

3101 North Hemlock Circle, Suite 110-F
 Broken Arrow, OK 74012-1125
 Phone: 918-258-5002 Fax: 918-258-5008
 E-Mail: eco@ecotulsa.com
www.ecotulsa.com

SERVICE AND MAINTENANCE MANUAL

FOR

ECO, INC. ECONOMIZER S/N J-1348

DESIGNED AND FABRICATED

FOR

**CLEAVER BROOKS
 LINCOLN, NE**

P.O. NUMBER

L161800

END USER

**MISSISSIPPI POWER CO.
 KEMPER COUNTY (IGCC FACILITY)
 LIBERTY, MS**

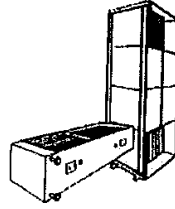
COPY



Southern Company Generation		Kemper County
MM105657	0	Unit 1
CLEAVER BROOKS	PO: MPC10003544	
QC DATA PACKAGE	Rev: NA	
IGCC - COMBINED CYCLE - MULTIPAGE - AUXILIARY BOILER - SERVICE AN		

APPROVED

Approved



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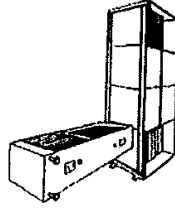
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Quality
Record

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PACKAGE BOILER ECONOMIZERS

INSTALLATION AND OPERATING INSTRUCTIONS **SPARE PARTS RECOMMENDATION**

GENERAL

Immediately upon receipt, unit should be inspected for damage during shipment. If any noticeable damage has occurred, a claim should be filed with the carrier. If major damage is visible, unit should be thoroughly inspected. It should then be determined whether or not to contact ECO, Inc. for field inspection. If nozzle protectors have been lost in shipment, inspect face of flange for damage and confirm that no foreign materials have entered nozzle opening. Economizer is not protected for outside storage for an extended time. If such storage is necessary, the coil must be adequately covered to preclude corrosive damage. Also, to protect against possible coil damage due to freezing, the unit must be stored level to maintain the gravitational self-draining characteristics. Vent and drain plugs should be removed.

INSTALLATION

Remove any flange protectors, boxing, shipping braces or covers. Install unit into duct system. The unit must be installed level to maintain the gravitational self-draining characteristics. If unit is not installed level, non-draining zones will result. Economizer duct openings must seal with duct work flanges to assure gas tight connections. Connect inlet and outlet nozzles of economizer to system piping in accordance with economizer drawing. Care should be taken during the installation of piping. No allowance has been made for stresses due to piping loads. This type of stress should be held to a minimum by supporting external piping and exercising extreme care during make up of a nozzle connection. Check all pressure connections prior to unit start-up to assure joints are sound and no leaks exist.

OPERATION

Unit should be started up by introducing the tubeside fluid through the system prior to introducing the hot flue gas. This sequence is reversed for the shut-down procedure. Introduction of a cold fluid to the hot tubes will result in excessive thermal shock which may result in damage to the coil and/or structure. Operation of unit at very low or no tubeside flow and may result in rapid oxidation of tubes and fins and possible inside fouling with consequent reduction in heat transfer. It is suggested that instrumentation be provided to insure against flow failure and/or excessive temperatures.

SPARE PARTS

Spare parts are not generally recommended unless, in the opinion of the customer's engineering department, standby components are required. In those instances, a list of specific components should be requested.

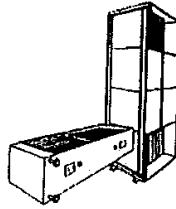
FACTORY ASSISTANCE

In the event problems of any nature arise, that require assistance from the factory, contact ECO, Inc. in Broken Arrow, Oklahoma (Tulsa).

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WARRANTY REPAIR STATEMENT

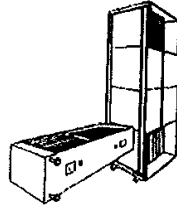
In the event that repair to this unit is necessary, contact ECO, Inc. immediately, at (918) 258-5002. Failure to do this before taking any corrective action will terminate ECO, Inc.'s warranty and ECO, Inc. will not be responsible for any charges incurred.

