

**Energy Industries of Ohio**

**Contract # S005242-F**

**Modular Coil Winding Form**

**A-4 Documentation Package**

**11/6/06**

# **This A-4 Documentation consists of:**

## **Part 1**

**Final documentation package Metal Tek Intl. – Pages 3 – 65  
Latest revision 11/6/2006  
Foundry documentation**

## **Part 2**

**Final documentation package Major Tool - Pages 66 -  
Latest revision  
Machine shop documentation**

## **Part 3**

**Metal Tek radiographic films from part 1 (shipped to PPPL)**

**Major Tool radiographic films from part 2 (shipped to PPPL)**

# **Energy Industries of Ohio**

**Contract # S005242-F**

**Modular Coil Winding Forms**

## **A-4 Documentation Package**

**Part 1 – Metal Tek International  
Casting Data Package**

**11/6/06**

\*\*Note – Document #'s listed in the TOC (page 4) are not necessarily the same as the number hand written on the top of the document. Please use page # to find relevant document.

## A-4 Documentation Package

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2	MTR for A-4 Shim	6
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11/6/06		



## Carondelet Division

8600 Commercial Blvd. - Pevely, MO 63070 USA  
Phone: 636-479-4499 - Fax: 636-479-3399

## Material Test Report

ENERGY INDUSTRIES OF OHIO

Purchase Order Number PPPL-FP-LTS-2  
Pattern Number MCWF-A4 Coil  
CAF Metal Designation CF8MNMnMod  
Material Spec CF8MNMnMOD

Cert Number 176190-1  
Pour Date 12/15/2005

Weighted average of 3 heats – Ladle 1 #31897(39%), Ladle 2 #31898(21%), Ladle 3 #31901(40%) Total Weight 30931 lbs.

Element	Min	Actual	Max
C	0.04	0.04	0.07
MN*	2.3	2.9	2.8
SI	0.0	0.4	0.7
CR	18.0	18.0	18.5
NI	13.0	13.3	13.5
MO	2.1	2.2	2.5
P	0.0	0.028	0.035
S	0.0	0.012	0.025
N	0.24	0.26	0.28

\*Over specification, see CA 1536.

### Comparison to WC Analysis

All analysis at CAF was performed after the preventive maintenance.

Lab	I.D.	Sample	C	Si	Mn	Cr	Ni	Mo	N	P	S
Ladle #1											
CAF	31897	Button #1	0.04	0.4	2.9	18.0	13.3	2.1	0.26	0.025	0.012
CAF	31897	Button #2	**	0.4	2.9	18.0	13.3	2.1	**	0.025	0.012
WC	31897	Button #2	**	0.4	2.7	17.9	13.4	2.1	**	0.023	0.024
Ladle #2											
CAF	31898	Button #1	0.04	0.4	2.9	18.0	13.2	2.2	0.26	0.032	0.013
CAF	31898	Button #2	**	0.4	2.9	18.0	13.2	2.2	**	0.032	0.013
WC	31898	Button #2	**	0.4	2.7	17.9	13.3	2.2	**	0.031	0.025
Ladle #3											
CAF	31901	Button #1	0.04	0.4	2.9	18.0	13.3	2.2	0.26	0.029	0.012
CAF	31901	Button #2	**	0.4	2.9	18.0	13.3	2.2	**	0.030	0.012
WC	31901	Button #2	**	0.4	2.6	18.0	13.4	2.2	**	0.032	0.025

Respectfully Submitted,  
Charles A. Ruud  
Quality Assurance Manager

Superior Quality Engineered Metal Products

[www.MetalTekInt.Com](http://www.MetalTekInt.Com)



## Carondelet Division

8600 Commercial Blvd. - Pevely, MO 63070 USA  
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## Material Test Report

ENERGY INDUSTRIES OF OHIO

Purchase Order Number PPPL-FP-LTS-2 Heat Number 29198 Pour Date 4/28/2005  
Pattern Number SE-141-073 COIL C SHIM (-3 thru-6 Parts) Cert Number S73220-2 and  
SE-141-033 COIL A SHIM (-1 thru-6 Parts) Cert Number S76220-1  
CAF Metal Designation CF8MNMnMod S/N 4  
Material Spec CF8MNMN MOD

Revised 1/30/06

Element	Min	Actual	Max
C	0.040	0.070	0.070
CR	18.000	18.100	18.500
MN	2.300	2.970	2.800
MO	2.100	2.450	2.500
N	0.240	0.255	0.280
NI	13.000	13.120	13.500
P*	0.000	0.013	0.035
S*	0.000	0.010	0.025
SI	0.000	0.700	0.700

MN & SI previously reported on CA 1308 and were accepted.

\*P & S taken from test from heat parts were poured from and analyzed by wet chemistry, ASTM E1019-03 for sulfur and Gravimetric for Phosphorous.

This report covers the eleven castings poured from heat 29198. Only parts listed above however will be shipped for this order. Each casting has a unique number stamped in the part adjacent to the pattern number to differentiate the part and subsequent reporting that will be traced to the casting.

Specification limits have been updated to latest specification.

The certificate is produced with EDP and valid without signature.

Respectfully Submitted,  
Charles A. Ruud  
Quality Assurance Manager

**Superior Quality Engineered Metal Products**

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# PRODUCT CONFORMANCE REPORT



Product	ENM 4455	Size(s) mm	1,2
Class	EN 12072-99: G 20 16 3 Min L	Lot/Batch	3018513/78308
		Item No.	692129
Customer	EUROWELD MOORESVILLE N.C. 28117 UNITED STATES	Quantity	105,0 KG
		Customer ref.	P.O. 05 - 46
		LSW Order No.	SD427896

Chemical analysis (%)										EN10204 2.2
C	Si	Mn	P	S	Cr	Ni	Mo	Cu	N	
0,01	0,5	7,3	0,015	0,001	20,3	15,4	2,9	0,1	0,19	

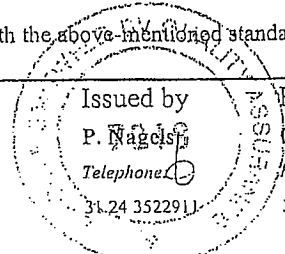
Mechanical tests, all weld metal										EN10204 2.2
Tensile testing					Impact testing					
Cond.	Temp.	Rp0.2	Rm	A5	Cond.	Temp.1	Av1			
	°C	N/mm2	N/mm2	%		°C	J			
AW	RT	407	623	41	AW	-196	67			

Additional information EN10204 2.2  
Other tests

Remarks  
Impact testing (individual values): 70J - 65J - 67J

The product identified above has been manufactured, tested and supplied in compliance with a Quality Assurance Programme that fulfils the requirements of EN 29000/ ISO 9000/BS 5750 or similar standard.  
We herewith certify that the product complies with the above-mentioned standards.  
Certified ISO 9001:2000.

Company	Lincoln Smitweld B.V.	Registered Office	Nieuwe Dukenburgseweg 20 6534 AD NIJMEGEN	Post address	P.O. Box 253 6500 AG Nijmegen	Issued by	P. Nagels	Telephone	31 24 3522911	Function	QA Administrator	Date	22/03/2005	Cert.No.	3018513/7830
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August 16, 2005  
 Lab No. 05P-2532  
 P.O. No. 21324  
 Page 1 of 2

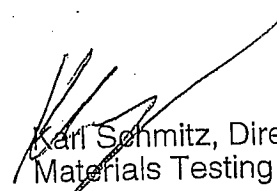
Attention: Chuck Ruud

**REPORT OF CHARPY IMPACT TEST**

**MATERIAL (SAMPLE ID):** LNM 4455, LINCOLN LOT 3018513/78308  
**SPECIFICATION:** ASTM A 370-03a  
**SPECIMEN TYPE:** "A" Vee Notch  
**SPECIMEN SIZE:** 10 mm x 10 mm  
**TEMPERATURE OF TEST:** 293°K

BASE METAL	FOOT LBS.	LATERAL EXPANSION	% SHEAR
LNM4455-7	104	0.085	100
LNM4455-8	106	0.093	100
LNM4455-9	99	0.084	100
<b>Average</b>	103	0.087	100

*Identification of tested specimen provided by client.*

  
 Karl Schmitz, Director  
 Materials Testing

KS/tlv



Certificate No. 0397-01  
 Certificate No. 0397-02

AN OFFICIAL COPY OF TEST REPORT WILL BE PROVIDED BY THIS LABORATORY ON REQUEST.  
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 Page 2 of 2

**Attention: CHUCK RUUD**

**REPORT OF MECHANICAL TESTS**

**SAMPLE ID: LNM 4455, LINCOLN LOT 3018513/78308**

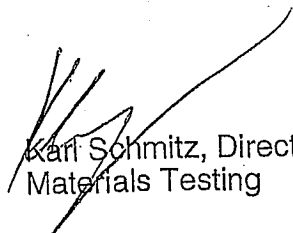
Sample ID	Original Area Sq. Inches	Reduced Area Sq. Inches	Reduction in Area %	Yield Strength PSI	Tensile Strength PSI	Elongation (2.0" Gage Length)		Modules of Elasticity
						in.	%	
LNM4455	0.1932	0.0866	55.2	65200	95200	0.76	38.0	23.4

Round, reduced section tensiles

Yield taken at .2% offset

Tested in accordance with ASTM A 370-03a

*Identification of tested specimens provided by the client.*

  
 Karl Schmitz, Director  
 Materials Testing

KS/tlv



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October 5, 2005  
 Lab No. 05P-3096  
 P.O. No. 21324  
 Page 1 of 1

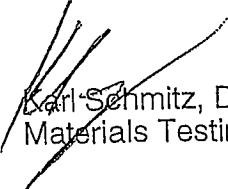
Attention: Chuck Ruud

**REPORT OF CHARPY IMPACT TEST**

**MATERIAL (SAMPLE ID):** WELD PLATE- 3018513 / 78308  
**SPECIFICATION:** ASTM A 370-03a  
**SPECIMEN TYPE:** "A" Vee Notch  
**SPECIMEN SIZE:** 10 mm x 10 mm  
**TEMPERATURE OF TEST:** -320°F  
**REQUIREMENTS:** minimum 35 ft / lbs.

BASE METAL	FOOT LBS.	LATERAL EXPANSION	% SHEAR
3018513/78308-1	48	0.033	50
3018513/78308-2	65	0.045	50
3018513/78308-3	48	0.033	50
<b>Average</b>	54	0.037	50

*Identification of tested specimen provided by client.*

  
 Karl Schmitz, Director  
 Materials Testing

KS/tlv



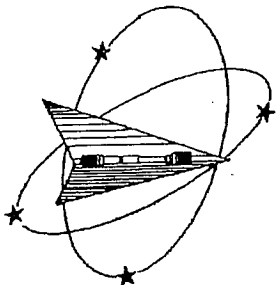
Certificate No. 0397-01  
 Certificate No. 0397-02

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14:29 OCT 18, 2005

PHX\_NUM: 53710051



# Westmoreland Mechanical Testing & Research, Inc.

P.O. Box 388  
Westmoreland Drive  
Youngstown, Pa. 15696-0388 U.S.A.  
Telephone: 724-537-3131 Fax: 724-537-3151

Website: [www.wmtr.com](http://www.wmtr.com)  
WMT&R is a technical leader in the material testing industry.



621-01 & 621-02



October 18, 2005

## CERTIFICATION

MetalTek International  
The Carondelet Division  
8600 Commercial Blvd.  
I-55 Industrial Park  
Pevely, MO 63070-1528

Attention: Jim Galaske

Subject: All processes, performed upon the material as received, were conducted at WMT&R, Inc. in accordance with the WMT&R Quality Assurance Manual, Rev. 9, dated 4/1/2000.  
The following tests were performed on this order: TENSILE

TENSILE RESULTS: ASTM E21-03a

SOAK TIME: 5 Minutes

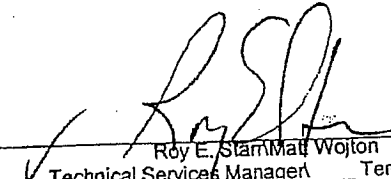
SPEED OF TESTING: 0.0030 in./in./min., 0.0500 in./min./in.

MATERIAL: METALTEK CF8MNMNMOD

DISPOSITION: Report

Specimen ID	TestLog Number	Temp. °F	UTS ksi	0.2% YS ksi	Elong %	RA %	Modulus Msi	Ult. Load lbf	0.2% YLD. lbf	Orig. Dia. (in.)	Final Dia. (in.)	4D Orig GL (in.)	4D Final GL (in.)	Orig. Area (sq. in.)	Machine Number	AIUR
3018513/78308	C54936	-320	184.9	123.7	33	33	32.8	18470	12350	0.3566	0.2926	1.40	1.86	0.09987403	M9	R

AIUR: A=ACCEPTABLE, U=UNACCEPTABLE, R=REPORT

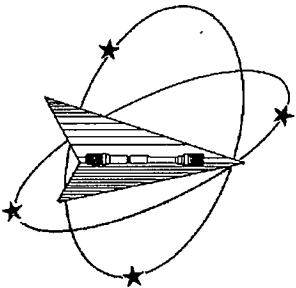
  
Roy E. Star Matt Wojton  
Technical Services Manager Tensile Supervisor

10-18-05  
October 18, 2005

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Testing Specialists for Aerospace, Automotive, and Material Testing Fields  
Locations in Youngstown, PA U.S.A. - Tel. (724) 537-3131 and  
Banbury, U.K. - Tel. +44 (0) 1295 261211

14:29 OCT 18, 2005



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P.O. Box 388

Westmoreland Drive

Youngstown, Pa. 15696-0388 U.S.A.

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Website: [www.wmtr.com](http://www.wmtr.com)

WMT&R is a technical leader in the material testing industry.



621-01 & 621-02



7

February 9, 2006

## CERTIFICATION

Section 1 of 1

WMT&R Report No. 6-20609

P.O. No. 19386

Requisition No. 7748

MetalTek International  
The Carondelet Division  
8600 Commercial Blvd.  
I-55 Industrial Park  
Pevely, MO 63070-1528

Attention: Jim Galaske

Subject: All processes, performed upon the material as received, were conducted at WMT&R, Inc. in accordance with the WMT&R Quality Assurance Manual, Rev. 9, dated 4/1/2000.

The following tests were performed on this order: TENSILE

### TENSILE RESULTS: ASTM E21-05

Requirements: UTS ksi (Min 95\Max ---) 0.2% YS ksi (Min 72\Max ---) 4D Elong. % (Min 32\Max ---) Modulus Msi (Min 21\Max ---)

SOAK TIME: 5 Minutes

SPEED OF TESTING: 0.003 in./in./min., 0.05 in./min./in.

MATERIAL: 316 S/S


DISPOSITION: Acceptable

Specimen ID	TestLog Number	Temp. °F	UTS ksi	0.2% YS ksi	Elong %	RA %	Modulus Msi	Ult. Load lbf	0.2% YLD. lbf	Orig. Dia. (in.)	Final Dia. (in.)	4D Orig GL (in.)	4D Final GL (in.)	Orig. Area (sq. in.)	Machine Number	AUUR
A4-Z1	C97608	-320	162.9	95.4	49	40	23.0	15620	9147	0.3494	0.2703	1.40	2.08	0.09588169	M9	A
A4-Z3	C97610	-320	165.6	100.9	43	37	31.1	15910	9690	0.3497	0.2786	1.40	2.00	0.09604641	M9	A
A4-Z2-2	D08135	-320	168.3	103.8	46	39	32.5	16650	10270	0.3549	0.2764	1.40	2.05	0.09892405	M9	A

AUUR: A=ACCEPTABLE, U=UNACCEPTABLE, R=REPORT

Requirements supplied by Metal Tek International.

