Date

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

8/5/2002

Darrell Dunn

From Page No. _____

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

Reference drawing for weld procedure
qualification specimens
CNwRA Drawing 20-01402-571-026
No dimensional tolerances

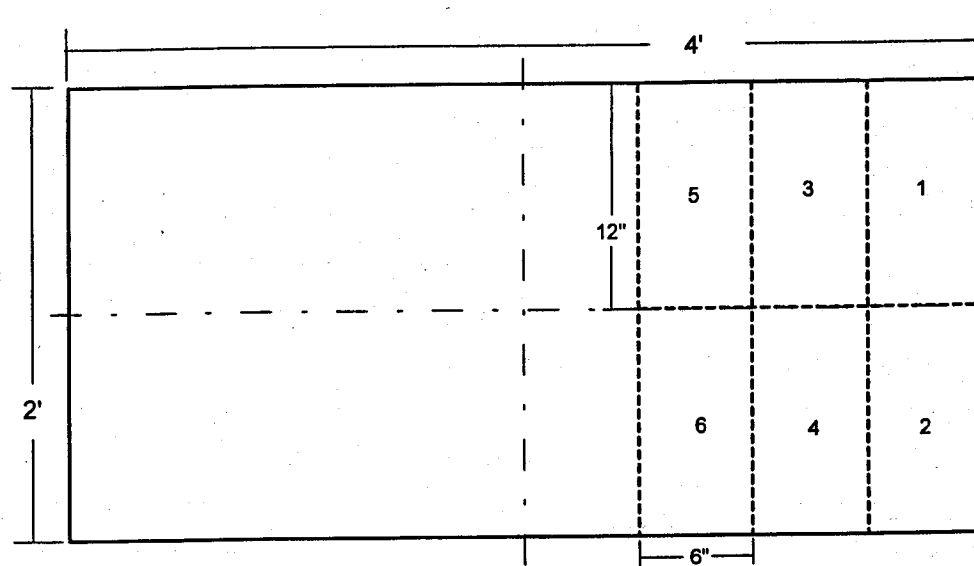
To be completed at time of order:

Material: Alloy 22

Heat: 2277-1-3164

Specimen Orientation: As Shown

Other: _____



Darrell Dunn 5/22/2002
Initiated by: D. Dunn Date

V. Jain 5/22/2002
Reviewed by: V. Jain Date

B. Mabrito 5/22/2002
QA Approval: B. Mabrito Date

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

8/5/2002

From Page No. _____

Jul-16-02 06:51A

P.02

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



CERTIFICATE OF CONFORMANCE

TO: Southwest Research Institute
6220 Culebra Road
San Antonio, Tx. 78238-5166

CUSTOMER P.O. 286716S

TTI JOB #: 33484

DESCRIPTION 5 EA. P/N 20-01402-571-25 ALLOY 22 WELD SPECIMEN

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

Drawings

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

ACCEPTED

TEXAS TOOLMAKERS,

BY : *Steven Espinoza* (Steven Espinoza)

TITLE: Q.C. Inspector

DATE: 7/16/02

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

8/5/2002

From Page No. _____

TEXAS TOOLMAKERS, INC.
11411 EAST COKER LOOP
SAN ANTONIO, TX 78216-2810

* * * * *
* SHIPPER *
* original *
* * * * *

SHIPPER NUMBER : 11360
DATE SHIPPED : 07/09/02

OUR JOB NUMBER : 33484

SHIPPED TO:

DARRELL DUNN
SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA ROAD
SAN ANTONIO, TX 78238

PURCHASE ORDER : 2867165 ✓
SHIPPED BY : TTI TRUCK
CUST# Q1111
PD

ITEM#	ORDERED	SHIPPED	PART NUMBER	PART NAME
1.0	6	6	20-01402-571-25	ALLOY 22 WELD SPECIMEN.

RECEIVED BY RD Smith DATE 7-9-02

Accepted 5 of 6 s/n 006 rejected

NCR 2002-008 INITIATED 7/17/2002

Darrell Dunn 7/17/2002
137
Angie Smith 7/9/02
Juv
Dunn
Smith

1 pallet 6 items BX

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Darrell Dunn

8/5/2002

From Page No. _____

DIMENSIONAL INSPECTION REPORT

TEXAS TOOLMAKERS, INC.

Job No.: 33484 Part No.: 20-01402-571-25 Rev. No.: - P.O. No.: 2867165
Customer: SWRI Part Name: Alloy 22 Weld Specimen Log No.: 2163001C
S/N 001

Inspection Plan: 100% Specified Dim. 1st Article Quantity: 1 Sample Size: 1 Accept No.: 1 Reject No.: 0 NR No.: 0

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1	6°	±.5°	6°	TI 081	
2	R.13		R.130	TI 024	
3	.090		.090	TI 101	
4	.050		.050	TI 101	
5	6.00		6.009-6.013	TI 102	
6	3.00	±.03	3.00	TI 102	
7	.250		.258	TI 083	
8	12.00	±.06	12.00	TI 083	
9	3.00		3.00	TI 102	
10	.500		.510	TI 083	
11	4.25		4.258	TI 102	
12	4.25		4.243	TI 102	
13	.50		.500	TI 102	
14	.128 2pl	±.002	.128	TI 103	2pl.
15	1.00		1.044	TI 102	
16	.250 2pl		.250	TI 103	2pl.

* Recorded if not affected by tolerance block.

Sheet 1 of 1

Inspection Performed by [Signature] Date 7/1/02 Customer (as applicable) _____ Date _____

TTI Form QF-100201

Rev 2

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Darrell Dunn

8/5/2002

From Page No. _____

DIMENSIONAL INSPECTION REPORT
TEXAS TOOLMAKERS, INC.

Job No.: 33484	Part No.: 20-01402-571-25	Rev. No.: -	P.O. No.: 2867165
Customer: SWRI	Part Name: Alloy 22 Weld Specimen		Log No.: 2163001C
Inspection Plan: <input type="checkbox"/> 100% <input checked="" type="checkbox"/> Specified Dim. <input type="checkbox"/> 1st Article	Quantity: 1	Sample Size: 1	Accept No.: 1 Reject No.: 0 NR No.: 0

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1	6°	± .5°	6°	TII 081	
2	R .13		R .130	TII 024	
3	.090		.090	TII 102	
4	.050		.050	TII 102	
5	6.00		6.010-6.011	TII 102	
6	3.00	± .03	3.00	TII 102	
7	.250		.253	TII 083	
8	12.00	± .06	12.00	TII 083	
9	3.00		3.00	TII 102	
10	.500		.509	TII 083	
11	4.25		4.246	TII 102	
12	4.25		4.238	TII 102	
13	.50		.500	TII 102	
14	.128	± .002	.128	TII 102	2 pl.
15	1.00		1.036	TII 102	
16	.250		.250	TII 102	2 pl.

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

Inspection Performed by: *[Signature]* Date: 7/1/02 Customer (as applicable): _____ Date: _____

TTI Form QF-100201 Rev 2

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/5/2002

From Page No. _____

DIMENSIONAL INSPECTION REPORT
TEXAS TOOLMAKERS, INC.

Job No.: 33484	Part No.: 20-01402-571-25	Rev. No.: -	P.O. No.: 2867165
Customer: SWRI	Part Name: Alloy 22 Weld Specimen		Log No.: 2163001C
Inspection Plan: <input type="checkbox"/> 100% <input checked="" type="checkbox"/> Specified Dim. <input type="checkbox"/> 1st Article	Quantity: 1	Sample Size: 1	Accept No.: 1 Reject No.: 0 NR No.: 0

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1	6°	± .5°	6°	TII 083 + 081	
2	R .13		R .130	TII 024	
3	.090		.090	TII 102	
4	.050		.050	TII 102	
5	6.00		6.009-6.014	TII 083	
6	3.00	± .03	3.00	TII 081	
7	.250		.260	TII 083	
8	12.00	± .06	12.013	TII 083	
9	3.00		3.00	TII 102	
10	.500		.510	TII 083	
11	4.25		4.248	TII 102	
12	4.25		4.249	TII 102	
13	.50		.500	TII 102	
14	.128	± .002	.128	TII 102	2 pl.
15	1.00		1.044	TII 102	

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

Inspection Performed by: *[Signature]* Date: 7/8/02 Customer (as applicable): _____ Date: _____

TTI Form QF-100201 Rev 2

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/5/2002

From Page No. _____

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

Alloy 22 Weld Specimen
CNWRRA Drawing 20-01402-571-25
All Dimensions $\pm 0.010"$
unless otherwise specified
Note: Detail A on Page 2

Page 1 of 2

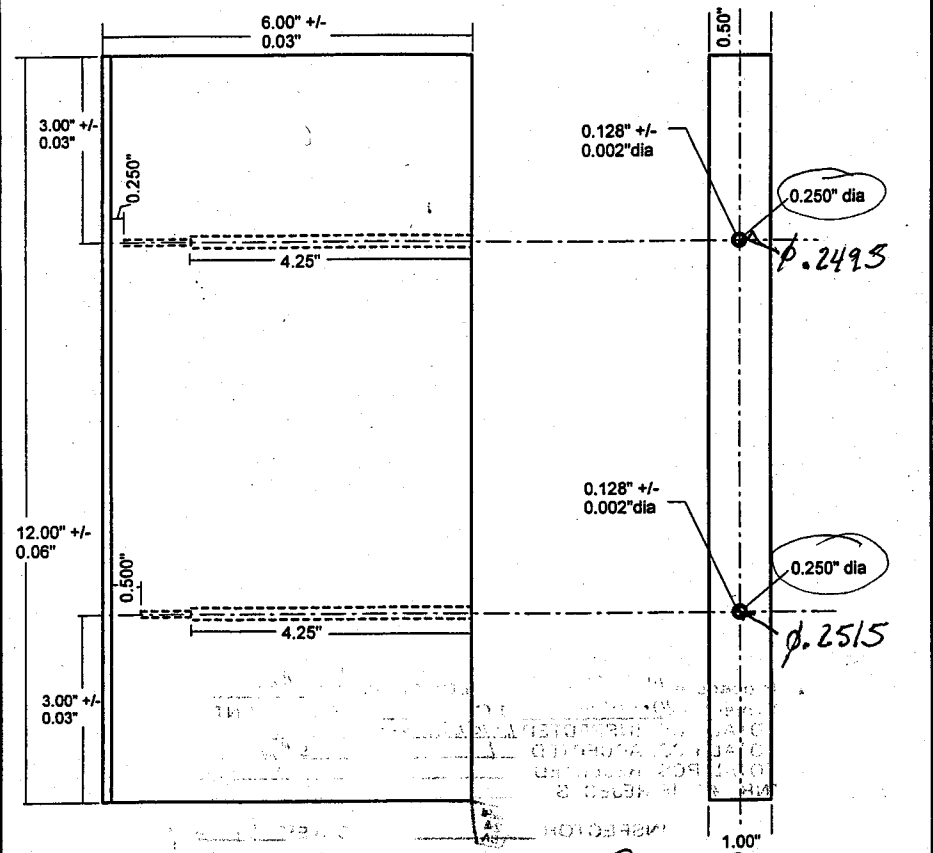
To be completed at time of order:

Material: ALLOY 22

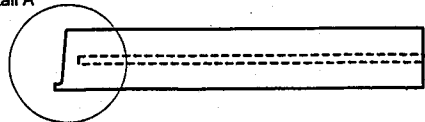
Heat: 2277-1-3164

Specimen Orientation: _____

Other: _____



Detail A



Darrell Dunn 5/22/02
Initiated by: D. Dunn Date

V. Jain 5/22/02
Reviewed by: V. Jain Date

B. Mabrito 5/22/02
QA Approval B. Mabrito Date

JUL 18 2002

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by *Darrell Dunn*

8/5/2002

From Page No. _____

Procedure: W1103-3/1 LOCATION CC31 MS
 Project # 20-01402 J.C. # M
 TOTAL PCS. INSPECTED 40/5 Dim only EQUIPMENT _____
 TOTAL PCS. ACCEPTED 1 _____
 TOTAL PCS. REJECTED _____
 "NR #" IF REJECTS _____
 INSPECTOR [Signature] DATE JUL 18 2002

0 $\phi.2495$
 0 $\phi.2515$

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by *Darrell Dunn*

8/5/2002

From Page No. _____

DIMENSIONAL INSPECTION REPORT
TEXAS TOOLMAKERS, INC.

Job No.: 33484	Part No.: 20-01402-571-25 S/N 004	Rev. No.: -	P.O. No.: 2867165
Customer: SWRI	Part Name: Alloy 22 Weld Specimen	Log No.: 2163001C	
Inspection Plan: <input type="checkbox"/> 100 % <input checked="" type="checkbox"/> Specified Dim. <input type="checkbox"/> 1st Article	Quantity: 1	Sample Size: 1	Accept No.: 1 Reject No.: 0 NR No.: 0

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1	6°	± .5°	6°	TII 081	
2	R.13		R.130	TII 024	
3	.090		.090	TII 102	
4	.050		.050	TII 102	
5	6.00		6.005-6.011	TII 102	
6	3.00	± .03	3.00	TII 102	
* 7	.250		.265	TII 083	
8	12.00	± .06	12.015	TII 083	
9	3.00		3.00	TII 102	
10	.500		.510	TII 083	
11	4.25		4.251	TII 083+102	
12	4.25		4.243	TII 102	
13	.50		.500	TII 102	
14	.128	± .002	.128	TII 102	2pl.
15	1.00		1.001-1.042	TII 102	2pl.
16	.250		.250	TII 102	2pl.

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

Inspection Performed by: *[Signature]* Date: 7/1/02 Customer (as applicable): _____ Date: _____

TTI Form QF-100201 Rev 2

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/5/2002

TITLE _____

From Page No. _____

DIMENSIONAL INSPECTION REPORT
TEXAS TOOLMAKERS, INC.

Job No.: 33484	Part No.: 20-01402-571-25 S/N 005	Rev. No.: -	P.O. No.: 2867165
Customer: SWRI	Part Name: Alloy 22 Weld Specimen	Log No.: 2163001C	
Inspection Plan: <input type="checkbox"/> 100 % <input checked="" type="checkbox"/> Specified Dim. <input type="checkbox"/> 1st Article	Quantity: 1	Sample Size: 1	Accept No.: 1 Reject No.: 0 NR No.: 0

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1	6°	± .5°	6°	TII 081	
2	R.13		R.130	TII 024	
3	.090		.090	TII 102	
4	.050		.050	TII 102	
5	6.00		6.005-6.010	TII 081	
6	3.00	± .03	3.00	TII 102	
7	.250		.260	TII 083	
8	12.00	± .06	12.001	TII 083	
9	3.00		3.00	TII 102	
10	.500		.507	TII 083	
11	4.25		4.242	TII 102	
12	4.25		4.249	TII 102	
13	.50		.500	TII 102	
14	.128	± .002	.128	TII 102	2pl.
15	1.00		1.035	TII 102	
16	.250		.250	TII 102	2pl.

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

Inspection Performed by: *[Signature]* Date: 6/28/02 Customer (as applicable): _____ Date: _____

TTI Form QF-100201 Rev 2

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/5/2002

From Page No. _____

DIMENSIONAL INSPECTION REPORT

TEXAS TOOLMAKERS, INC.

Job No.: 33484	Part No.: 20-01402-571-25 S/N 006	Rev. No.: -	P.O. No.: 2867165
Customer: SWRI	Part Name: Alloy 22 Weld Specimen	Log No.: 2163001C	

Inspection Plan: <input type="checkbox"/> 100% <input checked="" type="checkbox"/> Specified Dim. <input type="checkbox"/> 1st Article	Quantity: 1	Sample Size: 1	Accept No.: 0	Reject No.: 1	NR No.: 0
---	-------------	----------------	---------------	---------------	-----------

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1	6°	± .5°	6°	TII 081	
2	R .13		R .13	TII 024	
3	.090		.090	TII 102	
4	.050		.050	TII 102	
5	6.00		6.002-6.009	TII 083	
6	3.00	± .03	3.00	TII 102	
7	.250		.260	TII 083	
8	12.00	± .06	12.012	TII 083	
9	3.00		3.00	TII 102	
10	.500		.508	TII 083	
11	4.25		4.249	TII 083	
12	4.25		4.249	TII 083	
13	.50		.500	TII 102	
14	.128	± .002	.128	TII 102	2 pl.
15	1.00		1.040	TII 102	
16	.250		.250	TII 102	2 pl.

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

Inspection Performed by: *[Signature]* Date: 7/2/02 Customer (as applicable): _____ Date: _____

TTI Form QF-100201 Rev 2

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/5/2002

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	Date 7-22-2002
Revision No. 0	Supporting PQR No. (s) C22-GTAW-1
Welding Process(es) GTAW	Type(s) Semi-Auto
(Automatic, Manual, Machine, or Semi-Auto.)	

JOINTS (QW-402)

Joint Design: Single U

Backing (Yes) (No)

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

Metal Nonfusing Metal

Nonmetallic 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 Mfr., 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

AWS No. (Class) ERNiCrMo-10

F-No. 44

A-No. N/A

Size of Filler Metals 3/32"

Weld Metal

Thickness Range:

Groove 2.000"

Fillet Unlimited

Electrode-Flux (Class) N/A

Flux Trade Name N/A

Consumable Insert N/A

Other N/A

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

SED 18.05-10a

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	8/13/2002

From Page No. _____

QW-482 (Back)

WPS No. C22-GTAW Rev. 0

POSITIONS (QW-405) Position(s) of Groove <u>All</u> Welding Progression: Up <u>X</u> Down _____ Position(s) of Fillet <u>All</u>		POSTWELD HEAT TREATMENT (QW-407) Temperature Range <u>None</u> Time Range <u>N/A</u>																																	
PREHEAT (QW-406) Preheat Temp. Min. <u>125 F</u> Interpass Temp. Max. <u>200 F</u> Preheat Maintenance <u>None</u> (Continuous or special heating where applicable should be recorded)		GAS (QW-408) <table border="1"> <thead> <tr> <th rowspan="2">Gas(es)</th> <th colspan="2">Percent Composition (Mixture)</th> <th rowspan="2">Flow Rate</th> </tr> <tr> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Shielding</td> <td><u>Argon</u></td> <td><u>100%</u></td> <td><u>15-25 CFH</u></td> </tr> <tr> <td>Trailing</td> <td><u>N/A</u></td> <td><u>N/A</u></td> <td><u>N/A</u></td> </tr> <tr> <td>Backing</td> <td><u>Argon</u></td> <td><u>100%</u></td> <td><u>5-25 CFH</u></td> </tr> </tbody> </table>		Gas(es)	Percent Composition (Mixture)		Flow Rate			Shielding	<u>Argon</u>	<u>100%</u>	<u>15-25 CFH</u>	Trailing	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	Backing	<u>Argon</u>	<u>100%</u>	<u>5-25 CFH</u>														
Gas(es)	Percent Composition (Mixture)		Flow Rate																																
Shielding	<u>Argon</u>	<u>100%</u>	<u>15-25 CFH</u>																																
Trailing	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>																																
Backing	<u>Argon</u>	<u>100%</u>	<u>5-25 CFH</u>																																
ELECTRICAL CHARACTERISTICS (QW-409) Current AC or DC <u>DC</u> Polarity <u>Straight</u> Amps (Range) <u>75 - 175</u> Volts (Range) <u>12 - 22</u> (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 <u>3/32" 2% Thoriated</u> (Pure Tungsten, 2% Thoriated, etc.) Mode of Metal Transfer for GMAW <u>N/A</u> (Spray arc, short circuiting arc, etc.) Electrode Wire feed speed range <u>N/A</u>																																			
TECHNIQUE (QW-410) String or Weave Bead <u>String</u> Orifice or Gas Cup Size <u>#3L thru #7</u> Initial and Interpass Cleaning (Brushing, Grinding, etc.) <u>Brushing - Grinding</u> Method of Back Gouging <u>None</u> Oscillation <u>None</u> Contact Tube to Work Distance <u>N/A</u> Multiple or Single Pass (per side) <u>Multiple pass</u> Travel Speed (Range) <u>2 - 5 I.P.M.</u> Peening <u>None</u> Other <u>N/A</u>																																			
<table border="1"> <thead> <tr> <th rowspan="2">Weld Layer(s)</th> <th rowspan="2">Process</th> <th colspan="2">Filler Metal</th> <th colspan="3">Current</th> <th rowspan="2">Travel Speed Range</th> <th rowspan="2">Other (e.g., Remarks, Comments, Hot Wire, Addition, Technique, Torch Angle, Etc.)</th> </tr> <tr> <th>Class</th> <th>Dia.</th> <th>Type Polar.</th> <th>Amp. Range</th> <th>Volt Range</th> </tr> </thead> <tbody> <tr> <td>1"</td> <td>GTAW</td> <td>ERNiCrMo-10</td> <td>3/32"</td> <td>Straight</td> <td>75 - 120</td> <td>12 - 16</td> <td>2 - 5 I.P.M.</td> <td></td> </tr> <tr> <td>2nd and remainder</td> <td>GTAW</td> <td>ERNiCrMo-10</td> <td>3/32"</td> <td>Straight</td> <td>95 - 175</td> <td>14 - 22</td> <td>3 - 5 I.P.M.</td> <td></td> </tr> </tbody> </table>				Weld Layer(s)	Process	Filler Metal		Current			Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire, Addition, Technique, Torch Angle, Etc.)	Class	Dia.	Type Polar.	Amp. Range	Volt Range	1"	GTAW	ERNiCrMo-10	3/32"	Straight	75 - 120	12 - 16	2 - 5 I.P.M.		2nd and remainder	GTAW	ERNiCrMo-10	3/32"	Straight	95 - 175	14 - 22	3 - 5 I.P.M.	
Weld Layer(s)	Process	Filler Metal				Current			Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire, Addition, Technique, Torch Angle, Etc.)																									
		Class	Dia.	Type Polar.	Amp. Range	Volt Range																													
1"	GTAW	ERNiCrMo-10	3/32"	Straight	75 - 120	12 - 16	2 - 5 I.P.M.																												
2nd and remainder	GTAW	ERNiCrMo-10	3/32"	Straight	95 - 175	14 - 22	3 - 5 I.P.M.																												