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TYPICAL PROCEDURES FOR BUNDLE REPAIR **(Insulated Economizer)**

The bundle of the packaged economizer is made up of four basic components:

1. Tubes
2. Returns
3. Headers
4. "Stubs"

The encompassing enclosure of this bundle is normally designed to withstand gas pressure not to exceed ten inches of water column. This casing consists of a basic framework lined with carbon steel plate in the fin tube area and "header boxes" covering the return bend, header area. These sections are seal welded to the basic framework. Insulation is then applied to the outer surface and the exterior lagging is installed last.

Removal of any bundle component can be accomplished by following the procedure outlined below:

STEP 1 Remove screws holding outer casing from both ends of the unit. This outer casing must be removed at least past a line parallel to the end gas flanges (see sketch). After removing the speed clips from the insulation holders, the insulation is clear for removal.

STEP 2 The rain caps and drip pans (see sketch) are then flame cut away from the structure in a manner that they can be replaced in the same position.

STEP 3 The header boxes are then flame cut away from the structure where they connect to the angle iron members and around the header support plates. **Do not** disconnect the header support plates from the structure. The header boxes are to be slotted around these supports. Care must be taken not to damage the bundle when cutting off the box (usually 1 1/2" clearance between box and internal piping).

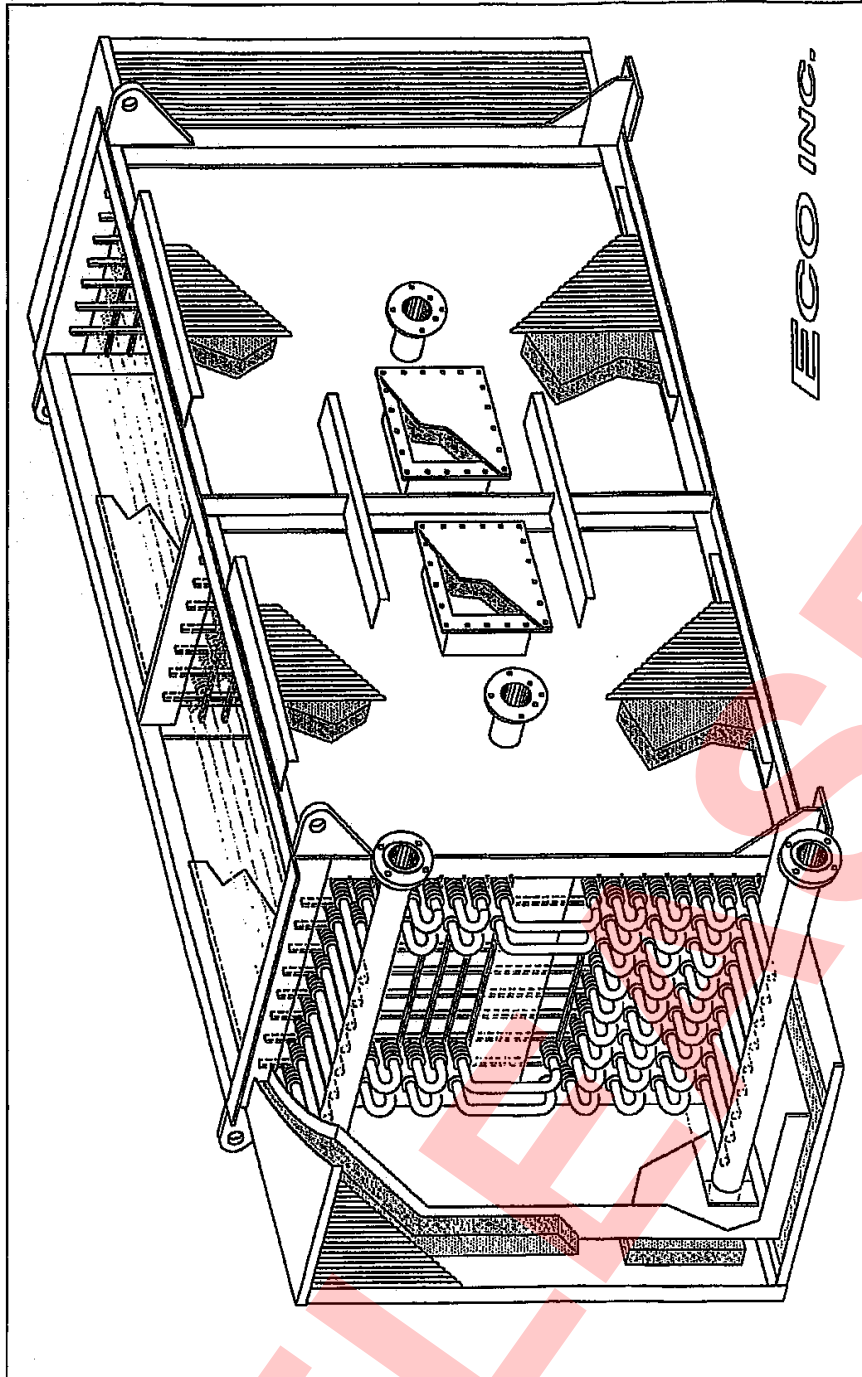
STEP 4 The straight sections of tube are connected with 180 degree return bends into a continuous stream.