  
Roy E. Starr / Matt Wojton  
Technical Services Manager / Tensile Supervisor

  
February 9, 2006

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 8600 Commercial Blvd.  
 Pevely, MO 63070

January 31, 2006  
 Lab No. 06P-0106  
 P.O. No. 21324  
 Page 1 of 3

**Attention: Chuck Ruud**

**REPORT OF CHARPY IMPACT TEST**

**MATERIAL (SAMPLE ID):** A4-Z1, Z2, Z3  
**SPECIFICATION:** ASTM A 370-03a  
**SPECIMEN TYPE:** "A" Vee Notch  
**SPECIMEN SIZE:** 10 mm x 10 mm  
**TEMPERATURE OF TEST:** 293K (Room Temp)  
**RESULTS:**

BASE METAL	FOOT LBS.	LATERAL EXPANSION	% SHEAR
Z1-4	150	0.094	100
Z1-5	152	0.075	100
Z1-6	148	0.075	100
<b>Average</b>	150	0.081	100
BASE METAL	FOOT LBS.	LATERAL EXPANSION	% SHEAR
Z2-4	130	0.084	100
Z2-5	154	0.087	100
Z2-6	144	0.093	100
<b>Average</b>	143	0.088	100
BASE METAL	FOOT LBS.	LATERAL EXPANSION	% SHEAR
Z3-4	166	0.125	100
Z3-5	148	0.101	100
Z3-6	160	0.083	100
<b>Average</b>	158	0.103	100



*Identification of tested specimens provided by client.*

  
 Karl Schmitz, Director  
 Materials Testing



Certificate No. 0397-01  
 Certificate No. 0397-02

AN OFFICIAL COPY OF TEST REPORT WILL BE PROVIDED BY THIS LABORATORY ON REQUEST.  
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 8600 Commercial Blvd.  
 Pevely, MO 63070

January 31, 2006  
 Lab No. 06P-0106  
 P.O. No. 21324  
 Page 2 of 3

**Attention: Chuck Ruud**

**REPORT OF CHARPY IMPACT TEST**

**MATERIAL (SAMPLE ID):** A4-Z1, Z2, Z3  
**SPECIFICATION:** ASTM A 370-03a  
**SPECIMEN TYPE:** "A" Vee Notch  
**SPECIMEN SIZE:** 10 mm x 10 mm  
**TEMPERATURE OF TEST:** 77K (-320°F)

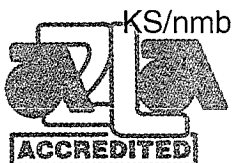
**RESULTS:**

BASE METAL	FOOT LBS.	LATERAL EXPANSION	% SHEAR
Z1-7	91	0.043	50
Z1-8	78	0.040	50
Z1-9	80	0.044	50
<b>Average</b>	<b>83</b>	<b>0.042</b>	<b>50</b>
BASE METAL	FOOT LBS.	LATERAL EXPANSION	% SHEAR
Z2-7	73	0.040	50
Z2-8	64	0.043	50
Z2-9	78	0.035	40
<b>Average</b>	<b>72</b>	<b>0.039</b>	<b>47</b>
BASE METAL	FOOT LBS.	LATERAL EXPANSION	% SHEAR
Z3-7	78	0.050	50
Z3-8	74	0.041	50
Z3-9	72	0.044	50
<b>Average</b>	<b>75</b>	<b>0.045</b>	<b>50</b>



Identification of tested specimens provided by client.

  
 Karl Schmitz, Director  
 Materials Testing



Certificate No. 0397-01  
 Certificate No. 0397-02

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*Chemical, Metallurgical, Mechanical, Nondestructive, Environmental Testing, Analyses and Field Service.*

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 8600 Commercial Blvd.  
 Pevely, MO 63070

January 31, 2006  
 Lab No. 06P-0106  
 P.O. No. 21324  
 Page 3 of 3

**Attention: Chuck Ruud**

**REPORT OF MECHANICAL TESTS**

**SAMPLE ID: A4-Z1, Z2, Z3**

Sample ID	Original Area Sq. Inches	Reduced Area Sq. Inches	Reduction in Area %	Modules of Elasticity	Yield Strength PSI	Tensile Strength PSI	Elongation (2.0" Gage Length)	
							in.	%
Z1	.1886	.1046	44.5	22.8	44200	85600	0.92	46.0
Z2	.1893	.0929	50.9	23.8	44400	84800	1.01	50.5
Z3	.1901	.0656	65.5	22.2	42900	83400	1.10	55.0

Round, reduced section tensiles

Yield taken at .2% offset

Tested in accordance with ASTM A 370-03a

*Identification of tested specimens provided by the client.*

  
 Karl Schmitz, Director  
 Materials Testing

KS/nmb



Certificate No. 0397-01  
 Certificate No. 0397-02

AN OFFICIAL COPY OF TEST REPORT WILL BE PROVIDED BY THIS LABORATORY ON REQUEST.  
 NOT OFFICIAL WITHOUT THE RAISED SEAL OF ST. LOUIS TESTING LABORATORIES, INC.  
 SEE REVERSE FOR CONDITIONS.



## A-4 Coil Weld Map – Metal Tek

Map of all major welds exceeding 20% of wall, over 1 inch or over 10<sup>2</sup> inches

<b>Defect Number</b>	<b>Drawing View</b>	<b>Length (inches)</b>	<b>Width (inches)</b>	<b>Depth (inches)</b>
1	Left	14	8	2
2	Left	15	10 ½	¾
3	Left	34	3	½
4	Left	21	6	½
5	Left	5	3	1
6	Left	6	2	1 ¼
7	Left	10	4	Thru
8	Left	5	2	1 ¼
9	Left	11	2	Thru
10	Left	4	3	1 ½
11	Left	11	5	¾
12	Top	13	2 ½	1
13	Top	15	2	Thru
14	Back	43	2 ¾	2 ¾
15	Back	16	2	2
16	Bottom	10	3	2 ½
17	Right	8	2	2
18	Right	11	2	¼
19	Right	2	2	½
20	Right	6	3	1 ½
21	Right	8	2	1 ½
22	Right	9	2	2
23	Right	3	2	1
24	Right	9	2	1
25	Right	11	2	1 ½
26	Right	7	2	1 ½
27	Right	14	1	½
28	Right	2	2	1 ½



# A-4 Coil Weld Map – Metal Tek

Map of all major welds exceeding 20% of wall, over 1 inch or over 10<sup>2</sup> inches

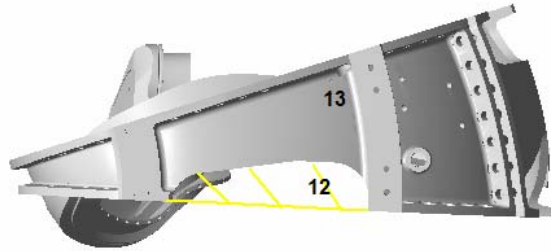
**A-4 Weldmap  
Left View**



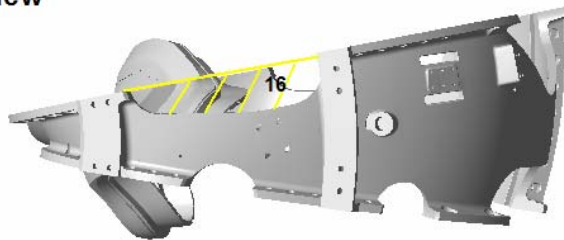
# A-4 Coil Weld Map – Metal Tek

Map of all major welds exceeding 20% of wall, over 1 inch or over 10<sup>2</sup> inches

**Top View**



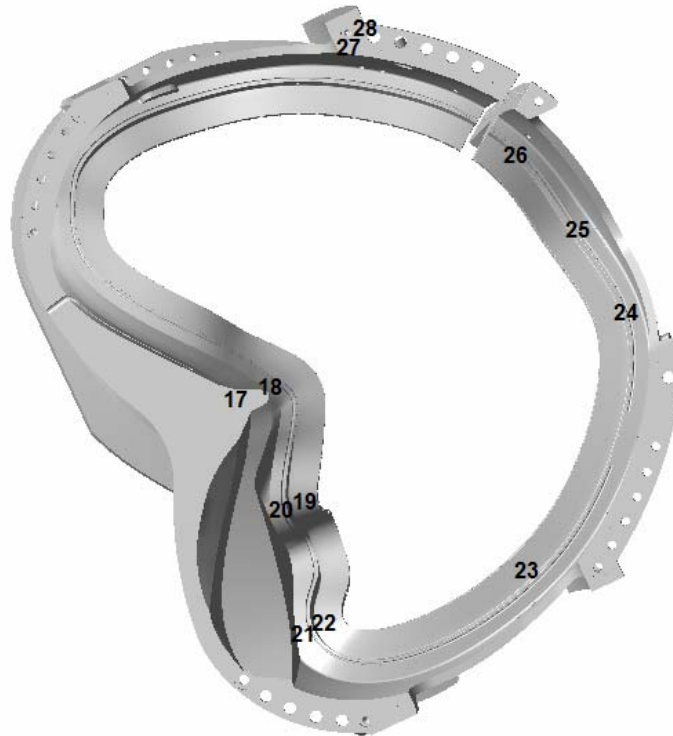
**Bottom View**



# A-4 Coil Weld Map – Metal Tek

Map of all major welds exceeding 20% of wall, over 1 inch or over 10<sup>2</sup> inches

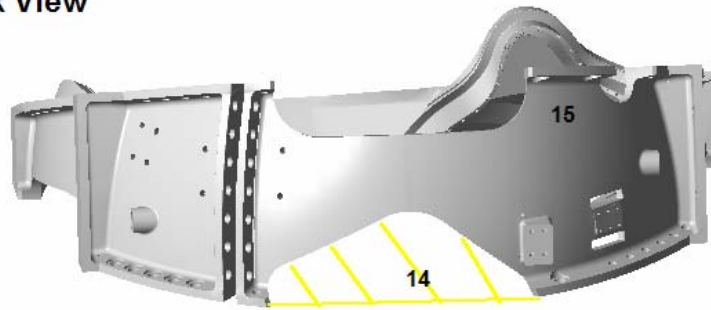
Right View



## A-4 Coil Weld Map – Metal Tek

Map of all major welds exceeding 20% of wall, over 1 inch or over 10<sup>2</sup> inches

**Back View**



# TEAM COOPERHEAT-MQS, INC.

## CERTIFIED RADIOGRAPHIC INSPECTION REPORT

FORM 6061-RT- 002 Rev.2

5512 W. State St. Milwaukee, WI 53208 Tel:(414)771-3060 Fax:(414)771-9481 (800)818-6403 www.cooperheat-mqs.com

CUSTOMER		DATE	WORK ORDER NO.
NAME METAL TEK INTERNATIONAL		01/25/2006	361-02844
ADDRESS 8600 COMMERCIAL BLVD		P.O. NUMBER	XRAY X
CITY PEVELY STATE MO ZIP 63070		22969	GAMMA
PROCEDURE SPECIFICATION ASTM E94-93	ACCEPTANCE CRITERIA MSS-SP-54-1999	SHEET ____ OF ____	

PART NUMBER	Serial No	View	No Apparent Indications		Incomplete Penetration		Shrinkage		Film Artifacts		REMARKS
			Acceptable	Rejected	Dross or Porosity	Lack of Fusion	Gas Cracks	Hot Under Tears	Surface		
MCWFA-4	1-2	✓								✓	
	2-3	✓					2				
Z103990	3-4	✓									
HT# M176190	4-5	✓					2				
CO 40851	5-6	✓						2			
	6-7	✓						1		✓	
	7-8	✓			2					✓	
	8-9	✓						2		✓	
	9-10	✓									
	10-11			R	4-5		2-3				
	11-12	✓								✓	
	12-13	✓			2		1			✓	
	13-14			R			4-5				
	15			R	4			4			
	16-17	✓					2				
	17-18	✓			2-3					✓	
	18-19	✓									✓
	19-20			R				4		✓	
	20-21	✓					2			✓	
	21-22	✓					1				
	22-23	✓					1			✓	
	23-24	✓					1			✓	
	24-25			R			2		R		
	25-26	✓					2				

NO. ACCEPTED	Φ	NO. REJECTED	1	MQS TECH. NO.	12970	SHT.	REV.
COMMENTS				CUST. RSS NO.		SHT.	REV.
				REVIEWER	<i>John Petroske</i>		
				CERTIFIED NDT LEVEL (RT)	John Petroske RT II Exp. 01/08		

# TEAM COOPERHEAT-MQS, INC.

## CERTIFIED RADIOGRAPHIC INSPECTION REPORT

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5512 W. State St. Milwaukee, WI 53208 Tel:(414)771-3060 Fax:(414)771-9481 (800)818-6403 www.cooperheat-mqs.com

CUSTOMER		DATE	WORK ORDER NO.
NAME <u>METAL TEK INTERNATIONAL</u>		<u>01/25/2006</u>	<u>361-02844</u>
ADDRESS <u>8600 COMMERCIAL BLVD</u>		P.O. NUMBER	XRAY <u>X</u>
CITY <u>PEVELY</u> STATE <u>MO</u> ZIP <u>63070</u>		<u>22969</u>	GAMMA
PROCEDURE SPECIFICATION	ACCEPTANCE CRITERIA	SHEET <u>    </u> OF <u>    </u>	
<u>ASTM E94-93</u>	<u>MSS-SP-54-1999</u>		

PART NUMBER	Serial No	View	No Apparent Indications			Incomplete Penetration			Shrinkage			Film Artifacts		REMARKS
			Acceptable	Rejected	Inclusion	Dross or Slag	Porosity	Lack of Fusion	Gas Cracks	Hot Tears	Under surface			
MCWFA-4	26-27		✓											
	27-28		✓											
Z103990	28-29			R						R			✓	
HT# M176190 CO 40851	29-1		✓		1				1					

NO. ACCEPTED <u>0</u>	NO. REJECTED <u>1</u>	MQS TECH. NO. <u>12970</u>	SHT.	REV.
COMMENTS		CUST. RSS NO.	SHT.	REV.
		REVIEWER <u>John Petroske</u>		
		CERTIFIED NOT LEVEL (RT)		
		John Petroske RT II Exp. 01/08		

# TEAM COOPERHEAT-MQS, INC.

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CUSTOMER		DATE	WORK ORDER NO.
NAME METAL TEK INTERNATIONAL		01/25/2006	361-02844
ADDRESS 8600 COMMERCIAL BLVD		P.O. NUMBER	XRAY X
CITY PEVELY STATE MO ZIP 63070		22969	GAMMA
PROCEDURE SPECIFICATION ASTM E94-93	ACCEPTANCE CRITERIA MSS-SP-54-1999	SHEET ____ OF ____	

PART NUMBER	Serial No	View	Acceptable	No Apparent Indications		Incomplete Penetration		Shrinkage		Film Artifacts		REMARKS
				Rejection	Inclusion	Dross or Slag	Porosity	Lack of Fusion	Gas Cracks	Hot Tears	Under cut surface	
MCWFA-4	30-31	✓										
	31-32	✓						1				✓
Z103990	32-33			R						R		
HT# M176190	33-34	✓										
CO 40851	34-35	✓										
	35-36	✓										
	37-38			R						R		
	38-39			R				5				✓
	39-40			R	5							
	41-42	✓										
	43-44	✓										✓
	44-45	✓						1				
	45-46	✓										
	46-47	✓										
	47-48	✓										
	48-49	✓										
	50-51	✓										✓
	51-52	✓										
	52-53			R						R		
	54-55	✓										
	55-56	✓										
	57-58	✓										✓
	58-59	✓										✓
	59-60	✓						1				✓
	60-61	✓										✓