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

8/13/2002

[Signature]

From Page No. _____

Revision to WPS C22-GTAW

Revised WPS dated 11/5/2002

Reason for revision

Shielding gas flow rate needed to be reduced below 15 CFH. In some cases the 15 CFH flow rate was too high. WPS was revised to allow shielding gas flow rate of 5-25 CFH

NO other changes to WPS

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

11/8/2002

[Signature]

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 Date 7-22-2002 Supporting PQR No. (s) C22-GTAW-1
 Revision No. 1 Date 11/05/2002
 Welding Process(es) GTAW Type(s) Semi-Auto
 (Automatic, Manual, Machine, or Semi-Auto.)

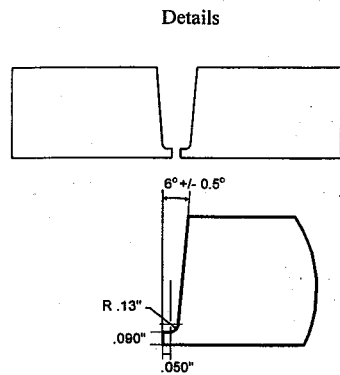
JOINTS (QW-402)

Joint Design Single U
 Backing (Yes) X (No) _____
 Backing Material (Type) Commercially pure Argon
 (Refer to both backing and retainers.)

- Metal Nonfusing Metal
 Nonmetallic 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 Mfr., 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. 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

AWS No. (Class) ERNiCrMo-10

F-No. 44

A-No. N/A

Size of Filler Metals 3/32"

Weld Metal

Thickness Range:

Groove 2.000"
 Fillet Unlimited

Electrode-Flux (Class) N/A

Flux Trade Name N/A

Consumable Insert N/A

Other N/A

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

SED 18.05-10a

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

Durill Dunn

11/8/2002

From Page No. _____

QW-482 (Back)

WPS No. C22 - GTAW Rev. 1

POSITIONS (QW-405)

Position(s) of Groove All
 Welding Progression: Up X Down _____
 Position(s) of Fillet All

POSTWELD HEAT TREATMENT (QW-407)

Temperature Range None
 Time Range N/A

GAS (QW-408)

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

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)

ELECTRICAL CHARACTERISTICS (QW-409)

Current AC or DC DC Polarity Straight
 Amps (Range) 75 - 175 Volts (Range) 12 - 22
 (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 N/A
 (Spray arc, short circuiting arc, etc.)

Electrode Wire feed speed range N/A

TECHNIQUE (QW-410)

String or Weave Bead String
 Orifice or Gas Cup Size #3L thru #7
 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.

Peening None

Other N/A

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

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____


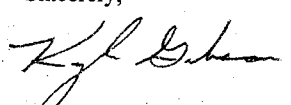
Recorded by _____

Durill Dunn

11/8/2002

PURCHASE REQUISITION		PURCHASING ORDER NUMBER		REQ. NO.	
8/29/02		8/29/02		624948	
SUGGESTED OR PREVIOUS SUPPLIER		PURCHASING SELECTED SUPPLIER		DELIVER TO	
An-Tech Laboratories		R. Doyle Smith/bldg. 137		R. Doyle Smith/bldg. 137	
Houston, TX 77207		P.O. 270 206N		SHP VIA	
ATN: Don Derrick		F.O.B.		SUPPLIER CODE	
PHONE 713/644-7501		TERMS		PHONE	
FAX 713/644-1400		ACCT		DATE REQUIRED	
DESCRIPTION		PROJECT		EST. UNIT PRICE	
NDE & destructively test plate #740 for PQR C22-GTAW-1 per 1998 ASME Section IX as follows:		01402		50.00	
LN.	QTY.	UNIT	ORG	%	TOTAL
A	1	EA	20	100	50.00
B	2	EA	20	100	60.00
C	4	EA	20	100	35.00
D	2	EA	20	100	22.00
E	4	EA	20	100	12.00
Quality affecting purchase.					
INTERNAL NOTES TO BUYER			SPECIAL INSTRUCTIONS TO SUPPLIER		
1. Government Project? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (CHECK FOR EXPLANATION OF PROPERTY TYPE) a <input type="checkbox"/> G-1 CONSUMABLE b <input type="checkbox"/> G-2 DELIVERABLE c <input checked="" type="checkbox"/> G-3 ACCOUNTABLE / REPORTABLE d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? <input type="checkbox"/> YES <input type="checkbox"/> NO CONTRACT REVIEW APPROVAL _____ DATE _____			2. QUALITY ASSURANCE? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO a ASL REQUIRED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO b QA CODES: Q19, Q12, Q20 c INSPECTION CRITERIA P1 to inspect per QAP-016 d QA APPROVAL (IF REQUIRED) _____ DATE _____ BUYER SIGNATURE _____		
3. SOURCING NOTES IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> 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 DEPT./DIVISION APPROVAL: _____ EXT. NO.: 6090 DATE: 8/29/02 ADMIN APPROVAL: _____			4. REPAIRS a IS THIS REQ. FOR A REPAIR? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO b IS THE REPAIR ON OR OFF CAMPUS? <input type="checkbox"/> ON <input type="checkbox"/> OFF c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO. _____		

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by *Darrell Dunn* 11/8/2002

From Page No. _____																			
 <p>PHONE: AREA CODE 713/644-7501 3204 BROADWAY P.O. Box 262265 HOUSTON, TEXAS 77207-2265</p>																			
August 29, 2002																			
Mr. Darrel Dunn Southwest Research Institute P.O. Box 28510 San Antonio, TX 78228-8510																			
RE: Alloy C-22 Quote, 1"t Weld Procedure (12" x 12" Coupon)																			
Dear Mr. Dunn:																			
Per our telephone conversation of this date, the following is a quote on the requested welding procedure testing on Alloy C22 material.																			
	<table border="0"> <tr> <td>Tensile Testing</td> <td>\$22.00 ea.</td> <td>\$ 44.00</td> </tr> <tr> <td>Machining</td> <td>\$60.00 ea.</td> <td>\$120.00</td> </tr> <tr> <td>Bend Testing</td> <td>\$12.00 ea.</td> <td>\$ 48.00</td> </tr> <tr> <td>Bend Machining</td> <td>\$35.00 ea.</td> <td>\$140.00</td> </tr> <tr> <td>X-Ray</td> <td>\$50.00</td> <td>\$ 50.00</td> </tr> <tr> <td>Total</td> <td></td> <td>\$402.00</td> </tr> </table>	Tensile Testing	\$22.00 ea.	\$ 44.00	Machining	\$60.00 ea.	\$120.00	Bend Testing	\$12.00 ea.	\$ 48.00	Bend Machining	\$35.00 ea.	\$140.00	X-Ray	\$50.00	\$ 50.00	Total		\$402.00
Tensile Testing	\$22.00 ea.	\$ 44.00																	
Machining	\$60.00 ea.	\$120.00																	
Bend Testing	\$12.00 ea.	\$ 48.00																	
Bend Machining	\$35.00 ea.	\$140.00																	
X-Ray	\$50.00	\$ 50.00																	
Total		\$402.00																	
If you have any questions, please feel free to contact me.																			
Sincerely,																			
																			
Kyle Gibson QA/QC Mgr. CQA. Metallurgical Technician																			
KG:sc																			
To Page No. _____																			

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by *Darrell Dunn* 11/8/2002

From Page No. _____



September 9, 2002

Page 1 of 1

Southwest Research Institute
Attn: Doyle Smith
P.O. Box 28510
San Antonio, Texas 78228

Reqn. No. 624948
Report No. 02-1797

IDENTIFICATION: Plate #740, PQR# C22-GTAW-1
MATERIAL: C22 Alloy (P44)
SPECIFICATION: ASME Sec. IX

Information potentially subject to copyright protection
was redacted from this location. The redacted material is
a test result report.

Our letters and reports are for the exclusive use of the client to whom they are addressed. Our reports apply only to the actual sample tested and are not necessarily indicative of the properties of other identical or similar materials.

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

11/8/2002

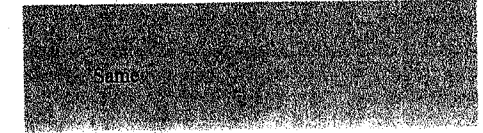
From Page No. _____

INVOICE

An-Tech Laboratories, Inc.