The first and last tubes of an individual stream are welded to short "stubs" extending from the respective header pipe. Therefore, when removing any component of the bundle, cuts should be made at weld connections so that duplicates of original parts can be installed in their place.

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ECO, INC.
3101 North Hemlock Circle, Broken Arrow, Ok 74012-1102
Tel: 918/258-5002 Fax: 918/258-5008

ECONOMIZER SPECIFICATIONS

CUSTOMER	CLEAVER BROOKS	CUSTOMER REF.	CP-4143
LOCATION	LINCOLN, NEBRASKA	PROPOSAL NO.	11137
USER	SOUTHERN CO.	DATE	04/05/2011
LOCATION		NO. UNITS	ONE

THERMAL PERFORMANCE DATA

FUEL FIRED	GAS
HEAT RECOVERY BTU/HR	37514192.
TRANSFER RATE OVERALL BTU/HR-FT ² -DEG F	7.88
LMTD DEG F	194.31
EFFECTIVE HEATING SURFACE SQ FT	24982.
MINIMUM TUBE WALL TEMPERATURE DEG F	244.

	TUBE SIDE	SHELL SIDE
FLOW	DOWN	UP
LBS/HR	220420.	296422.
INLET TEMP DEG F	227.	771.
EXIT TEMP DEG F	391.	309.
PRESSURE DROP PSI--IN WC	17.10	2.04
VELOCITY FT/SEC	6.36	40.49
SPECIFIC HEAT BTU/LB-DEG F	1.0374	0.2767
FOULING RESISTANCE	0.0010	0.0010
OPERATING PRESSURE PSIG	360.	
DESIGN PRESSURE PSI--IN WC	565.	16.
DESIGN TEMP DEG F	700.	

TUBE DATA

NO TUBES 180 20/ROW 9 ROWS 10 STRMS PITCH LxT 4.000 x 4.000 STAGGERRED
OD TUBES 2.00 MIN WALL 0.1050 SPEC SA-210-A1
FINNING 6.0/IN X 0.050 THK X 0.750 HI X C STEEL TYPE SERRATED
HEADERS 8 IN SCH 40 TERMINALS 6.0 IN X 600 LB FLG RFWN