NO. ACCEPTED	NO. REJECTED	MQS TECH. NO.	SHT.	REV.
0	1	12970		
COMMENTS		CUST. RSS NO.	SHT.	REV.
		REVIEWER		
		John Petroske		
		CERTIFIED NDT LEVEL (RT)		
		John Petroske RT II Exp. 01/08		

# TEAM COOPERHEAT-MQS, INC.

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CUSTOMER		DATE	WORK ORDER NO.
NAME METAL TEK INTERNATIONAL		01/25/2006	361-02844
ADDRESS 8600 COMMERCIAL BLVD		P.O. NUMBER	XRAY X
CITY PEVELY STATE MO ZIP 63070		22969	GAMMA
PROCEDURE SPECIFICATION ASTM E94-93	ACCEPTANCE CRITERIA MSS-SP-54-1999	SHEET ____ OF ____	

PART NUMBER	Serial No	View	No Apparent Indications		Dross		Incomplete Penetration		Shrinkage		Film Artifacts		REMARKS
			Acceptable	Rejected	Inclusion	Porosity	Lack of Fusion	Gas Cracks	Hot Tears	Under Surface			
MCWFA-4	61-62			R					4				
	62-63			R						R			
Z103990	62A-63A			R						R			
HT# M176190	63-64			R	4								
CO 40851	64-65			R	4							✓	
	65-65A-66			R					5				
	66-67			R					5				
	67-68	✓										✓	
	68-69	✓										✓	✓
	69-70	✓										✓	
	70-71	✓										✓	
	71-72	✓										✓	
	72-73	✓										✓	
	73-74	✓										✓	
	74-75	✓										✓	
	75-76	✓										✓	
	76-77			R						R			
	77-78	✓			2								
	78-79	✓											
	79-80			R				4-5					
	80-81			R	5			5					
	81-82	✓										✓	
	82-83	✓										✓	
	84-85	✓										✓	
	85-86	✓						2				✓	

NO. ACCEPTED	NO. REJECTED	MQS TECH. NO.	SHT.	REV.
0	1	12970		
COMMENTS		CUST. RSS NO.	SHT.	REV.
		REVIEWER		
		<i>John Petroske</i>		
		CERTIFIED NDT LEVEL (RT)		
		John Petroske RT II Exp. 01/08		



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CUSTOMER		DATE	WORK ORDER NO.
NAME METAL TEK INTERNATIONAL		01/25/2006	361-02844
ADDRESS 8600 COMMERCIAL BLVD		P.O. NUMBER	XRAY X
CITY PEVELY STATE MO ZIP 63070		22969	GAMMA
PROCEDURE SPECIFICATION ASTM E94-93	ACCEPTANCE CRITERIA MSS-SP-54-1999	SHEET ____ OF ____	

PART NUMBER	Serial No	View	No Apparent Indications		Dross		Incomplete Penetration		Shrinkage		Film Artifacts		REMARKS
			Acceptable	Rejected	Included	or Porosity	Lack of Fusion	Gas Cracks	Hot Tears	Under cut	Surface		
MCWFA-4	86-87	✓							2				
	87-88	✓											
Z103990	88-89	✓										✓	
HT# M176190	89-90	✓										✓	
CO 40851	90-91	✓										✓	
	92-93			R					4				
	94-95			R						4			
	95-96			R						4.5			
	96-97			R						4.5			
	97-98	✓								2			
	98-99			R						4			
	99-100			R						5			
	100-101	✓								2			
	102-103			R					4				
	103-104	✓							1				
	104-105			R						4			
	106-107	✓											
	107-108			R					4				
	108-109			R	5				4				
	109-110			R					4	2			
	111-112	✓											
	112-113	✓											
	113-114	✓								2-3			
	115-116	✓											
	116-117	✓											

NO. ACCEPTED	NO. REJECTED	MQS TECH. NO.	SHT.	REV.
0	1	12970		
COMMENTS		CUST. RSS NO.	SHT.	REV.
		REVIEWER		
		CERTIFIED NDT LEVEL (RT)		
		John Petroske RT II Exp. 01/08		

# TEAM COOPERHEAT-MQS, INC.

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CUSTOMER		DATE	WORK ORDER NO.
NAME METAL TEK INTERNATIONAL		01/25/2006	361-02844
ADDRESS 8600 COMMERCIAL BLVD		P.O. NUMBER	XRAY X
CITY PEVELY STATE MO ZIP 63070		22969	GAMMA
PROCEDURE SPECIFICATION ASTM E94-93	ACCEPTANCE CRITERIA MSS-SP-54-1999	SHEET ____ OF ____	

PART NUMBER	Serial No	View	No Apparent Indications		Dross		Incomplete Penetration		Shrinkage		Film Artifacts		REMARKS
			Acceptable	Rejected	Included	or Porosity	Lack of Fusion	Gas Cracks	Hot Tears	Under Surface			
MCWFA-4	118-119			R 5								✓	
	119-120			R 4									✓
Z103990	121-122			R 4									
HT# M176190	122-123		✓		1								
CO 40851	123-124		✓										✓
	124-125		✓										
	125-126		✓						2				
	126-127		✓										
	127-128		✓										
	128-129		✓										
	130-131		✓		2								
	131-132		✓										✓
	V133		✓										
	V134		✓										

NO. ACCEPTED	φ	NO. REJECTED	1	MQS TECH. NO.	12970	SHT.	REV.
COMMENTS				CUST. RSS NO.		SHT.	REV.
				REVIEWER	<i>John Petroske</i>		
				CERTIFIED NDT LEVEL (RT)			
				John Petroske	RT II Exp. 01/08		

# TEAM COOPERHEAT-MQS, INC.

## CERTIFIED RADIOGRAPHIC INSPECTION REPORT

FORM 6061-RT- 002 Rev.2

5512 W. State St. Milwaukee, WI 53208 Tel:(414)771-3060 Fax:(414)771-9481 (800)818-6403 www.cooperheat-mqs.com

**CUSTOMER**

NAME METAL TEK INTERNATIONAL  
 ADDRESS 8600 COMMERCIAL BLVD  
 CITY PEVELY STATE MO ZIP 63070

DATE 03/04/2006

WORK ORDER NO.  
361-03001

P.O. NUMBER  
23292

XRAY X  
GAMMA

PROCEDURE SPECIFICATION  
ASTM E94-93

ACCEPTANCE CRITERIA  
MSS-SP-54-1999

SHEET \_\_\_\_\_ OF \_\_\_\_\_

PART NUMBER	Serial No	View	No Apparent Indications		Dross		Incomplete Penetration		Shrinkage			Film Artifacts		REMARKS
			Acceptable	Rejected	Included	or Porosity	Lack of Fusion	Gas Cracks	Hot Tears	Under cut	Surface			
MCWFA-4	R1	10-11	✓											
		13-14	✓											
Z103990		V15	✓		2									
HT# M176190		19-20	✓					2						
CO 40851		24-25	✓						2-3					
		28-29	✓											
		32-33	✓											
		37-38	✓											
		38-39	✓										✓	
		39-40	✓		1									
		52-53	✓										✓	✓
		4-62	✓											
		62-63	✓											
	62A	63A	✓											
		63-64	✓						2					
		64-65	✓											
	65-	65A-66	✓											
		66-67	✓							2				
		76-77	✓							2				
		79-80	✓											
		80-81	✓											
		92-93	✓											
		94-95	✓							2				
		95-96	✓							1				
		96-97	✓							1-2				

NO. ACCEPTED 9

NO. REJECTED 1

MQS TECH. NO. 12970

SHT. REV.

COMMENTS

CUST. RSS NO.

SHT. REV.

REVIEWER John Petroske  
 CERTIFIED NDT LEVEL (RT)  
 John Petroske RT II Exp. 01/08

# TEAM COOPERHEAT-MQS, INC.

## CERTIFIED RADIOGRAPHIC INSPECTION REPORT

FORM 6061-RT- 002 Rev.2

5512 W. State St. Milwaukee, WI 53208 Tel:(414)771-3060 Fax:(414)771-9481 (800)818-6403 www.cooperheat-mqs.com

CUSTOMER		DATE	WORK ORDER NO.
NAME <u>METAL TEK INTERNATIONAL</u>		<u>03/04/2006</u>	<u>361-03001</u>
ADDRESS <u>8600 COMMERCIAL BLVD</u>		P.O. NUMBER	XRAY <u>X</u>
CITY <u>PEVELY</u> STATE <u>MO</u> ZIP <u>63070</u>		<u>23292</u>	GAMMA
PROCEDURE SPECIFICATION	ACCEPTANCE CRITERIA	SHEET _____ OF _____	
<u>ASTM E94-93</u>	<u>MSS-SP-54-1999</u>		

PART NUMBER	Serial No	View	No Apparent Indications		Dross		Incomplete Penetration		Shrinkage		Film Artifacts		REMARKS
			Acceptable	Rejected	Inclusion	Porosity	Lack of Fusion	Gas Cracks	Hot Tears	Undercut	Surface		
MCWFA-4	R1	98-99								4			
		99-100			R					4			
Z103990		102-103	✓										
HT# M176190		104-105	✓										
CO 40851		107-108	✓										
		108-109	✓										
		109-110	✓							2			
		118-119	✓										
		119-120	✓										
		121-122	✓							1			

NO. ACCEPTED <u>4</u>	NO. REJECTED <u>1</u>	MQS TECH. NO. <u>12970</u>	SHT.	REV.
COMMENTS		CUST. RSS NO.	SHT.	REV.
		REVIEWER <u>John Petroske</u>		
		CERTIFIED NDT LEVEL (RT)		
		John Petroske RT II Exp. 01/08		

# MetalTek

## INTERNATIONAL

### RADIOGRAPHIC INTERPRETATION REPORT

CUSTOMER <b>E.I.O.</b>		PURCHASE ORDER NUMBER <b>PPPL-FP-LTS-2</b>			DATE <b>3-8-06</b>		CONTROL NO. <b>40851</b>		PAGE <b>1 of 1</b>			
PART NO. <b>MCWFA-4</b>		SPECIFICATION <b>E186</b>		CLASS <b>See Spec</b>		TOTAL PIECES <b>1</b>		PIECES ACCEPTED <b>1</b>				
RADIOGRAPHED BY: <b>Kelley</b>				INTERPRETED BY: <b>Kelley</b>				ASNT LEVEL <b>II</b>				
FILM TYPE <b>80</b>		MATERIAL <b>CF8M/NN MOD</b>			ISOTOPE <b>IRIDIUM 192 COBALT 60 /</b>			CODE <b>ASTM E94 / ASME MIL-STD-453</b>				
		V I E W	P E N E	A C C E P T	R E J E C T	S H R I N K	I N C L U S I O N	P O R O S I T Y	L I N E A R	S U R F A C E	L O F / L O P	COMMENTS
<b>M176190-1</b>												
<b>R2</b>		<b>98-99</b>	<b>50</b>	<b>ABR /</b>	<b>X</b>						<b>X</b>	
		<b>99-100</b>	<b>↓</b>	<b>/</b>		<b>1</b>		<b>1</b>		<b>/</b>		
<b>R3</b>		<b>98-99</b>	<b>50</b>	<b>/</b>			<b>1</b>	<b>1</b>				<b>Film Scratch</b>



RADIOGRAPHIC STANDARD SHOOTING SKETCH

Customer	E.I.O	Pattern Number	MCWFA-4
Material	CF8MNMN MOD	Traceability Number	
Film Manufacturer	FUJI	Source Number	CO 60 21.7 CI
IQI LEVEL <u>2-2T</u> From CQP 401 <input checked="" type="checkbox"/> Other (Specify, E.G. 2-4T, 2-1T) <u>N/A</u>			

Exposures (views)	98-99	99-100																		
Thickness (IN.)	2 3/8	→																		
S/F Distance (IN.)	20"	→																		
Penetrameter	50	→																		
Time (MIN.)	8 in 20	→																		
Focal Spot (IN.)	.1	→																		
Film Size (IN.)	14x17	→																		
Screen Size (Pb) Front/Back	.01	→																		
S.W.E./D.W.E.	SWE	→																		
S.W.V./D.W.V.	SWV	→																		
Film Type	80	→																		
Acceptance Standard	E186	→																		
Severity Level	See Spec																			

Shooting Sketch (Use Additional Pages as Needed)

Spec: MSS-SP-54-1999

Technique Prepared By: Kon Kelley Level: II Date: 3-8-06  
 Technique Approved By: \_\_\_\_\_ Level: \_\_\_\_\_ Date: \_\_\_\_\_

# MetalTek

## INTERNATIONAL

### RADIOGRAPHIC INTERPRETATION REPORT

CUSTOMER <i>Energy Industries of Ohio</i>		PURCHASE ORDER NUMBER <i>PPL-FP-LTS-2</i>		DATE <i>12-16-05</i>		CONTROL NO. <i>40851</i>		PAGE <i>1 of 1</i>				
PART NO. <i>SE-141-033-4</i>		SPECIFICATION <i>E186</i>		CLASS <i>III</i>		TOTAL PIECES <i>1</i>		PIECES ACCEPTED <i>1</i>				
RADIOGRAPHED BY: <i>Kelley / Midgett</i>			INTERPRETED BY: <i>Kelley / Midgett</i>			ASNT LEVEL <i>II</i>						
FILM TYPE <i>80</i>		MATERIAL <i>CF8M UNN MOD</i>			ISOTOPE <i>IRIDIUM 192</i>		CODE <i>ASTM E94 / ASME MIL-STD-453</i>					
		V I E W	P E N E	A C C E P T	R E J E C T	S H R I N K	I N C L U S I O N	P O R O S I T Y	L I N E A R	S U R F A C E	L O F / L O P	COMMENTS
<i>MS76220</i>												
<i>RT.4</i>		<i>A</i>	<i>50</i>	<i>/</i>						<i>/</i>		<i>Filmcrimp</i>
		<i>B</i>	<i> </i>	<i>/</i>						<i>/</i>		
		<i>C</i>	<i> </i>	<i>/</i>						<i>/</i>		
		<i>D</i>	<i> </i>	<i>/</i>								
			<i>↓</i>	<i>/</i>								