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

Ship To



Quantity	Item Number	Description	Unit Price	Disc.	Amount
4	6008	GUIDED BEND TEST	12.00		48.00
4	6007	MACHINING	35.00		140.00
2	6008	TENSILE TESTS	22.00		44.00
2	6007	MACHINING	60.00		120.00
1	6006	X-RAY	50.00		50.00

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

02-1797
Doyle Smith

RECEIVED
VISC. CHCS
TUES. BY
11/8/02

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

11/8/2002

From Page No. _____

PURCHASING REQUISITION		PURCHASE ORDER NUMBER		REQ. NO.				
10/11/02		D. Dunn/bldg. 57		624983				
SOUTHWEST RESEARCH INSTITUTE™		PURCHASING SELECTED SUPPLIER						
SUGGESTED OR PREVIOUS SUPPLIER		DELIVER TO		SHIP VIA				
Texas Toolmakers		D. Dunn/bldg. 57						
CITY, STATE		SHP VIA		FO.B				
San Antonio, TX								
ATTN:		TERMS		PHONE				
Mike Ridgway								
PHONE		FAX		EST. UNIT PRICE				
210/494-3651		210/494-6139						
LN.	QTY.	UNIT	DESCRIPTION	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	4	EA	C-22 weld specimens CNWRA drawing	20	06002.01	.081	11/1/02	1150.00
			20-06002-01-081-001					
Quality & Technical Requirements: Specimens machined as per CNWRA drawing 20-06002-01-081. 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.								
INTERNAL NOTES TO BUYER			SPECIAL INSTRUCTIONS TO SUPPLIER			TOTAL		
1. Government Project? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			3. SOURCING NOTES			4. REPAIRS		
IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)			IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			a IS THIS REQ. FOR A REPAIR? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
a <input checked="" type="checkbox"/> G-1 CONSUMABLE			IF YOU HAVE SUGGESTED A SUPPLIER, AND NO OTHER SUPPLIER WILL MEET YOUR NEEDS, PLEASE ATTACH A MEMO OF EXPLANATION.			b IS THE REPAIR ON OR OFF CAMPUS? <input type="checkbox"/> ON <input checked="" type="checkbox"/> OFF		
b <input type="checkbox"/> G-2 DELIVERABLE			REQUESTOR'S SIGNATURE			c IF OFF CAMPUS PROVIDE SHIPPING TICKET NO.		
c <input type="checkbox"/> G-3 ACCOUNTABLE / REPORTABLE			Darrell Dunn					
d IS GOVT. PROPERTY BEING SENT TO SUPPLIER? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			EXT. NO. 6090					
			DATE 10/11/02					
CONTRACT REVIEW APPROVAL			BUYER SIGNATURE			SEE INSTRUCTIONS ON REVERSE SIDE		

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by *[Signature]* 11/8/2002

From Page No. _____

Justification for Other Than Full and Open Competition

Date: 10/08/2002
 To: Purchasing Department
 From: Darrell S. Dunn
 SUBJECT: Sole Source Justification
 Purchase Requisition: 624983
 Project No.: 20.06002.01.081
 Recommended Source: Texas Toolmakers

This form must be completed and returned to Purchasing before your Purchase Requisition can be awarded.

- Is the recommended source the only source you considered?
 Yes No
- a. If you check yes, why didn't you consider any other sources?
 Texas Toolmakers has been used because they are a machine shop on the ASL and have provided services at a competitive price. Texas tool makers has successfully machined previous weld preparation specimens from Alloy 22 in a timely manner with minimal problems.
- b. If you checked no, what other sources did you consider?
 Herco

How did you determine that the recommended source was the only source? (Include any market survey conducted, as well as review of technical journals and other sources such as the Thomas Register.)
 Texas Toolmakers has machined previous weld procedure qualification specimens. It is advantageous to use the same supplier to machine the weld prep that will be used for test specimens

Why were these other sources ruled out for this purchase?
 Herco was originally ruled out because of higher quoted cost estimates

- What characteristics does this item/company have that are necessary, and that no other item/company has?
 Combination of being on the approved supplier list and proven success machining the same material.
- Remarks:

I certify that this justification is accurate and complete to the best of my knowledge.

Purchase Requisition Requester:
[Signature]

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by *[Signature]* 11/8/2002

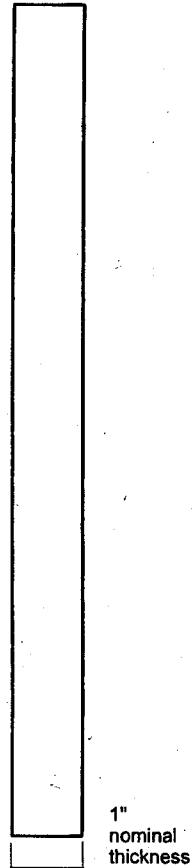
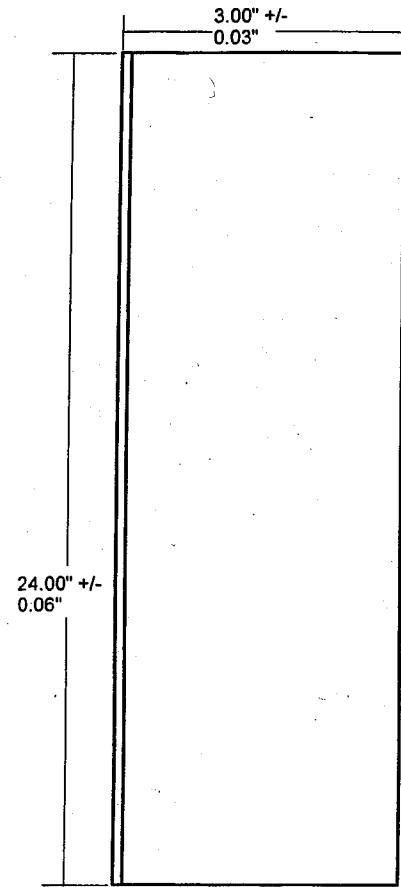
From Page No. _____

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

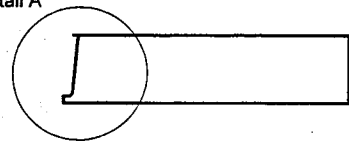
Alloy 22 Weld Specimen
CNwRA Drawing 20-06002-01-081-001
Dimensional tolerances as specified
Note: Detail A on Page 2
Page 1 of 2

To be completed at time of order:

Material: _____
Heat: _____
Specimen Orientation: _____
Other: _____



Detail A



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

V. Jain 10/7/2002
Reviewed by V. Jain Date

B. Mabrito 10/7/2002
QA Approval B. Mabrito Date

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

11/8/2002

From Page No. _____

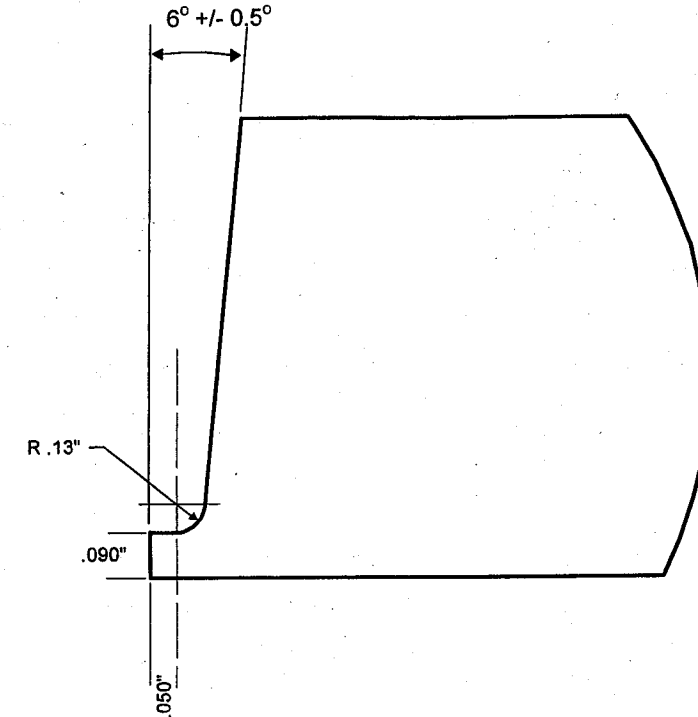
Darrell S. Dunn
SwRI-CNwRA
Phone: (210) 522-6090
Fax: (210) 522-5184
e-mail: ddunn@swri.org

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



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

V. Jain 10/7/2002
Reviewed by V. Jain Date

B. Mabrito 10/7/2002
QA Approval B. Mabrito Date

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

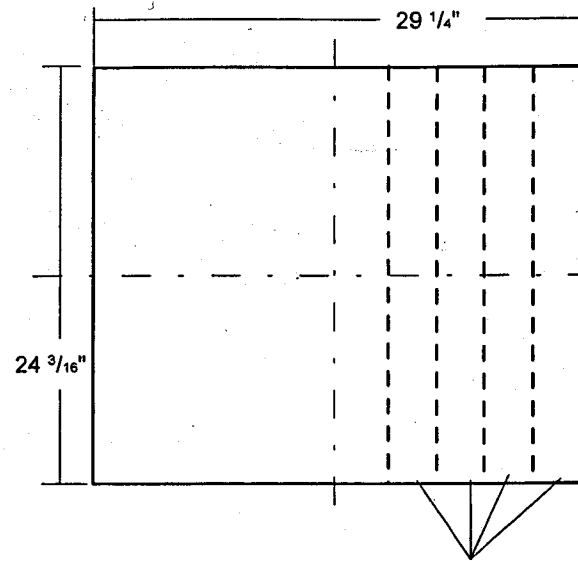
11/8/2002

From Page No. _____

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

Reference drawing for weld procedure qualification specimens
CNWRA Drawing 20-06002-01-081-002
Nominal dimensions shown for reference

To be completed at time of order:
Material: Alloy 22
Heat: 2277-1-3164
Specimen Orientation: As Shown
Other: _____



4 pieces per 20-06002-01-081-001

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

V. Jain 10/7/2002
Reviewed by: V. Jain Date

B. Mabrito 10/7/2002
QA Approval B. Mabrito Date

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

11/8/2002

TITLE _____

From Page No. _____

JIM SILVERS 3964

Texas Toolmakers, Inc.
11411 E. Coker Loop / San Antonio, TX 78216

Phone: (210) 494-3651
Fax: (210) 494-6139

CUSTOMER WORK ORDER / QUOTE

Job No.:	Quote No.:	Date Opened:	Delivery Date:	Customer No.:	Job Taken/Quoted by:				
	1964		2-3 WEEKS ARO	01111	MIKE RIDGWAY				
Customer:			Quote Good For:	Terms:					
SOUTHWEST RESEARCH INSTITUTE			90 DAYS	1/2% 10 NET 30					
6220 CULEBRA			Customer P.O.:	Contact:					
SAN ANTONIO, TX 78238				DARREL DUNN					
			Phone No.:	Fax No.:					
			210-522-6090	210-522-5184					
Item	Qty	Part No.	Rev	Part Name	Bld	YAM	Price Ea.	Total	
1	4	20-06002-01-081-001		ALLOY					
				22 WELD SPECIMEN			1150.00	\$4,600.00	
								\$ 0.00	
								\$ 0.00	
								\$ 0.00	
								\$ 0.00	
								\$ 0.00	
								\$ 0.00	
								\$ 0.00	
								\$ 0.00	
Work Instructions:								Total	\$4,600.00

FOB: TEXAS TOOLMAKERS, INC.