DIMENSIONS

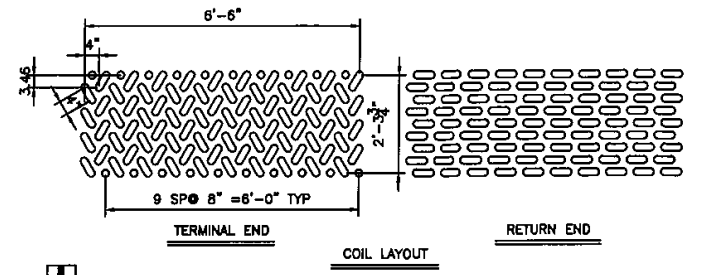
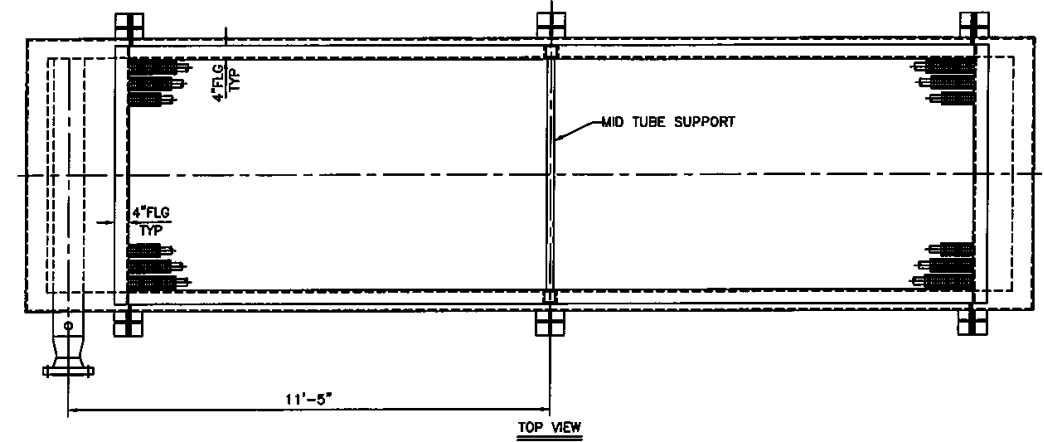
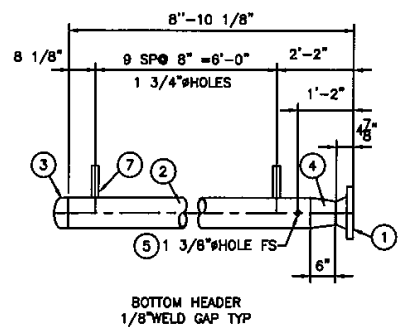
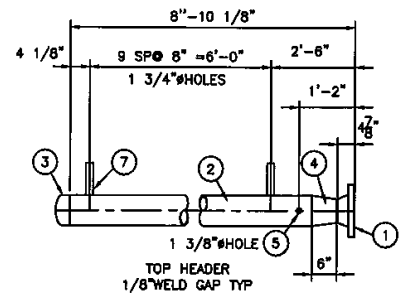
OVERALL LENGTH 23.833 FT OVERALL HT 4.309 OVERALL WIDTH 7.833 FT
DUCT OPENING L X W (FT) 20.000 X 6.833 SOOTBLOWER LANE 0 - 0.00 IN
NO TUBE SUPPORTS 3 SPAN BETWEEN SUPPORTS 10.000 FT
ESTIMATED WT DRY 36077 LBS ESTIMATED WT FLOODED 39833 LBS
INNER CASING THICKNESS 10 GAUGE

NOTE: This unit is designed, fabricated, and stamped in accordance with the latest edition of the ASME SECTION I POWER BOILER CODE.