E10 1-22-06

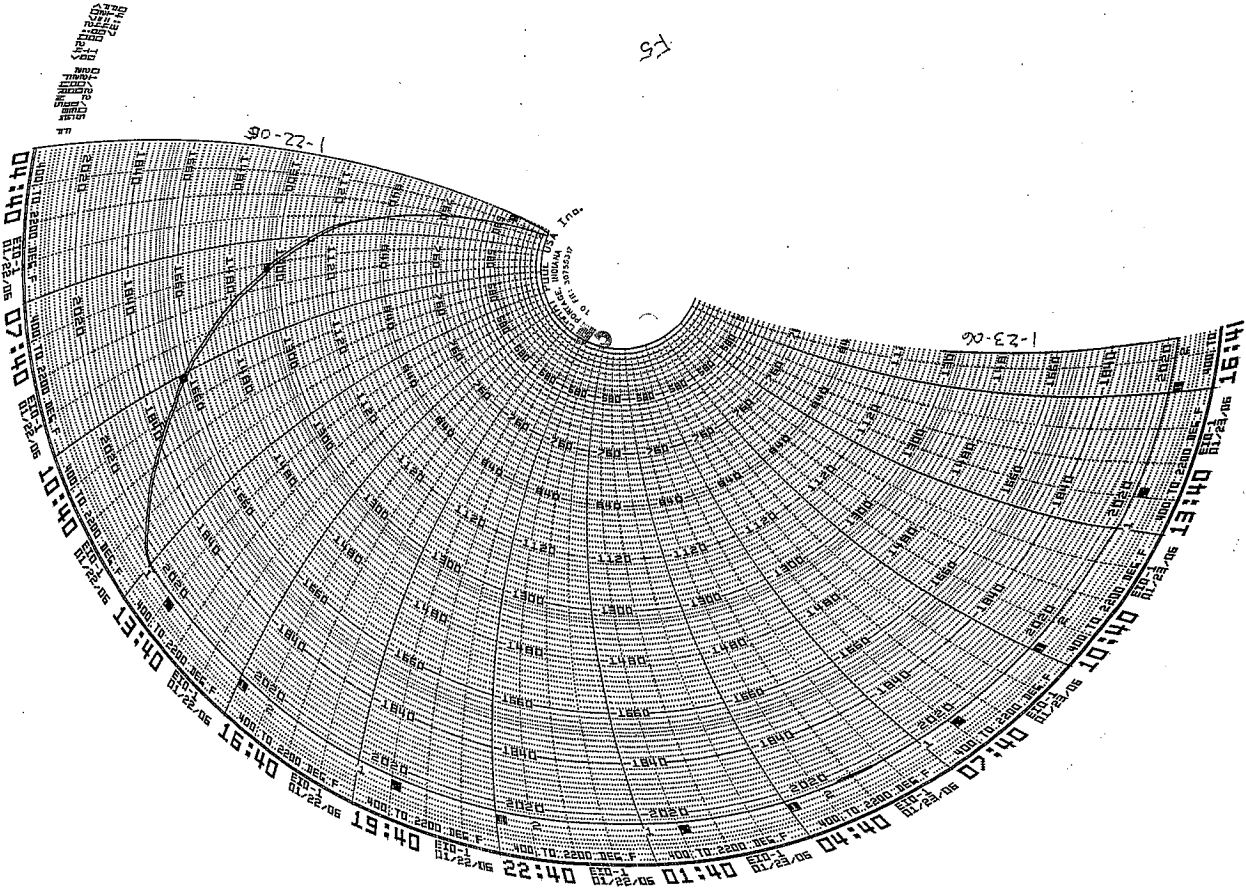
A4

176190-1 1Pc

B SHIMS

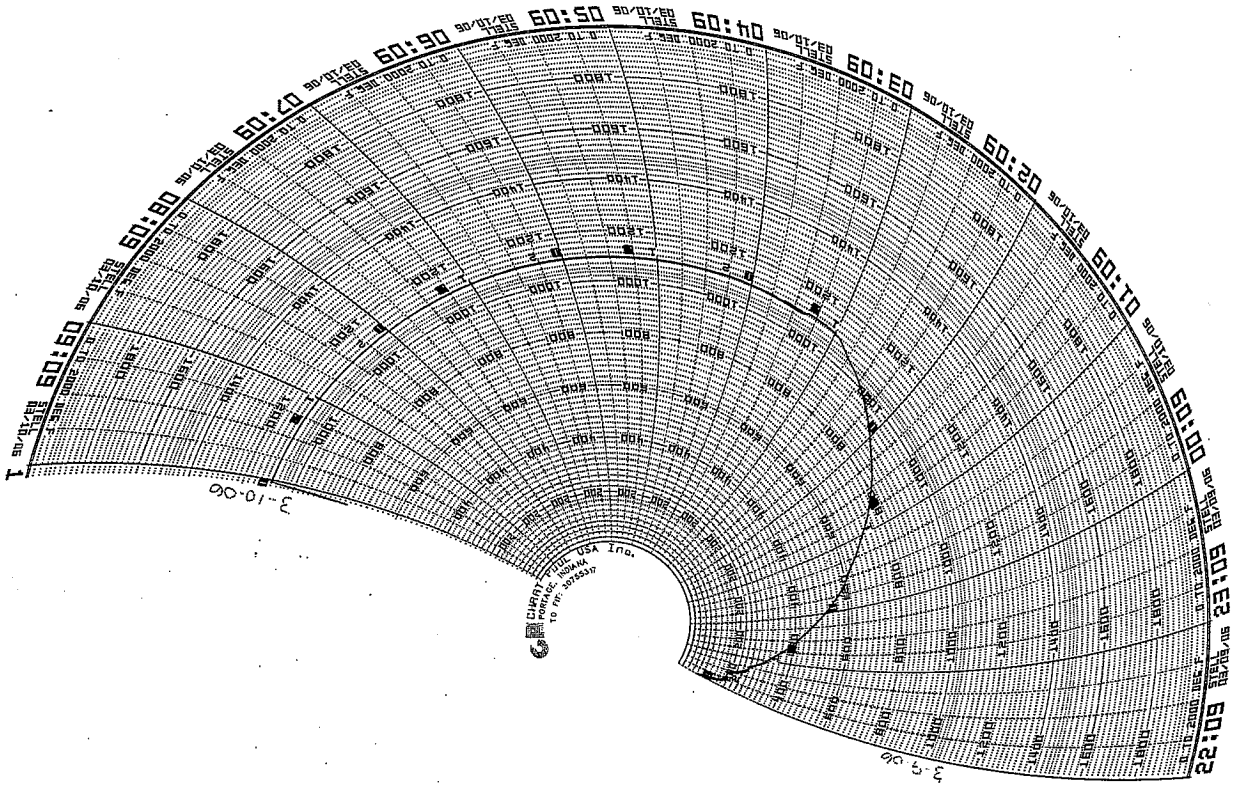
177360-1 6Pcs.

SERIAL #'S 1 THRU 6



FS





3-10-06

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PROPERTY OF THE USA Inc.  
MADE IN THE USA

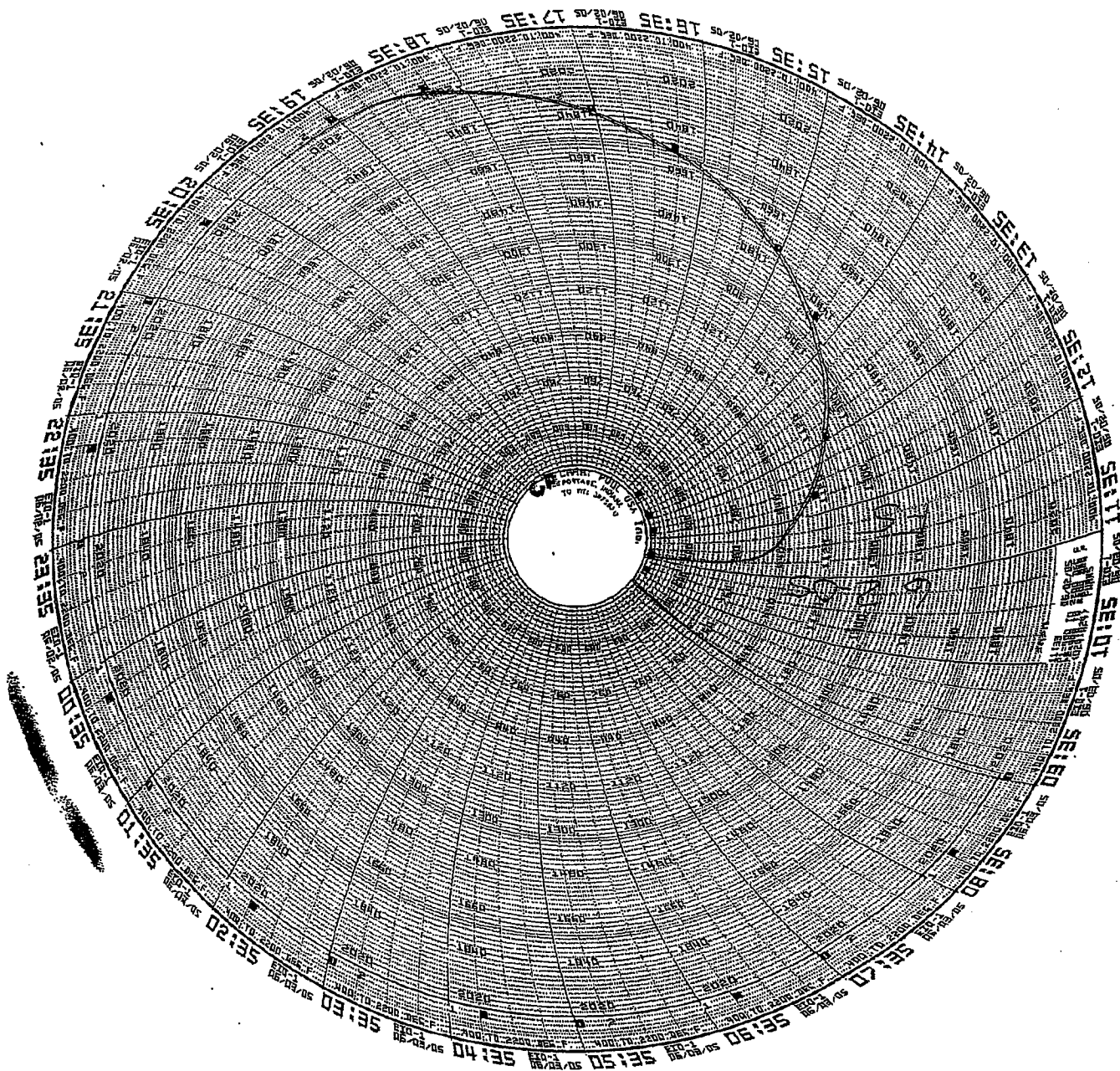
STRESS RELIEF

E10 3-9-06

A4

M6190-1 IR

A+C Shims CTR



**Energy Industries of Ohio  
Manufacturing and Test Sequence (MTS) A 4 Coil**

1 OF 11 CO# 40851 Dated 3-9-05 Revision: Rev 9 Dated Issued: 12/1/05

OPER. #	STATION	DESCRIPTION OF PROCESS	Name	Date
10	QUALITY RELEASE	REVIEW AND APPROVE MTS. RECEIVED APPROVAL FROM EIO ON xxxxx FROM _Pete D._ SIGNED QUALITY MANAGER	<i>[Signature]</i>	12/1/05
* 15	PATTERN NPAT SOP 0100REV2	APPLY APPROPRIATE PART NUMBER, SERIAL NUMBER, AND FOUNDRY MARK, TO THE PATTERN. CAST ON TEST BARS AND CAST ON BLOCKS (extra 3"x3"x1" specimens) REQUIRED, ID AS TO COIL NUMBER AND ZONE LOCATION.	RB	12/7/05
20	COREMAKE CORE SOP 0100 REV 6 CALIBRATION PER CORE SOP 0200R4/0300R6	MAKE CORES IN SAND MIXTURES AS DESCRIBED BY METALTEK ENGINEERING AND VERIFIED IN MODELING TRIALS. METALTEK CORE SOP 0100 REV 6) CORE WASH WITH ZIRCONIUM CORE WASH. (CALIBRATION OF EQUIPMENT REQUIRED PER CORE SOP 0200,R4 / 0300,R6).  VERIFY COUNT AND INSPECT.	KB	12/7/05
30	MOLD MOLD SOP 0400 REV 8 CALIBRATION PER MOLD SOP 0900 REV 5 PREPARATION PER MOLD SOP 1100R2/1200R2/1300R1 SAND TESTING PER MOLD SOP 1400R2/1500R3/1600R2	MOLD PER WORK INSTRUCTIONS IN MAPICS ROUTING AND SOPS REFERENCED. ENGINEER OF RECORD - ROGER BROMAN, CONSULT ON MOLD-RELATED CONCERNS. MOLD MATERIALS REQUIRED PER MAPICS BOM. NOTIFY ENGINEER OF ANY SUBSTITUTIONS.	<i>[Signature]</i>	12/14/05
40	POUR MELT SOP 0100R5 MELT SOP 0700R2 MELT SOP 0600R2	METAL MUST BE AOD REFINED OR AOD INGOT. VIRGIN METAL ADDITIONS ALLOWED. RECORD POURING TEMPERATURE: <u>2750</u> CASTING POURED AT: <u>4:00 AM</u> DATE: <u>12-14-05</u> HEAT #'s: <u>31897 thru 31901</u> ELAPSED POUR TIME <u>10 min</u> KEEL BLOCKS POURED: <u>NA</u> Sample from ladle to be analyzed for final chemical analysis and reported on material certifications. Sample Taken by: <u>I.W.</u> Analyzed: <u>G.it.</u> Date: <u>12/15/05</u>	J.G.	12/15/05
50	MELT SOP 0800R2	SHAKEOUT	<i>[Signature]</i>	12/19/05
60	ARC RISE SOP 0100R1	REMOVE RISERS AS DIRECTED BY SUPERVISOR.	DCEJ	1-11-06

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70	HEAT TREAT HEAT SOP 0103R5	SOLUTION ANNEAL. MAKE SURE TO BLOCK ALL FLANGES OF FORM AND RACETRACK TO MINIMIZE CREEP DISTORTION. Soak Temp: 2050F, Soak Time: At least 7 hours, Quench Type: Air Cool MAKE SURE TEST MATERIAL IS PLACED IN THE CORRECT ZONE.	FS-1	KMR 1-04-06
* 80	PHYSICAL TESTING	OBTAIN TEST SPECIMENS AND SUBMIT FOR PHYSICAL TESTING. REPORT RESULTS AS PART OF STEP 530. DCMA IS TO WITNESS CHARPY TESTING AT LAB.	WH	1/5/06
NOTE		<b>THE ORDER OF CLEANING PROCESSES MAY BE ALTERED DUE TO CAPACITY CONSTRAINTS. HOLD POINTS AND COMPLIANCE WILL NOT BE COMPROMISED. EIO WILL BE ADVISED OF ALL CHANGES THAT MAY RESULT IN A REQUEST FOR DEVIATION FROM REQUIREMENTS.</b>		
90	GRIND GSA SOP 0100R3	SWING GRIND TO REMOVE RISER REMAINS AND FLASH IF REQUIRED.	JR	1-12-06
100	GRIND GCHI SOP 0100R2	CHIP AND HAND GRIND SURFACE OF PART AS REQUIRED FOR CONTOUR.	CA	1/14/06
110	SAND BLAST BLAS SOP 0100R6	SANDBLAST (REMOVE ALL BLAST MATERIAL FROM CASTING) SANDBLASTING WILL BE DONE USING RECYCLED SHARP ANGULAR AGGREGATE.	CS	1/15/06
NOTICE	WITNESS NOTIFICATION	PROVIDE NOTICE TO EIO AND DCMA AT LEAST FIVE DAYS IN ADVANCE OF X-RAY . EIO NOTIFIED ON _____ DCMA NOTIFIED ON _____	Q ENG OR QA MGR	
120	X-RAY AT MQS MQS PROCEDURE 20.H.010 REV 0	X-RAY PER TECHNIQUE # 12726 USE CALIBRATED DENSITOMETER FOR DENSITY VERIFICATION. WHEN MARKING USE BLACK MARKERS. ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET.	RT - LEVEL II 2-2-06	RBK
130	X-RAY CQP 401 REV 5	X-RAY INTERPRETATION. ACCEPTANCE MSS SP 54. ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET. IF OK CHECK HERE _____ AND SEND TO STEP 160. REJECTED CHECK HERE <input checked="" type="checkbox"/> MARK UP DEFECTS AND SEND THE CASTING TO STEP 140.	RT - LEVEL II 2-2-06	RBK
140	WELD SOP 0100 REV 7	EXCAVATE ANY DEFECTS FOUND DURING 100% RT INSPECTION.	TAD	2/3/06
150	GRIND GCHI SOP 0100R2	CHIP AND HAND GRIND EXCAVATION AS REQUIRED.	RL	2/3/06