Page/Sheet _____ of _____

Quality Requirements: None As noted below
Material/Process Certification: Yes No Certificate of Compliance: Yes No Source Inspection Yes No
Documented Dimensional Inspection: Yes No; If Yes: 1) Specified Dimensions Only, 2) Sampling, OR 3) 100%
Authorized TTI Representative: *Mike Ridgway* Date: 10/8/02
Customer Acceptance: _____ Title: _____ Date: _____
Customer Comments (if applicable): _____
Note: price(s) may be affected if scope of work/inspection is deviated from that quoted.
For TTI Use Only
Reviewed by: _____ Date: _____ P.O. provided at time of review.
 Yes No

TTI Form QF-030101

Rev 2

To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

11/8/2002

From Page No. _____

TEXAS TOOLMAKERS, INC.
11411 EAST COKER LOOP
SAN ANTONIO, TX 78216-2810

* * * * *
* SHIPPER *
* * * * *

SHIPPER NUMBER : 12203
DATE SHIPPED : 11/06/02
OUR JOB NUMBER : 33919

SHIPPED TO:
DARREL DUNN
SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA ROAD
SAN ANTONIO, TX 78238

PURCHASE ORDER : 3824255
SHIPPED BY : TTI TRUCK
CUST# 01111

ITEM#	ORDERED	SHIPPED	PART NUMBER	PART NAME
1.0	4	4	200600201081001	ALLOY 22 WELD SPECIMEN

RETURNING REMAINING MATERIAL.

RECEIVED BY *Darrel Dunn* DATE 11/6/2002

Accepted 11/8/2002

*57
90
Darrel Dunn
11-6-02*



1 Pallet 4 Items and Material DL

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Darrel D</i>	11/8/2002

From Page No. _____

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

CERTIFICATE OF CONFORMANCE

TO: Southwest Research Institute
6220 Culebra Road
San Antonio, Tx. 78238-5166

CUSTOMER P.O. 382425S
TTI JOB #: 33919

DESCRIPTION 4 EA.; P/N 20-06002-01-081-001 Alloy 22 Weld Specimen

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

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

TEXAS TOOLMAKERS,

BY : *Casey Ridgway* (Casey Ridgway)
TITLE: Q.A. Manager
DATE: 11/6/02

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Darrel D</i>	11/8/2002

From Page No. _____

DIMENSIONAL INSPECTION REPORT
TEXAS TOOLMAKERS, INC.

Job No.: 33919	Part No.: 20-06002-D1-081-001	Rev. No.: -	P.O. No.: 382425 S
Customer: S.W.R.I.	Part Name: Alloy 22 weld specimen	Log No.: 2294002-C	
Inspection Plan: <input type="checkbox"/> 100 % <input checked="" type="checkbox"/> Specified Dim.	Quantity: 4	Sample Size: 4	Accept No.: 4 Reject No.: 0 NR No.: 0

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1.	3.00	±.030	3.01-3.02	TTF-102	
2.	24.00	±.06	24.05	TTF-081	
3.	6°	±.5°	6°	TTF-097	
4.	R.13		R.13	TTF-024	
5.	.090		.089-.100	TTF-102	
6.	.050		.045-.055	TTF-039	

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

Inspection Performed by: Casey Ridgman Date: 11-6-02 Customer (as applicable): _____ Date: _____

TTI Form QF-106201 Rev 2

Witnessed & Understood by me, _____

Date _____

Invented by _____
Recorded by [Signature]

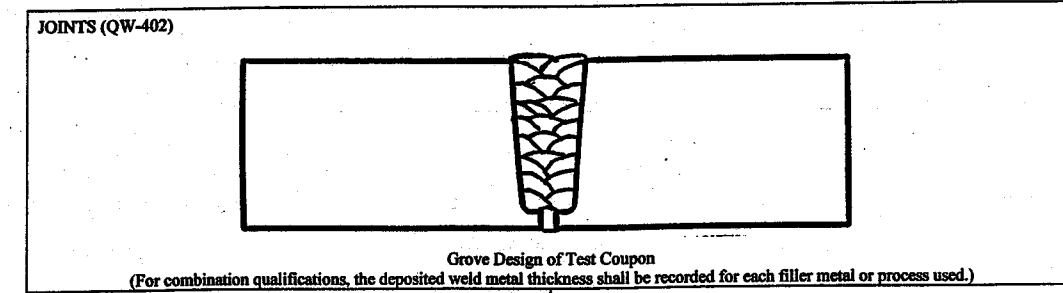
Date _____
11/8/2002

To Page No. _____

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: Southwest Research Institute Date: 8/27/02
 Procedure Qualification Record No.: C22-GTAW-1
 WPS No.: C22-GTAW
 Welding Process(es): GTAW
 Types (Manual, Automatic, Semi-Auto.): Semi-Auto



BASE METALS (QW-403)
 Material Spec: SB-375
 Type or Grade: UNS No. N06022
 P-No.: 44 to P-No.: 44
 Thickness of Test Coupon: 1"
 Diameter of Test Coupon: Plate
 Other: _____

POSTWELD HEAT TREATMENT (QW-407)
 Temperature: None
 Time: N/A
 Other: _____

GAS (QW-408)

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

FILLER METALS (QW-404)
 SFA Specification: A5.14
 AWS Classification: ERNiCrMo-10
 Filler Metal F-No.: 44
 Weld Metal Analysis A-No.: N/A
 Size of Filler Metal: 3/32"
 Other: _____
 Weld Metal Thickness: 1"

ELECTRICAL CHARACTERISTICS (QW-409)
 Current: DC
 Polarity: Straight
 Amps: 100-175 Volts: 15-21
 Tungsten Electrode Size: 3/32"
 Other: _____

POSITION (QW-405)
 Position of Groove: IG
 Weld Progression (Uphill, Downhill): N/A
 Other: _____

TECHNIQUE (QW-410)
 Travel Speed: 3-3.5 IPM
 String or Weave Bead: String
 Oscillation: None
 Multipass or Single Pass (per side): Multipass
 Single or Multiple Electrodes: Single
 Other: _____

PREHEAT (QW-406)
 Preheat Temp.: 125-degreesF
 Interpass Temp.: 200-degreesF
 Other: _____

SED 18.05-11a

Witnessed & Understood by me, _____

Date _____

Invented by _____
Recorded by [Signature]

Date _____
11/22/2002

To Page No. _____

From Page No. _____

QW-483 (Back) PQR No. C22-GTAW-1

Tensile Test (QW-150)

Specimen No.	Width	Thickness	Area	Ultimate Total Load lb	Ultimate Unit Stress psi	Type of Failure & Location
See An-Tech Report No. 02-1797						

Guided-Bend Tests (QW-160)

Type and Figure No.	Result
See An-Tech Report No. 02-1797	

Toughness Tests (QW-170)

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

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 X-Ray - Satisfactory

Welder's Name Frank Garcia Clock No. 4248 Stamp No. 299

Tests conducted by: An-Tech Laboratories, Inc. Laboratory Test No. 02-1797

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 Southwest Research Institute

Date 9/9/02 By F. D. Caroline

(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 <u>[Signature]</u>	<u>11/22/2002</u>

From Page No. _____

WELDING PLATE FOR TEST SPECIMENS

PLATES MACHINED PER DRAWING 20-06002-01-081-01 SHOWN ON PAGES 64 & 65

PLATES WELDED USING WPS ON Page 56-57 SUPPORTED BY PQR ON PAGE 71 & 72 AND TESTS ON PAGE 60

PENETRANT TEST PERFORMED ON ROOT PASS RADIOGRAPHIC TESTING PERFORMED ON COMPLETED WELD

AFTER WELDING WAS COMPLETED, PLATE WAS STAMPED # 759

A SECOND SET OF PLATES WAS ALSO WELDED USING THE SAME WPS

PENETRANT TESTING OF ROOT PASS RADIOGRAPHIC TEST OF COMPLETED WELD

AFTER WELDING WAS COMPLETED PLATE WAS STAMPED # 760

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <u>[Signature]</u>	<u>12/13/2002</u>

PURCHASING

PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE, INC.

REQUISITION DATE: 12/2/02 ORDER DATE: _____ PURCHASE/ORDER NUMBER: _____ REQ. NO.: 637634

SUGGESTED OR PREVIOUS SUPPLIER: IHI Southwest DELIVER TO: D. Dunn/bldg. 57 PURCHASING SELECTED SUPPLIER: _____

CITY, STATE: _____ SHIP VIA: _____ SUPPLIER CODE: _____

ATTN: Fred Anderson PHONE: 256-4108 FAX: 521-2311

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	3	EA	Penetrant test root pass of Alloy 22 weld	20	06002.01.	081	100	12/4/02	\$200.00

Quality & Technical Requirements: Quality affecting item test procedures must be compliant with Section V of the ASME code. *NDE certifications needed for the individuals performing penetrant test; certifications needed on 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
 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: 12/2/02

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 EXT. NO.: 6090
DEPT. / DIVISION APPROVAL: _____ DATE: 12/2/2002
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: _____ BUYER SIGNATURE: _____ DATE: _____

ATTACH SOLE SOURCE MEMOS, QUOTES AND OTHER DOCUMENTS.