Quality
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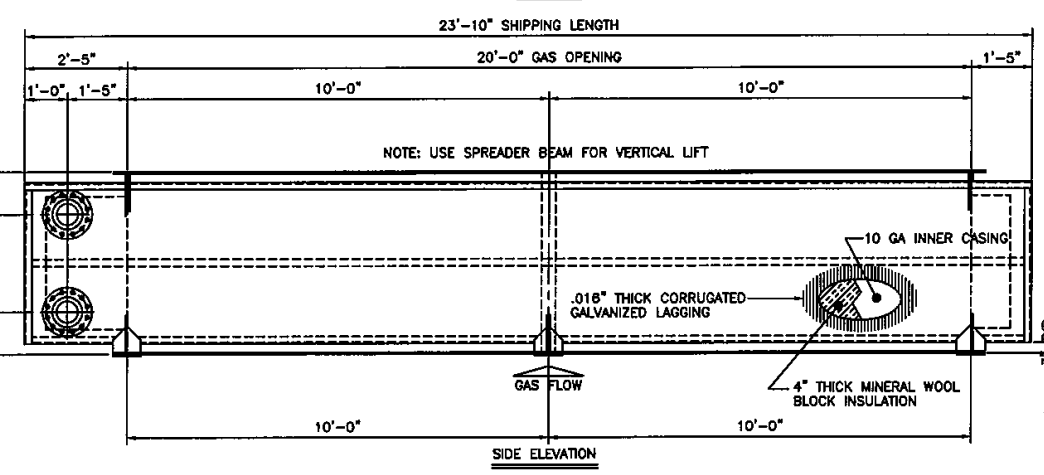
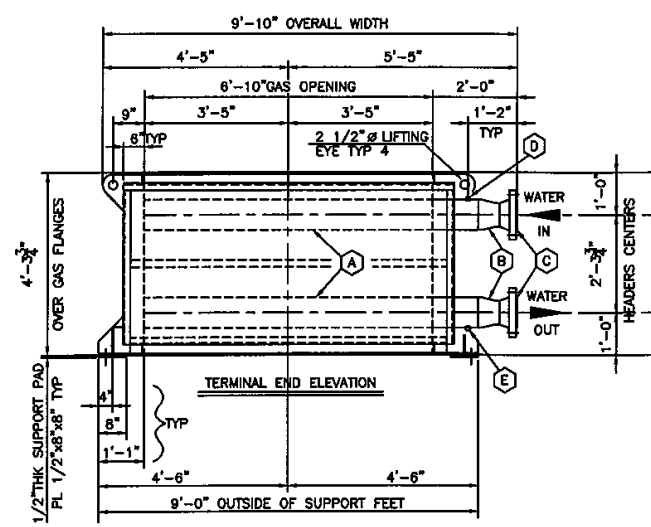
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COIL BILL OF MATERIAL SHOWN FOR ONE-ONE REQUIRED

PART	QTY	DESCRIPTION	MAT'L
1	2	6"-800# RFWN FLANGE SCH80 BORE	SA-105
2	2	8" SCH 80 PIPE x 7'-11" (BBE)	SA-106-B
3	2	8" SCH 80 WELD CAP	SA-234-WPB
4	2	8" x 6" SCH 80 CONCENTRIC REDUCER	SA-234-WPB
5	2	10-6 x 1"-3000# THREDOLET W/ PLUG	SA-105
6	180	2"ODx.105"MWx20'-7" STRT F.T.	SA-210-A1
7	20	2"ODx.105"MWx0'-9 1/16" HEADER STUBS	SA-210-A1
8	170	2"ODx.105"MWx HT FRGD 180'RET BEND 4" C/C	SA-234-WPB



- NOTES
- CUSTOMER P.O.: L161800
 - TUBES: 2"O.D. x .105"MW. x SA-210-A1 MATERIAL
 - FINS: 6 PER INCH x .05"THK. x .75"HL. C.S. SERRATED
 - DESIGN PRESSURE: 585 PSIG @ 700 F.
 - HYDROSTATIC TEST PRESSURE: 848 PSIG
 - RADIOGRAPH 100% OF ALL COIL WELDS AND HOT FORGED RETURN BENDS
 - CODE STAMPED ASME SECTION I PJ
 - EFFECTIVE HEATING SURFACE: 24982 SQUARE FEET
 - RATED HEAT ABSORPTION: 37514192 BTU/HOUR
 - ESTIMATED WEIGHT: 38500# DRY, 40500# WET
 - NUMBER OF UNITS: ONE
 - END USER: MISSISSIPPI POWER CO, KEMPER COUNTY (IGCC FACILITY)
 - LOCATION: LIBERTY, MS 39845
 - ALL STRUCTURE IS A-36 CARBON STEEL, DESIGNED FOR A MAXIMUM 5000# IMPOSED DEAD LOAD
 - INNER CASING IS DESIGNED, STIFFENED AND GAS TIGHT SEAL WELDED, FOR ± 16" W.C. INTERNAL PRESSURE
 - PREP. AND PAINT: ALL OUTER CARBON STEEL SURFACES WILL BE CLEANED PER SSPC-SP3 THEN PAINTED WITH ONE COAT OF HI-TEMP BLACK
 - THIS UNIT MAY NOT BE OPERATED IN A STEAMING CONDITION. IF SO OPERATED, VAPOR LOCKING AND THERMAL SHOCK MAY OCCUR, CAUSING SEVERE DAMAGE, THUS VOIDING ALL WARRANTIES.
 - THIS EQUIPMENT IS NOT WARRANTED AGAINST ANY TYPE OF EROSION OR CORROSION
 - HOT FORGED RETURN BENDS: 2"O.D. x .105"MW. x 180', 4" C/C x SA-234-WPB MATERIAL
 - THE MAXIMUM THICKNESS USED FOR ANY PRESSURE RETAINING PART USED FOR ECONOMIZER CONSTRUCTION IS LESS THAN 3/4"
 - CARBON CONTENT FOR ANY PRESSURE RETAINING PART USED FOR ECONOMIZER CONSTRUCTION SHALL BE LESS THAN 0.3%