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* 160	INTERIM VISUAL INSPECTION CQP-500 REV 4	VISUALLY INSPECT 100% of COMPONENT ACCORDING TO ASTM A802 LEVEL 3 IN NON MACHINED AREAS AND LEVEL 2 IN MACHINED AREAS. IF OK CHECK HERE _____ ✓ IF REJECTED CHECK HERE _____ MARK AND REPAIR AT STEP 190.	VT - LEVEL II T.R.C	2-4-06
170	INTERIM 100% L.P. CQP 0300 REV 10	L.P. 100% OF COMPONENT. ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA- LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING. IF OK CHECK HERE _____ GO TO 190. IF REJECTED CHECK HERE _____	LP - LEVEL II T.R.C.	2-5-06
180	WELD SOP 0100 REV 7	EXCAVATE ANY DEFECTS FOUND DURING 100% VISUAL AND LP INSPECTION.	B.W.	2-6-06
190	GRIND GCHI SOP 0100R2	CHIP AND HAND GRIND EXCAVATION OR VISUAL DEFECTS AS REQUIRED.	KLB	2-7-06
200	L.P. EXCAVATION CQP-300 REV 10	L.P. ALL EXCAVATIONS PRIOR TO WELDING TO ENSURE REMOVAL OF DEFECT. ACCEPTANCE PER A903. ACCEPTANCE CRITERIA-LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING. IF OK CHECK HERE _____ ✓ IF REJECTED SEND BACK TO STEP 190	LP - LEVEL II T.R.C	2-10-06
* 210	SAND BLAST BLAS SOP 0100R6	SANDBLAST (REMOVE ALL BLAST MATERIAL FROM CASTING) SANDBLASTING WILL BE DONE USING RECYCLED SHARP ANGULAR AGGREGATE.	C.S	2/13/06
220	WELD MAP	MAP ALL MAJOR WELDS WITH DIGITAL PHOTO/MAPS INDICATING LOCATION. SERIALIZE DEFECTS ON CASTING, USE SCALE IN PHOTOS AND DOCUMENT SIZE. THIS IS TO BE PERFORMED BY SUPERVISOR, INSPECTION LEAD MAN OR THEIR DESIGNEE, FILE WITH QA. USE YELLOW MARKER. SUBMIT MAP WITHIN 24 HOURS OF START OF WELDING. MUST INDICATE ON MAP ALL MAJOR WELDS, DEFINED AS GREATER THAN 20% OF THE WALL OR 1 INCH WHICHEVER IS LESS OR 10 SQUARE INCHES APPROXIMATELY 3.3"X3.3".	JRB	2/17/06 2/14
NOTICE	WITNESS NOTIFICATION	PROVIDE NOTICE TO EIO AND DCMA AT LEAST FIVE DAYS IN ADVANCE OF WELD STEP. EIO NOTIFIED ON _____ DCMA NOTIFIED ON _____	Q ENG OR QA MGR	
* 230	QA APPROVAL HOLD POINT	QA TO APPROVE ELECTRODE PRIOR TO USE. <del>316</del> LNM 44/55 PROCEDURE USED: <del>316</del> 15 SMAW CF8MNMN MOD LIST ALL MATERIAL/LOTS USED: 3018513 QUALITY ENG. Name: BC Date: 2/11		
240	WELD SOP 0100 REV 7	WELD REPAIR DEFECTS AS MARKED. FOR WELDS <2" - WPS 10-SMAW-CF8MNMN MOD REV 1(Flat) or 25 SMAW-CF8MNMN MOD	TAD	2/10/06

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		REV 0 (Vertical) FOR WELDS <8" - WPS 15-GMAW-CF8MNMN MOD REV 2							
* 250	GRIND GCHI SOP 0100R2	HAND GRIND WELDS.						NM	2/14/06
* 260	L.P. WELD CQP 0300 REV 10	L.P. WELD REPAIRS ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA-LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING. IF OK CHECK HERE _____ WASH AND SEND TO STEP 280. IF REJECTED CHECK HERE <input checked="" type="checkbox"/>						LP - LEVEL II CC	2/15/06
270	REPEAT	REPEAT STEPS S180 TO S250AS REQUIRED TILL CLEAR THROUGH VISUAL INSPECTION & PENETRANT INSPECTION. IF OK CHECK HERE _____ AND PROCEED TO STEP 280.							
280	REPEAT STEPS	SUPPLEMENTAL REPAIR STEPS	1 <sup>ST</sup>	2 <sup>ND</sup>	3 <sup>RD</sup>	4 <sup>TH</sup>	5 <sup>TH</sup>		
S180	WELD SOP 0100 REV 7	EXCAVATE ANY DEFECTS FOUND DURING RADIOGRAPHY.							
S190	GRIND GCHI SOP 0100R2	CHIP AND HAND GRIND EXCAVATION OR VISUAL DEFECTS AS REQUIRED.							
S200	L.P. EXCAVATION CQP-300 REV 10	L.P. ALL EXCAVATIONS PRIOR TO WELDING TO ENSURE REMOVAL OF DEFECT. ACCEPTANCE PER A903. ACCEPTANCE CRITERIA-LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING.						LP - LEVEL II	TAD TAD TAD 2/21/06 2/24/06 3/8/06
S210	WELD MAP	MAP ALL MAJOR WELDS WITH DIGITAL PHOTO/MAPS INDICATING LOCATION. SERIALIZE DEFECTS ON CASTING, USE SCALE IN PHOTOS AND DOCUMENT SIZE. THIS IS TO BE PERFORMED BY SUPERVISOR, INSPECTION LEAD MAN OR THEIR DESIGNEE, FILE WITH QA. USE YELLOW MARKER. MUST INDICATE ON MAP ALL MAJOR WELDS, DEFINED AS GREATER THAN 20% OF THE WALL OR 1 INCH WHICHEVER IS LESS OR 10 SQUARE INCHES APPROXIMATLY 3.3"X3.3". SUBMIT MAP WITHIN 24 HOURS OF START OF WELDING.							
NOTICE	WITNESS NOTIFICATION	PROVIDE NOTICE TO EIO AND DCMA AT LEAST FIVE DAYS IN ADVANCE OF WELD STEP. EIO NOTIFIED ON <u>2/15</u> DCMA NOTIFIED ON <u>2/15/06</u>						Q ENG OR QA MGR	
* S220	QA APPROVAL HOLD POINT	QA TO APPROVE ELECTRODE PRIOR TO USE. PROCEDURE USED: <u>15 GMAW CF8MNMN MOD</u> MATERIAL /LOT USED: <u>308</u> QUALITY ENG. Name: <u>BC</u> Date: <u>3/1/06</u>							
S230	WELD SOP 0100 REV 7	WELD REPAIR DEFECTS AS MARKED. FOR WELDS <2" - WPS 10-SMAW-CF8MNMN MOD REV 1(Flat) or 25 SMAW-CF8MNMN MOD REV 0 (Vertical)							

~~2/14/06~~  
~~2/15/06~~  
~~2/15/06~~

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		FOR WELDS <8" - WPS 15-GMAW-CF8MNMN MOD REV 2	2/1/06 3/1/06 KB 3/1/06	TAD 3/1/06 KB 3/1/06				
S240	GRIND GCHI SOP 0100R2	HAND GRIND WELDS.						
S250	L.P. WELD CQP 0300 REV 10	L.P. WELD REPAIRS ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA-LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING. IF OK CHECK HERE <input checked="" type="checkbox"/> WASH AND SEND TO STEP 280. IF REJECTED CHECK HERE _____ AND RETURN TO STEP S180.	LP - LEVEL II GRC	OK 3-9-06 REJ	OK	OK	OK	OK
	REPEAT	REPEAT STEPS S180 TO S250 AS REQUIRED TILL CLEAR THROUGH VISUAL INSPECTION & PENETRANT INSPECTION.	QA ENG.					
280	TEST MAG PERM SOP MAG PERM 100, REV 1	TEST MAG PERMEABILITY REPAIR AREAS TEST AT LEAST EVERY 2 INCH SQUARE OF WELD. ACCEPTANCE 1.02. IF OK CHECK HERE <input checked="" type="checkbox"/> AND GO TO STEP 300. IF REJECTED CHECK HERE _____.						CR 3/1/06
290	GRIND GCHI SOP 0100R2	GRIND AREAS OF NON COMPLIANCE AND RETURN TO STEP 280. REPEAT UNTIL COMPLIANCE IS ACHIEVED.						N/K
300	X-RAY (NOTE)	IF RADIO GRAPHED AREAS ARE GREATER THAN FOUR TO FIVE INCHES THE CASTING WILL BE SENT TO MQS. SEND TO MQS CHECK HERE <input checked="" type="checkbox"/> . RADIOGRAPH AT CAF CHECK HERE _____.			QA ENGINE ER			RBK 3-2-06
310 A	MQS X-RAY DEFECTS REPAIRED BY WELDING	X-RAY PER TECHNIQUE # 12726 USE CALIBRATED DENSITOMETER FOR DENSITY VERIFICATION. <b>ALL RT REJECTS, INCLUDING SURFACE DEFECTS WILL BE VERIFIED BY RT.</b> ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET.			LEVEL II			RBK 3-7-06
310 B	CAF X-RAY DEFECTS REPAIRED BY WELDING CQP 401 REV 5	X-RAY PER TECHNIQUE # 12726 USE CALIBRATED DENSITOMETER FOR DENSITY VERIFICATION. <b>ALL RT REJECTS, INCLUDING SURFACE DEFECTS WILL BE VERIFIED BY RT.</b> ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET.			RT - LEVEL II			RBK 3-7-06
320	X-RAY CQP 401 REV 5	X-RAY INTERPRETATION. ACCEPTANCE MSS SP 54. ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET. IF OK CHECK HERE _____ AND SEND TO STEP 340. REJECTED CHECK HERE <input checked="" type="checkbox"/> MARK UP DEFECTS AND SEND THE CASTING TO STEP S321.			RT - LEVEL II			RBK 3-7-06
	REPEAT STEPS	SUPPLEMENTAL REPAIR STEPS						

XRAY  
3-8-06  
REJECT

1<sup>ST</sup> RBK  
3-8-06

2<sup>ND</sup> RBK  
3-8-06

3<sup>RD</sup>

4<sup>TH</sup>

5<sup>TH</sup>

ACCEPT  
XRAY



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S321 *	WELD SOP 0100 REV 7	EXCAVATE ANY DEFECTS FOUND DURING RADIOGRAPHY.	BD 3/7	BD 3/7	TAD 3/8		
S322 *	L.P. EXCAVATION CQP-300 REV 10	L.P. ALL EXCAVATIONS PRIOR TO WELDING TO ENSURE REMOVAL OF DEFECT. ACCEPTANCE PER A903. ACCEPTANCE CRITERIA-LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING.	LP LEVEL II 3/7	CC 3/7	TRC 3/8		
S323 *	WELD MAP	MAP ALL MAJOR WELDS WITH DIGITAL PHOTO/MAPS INDICATING LOCATION. SERIALIZE DEFECTS ON CASTING, USE SCALE IN PHOTOS AND DOCUMENT SIZE. THIS IS TO BE PERFORMED BY SUPERVISOR, INSPECTION LEAD MAN OR THEIR DESIGNEE, FILE WITH QA. USE YELLOW MARKER. MUST INDICATE ON MAP ALL MAJOR WELDS, DEFINED AS GREATER THAN 20% OF THE WALL OR 1 INCH WHICHEVER IS LESS OR 10 SQUARE INCHES APPROXIMATELY 3.3"X3.3". SUBMIT MAP WITHIN 24 HOURS OF START OF WELDING. SUBMIT MAP WITHIN 24 HOURS OF START OF WELDING.	NO MAJOR WELDS				
NOTICE	WITNESS NOTIFICATION	PROVIDE NOTICE TO EIO AND DCMA AT LEAST FIVE DAYS IN ADVANCE OF WELD STEP. EIO NOTIFIED ON <u>3/1/06</u> DCMA NOTIFIED ON <u>CA</u>	Q ENG OR QA MGR	CA			
S324 *	QA APPROVAL HOLD POINT	QA TO APPROVE ELECTRODE PRIOR TO USE. PROCEDURE USED: _____ MATERIAL /LOT USED: <u>308</u> QUALITY ENG. Name: <u>CA</u> Date: <u>3/7</u>					
S325 *	WELD SOP 0100 REV 7	WELD REPAIR DEFECTS AS MARKED. FOR WELDS <2" - WPS 10-SMAW-CF8MNMN MOD REV 1 (Flat) or 25 SMAW-CF8MNMN MOD REV 0 (Vertical) FOR WELDS <8" - WPS 15-GMAW-CF8MNMN MOD REV 2	BD 3/7	BD 3/7	TAD 3/8		
S326 *	GRIND GCHI SOP 0100R2	HAND GRIND WELDS.	NM 3/7	NM 3/7	AB 3/8		
S327	L.P. WELD CQP 0300 REV 10	L.P. WELD REPAIRS ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA-LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING. IF OK CHECK HERE _____ WASH AND SEND TO STEP S328. IF REJECTED CHECK HERE _____ AND RETURN TO STEP S321.	LP - LEVEL II TRC	OK 3-8-06 REJ	OK 3-9-06 REJ	OK	OK
S 328 A	MQS X-RAY DEFECTS REPAIRED BY WELDING	X-RAY PER TECHNIQUE # 12726 USE CALIBRATED DENSITOMETER FOR DENSITY VERIFICATION. <b>ALL RT REJECTS, INCLUDING SURFACE DEFECTS WILL BE VERIFIED BY RT.</b> ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET.	RT-LEVEL L II NA OK	at	320 on 3/8		