MORGAN BUSINESS SOLUTIONS • (210) 342-7953

Penetrant examination of root pass of plate 759

Witnessed & Understood by me, _____ Date: 12/13/2002
Invented by _____ Date: _____
Recorded by _____

To Page No. _____

ISWT LIQUID PENETRANT EXAMINATION RECORD

PROJECT No.: 02-0283 SITE: SwRI Fab Shop DATE: (DAY - MONTH - YEAR) Dec. 3, 2002 Lo LOCATION: Left End of Plate SHEET No.: 010001

EXAMINATION AREA (SYST / COMP): Test Specimen LINE / SUBASSEMBLY: Weld Material IDENTIFICATION: N/A Wo LOCATION: CL of Weld Root WELD TYPE (FLOW →): Plate

EXAMINER: Ralph Williams SNT LEVEL: III PROCEDURE NO. ISWT-NN-PT1 SURFACE TEMP °F: 72.5F PENETRANT TEMP °F: 82.5F THERMOMETER SERIAL NUMBER: 78700033

EXAMINER: N/A SNT LEVEL: N/A ICN: N/A SURFACE FINISH: As Welded WELD LENGTH: 24"

PRE CLEANER		PENETRANT		REMOVER		DEVELOPER	
BRAND	Spotcheck	BRAND	Spotcheck	BRAND	Spotcheck	BRAND	Spotcheck
TYPE	SKC-S	TYPE	SKL-SP	TYPE	SKC-S	TYPE	SKD-S2
BATCH No.	96M02K/44828	BATCH No.	97J01K/09154	BATCH No.	96M02K/44828	BATCH No.	97M01K/12193
CLEANING COMPLETED	0855	TIME APPLIED	0907	REMOVAL COMPLETED	0925	TIME APPLIED	0930
		TIME REMOVED	0917			TIME READ	0940

INDICATION No.	L	W	LOCATION UP OR DOWN STREAM	TYPE ROUND OR LINEAR	SIZE DIAMETER OR LENGTH	REMARKS	INITIALS
						No Recordable Indication	
						Examined Root Pass	RD

EXAMINATION AREA LIMITATION - IF NONE, SO STATE: None

REVIEWED BY: _____ SNT LEVEL: II DATE: 3 Dec 02 PAGE: 1 OF 1

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

Plate 759 PT examination record Root Pass

Witnessed & Understood by me, _____ Date: 12/13/2002
Invented by _____ Date: _____
Recorded by _____

To Page No. _____

From Page No. _____

IHI SOUTHWEST TECHNOLOGIES, INC.

STATEMENT OF NDE CERTIFICATION

The President of IHI Southwest Technologies, Inc. certifies that

Ralph Williams

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 Winston Churchill H.S., San Antonio, Texas, 1974. Attended North Texas State Univ. for 2 years.

EXPERIENCE (Initial certification): 48 months.

TEST SCORES:	Weight	Score	Date
Basic	.30	96.82	06/06/00
Specific	.33	100.00	06/05/00
Method	.33	95.40	06/05/00
Composite (Average)		97.43	

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: No Date: 02/17/02

CERTIFICATION HISTORY:

Date of Employment: 1 June 1999
 Date of Initial Level I Certification: 23 September 1980
 Date of Initial Level II Certification: 21 October 1981
 Date of Initial Level III Certification: 30 April 1992
 Date of Most Recent Recertification: 6 June 2000
 Date of Expiration: 5 June 2005

REMARKS: NDE Instructor

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

SIGNED: 
 President, IHI Southwest Technologies, Inc.

01/21/02

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

To Page No. _____


Witnessed & Understood by me,

Date

Invented by

Date

Recorded by



12/13/2002

From Page No. _____

IHI SOUTHWEST TECHNOLOGIES, INC.

STATEMENT OF NDE CERTIFICATION

The President of IHI Southwest Technologies, Inc. certifies that

Richard Riddles

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

EDUCATION: Graduated Thomas A. Edison H.S., San Antonio, Texas, 1977.

TRAINING (For this certification): 26 hours.

EXPERIENCE (Initial certification): 2 months.

TEST SCORES:	Weight	Score	Date
General	.33	93.32	08/08/00
Specific	.33	86.67	08/08/00
Practical	.33	100.00	08/08/00
Composite (Average)		93.33	

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: No Date: 01/17/02

CERTIFICATION HISTORY:

Date of Employment: 1 June 1999
 Date of Initial Level I Certification: 17 March 1982
 Date of Initial Level II Certification: 28 October 1983
 Date of Most Recent Recertification: 8 August 2000
 Date of Expiration: 8 August 2003

REMARKS:

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

SIGNED: 
 Responsible Level III

 President, IHI Southwest Technologies, Inc.

ISWT Form QA-2-01 (Rev. 07/99)

01/18/02

To Page No. _____

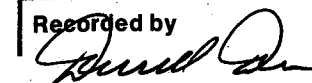
Witnessed & Understood by me,

Date

Invented by

Date

Recorded by



12/13/2002

From Page No. _____

PURCHASING

PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE,

REQUISITION DATE: 12/11/02 ORDER DATE: _____ PURCHASE ORDER NUMBER: _____ REG. NO.: 637637

SUGGESTED OR PREVIOUS SUPPLIER: IHI Southwest DELIVER TO: D. Dunn/bldg. 57 PURCHASING SELECTED SUPPLIER: _____

CITY, STATE: _____ SHIP VIA: _____

ATTN: Fred Anderson PHONE: 256-4108 FAX: 521-2311

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.	01.001	100	12/13/02	200.00
<p>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.</p>									
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: *PL to inspect per 004-016*
 d QA APPROVAL (IF REQUIRED) _____ DATE _____
 BUYER SIGNATURE: *Darrell Dunn* 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
 REPT. DIVISION APPROVAL: _____ DATE: 12/11/02
 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: _____
 SEE INSTRUCTIONS ON REVERSE SIDE

PT examination of Root Pass of Plate 760

Witnessed & Understood by me, _____ Date: 12/13/2002
 Invented by _____
 Recorded by *Darrell Dunn*

To Page No. _____

From Page No. _____

ISWT LIQUID PENETRANT EXAMINATION RECORD

PROJECT No.: 02-0283 SITE: SwRI Fab Shop DATE: (DAY - MONTH - YEAR) Dec. 10, 2002 Lo LOCATION: Left End of Plate SHEET No.: 010002

EXAMINATION AREA (SYST / COMP): Test Specimen LINE / SUBASSEMBLY: Weld Material IDENTIFICATION: N/A Wo LOCATION: CL of Weld Root WELD TYPE (FLOW →): Plate

EXAMINER: Ralph Williams SNT LEVEL: III PROCEDURE NO. ISWT-NN-PT1 SURFACE TEMP °F: 73 F PENETRANT TEMP °F: 82.5F THERMOMETER SERIAL NUMBER: 78700033

EXAMINER: N/A SNT LEVEL: N/A CHK: 0 SURFACE FINISH: As Welded WELD LENGTH: 24"

PRE CLEANER		PENETRANT		REMOVER		DEVELOPER	
BRAND	Spotcheck	BRAND	Spotcheck	BRAND	Spotcheck	BRAND	Spotcheck
TYPE	SKC-S	TYPE	SKL-SP	TYPE	SKC-S	TYPE	SKD-S2
BATCH No.	96M02K/44828	BATCH No.	97J01K/09154	BATCH No.	96M02K/44828	BATCH No.	97M01K/12193
CLEANING	0905	TIME APPLIED	0911	REMOVAL	0929	TIME APPLIED	0935
COMPLETED		TIME REMOVED	0922	COMPLETED		TIME READ	0945

INDICATION No.	L	W	LOCATION UP OR DOWN STREAM	TYPE ROUND OR LINEAR	SIZE DIAMETER OR LENGTH	REMARKS	INITIALS
						No Recordable Indication	
						Examined Root Pass	<i>RW</i>

EXAMINATION AREA LIMITATION - IF NONE, SO STATE: None *RW*

REVIEWED BY: *Boo Boo* SNT LEVEL: II DATE: 10 Dec 02 PAGE: 1 OF 1

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

PT examination record for Root Pass of Plate 760

Witnessed & Understood by me, _____ Date: 12/13/2002
 Invented by _____
 Recorded by *Darrell Dunn*

To Page No. _____

PURCHASE REQUISITION **PURCHASING**

SOUTHWEST RESEARCH INSTITUTE™

REQUISITION DATE: 12/11/02

SUGGESTED OR PREVIOUS SUPPLIER: **IHI Southwest**

DELIVER TO: **D. Dunn/bldg. 57**

ATTN: **Fred Anderson**

PHONE: 256-4108 FAX: 521-2311

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	2	EA	Radiographic inspection of Alloy 22 weld	20	06002.	01.081	100	12/17/02	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: **PLEASE RUSH!!!!**

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 O A CODES: **Q20, Q12**

c INSPECTION CRITERIA: **AI, To inspect per CAP-016**

d QA APPROVAL (IF REQUIRED) DATE: **12/11/02**

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** EXT. NO. **6090**

DATE: **12/11/02**

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

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____

Recorded by *Darrell Dunn* Date *1/7/2003*

RT examination for plate 759 & 760

To Page No. _____

ISWT RADIOGRAPHIC EXAMINATION RECORD

PROJECT No.: 02-00286 SITE: SwRI DATE: (DAY - MONTH - YEAR) 18-Dec-02 SHEET No: WA0001

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

ISOTOPE: N/A DIA. X LENGTH: N/A CURIES: N/A DISTANCE: N/A TIME: N/A EFFECTIVE SHARPNESS: KODAK T FILM SIZE: 4 1/2 X 17 FILM TECHNIQUE: SINGLE WALL DOUBLE WALL

X-RAY: SPERRY 300C Kv: 290 MA: 9.5 DISTANCE: 40 TIME: 12 FOCAL SPOT SIZE: 3MM EXAMINER: *W. Angell* W. ANGELL SNT LEVEL: III

QUALITY LEVEL: 2T PENETRATOR ID: 20 FILM PROCESSING: MANUAL 70 F SHM MATERIAL: S.S. SHM THICKNESS: 1/8

1. No. of Views: 2

2. Location of Radiation: 90

3. Location Markers: 1,2&3

4. Screen Type: LEAD

5. Thickness (in.) Front: .006- Back: .001

6. Signal Load Double Loaded

7. No. of Films: 2

TWO SHOTS PER PLATE
AREA 1-2 AND 2-3

SHOOTING SKETCH

COMPONENT ID: PLATE # 759 AND 760

REVIEWED BY: *W. Angell* SNT LEVEL: III DATE: 12/19/02 PAGE: 1 OF 1

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

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____

Recorded by *Darrell Dunn* Date *1/7/2003*

RT EXAMINATION PLATES 759 & 760

To Page No. _____

From Page No. _____

ISWT RADIOGRAPHIC INTERPRETATION RECORD

PROJECT No.: 02-00286 SITE: SWRI DATE: (DAY - MONTH - YEAR) 19-Dec-02 SHEET No: W/A0201
ACCEPTANCE STANDARD: ASME SECT III, NB-5320