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S 328 B	CAF X-RAY DEFECTS REPAIRED BY WELDING CQP 401 REV 5	X-RAY PER TECHNIQUE # 12726 USE CALIBRATED DENSITOMETER FOR DENSITY VERIFICATION. <b>ALL RT REJECTS, INCLUDING SURFACE DEFECTS WILL BE VERIFIED BY RT.</b> ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET.	RT - LEVE L II		NA	
S 329	X-RAY CQP 401 REV 5	X-RAY INTERPRETATION. ACCEPTANCE MSS SP 54. ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET. IF OK CHECK HERE _____ AND SEND TO STEP 340. REJECTED CHECK HERE _____ MARK UP DEFECTS AND SEND THE CASTING TO STEP S321.	RT - LEVE L II			
	REPEAT	REPEAT STEPS S321 TO S329 AS REQUIRED TILL CLEAR THROUGH VISUAL, PENETRANT AND RT INSPECTION.	QA ENG.			
340	SAND BLAST BLAS SOP 0100R6	SANDBLAST (REMOVE ALL BLAST MATERIAL FROM CASTING) SANDBLASTING WILL BE DONE USING RECYCLED SHARP ANGULAR AGGREGATE.			CA	3/10
NOTICE	WITNESS NOTIFICATION	PROVIDE NOTICE TO EIO AND DCMA AT LEAST FIVE DAYS IN ADVANCE OF VISUAL AND LP STEPS. EIO NOTIFIED ON <u>3/5</u> DCMA NOTIFIED ON <u>3/5</u>			Q ENG OR QA MGR	CA
350	FINAL VISUAL INSPECTION CQP-500 REV 4	VISUALLY INSPECT 100% of COMPONENT ACCORDING TO ASTM A802 LEVEL 3 IN NON MACHINED AREAS AND LEVEL 2 IN MACHINED AREAS. IF OK CHECK HERE _____ SEND TO STEP 453. IF REJECTED CHECK HERE _____ MARK AND REPAIR. INITIAL WHEN COMPLETE. MUST BE PERFORMED BY LEVEL II in VT.	VT - LEVEL II		KRA	3/13/06
360	FINAL L.P. CQP 0300 REV 10	FINAL L.P. 100% OF COMPONENT. ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA-LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING. IF OK CHECK HERE <input checked="" type="checkbox"/> WASH AND SEND TO STEP 453. <del>IF REJECTED CHECK HERE <input checked="" type="checkbox"/></del>	LP - LEVEL II		CC	3-13-6
380	WELD SOP 0100 REV 7	EXCAVATE ANY DEFECTS FOUND DURING FINAL PENETRANT INSPECTION.			N/A	
385	GRIND GCHI SOP 0100R2	CHIP AND HAD GRIND EXCAVATION AS REQUIRED.			NM	3/13/06



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390	L.P. EXCAVATION CQP-300 REV 10	L.P. ALL EXCAVATIONS PRIOR TO WELDING TO ENSURE REMOVAL OF DEFECT. ACCEPTANCE PER A903. IF OK CHECK HERE _____ IF REJECTED SEND BACK TO STEP 385.	LP - LEVEL II N/A	
400	WELD MAP	MAP ALL MAJOR WELDS WITH DIGITAL PHOTO/MAPS INDICATING LOCATION. SERIALIZE DEFECTS ON CASTING, USE SCALE IN PHOTOS AND DOCUMENT SIZE. THIS IS TO BE PERFORMED BY SUPERVISOR, INSPECTION LEAD MAN OR THEIR DESIGNEE, FILE WITH QA. USE YELLOW MARKER. SEND MAPS WITHIN 24 HOURS OF WELDING. MUST INDICATE ON MAP ALL MAJOR WELDS, DEFINED AS GREATER THAN 20% OF THE WALL OR 1 INCH WHICHEVER IS LESS OR 10 SQUARE INCHES APPROXIMATLY 3.3"X3.3".	N/A	
420	QA APPROVAL HOLD POINT	QA TO APPROVE ELECTRODE PRIOR TO USE. PROCEDURE USED: _____ MATERIAL/LOT USED: _____ QUALITY ENG. Name: _____ Date: _____	N/A	
430	WELD SOP 0100 REV 7	WELD REPAIR DEFECTS AS MARKED. FOR WELDS <2" - WPS 10-SMAW-CF8MNMN MOD REV 1(Flat) or 25 SMAW-CF8MNMN MOD REV 0 (Vertical) FOR WELDS <8" - WPS 15-GMAW-CF8MNMN MOD REV 2	N/A	
440	GRIND GCHI SOP 0100 REV 2	HAND GRIND WELDS.	N/A	
450	L.P. WELDS CQP 0300 REV 10	L.P. WELD REPAIRS ACCEPTANCE PER ASTM A903. IF OK CHECK HERE <input checked="" type="checkbox"/> WASH AND SEND TO STEP 453. IF REJECTED CHECK HERE _____ AND RETURN TO STEP 440.	LP - LEVEL II N/A	CE 3/13/05 GH
	REPEAT	REPEAT STEPS 350 TO 450 AS REQUIRED TILL WELDS CLEAR FINAL LIQUID PENETRANT INSPECTION. DOCUMENT REWORK ON A SUPPLEMENTAL MTS	QA ENG N/A	
451	TEST MAG PERM SOP MAG PERM 100, REV 1	TEST MAG PERMEABILITY REPAIR AREAS. RECORD ON WELD MAP LIST. TEST AT LEAST EVERY 2" SQUARE OF WELD. ACCEPTANCE 1.02. IF OK CHECK HERE <input checked="" type="checkbox"/> AND GO TO STEP 430. IF REJECTED CHECK HERE _____	QA N/A	
452	GRIND GCHI SOP 0100R2	GRIND AREAS OF NON COMPLIANCE AND RETURN TO STEP 451. REPEAT UNTIL COMPLIANCE IS ACHIEVED.	N/A	
NOTICE	WITNESS NOTIFICATION	PROVIDE NOTICE TO EIO AND DCMA AT LEAST FIVE DAYS IN ADVANCE OF LAYOUT. EIO NOTIFIED ON _____ DCMA NOTIFIED ON _____  APPROVAL RECEIVED ON _____	Q ENG OR QA MGR N/A	

**Energy Industries of Ohio  
Manufacturing and Test Sequence (MTS) A 4 Coil**

9 OF 11 CO# 40851 Dated 3-9-05 Revision: Rev 9 Dated Issued:12/1/05

453	INTERIM LAYOUT SOP LAYOUT 0100	INSPECT CASTING TO VERIFY DIMENSIONS. THIS STEP MAY BE MOVED. NOTE: THE FIRST PART PRODUCED OF EACH TYPE A, B AND C WILL BE DIMENSIONED BY LAWTON PATTERN. IF DIMENSIONED BY LAWTON IT WILL BE DOCUMENTED HERE. Subsequent casting done internally per Romer Arm.		
455	HEAT TREAT	STRESS RELIEF. Load casting into cold furnace. Ramp up to 1100 F at rate of 200 F per hour. Hold at temp 4 hours. Furnace cool to 500 F at 50 F per hour. Air cool. Submit furnace charts to QA.	KMR	3/9/06
NOTICE *	WITNESS NOTIFICATION	PROVIDE NOTICE TO EIO AND DCMA AT LEAST FIVE DAYS IN ADVANCE OF VISUAL AND LP STEPS. EIO NOTIFIED ON <u>3/5</u> DCMA NOTIFIED ON <u>3/5</u>	Q ENG OR QA MGR	CA <del>3/13/06</del>
460	FINAL VISUAL INSPECTION CQP-500 REV 4	VISUALLY INSPECT 100% of COMPONENT ACCORDING TO ASTM A802 LEVEL 3 ALL CONDITIONS. THIS STEP MAY BE UNNECESSARY IF OK AT STEP 350. IF OK CHECK HERE <u>X</u> . IF REJECTED CHECK HERE _____ . MARK AND REPAIR AT STEP 510. MUST BE PERFORMED BY LEVEL II in VT.	VT - LEVEL II KRA	3/13/06
470	FINAL L.P. CQP 0300 REV 10	FINAL L.P. 100% OF COMPONENT. ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA-LEVEL 1 FOR HIGH STRESSED AREAS, LEVEL 2 FOR ALL OTHER AREAS. SEE LP DRAWING. THIS STEP MAY BE UNNECESSARY IF OK AT STEP 360. IF OK CHECK HERE <u>X</u> WASH AND SEND TO STEP 500. IF REJECTED CHECK HERE _____ . DOCUMENT REPAIRS USING A SUPPLEMENTAL MTS.	LP - LEVEL II CC	3/13/06
NOTICE	WITNESS NOTIFICATION	PROVIDE NOTICE TO EIO AND DCMA AT LEAST FIVE DAYS IN ADVANCE OF MAG PERM STEPS. EIO NOTIFIED ON _____ DCMA NOTIFIED ON _____	Q ENG OR QA MGR	
500	FINAL MAG PERM INSPECTION SOP MAG PERM 100, REV 1	PERFORM MAG PERM TESTING WITH SEVRIN GAUGE. ACCEPTANCE 1.02. CHECK THE ENTIRE SURFACE ON A 6"BY6" GRID. REPORT RESULTS. USE A 6" SQUARE BLOCK TO INDICATE TEST LOCATIONS AND RECORD RESULTS. COMPLIANT AREAS WILL NOT BE MARKED. MARK NONCOMPLIANT AREAS WITH AN "X" FOR REPAIR. OK CHECK HERE <u>X</u> AND GO TO STEP 530. IF REJECTED CHECK HERE _____	CA	3/13/06
510	GRIND GCHI SOP 0100 REV 2	HAND GRIND WITH SUITABLE CONE OR OTHER SIMILAR GRINDER AS REQUIRED TO ENSURE REMOVAL OF MATERIAL TO ACHIEVE MAG PERM REQUIREMENT. CIRCLE AREA REMEDIATE FOR RETEST.	N/A	↓
520	RETEST MAG PERM SOP MAG PERM 100, REV 1	RETEST MAG PERMEABILITY AT FAILED TEST POINTS. MARK NONCOMPLIANT AREAS WITH AN "X" FOR REPAIR. ACCEPTANCE 1.02. IF OK CHECK HERE _____ IF REJECTED CHECK HERE _____ RETURN TO STEP 510.	↓	↓
530	DOC. REVIEW	REVIEW DOCUMENTS AS REQUIRED IN CAF CHECKLIST, ALL DOCUMENTS NOTED TO BE ACCESSIBLE FOR AUDITING. (SHIPPER, C OF C, M.T.R., M.T.S., INSPECTION REPORT, X-RAY READER SHEETS AND HEAT TREAT CHARTS)	CA	3/13/06

CA  
~~3/13/06~~  
~~3/13/06~~

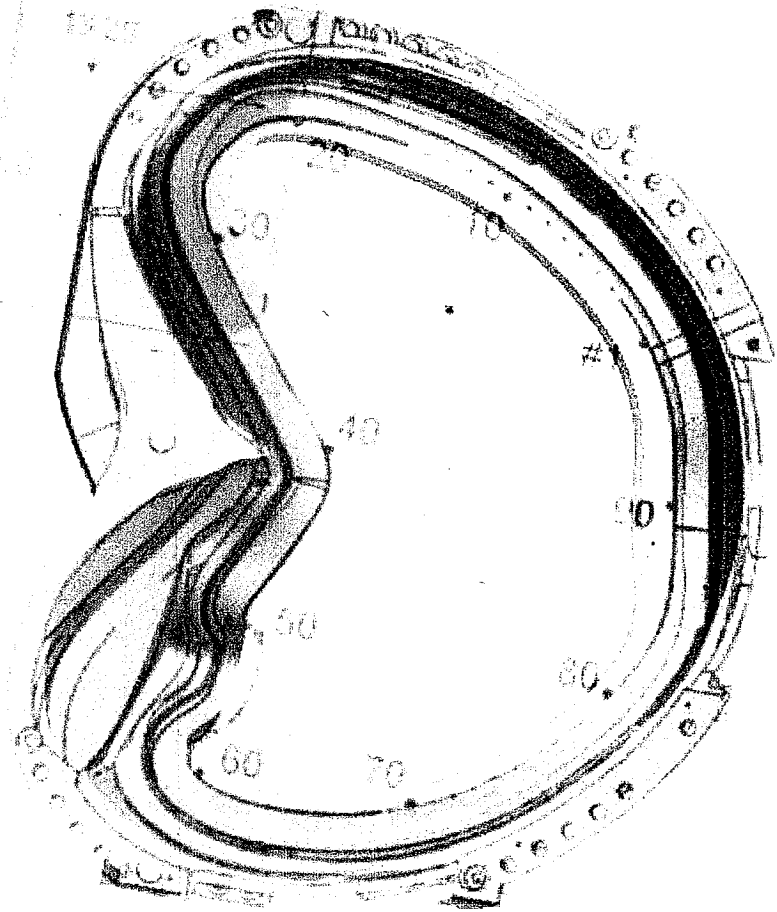
Energy Industries of Ohio

Manufacturing and Test Sequence (MTS) A 4 Coil

10 OF 11 CO# 40851 Dated 3-9-05 Revision: Rev 9 Dated Issued:12/1/05

NOTICE	RELEASE FROM EIO	PROVIDE DOCUMENTS TO EIO. SENT ON <u>3/13</u> BY <u>Ch</u> . RECEIVED RELEASE FROM EIO ON <u>Pda</u> .	Q ENG OR QA MGR	<u>Ch</u>
540	PACK AND SHIP	PACKAGE AND SHIP TO MAJOR TOOL. MARK ON CASTING THE COIL NUMBER. <u>"A-4"</u>		<u>Ch 3/13</u>
1000	REVISION HISTORY	ORIGINAL 12-14-04. Approved 12-14-04. Revision level 1- Revised 1-26-05 new page 8, correct High stress areas, Revision level 2 3-16-05, delete LO step 455. Revision 3 3-28-05 Added note regarding hold point at weld step 400. Revision level 4 written for C-2 casting 4-18-05. Rev 5 added Layout SOP# and note regarding first casting layout responsibility. 5-10-05. Rev 6 added word LOT to weld material steps. 5-29-05. Rev 7 6-14-05 added "LOT" to weld step on supplement page. Rev. 8 7-29-05 added stress relief, deleted weld hold points, added vertical weld procedure, and several editorial changes. REV 9 8-28-05 – MODIFIED RT STEPS AND ADDED REQUIREMENT TO RT ALL RT DEFECTS INCLUDING SURFACE.	CARUUD	

RED AREA INDICATES HIGH STRESSED AREA



**MetalTek International – Carondelet Division  
Manufacturing and Test Sequence (MTS) Coil Shim A-4**

Dated 12/14/045 Revision: 1 Dated Issued:10-26-05 Page 1of 3

OPER. #	STATION	DESCRIPTION OF PROCESS	Name	Date
10	QUALITY RELEASE	REVIEW AND APPROVE MTS. RECEIVED APPROVAL FROM EIO ON 10-26-05 FROM Pete Djordjevich  SHADED BOXES NEED NOT BE SIGNED.	CAR	10-26-05
20	PATTERN NPAT SOP 0100REV2	APPLY APPROPRIATE PART NUMBER, SERIAL NUMBER, FOUNDRY MARK, TO THE PATTERN.		
30	MOLD	MOLD PER WORK INSTRUCTIONS IN MAPICS ROUTING AND SOPS REFERENCED. MOLD MATERIALS REQUIRED PER MAPICS BOM. NOTIFY ENGINEER OF ANY SUBSTITUTIONS. MOLD SOP 0400 REV 8 CALIBRATION PER MOLD SOP 0900 REV 5 PREPARATION PER MOLD SOP 1100R2/1200R2/1300R1 SAND TESTING PER MOLD SOP 1400R2/1500R3/1600R2		
40	POUR MELT SOP 0100R5 MELT SOP 0700R2 MELT SOP 0600R2	METAL MUST BE AOD REFINED OR AOD INGOT. VIRGIN METAL ADDITIONS ALLOWED. HEAT #: <u>29198</u>  Sample from ladle to be analyzed for final chemical analysis and reported on material certifications. Sample Taken by: <u>SR</u> Analyzed: <u>GH</u>	4/28	JG
50	MELT SOP 0800R2	SHAKEOUT		
60	ARC RISE SOP 0100R1	REMOVE RISERS AS DIRECTED BY SUPERVISOR.		
70	HEAT TREAT HEAT SOP 0103R5	SOLUTION ANNEAL. MINIMUM 4 HOURS AT 2050 F. AIR COOL.	DLS	6/2
80	GRIND GSA SOP 0100R3 GCHI SOP 0100R2	SWING GRIND TO REMOVE RISER REMAINS AND FLASH IF REQUIRED. CHIP AND HAND GRIND SURFACE OF PART AS REQUIRED.		
90	SAND BLAST BLAS SOP 0100R6	SANDBLAST (REMOVE ALL BLAST MATERIAL FROM CASTING) SANDBLASTING WILL BE DONE USING RECYCLED SHARP ANGULAR AGGREGATE.		
100	VISUAL INSPECTION CQP-500 REV 4	VISUALLY INSPECT 100% of COMPONENT ACCORDING TO ASTM A802 LEVEL 3 ALL CONDITIONS. IF OK CHECK HERE _____ IF REJECTED CHECK HERE <input checked="" type="checkbox"/> MARK AND REPAIR AT STEP 130OR 140 IF WELDING IS REQUIRED. MAY PERFORM STEPS 110 AND 120 TOGETHER.	VT - LEVEL II KA	8/24