FILM INTERPRETATION BY: W. ANGELL SNT LEVEL: III

FILM SEAM OR JOINT NUMBER	FILM INTERVAL NUMBER	PENETRANT SIZE AND CONDITION	S.S. TEST PLATES		ACCEPT	REJECT	SLAG	POROSITY	CRACK	LACK OF PENETRATION	LACK OF FUSION	UNDERCUT	SURFACE	SHRINK	HOT TEAR	SAND	CHAPLET	DATE FILM EXPOSED	REPAIR No.	REMARKS
			1 TO 2	2 TO 3																
759	1 TO 2	20	X							X	X							18-Dec-02		
759	2 TO 3	20	X							X	X							18-Dec-02		
760	1 TO 2	20	X							X	X							18-Dec-02		
760	2 TO 3	20	X							X	X							18-Dec-02		

REVIEWED BY: W. ANGELL DATE: 19-Dec-02 SNT LEVEL: III PAGE: 1 OF 1

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

RT EXAMINATION PLATES 759 & 760

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by *[Signature]* 1/7/2003

To Page No. _____

From Page No. _____

RT EXAMINATION OF PLATES 759 & 760

After welding, RT examination was performed on plates 759 & 760. The RT examination revealed many areas identified as lack of fusion between the base metal and filler metal and between filler metal passes. Based on the results of the RT examination the plates were determined to be unacceptable for testing of mechanical properties or for testing of the effects of welding on corrosion resistance.

RT films from plates 759 & 760 were also DD 1/4/2003 also reviewed by Mark Ekstrom, Francis Caroline & R. Doyle Smith. The cause of the lack of fusion defects was determined to be insufficient preparation of the weld between weld passes and possibly a filler metal feed rate that was too high.

Additional plates will be prepared for welding. The DD 1/7/2003. The plates will be welded using the same procedure (C22 GTAW REVISION 1) shown on page 56/57.

Witnessed & Understood by me, _____ Date _____
Invented by _____ Date _____
Recorded by *[Signature]* 1/7/2003

To Page No. _____

PURCHASE REQUISITION		REQUISITION DATE	ORDER DATE	PURCHASE ORDER NUMBER	REQ. NO.				
SOUTHWEST RESEARCH INSTITUTE		12/18/02			637640				
SUGGESTED OR PREVIOUS SUPPLIER		DELIVER TO		PURCHASER/SELECTED SUPPLIER					
Welders Supply		Darrell Dunn/bldg. 57							
CITY, STATE		SHIP VIA							
PHONE		FAX		TERMS					
684-0232									
LN	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	10	lb	3/32" dia x 36" long bare electrodes ER NiCrMo-10 filler metal	20	06002.01.	081	100	1/3/03	21.49
B	30	lb	0.045" dia spool welding ER NiCrMo-10 filler metal	20	06002.01.	081	100	1/3/03	21.57
Quality & Technical Requirements: Quality affecting purchase. Material must meet the compositional specifications SPA 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.									
INTERNAL NOTES TO BUYER				SPECIAL INSTRUCTIONS TO SUPPLIER				TOTAL	
1. Government Property? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, CHECK THE APPROPRIATE PROPERTY TYPE (SEE BACK FOR EXPLANATION OF PROPERTY TYPES)		2. QUALITY ASSURANCE? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO a. ASL REQUIRED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO b. QA CODES: Q4 c. INSPECTION CRITERIA d. QA APPROVAL (IF REQUIRED)		3. SOURCING NOTES IF YOU HAVE SELECTED A BRAND NAME OR PARTICULAR MANUFACTURER, WOULD AN EQUIVALENT BRAND OR PRODUCT ALSO SATISFY YOUR NEED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> 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? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO b. IS THE REPAIR ON OR OFF CAMPUS? <input type="checkbox"/> ON <input checked="" type="checkbox"/> OFF c. IF OFF CAMPUS PROVIDE SHIPPING TICKET		REQUESTOR'S SIGNATURE Darrell Dunn EXT. NO. 6090 DATE 12/18/02 BUYER APPROVAL DATE	
CONTRACT REVIEW APPROVAL		DATE		BUYER SIGNATURE		DATE		SEE INSTRUCTIONS ON REVERSE SIDE	

ORDERED QUANTITY	SHIPPED QUANTITY	ORDER ENTERED BY	DATE	DESCRIPTION	UNIT	PRICE	AMOUNT	TAXES	TOTAL
10	10	WJ	12/18/02	3/32" dia x 36" long bare electrodes ER NiCrMo-10 filler metal	lb	21.49	214.90		214.90
30	30	WJ	12/18/02	0.045" dia spool welding ER NiCrMo-10 filler metal	lb	21.57	647.10		647.10
							NET 862.00		862.00
							TAXES		
							TOTAL		862.00

ORDER PLACED BY: WJ
 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.
 THE PURCHASER, BY ACCEPTANCE AND USE OF THE GOODS SPECIFIED HEREIN, AGREES AND WARRANTS TO BE BOUND BY THE CONDITIONS PRINTED ON THE REVERSE SIDE OF THIS ORDER.

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

RECEIVED BY: [Signature]
 DATE: 1/15/2003

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by *Darrell D* Date *1/15/2003*

From Page No. _____

JAN-15-2003 11:03 FROM: 01/14/2003 23:59 7136449628

TO: 512525184 P. 045
AMERICAN FILLER METAL PAGE 01

ACTUAL MATERIAL TEST REPORT

AMERICAN FILLER METALS

6060 Denohe Street • Houston, Texas 77033
 Phone: 713-649-8785 • 1-800-394-4350 • Fax: 713-644-9628 • www.amfiller.com

Customer: WELDERS SUPPLY COMPANY
 5406 JACKWOOD
 SAN ANTONIO, TX 78238

PO: WSC1041 Ship Date: 01/15/03 Net Weight: 30.1#
 Product: NB 622 MN Dimensions: .045 X 30
 Heat #: XK1977BG11 Specification: AWS A5.14 ERNiCrMo-10

C	Co	Cr	Cu	Fe	Mn
.005	.07	20.25	.09	2.56	.2
Mo	Ni	P	S	Si	V
14.13	59.6	.008	.001	.06	.04
Wt %	Tot Others				
2.99	.5				

This certification is provided by American Filler Metals Co. with the understanding that if the product covered does not conform to the stated specifications, there shall be no personal liability of any kind by the undersigned. Furthermore, the obligation and liability of (such non-conformance) by American Filler Metals Co. will be limited to a furnishing the purchaser with a product conforming to the correct specifications, at no additional charge of a) to refund to the full purchase price paid for such non-conforming product. American Filler Metals Co. will not be liable for consequential damage.

Authorized Representative

MEGTS AWS A5.14 ERNiCrMo-10
 SPECIFICATION *Darrell D* 1/15/2003

Witnessed & Understood by me, _____ Date _____
 Invented by _____ Date _____
 Recorded by *Darrell D* Date *1/15/2003*

From Page No. _____

JAN-15-2003 11:03 FROM: 01/14/2003 23:59 7136449628 TO: 5125225104 P.002 AMERICAN FILLER METAL PAGE 02

ACTUAL MATERIAL TEST REPORT

AMERICAN FILLER METALS

6060 Donoho Street • Houston, Texas 77033
Phone: 713-648-8785 • 1-800-394-4550 • Fax: 713-644-9628 • www.amfiller.com




Customer: WELDERS SUPPLY COMPANY
5406 JACKWOOD
SAN ANTONIO, TX 78238

PO: WSC1041 Ship Date: 01/15/03 Net Weight: 10.6#
Product: NB 622 TE Dimensions: 3/32 X 36
Heat #: XX2432BG Specification: AWS A5.14 ERNiCrMo-10

C	Co	Cr	Cu	Fe	Mn
.004	.06	20.62	.51	2.25	.25
Mo	Ni	P	S	Si	V
13.89	59.73	.004	.001	.04	.01
Wt. %		Tot Others			
3.14		.5			

This certification is provided by American Filler Metals Co. with the understanding that if the product covered does not conform to the stated specifications, there shall be no personal liability of any kind by the undersigned. Furthermore, the obligation and liability of (such non-conformance) by American Filler Metals Co. will be limited to a) furnishing the purchaser with a product conforming to the correct specifications, at no additional charge or b) to refund to the full purchase price paid for such non-conforming product. American Filler Metals Co. will not be liable for consequential damage.

[Signature]
Authorized Representative

MEETS AWS A5.14 ERNiCrMo-10 SPECIFICATION *Darrell Dunn 1/15/2003*

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	1/15/2003

From Page No. _____

SRIT **CNWRA** A center of excellence in earth sciences and engineering
6220 Culebra Road • San Antonio • Texas, U.S.A. 78228-5166

January 16, 2003

Darrell S. Dunn
Bldg. 57
Phone: (210) 522-6090
Fax: (210) 522-5184
E-Mail: ddunn@swri.org

Bill Scorzo
Conam Inspection

Dear Mr. Scorzo,

Enclosed please find the heat of Alloy 622 weld filler metals heat numbers XX1977BG11 (0.045" diameter), and XX2432BG (3/32" diameter) submitted for chemical analyses. Per our previous phone conversations, I need to have the specimen analyzed for the Ni, Cr, Mo, W, Fe, C, Co, Cu, Mn, P, S, Si, and V. According to the vendor, the material heats are within the chemical composition ranges specified in AWS A5.14 ERNiCrMo-10. The specified chemical composition is provided below.

Cr: 20.0 - 22.5
Mo: 12.5 - 14.5
W: 2.5 - 3.5
Fe: 2.0 - 6.0
C: 0.015 max
Co: 2.5 max
Mn: 0.50 max
P: 0.02 max
S: 0.010 max
Si: 0.08 max
V: 0.35 max
Cu: 0.50
Others Elements Total: 0.5
Ni: balance

A copy of the specification requirements in AWS A5.14 and copies of the mill test reports are included.