**MetalTek International – Carondelet Division**

**Manufacturing and Test Sequence (MTS) Coil Shim A COIL S/N 4**

**Dated 12-14-04 Revision:1**

**Dated Issued:10-25-05**

**Page 2 of 3**

120	100% L.P. CQP 0300 REV 10	L.P. 100% OF COMPONENT. ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA- LEVEL 2. IF OK CHECK HERE _____ GO TO 150. IF REJECTED CHECK HERE <input checked="" type="checkbox"/> MARK AND REPAIR AT STEP 130 OR 140 IF WELDING IS REQUIRED.	LP - LEVEL II JPS 12-28	
* 130	GRIND GCHI SOP 0100R2	HAND GRIND DEFECTS. CONFIRM REPAIRS VISUALL AND BY LP. ACCEPTANCE AS NOTED ABOVE. IF OK, CHECK HERE <input checked="" type="checkbox"/> AND GO TO STEP 170. IF WELDING IS NEEDED GO TO STEP 130.	CHA	3/8/06
140 IF NEEDED		IF REPAIRS BY WELDING ARE REQUIRED DOCUMENT ON SUPPLEMENTAL MTS ON LAST PAGE.		
150	CAF X-RAY DEFECTS REPAIRED BY WELDING CQP 401 REV 5	X-RAY PER TECHNIQUE: SE-141-073-C SHIM. USE CALIBRATED DENSITOMETER FOR DENSITY VERIFICATION. ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET.	RT - LEVEL II DWM	12/16/05
160	X-RAY CQP 401 REV 5	X-RAY INTERPRETATION. ACCEPTANCE MSS SP 54. ATTACH TECHNIQUE, READER SHEET FOR ALL RADIOGRAPHS. MUST INDICATE RADIOGRAPHER AND ASNT CERTIFICATION LEVEL ON READER SHEET. IF OK CHECK HERE <input checked="" type="checkbox"/> AND SEND TO STEP 200. REJECTED CHECK HERE _____ MARK UP DEFECTS. DOCUMENT REPAIRS ON S10 TO S70.	RT - LEVEL II DWM	12/16/05
	REPEAT	REPEAT STEPS S10 TO S70 AS REQUIRED TILL WELDS CLEAR X-RAY.	QA ENG.	
170	SAND BLAST BLAS SOP 0100R6	SANDBLAST (REMOVE ALL BLAST MATERIAL FROM CASTING) SANDBLASTING WILL BE DONE USING RECYCLED SHARP ANGULAR AGGREGATE.		
180	LAYOUT SOP 0100 ORIGINAL	INSPECT CASTING TO VERIFY DIMENSIONS. THIS MAY BE PERFORMED EARLIER IF DESIRED. SUBMIT RPORT TO QA.		3-8-06
* 190	FINAL VISUAL INSPECTION CQP-500 REV 4	VISUALLY INSPECT 100% of COMPONENT ACCORDING TO ASTM A802 LEVEL 2 ALL CONDITIONS. IF OK CHECK HERE <input checked="" type="checkbox"/> IF REJECTED CHECK HERE _____ MARK AND REPAIR DOCUMENT REWORK ON A SUPPLEMENTAL MTS	VT - LEVEL II 3/13/06	JOR
200	FINAL L.P. CQP 0300 REV 10	FINAL L.P. 100% OF COMPONENT. ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA- LEVEL 2 ALL AREAS. IF OK CHECK HERE <input checked="" type="checkbox"/> WASH AND SEND TO NEXT STEP. IF REJECTED CHECK HERE _____ MAKE REPAIRS AND DOCUMENT ON SUPPLEMENTL MTS.	LP - LEVEL II TAC	1-14-06
* 210	FINAL MAG PERM INSPECTION SOP MAG PERM 100, REV 1 GRIND GCHI SOP 0100 REV 2	PERFORM MAG PERM TESTING WITH SEVRIN GAUGE. ACCEPTANCE 1.02. CHECK THE ENTIRE SURFACE ON A 6"BY6" GRID. REPORT RESULTS. HAND GRIND WITH SUITABLE CONE OR OTHER SIMILAR GRINDER AS REQUIRED TO ENSURE REMOVAL OF MATERIAL TO ACHIEVE MAG PERM REQUIREMENT. <i>Mag. Perm: OK</i>	BDR	3-13-06
220	DOC. REVIEW	REVIEW DOCUMENTS ALL DOCUMENTS NOTED TO BE ACCESSIBLE FOR AUDITING. (C OF C, M.T.R., SIGNED M.T.S., LAYOUT INSPECTION REPORT, X-RAY READER SHEETS AND HEAT TREAT CHARTS)	CHA	3/13

**MetalTek International – Carondelet Division**  
**Manufacturing and Test Sequence (MTS) Coil Shim A COIL S/N 4**  
**Dated 12-14-04 Revision:1 Dated Issued:10-25-05 Page 3 of 3**

NOTICE	RELEASE FROM EIO	PROVIDE DOCUMENTS TO EIO. SENT ON <u>3/13</u> BY <u>Chn</u> RECEIVED RELEASE FROM EIO ON <u>3/13</u>	Q ENG OR QA MGR	<u>Chn</u>
	PACK AND SHIP	PACKAGE AND SHIP TO MAJOR TOOL.		<u>Chn</u>
1000	REVISION HISTORY	ORIGINAL 12-14-04. Rev1 complete rewrite due to specification changes.	CARUUD	<u>Chn</u>

SUPPLEMENTAL MTS FOR WELD REPAIRS.			FOR VT&LP/ FOR RT	
S10	WELD SOP 0100 REV 7	EXCAVATE ANY DEFECTS.		
S20	L.P. EXCAVATION CQP-300 REV 10	L.P. ALL EXCAVATIONS PRIOR TO WELDING TO ENSURE REMOVAL OF DEFECT. ACCEPTANCE PER A903. ACCEPTANCE CRITERIA- LEVEL 2.	LP - LEVEL II	LP - LEVEL II
S30	WELD MAP	MAP ALL WELDS WITH DIGITAL PHOTO/MAPS. SERIALIZE DEFECTS ON CASTING, USE SCALE IN PHOTOS AND DOCUMENT SIZE. THIS IS TO BE PERFORMED BY SUPERVISOR, INSPECTION LEAD MAN OR THEIR DESIGNEE, FILE WITH QA.. USE YELLOW MARKER. MUST SEND REPORT ON ALL AJOR WELDS, DEFINED AS OVER 20% OF WALL THICKNESS OR 1 INCH WHICHEVER IS LESS OR 10 SQUARE INCHES TO CUSTOMER. MAJOR WELDS YES _____, REPORT SENT BY _____ DATE _____ NO MAJOR WELDS CHECK HERE _____ AND GO TO STEP 170.		
S40	QA APPROVAL HOLD POINT	QA TO APPROVE ELECTRODE PRIOR TO USE. PROCEDURE USED: _____ MATERIAL USED: _____ QUALITY ENG. Name: _____ Date: _____		
S50	WELD SOP 0100 REV 7	WELD REPAIR DEFECTS AS MARKED. FOR WELDS <2" - WPS 10-SMAW-CF8MNMN MOD REV 1 FOR WELDS <8" - WPS 15-GMAW-CF8MNMN MOD REV 2		
S60	GRIND GCHI SOP 0100R2	HAND GRIND WELDS.		
S70	L.P. WELD CQP 0300 REV 10	L.P. WELD REPAIRS ACCEPTANCE PER ASTM A903. ACCEPTANCE CRITERIA-LEVEL 2. IF OK CHECK HERE _____ WASH AND SEND TO STEP 300. IF REJECTED CHECK HERE _____ AND RETURN TO STEP 220.	LP - LEVEL II	LP - LEVEL II
	REPEAT	REPEAT STEPS S10 TO S70 AS REQUIRED TILL CLEAR THROUGH VISUAL INSPECTION & PENETRANT INSPECTION.	QA ENG.	QA ENG.
S80	TEST MAG PERM SOP MAG PERM 100, REV 1	TEST MAG PERMEABILITY REPAIR AREAS RECORD ON WELD MAP LIST. TEST AT LEAST 5 POINTS PER WELD. ACCEPTANCE 1.02. IF OK CHECK HERE _____ AND GO TO STEP 170. GRIND AS NEEDED TO REMEDIATE.		





4

Corrective Action 1308  
Carondelet Division - CA / PA / RGA Database  
Corrective Action Type NCR  
Date 6/13/2005  
CA Originator C. Ruud  
Pattern Number: C and A Coil Shims 11 Pieces

**Description of Defect / Non-Conformance**

Chemistry for 11 shim castings is out of specification.

**Root Cause**

Chemistry specification was not changed in system and not communicated to Lab personnel.

**Corrective Action**

Specification was corrected in system and Lab personnel trained. Mag permeability was checked on the parts and are less than 1.02u.

**Verification of Corrective Action**

Chemistries were checked on subsequent parts and are within specification.

**Preventive Action**

Create Inspection and Test Plan summarizing all requirements.

**Estimated Completion Date**

6/15/05

**Actual Completion Date**

Complete.

A handwritten signature in black ink, appearing to read "C. Ruud".

Signed: C. Ruud

CC: Roger Broman, Barry Craig, Joe Edwards, E.J. Kubick

**Nonconformance Report: CA 1323 (phosphorus levels exceeds specification limits for castings C1- C4 and A1 and C1 shim and four Type C and six A coil shims)**

**Project Disposition:**

The erroneous levels were due to calibration errors with the spectrometer. As reported in MTK's attached report, preventive maintenance has since been performed on the spectrometer. The reported chemistry will be accepted for the castings and shims noted above. The specification chemistry will not be changed at this time.

**Approvals:**

**Phil  
Heitzenroeder**

Digitally signed by Phil Heitzenroeder  
DN: CN = Phil Heitzenroeder, C = US,  
O = PPPL, OU = Mech. Eng. Division  
Reason: I agree to 'specified' portions  
of this document  
Date: 2006.02.21 11:49:56 -05'00'

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Procurement Technical Representative

**Brad  
Nelson**

Digitally signed by Brad Nelson  
DN: cn=Brad Nelson, c=US,  
o=ORNL, ou=FED,  
email=nelsonbe@ornl.gov  
Date: 2006.02.21 14:16:12  
-05'00'

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Responsible Line Manager:



Corrective Action 1323  
Carondelet Division - CA / PA / RGA Database  
Corrective Action Type NCR  
Date 7/27/2005  
CA Originator C. Ruud  
Applies to: Coil castings C-1, C-2, C-3, C-4 and A-1 and C 1 shim and four C coil and six A coil shims

**Description of Defect / Non-Conformance**

Phosphorus levels in material produced to date exceed specification limits. Both phosphorus and sulfur readings reported erroneously in certifications.

Certification reports have shown phosphorus and sulfur levels in the <.01% range. Independent laboratory data confirmed phosphorus in the .018 to .033% range and sulfur in the .005 to .022% range. Actual levels of some tests are above those in PPPL Specification NCSX-CSPEC-141-03-07 Rev 7.

Nonconformance was first suspected as a result of analysis of zoned attached test specimens volunteered by MetalTek International as response to PPPL questions on weighted average chemical analysis and quality of blending in the gating system. Nonconformance was verified on the bars used in the study and has been extended to evaluation of previously poured products.

**Root Cause**

Specification limits were set below the levels achievable through use of available raw materials. Spectrometer did not properly calibrate for phosphorus and sulfur at levels of specification due to equipment malfunction.

The chemical specification of EIO heats uses alloy CF8MNMn-Mod which incorporates a type standard calibration with a certified reference material (CRM) BS180. This enables the operator of the spectrometer to match the elemental concentrations of this alloy with corrective factors. These factors are determined by analyzing the CRM and having them compared with the calibration curves for each element. The phosphorus and sulfur content have very low measured intensities due to low concentrations. Intermittent failure of the spectrometer intensity measuring card caused higher intensity readings for phosphorus and sulfur. Subsequent checks with the CRM resulted in low corrective factors that were not detected. This in turn resulted in low reported concentrations for the EIO samples. All the major elements, which are measured on other intensity cards, have been closely monitored and matched very well with the CRM and thus were reported correctly.

**Corrective Action**

Modification to specification for phosphorus and sulfur will be requested. Limits will be set based on process capability and consistent with other stainless steel grades. Replacement of deficient card in spectrometer will be made upon delivery.

Subsequent immediate analysis of chemistry results, obtained by wet analysis, is attached and demonstrate top of specification for sulfur and over specification for phosphorus. The spectrometer manufacturer has performed an analysis to determine the cause of the malfunction and verified that the intensity card has an intermittent fault and must be replaced. The card has been ordered and scheduled for replacement on August 15, 2005.

Until the card is replaced we will be performing additional type standardizations to ensure accurate sulfur and phosphorus analysis. Additionally, for coils made until the card is replaced, an independent laboratory will perform a verification of the chemical analysis.

**Verification of Corrective Action**

Will be determined at a later date.

**Preventive Action**

In addition to spectrometer faults, we have identified that the specification ranges for sulfur and phosphorus is unattainable. Analysis and specifications for virgin charge materials predict sulfur at 0.040% maximum and phosphorus at 0.040% maximum. We have no way to remove phosphorus from the melt and do not intentionally add phosphorus. So, the confirmed coil analyses, along with analyses of virgin material heats, demonstrate sulfur in the range of 0.010% to 0.022% and phosphorus in the range of 0.018% to 0.033%. These results are consistent with our charge material analysis. We will request a deviation for phosphorus in the subject parts and also request a permanent specification change to 0.040% maximum for both phosphorus and sulfur, to allow us to provide non-discrepant material. This change will not affect, in any way, the physical properties or material performance because all coils and test material exhibited sulfur and phosphorus within the new ranges despite inaccurate reporting. Other actions: Specifications have been added to the BS 180 standard and the type standard will be measured against the criteria.

**Estimated Completion Date**

August 15, 2005

**Actual Completion Date TBD**

Signed: C. Ruud



CC: Jim Galaske, Barry Craig, Joe Edwards, E.J. Kubick

**Guide to St Louis Testing Report Dated 7-26-05**

Sample name	Sample origin
A1Z1	Cast on bar A-1 coil, zone 1
A1Z2	Cast on bar A-1 coil, zone 2
A1Z3	Cast on bar A-1 coil, zone 3
C1	Cast on bar C-1 coil
C2Z1	Cast on bar C-2 coil, zone 1
C2Z2	Cast on bar C-2 coil, zone 2
C2Z3	Cast on bar C-2 coil, zone 3
C3Z1	Cast on bar C-3 coil, zone 1
C3Z2	Cast on bar C-3 coil, zone 2
C3Z3	Cast on bar C-3 coil, zone 3
F1	Final analysis button from ladle for C-4 coil
F2	Final analysis button from ladle for C-4 coil
F3	Final analysis button from ladle for C-4 coil
P1	Preliminary analysis button from ladle for C-4 coil

Testing is underway of the heat used to pour the four C coil and six A coil shims.