The chemical analyses performed by Conam Inspection should provide the chemical composition of the alloy heats and should specify the heat number of the material. The chemical analyses report should include the heat number of the base metal for the analyses conducted outside the weld fusion zone, and the heat number of both the base alloy and the filler metal for the analyses of the as deposited weld. The analyses should conclusively determine if the heats submitted are within the specifications listed in AWS A5.14 for ERNiCrMo-10. Any discrepancy between the chemical analyses performed by Conam Inspection and the specifications of AWS A5.14 for ERNiCrMo-10 should be clearly identified.

Please call me if you have any questions. Thank you for your assistance.

Sincerely,
[Signature]
Darrell S. Dunn

To Page No. _____

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	2/19/2003

From Page No. _____

194 International Blvd
Glendale Heights, IL 60139
Telephone +1 630/681-0006
Facsimile +1 630/681-5520
http://www.conam.com



TEST REPORT

SOUTHWEST RESEARCH INST. 7010 P. O. # 5013B
6220 CULEBRA RD
P. O. DRAWER 28510
SAN ANTONIO TX 78284
DARRELL S. DUNN
DESCR 01/16/03
ALLOY 622 AMS A5.14
ERNICTMO-10
REPORT DATE: 02/19/2003
JOB NO: 01/21 #13

LAB NO: 0120-025 / 02 RECEIVED DATE: 01/20/2003
ALLOY 622 HT# X2432B6 (3/32" DIA)

CHEMICAL ANALYSIS

Si	.05	Mn	.22	C	.009
P	.014	S	.001	Ni	
Cr	20.48	Mo	13.68	Cu	
V	.01	Co	.08	Fe	
W	2.53				
AL	.40				

TEST METHODS: ASTM E1024 ; ASTM E 1019 ; ASTM E 334 ; ICP* ;

AMENDED TEST REPORT

MEETS SPECIFICATIONS FOR AWS A 5.14
ERNiCrMo-10

Darrell Dunn 2/19/2003
QA 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 APPROVAL OF CONAM.
KNOWINGLY OR UNWILLINGLY MAKING ANY FRAUDULENT STATEMENT OR REPRESENTATION IN THIS FORM OR MAKING FALSE, FICTITIOUS OR
FRAUDULENT STATEMENTS OR REPRESENTATIONS HEREIN COULD CONSTITUTE A VIOLATION PUNISHABLE UNDER FEDERAL STATUTES.

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____
Recorded by *Darrell Dunn* Date 2/19/2003

From Page No. _____



PURCHASE REQUISITION

SOUTHWEST RESEARCH INSTITUTE		REQUISITION DATE	1/16/03	ORDER DATE	3/32/03	PURCHASE ORDER NUMBER	537646
SUGGESTED OR PREVIOUS SUPPLIER Conam Inspection		DELIVER TO	D. Dunn/bldg. 57				
CITY, STATE Glendale Heights, IL 60139		SHIP VIA					
ATTN: Bill Scorzo		TERMS					
PHONE 630/681-0008	FAX 630/871-5520						

LN.	QTY.	UNIT	DESCRIPTION	ORG	PROJECT	ACCT	%	DATE REQUIRED	EST. UNIT PRICE
A	2	EA	Chemical analyses of ER NiCrMo-10						
			filler metal	20	06002.01.	081	100	1/23/03	150.00
Quality & Technical Requirements: See attached documentation.									
TOTAL									

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 / REPAIRABLE
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. 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: 1/16/03
DEPT. / DIVISION APPROVAL: *Darrell Dunn* DATE: 1/16/03
ADMIN. APPROVAL: *Darrell Dunn* DATE: 1/16/03

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

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____
Recorded by *Darrell Dunn* Date 2/19/2003

To Page No. _____

THIS TEST RESULT IS NOT COVERED BY OUR CURRENT A2LA ACCREDITATION
THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF CONAM.
KNOWINGLY OR UNWILLINGLY MAKING ANY FRAUDULENT STATEMENT OR REPRESENTATION IN THIS FORM OR MAKING FALSE, FICTITIOUS OR
FRAUDULENT STATEMENTS OR REPRESENTATIONS HEREIN COULD CONSTITUTE A VIOLATION PUNISHABLE UNDER FEDERAL STATUTES.

PAGE 1 OF 2

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

AMENDED TEST REPORT

MEETS SPECIFICATION FOR AWS A 5.14
ERNiCrMo-10

Darrell Dunn 2/19/2003
QA INSPECTOR

CHEMICAL ANALYSIS

Si	.04	Mn	.18	C	.008
P	.012	S	.001	Ni	
Cr	20.70	Mo	13.44	Cu	
V	.02	Co	.10	Fe	
W	2.88				
AL	.42				

TEST METHODS: ASTM E1024 ; ASTM E 1019 ; ASTM E 334 ; ICP* ;

SOUTHWEST RESEARCH INST. 7010 P. O. # 5013B
6220 CULEBRA RD
P. O. DRAWER 28510
SAN ANTONIO TX 78284
DARRELL S. DUNN
DESCR 01/16/03
ALLOY 622 AMS A5.14
ERNICTMO-10
REPORT DATE: 02/19/2003
JOB NO: 01/21 #12

LAB NO: 0120-025 / 01 RECEIVED DATE: 01/20/2003
ALLOY 622 HT# X119778011 (.045" DIA)

194 International Blvd
Glendale Heights, IL 60139
Telephone +1 630/681-0006
Facsimile +1 630/681-5520
http://www.conam.com



TEST REPORT

Witnessed & Understood by me, _____ Date _____

Invented by _____ Date _____
Recorded by *Darrell Dunn* Date 2/19/2003

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From Page No. _____

CONTINUED IN NOTEBOOK 579

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Daniel D...

2/24/2003



From Page No. _____

To Page No. _____

Witnessed & Understood by me,

Date

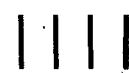
Invented by

Date

Recorded by

Daniel D...

2/26/2003



From Page No. _____

Main body of the page with horizontal lines for text entry, crossed out with a diagonal line.

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

[Signature]

2/26/2003



From Page No. _____

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To Page No. _____

Witnessed & Understood by me,

Date

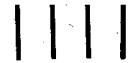
Invented by

Date

Recorded by

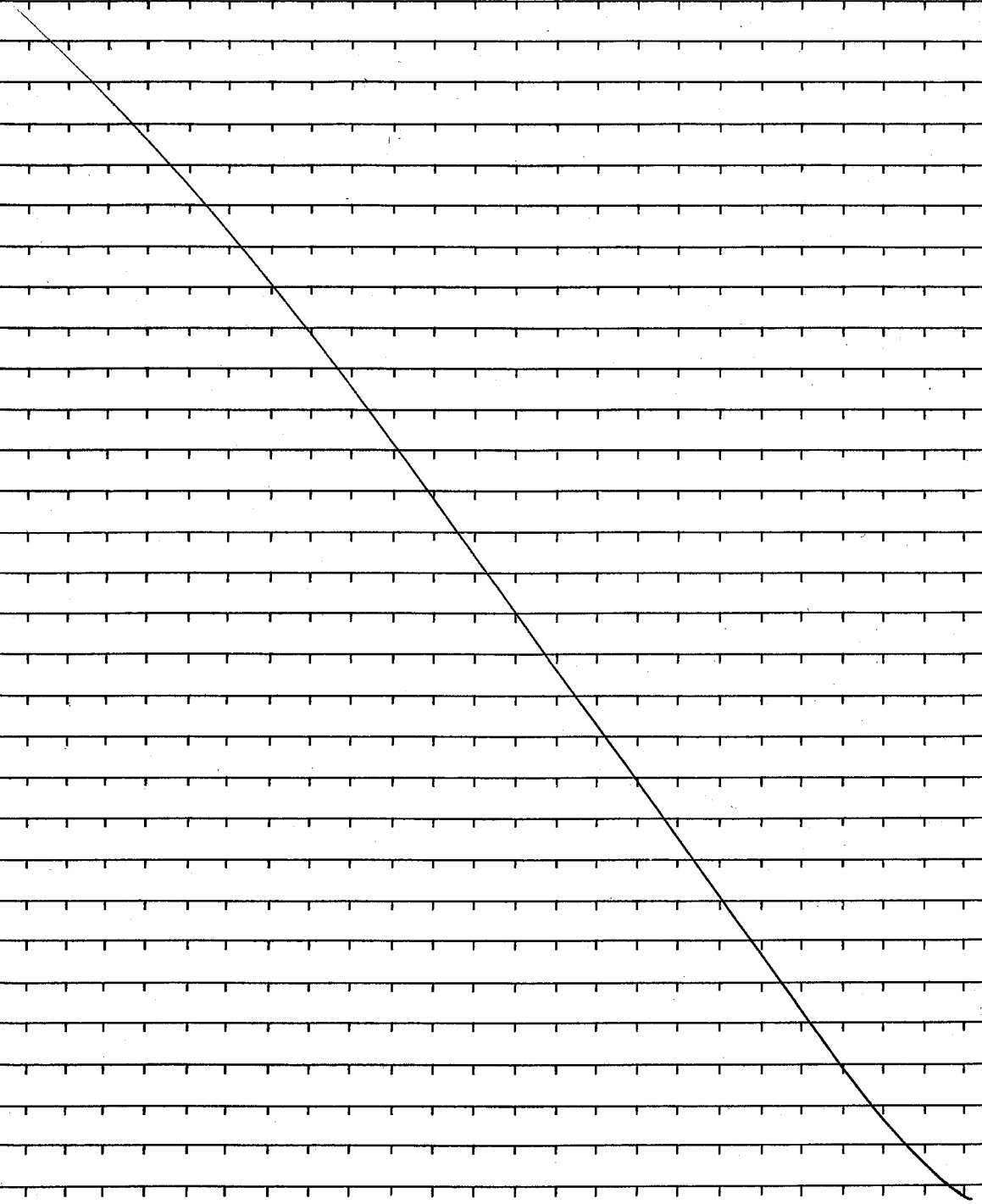
[Signature]

2/26/2003



From Page No. _____

CONTINUED IN NOTEBOOK 579



To Page No. _____

Witnessed & Understood by me, _____

Date _____

Invented by _____

Date _____

Recorded by _____

[Signature]

2/26/2003

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

[Signature] 9/21/2004