*Attachment to  
CA 1323*



Chemical, Metallurgical, Mechanical, Nondestructive, Environmental Testing, Analyses and Field Service.

July 26, 2005  
Lab No. 05C-0608  
Invoice No. 59891  
P.O. No. 21324  
Page 1 of 1

**METALTEK INTERNATIONAL**  
8600 Commercial Blvd.  
Pevely, MO 63070

**Attention: Chuck Ruud**

**REPORT OF CHEMICAL ANALYSIS**

**SAMPLE ID:** A1 Z1, A1 Z2, A1 Z3, C1, C2 Z1, C2 Z2, C2 Z3,  
C3 Z1, C3 Z2, C3 Z3, F1, F2, F3, P1

**RESULTS: %**

ANALYTE	A1Z1	A1Z2	A1Z3
Sulfur	.013	.005	.010
Phosphorus	.025	.023	.018

ANALYTE	C1	C2Z1	C2Z2	C2Z3
Sulfur	.014	.022	.018	.015
Phosphorus	.018	.024	.021	.025

ANALYTE	C3Z1	C3Z2	C3Z3
Sulfur	.013	.014	.012
Phosphorus	.024	.025	.021

ANALYTE	F1	F2	F3	P1
Sulfur	.014	.015	.012	.010
Phosphorus	.029	.033	.028	.030

Sulfur Test Method: ASTM E1019-03

Phosphorous Test Method: Colormetric

Identification of tested specimen provided by the client.

Robin E. Sinn  
Laboratory Director





## Carondelet Division

8600 Commercial Blvd. • Pevely, MO 63070 USA

Phone: 636-475-2199 • Fax: 636-479-3399

E-Mail: Charles.Ruud@MetalTek.com

Corrective Action 1347  
Carondelet Division - CA / PA / RGA Database  
Corrective Action Type NCR  
Date 8/1/2005 Revised 1-31-06  
CA Originator C. Ruud  
Applies to: A-1Coil

### Description of Defect / Non-Conformance

Wall thickness below model minimum. Localized areas were measured below the 1.375" minimum wall thickness during metrology. MetalTek independently verified wall thickness and confirmed condition.

### Root Cause

The tooling produces a casting with a wall thickness less than required by the model. Measurements taken on A-3, A-4 and A-5 are consistent and lower than predicted by the model. Material losses during normal processing and heat treat with A-1 and A-2 are also a factor.

### Corrective Action

Request "Use As Is" disposition on wall thickness related dimensions on A-1 coil.

### Verification of Corrective Action

Not required. PPPL independently verified in conjunction with ORNL the design performance at a wall thickness of 1.05". Results were deemed adequate. Minimum measured dimension is 1.18" (to be verified). **Scans of A-2 and 3 coils shows that the walls are above the 1.18" minimum dimension in all but a few isolated locations. The areas were identified and repaired by approved welding procedures.**

### Preventive Action

Several steps need to be taken to resolve and propose:

1. Validation of 3D Scanco data. MetalTek proposes to use Romer Arm with Laser scanner as validation technique. This instrument will be used to validate subsequent parts and minimizes measurement technique error.  
- Completed - The data provided by 3D Scanco has been validated on A1.
2. Report to PPPL/ORNL. Understanding the concern that the wall not be thinner than measured and the limitations of the process, e.g. setting a large core into a mold with overhead crane, MetalTek will submit layout results to EIO wand set teleconference to review remediations to tool.  
- It was determined to produce A2 with no tooling changes.

3. Upon verification of 3D Scanco data, MetalTek will confirm results to EIO team to begin root cause determination. Additional layout may be required to assure compliance of tooling, depending on results of layout.
  - Transfer caliper dimensions were taken on A-2 and A-3 at pre-clean step and shown to exceed required minimum wall thickness. **However scans performed using Romer Arm on A-2 and A-3 indicated dimensions consistent with A-1.**
4. Modification to tooling. Limited tooling modifications may be performed without severely impacting schedule or negating previous engineering (solidification modeling, etc.). These will be evaluated and proposed, where appropriate.
  - No tooling changes have been made.
5. Permanent deviation. Based on results of above, a permanent deviation may be required to dimensional tolerances in limited areas of the component. These will be known in greater detail later.

**Actual Completion Date**

All items complete, except a deviation.

Signed: C. Ruud



CC: Roger Broman, Barry Craig, Joe Edwards, E.J. Kubick, J. Markham



## NCSX Disposition to CA 1347

Analyses were performed to determine the effect of the thin section on deflections and stresses and are summarized below.

- Thin shell areas like that of A1 **has an extremely minor affect on the stresses and displacements in ANY of the coils or shells** with the thickness being either 1.18" as for A1 or even with the thickness being 1.05" which MTK projects is the minimum if the shell is not changed. Reasons:
  - a) The shape of the tee is not changed by this, and the tee provides most of the bending stiffness
  - b) Some EM forces are transferred to the shell B from the wing.
  - c) The thin wall region is not the location for the peak stress and much of the area will be machined away.

Run #	Configuration	Shell Type A		Coil Type A		All Coils	
		Max.	Max.	Max.	Max.	Max.	Max.
		Displacement - mm	Stress - Mpa	Displacement - mm	Stress - Mpa	Displacement - mm	Stress - Mpa
1	Baseline	0.98	168	1.246	239	2.711	239
5	Updated E	1.17	160	1.513	248	2.934	248
6	Updated E; thin sect. =1.18"	1.169	161	1.516	249	2.984	249
4	Updated E; thin sect. =1.05"	1.168	161	1.517	248	2.971	248

Since the effect has been shown to be extremely minor, the disposition for the A1 winding form is **Accept As Is**.

**However, since the root cause determination is still underway, this NCR should be kept open. It is requested that EIO re-issue an amended CA with the root cause determination and preventive action; PPPL will disposition that portion of the NCR at that time.**

**Approved:**

Phil Heitzenroeder  
2005.08.19 14:10:46 -04'00'

**P. Heitzenroeder, Tech. Rep.**

**Brad Nelson**

Digitally signed by Brad Nelson  
DN: cn=Brad Nelson, c=US,  
o=ORNL, ou=FED,  
email=nelsonbe@ornl.gov  
Date: 2005.08.19 16:56:28 -04'00'

**B. Nelson, RLM**

**Nonconformance Report: CA1536**

**Project Disposition:**

The manganese level at 0.1% over the 2.8% limit will be accepted for A-3, A-4, A-5 & C-6. However, since the physical properties of the alloy are dependent upon consistent chemistry, NCSX requests that MetalTek do its best to conform to the chemistry as presently stated in the specification. Deviations will be considered on a case by case basis.

**Approvals:**

**Wayne  
Reiersen**

Digitally signed by Wayne Reiersen  
DN: CN = Wayne Reiersen, C = US, O  
= PPPL  
Reason: I am approving this document  
Date: 2006.02.14 11:18:44 -05'00'

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Procurement Technical Representative

**Brad Nelson**

Digitally signed by Brad Nelson  
DN: cn=Brad Nelson, c=US,  
o=ORNL, ou=FED,  
email=nelsonbe@ornl.gov  
Date: 2006.02.14 17:35:58 -05'00'

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Responsible Line Manager:



Corrective Action 1536  
Carondelet Division  
Corrective Action Type NCR  
Date 1-13-06  
CA Originator C. Ruud  
Applies to: A-3, A-4, A-5 and C-6 Coil

**Description of Defect / Non-Conformance**

Manganese levels in material produced for A-3 and C-6 coil castings exceed specification limits in PPPL Specification NCSX-CSPEC-141-03-07 Rev 10. Manganese is 0.1% over the maximum of 2.8% for both parts.

**Root Cause**

Mt has aimed at the higher end of the range for manganese to assure the chemistry is correct in the casting. However the manganese did not fade as much as expected.

**Corrective Action**

Lower the aim to 2.9%.

**Verification of Corrective Action**

Chemistry analysis of coil chemistries for A-4 and 5 indicated that we are still 0.1% high. Therefore they have been added to this corrective action. Based on this result we will lower aim to 2.8%.

**Preventive Action**

The specification for manganese should be increased.

**Verification of Preventative Action**

Pending

**Estimated Completion Date**

TBD

**Actual Completion Date**

TBD

Signed: C. Ruud

A handwritten signature in black ink, appearing to be "C. Ruud", with a long horizontal line extending to the right.

CC: R. Broman, B. Craig, J. Edwards, E.J. Kubick, J. Markham, J. Galaske



## Carondelet Division

8600 Commercial Blvd. - Pevely, MO 63070 USA  
Phone: 636-479-4499 - Fax: 636-479-3399

### Final Inspection Report

Customer ENERGY INDUSTRIES OF OHIO  
Pattern: MCWF-A4 COIL

Order PPPL-FP-LTS-2

ASTM Metal CF8MNMN MOD

Date 3/13/2006

Type Description	Cert Number	Procedure	Acceptance Criteria	Actual
<b>Liquid Penetrant</b> <b>Notes</b> Acceptance per ASTM A903. Acceptance criteria - level 1 for high stressed areas, level 2 for all other areas.	176190-1	CQP - 300 Rev 9	SEE NOTE	Acceptable
<b>Mag Perm</b>	176190-1	SOP Mag Perm 100 Rev 1	<1.02	Acceptable
<b>Radiographic</b>	176190-1	Technique # 12726	MSS SP 54	Acceptable
<b>Visual</b>	176190-1	CQP - 500 REV 4	ASTM A802 LEVEL 2	Acceptable

Liquid Penetrant

Technician: C. Copeland – LP ASNT Level II

Visual Inspection

Technician: K. Anderson – VT ASNT Level II

Respectfully Submitted,  
Charles A. Ruud  
Quality Assurance Manager

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## Carondelet Division

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### Certificate of Conformance

ENERGY INDUSTRIES OF OHIO

Order Number PPPL-FP-LTS-2

Pattern MCWF-A4 COIL

ASTM CF8MNMN MOD

Date 3/13/2006

Cert Number

176190-1

A handwritten signature in black ink, appearing to read "Charles A. Ruud".

We certify that we have complied in accordance with the drawings(s) and specifications(s) listed on the above purchase order. The articles furnished were made and/or processed from parts and/or materials in accordance with all applicable drawings(s) and specifications(s) pursuant to the afore mention purchase order.

Respectfully Submitted,  
Charles A. Ruud  
Quality Assurance Manager

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Phone: 636-479-4499 - Fax: 636-479-3399

### Final Inspection Report

Customer ENERGY INDUSTRIES OF OHIO  
Pattern: SE-141-033 COIL A SHIM S/N 4

Order PPPL-FP-LTS-2

ASTM Metal CF8MNMN MOD

Date 3/13/2006

Type Description	Cert Number	Procedure	Acceptance Criteria	Actual
Liquid Penetrant	S76220-1	CQP - 300 Rev 9	ASTM A903 Level II	Acceptable
Mag Perm	S76220-1	SOP Mag Perm 100 Rev 1	<1.02	Acceptable
Radiographic	S76220-1	Technique # 12726	MSS SP 54	Acceptable
Visual	S76220-1	CQP - 500 REV 4	ASTM A802 LEVEL 2	Acceptable

Liquid Penetrant

Technician: T. Chapman – LP ASNT Level II

Visual Inspection

Technician: J. Rees – VT ASNT Level II

Respectfully Submitted,  
Charles A. Ruud  
Quality Assurance Manager

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### Certificate of Conformance

ENERGY INDUSTRIES OF OHIO

Order Number PPPL-FP-LTS-2

Pattern SE-141-033 COIL A SHIM S/N 4

Alloy CF8MNMnMOD Date 3/13/2006

Cert Number

S76220-1

A shim for A-4 coil was poured from heat number 29198. No weld repairs were necessary.

A handwritten signature in black ink, appearing to read "Charles A. Ruud". The signature is fluid and cursive, written in a professional style.

We certify that we have complied in accordance with the drawings(s) and specifications(s) listed on the above purchase order. The articles furnished were made and/or processed from parts and/or materials in accordance with all applicable drawings(s) and specifications(s) pursuant to the afore mention purchase order except as noted by corrective actions.

Respectfully Submitted,  
Charles A. Ruud  
Quality Assurance Manager

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**EIO**  
**Energy Industries of Ohio**  
**SUPPLIER QUALITY RELEASE**

		Date: 3-13-06
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I. General Information:		
Project Name:	Modular Coil Winding Form A4	
PO No:	NCSX-SOW-141-02-01	Rev.: 10
Supplier:	MetalTek	
Procurement Agent:	EIO	
Shipment:	<input checked="" type="checkbox"/> Partial <input type="checkbox"/> Final	

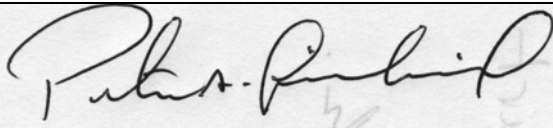
II. Material Description
Casting A4 Coil and shim casting.

III. Release Checklist	
Plan Requirements Complete?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (If identified "No" provide explanation in comments section below)
Variations?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (If identified "No" provide explanation in comments section below)
Princeton Notified of Shipment?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (If identified "No" provide explanation in comments section below)
DCMA Notified of Shipment?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (If identified "No" provide explanation in comments section below)
<input checked="" type="checkbox"/> Conditional <input checked="" type="checkbox"/> Unconditional	Explain conditional releases in comments section.

IV. Comments
Variations – See attached package for CA's and deviations

By signing below you acknowledge that the casting has met all applicable standards and contractual requirements

V. Supplier Quality Representative Sign Off		
Charles Ruud	X	
Supplier Quality Representative (SQR) Print/Type Name		Supplier Quality Representative (SQR) Signature
		Date 3-13-06

VI. Supplier Approval For Shipment		
Procurement Agent Notified of Shipment	Date: 9-21-05	
Required Vendor Data Ready for Shipment	Date: 9-21-05	
Peter A Djordjevich	X	 3-13-06



**EIO**  
**Energy Industries of Ohio**  
**SUPPLIER QUALITY RELEASE**

		Date: 3-13-06
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I. General Information:		
Project Name:	Modular Coil Winding Form A4	
PO No:	NCSX-SOW-141-02-01	Rev.: 10
Supplier:	MetalTek	
Procurement Agent:	EIO	
Shipment:	<input checked="" type="checkbox"/> Partial <input type="checkbox"/> Final	
Supplier's Representative Print/Type Name	Supplier's Signature	Date

1. Enter:  
Project Name  
PO Number  
Supplier  
Procurement Agent
  
2. Enter a brief description of items being released, including applicable drawing number(s), dash or item number(s), drawing revision letter, specification(s), and serial number(s).
  
3. Self-Explanatory
  
4. Record any unusual circumstance, such as a conditional release.
  
5. The Supplier's representative shall sign and date.
  
7. Signature and date of the Supplier's authorized representative indicating shipping date.
  
8. In case of partial release, the supplier shall maintain copies of each sequential "Supplier Quality Release" and establish complete accountability of material release on final shipment.
  
9. Supplier shall include a copy of the completed form with each shipment.