- HEADER & CONNECTION DESCRIPTION
(NOTE: ALL NOZZLE FLANGES---BOLT HOLES TO STRADDLE CENTERLINES)
- (A) HEADER PIPE 8" SCH. 80 x SA-106-B
 - (B) 8" x 6" CONCENTRIC REDUCER x SA-234-WPB
 - (C) FLANGE 6"-800# RFWN SCH. 80 BORE x SA-105
 - (D) VENT 1"-3000# THREDOLET W/ PLUG x SA-105
 - (E) DRAIN 1"-3000# THREDOLET W/ PLUG x SA-105

REVISION	ECO INC.	
	SCALE NONE	DRAWN BY CEB
	DATE 05-26-11	REVISED 09-29-11
	ECONOMIZER	
PER CUSTOMER REQUEST AND MARKUP ---ADDED NOTES 20 AND 21		FOR CLEAVER BROOKS DWS NO J-1348-1A



Approved

**FORM P-3 MANUFACTURER'S DATA REPORT FOR WATERTUBE BOILERS, SUPERHEATERS,
WATERWALLS, AND ECONOMIZERS**

As Required by the Provisions of the ASME Code Rules, Section I

**MASTER DATA REPORT YES
(Check one) NO**

1. Manufactured by Economasters, L.L.C. 3209 W. 21st St. Tulsa, Ok. 74107
(Name and address of manufacturer)

2. Manufactured for Eco, Inc. 3101 N. Hemlock Circle Ste. 110-F Broken Arrow, Ok. 74012
(Name and address of purchaser)

3. Location of installation Mississippi Power Co. Liberty, Ms. 39645
(Name and address)

4. Unit identification Economizer ID Nos. 11070 J-1348-1A Rev. 1 1491 2012
(Complete boiler, superheater, waterwall, economizer, etc.) (Manufacturer's Serial No.) (CRN) (Drawing No.) (Nat'l. Board No.) (Year built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to Section I of the ASME BOILER AND PRESSURE VESSEL CODE 2010
(Year)

Addenda to NA and Code Cases _____
(Date) (Numbers)

Supporting Manufacturer's Data Reports properly identified and signed by Commissioned Inspectors are attached for the following items of this report:

(Name of part, item number, manufacturer's name, and identifying stamp)

6(a). Drums

No.	Inside Diameter	Inside Length	Shell Plates			Tubesheets		Tube Hole Ligament Efficiency, %	
			Material Spec. No., Grade	Thickness	Inside Radius	Thickness	Inside Radius	Longitudinal	Circumferential
1									
2									
3									

No.	Longitudinal Joints		Circum. Joints		Heads					Hydrostatic Test
	No. & type*	Efficiency	No. & type	Efficiency	Material Spec. No., Grade	Thickness	Type**	Radius of Dish	Manholes No. Size	
1										
2										
3										

*Indicate if (1) Seamless; (2) Fusion welded.

**Indicate if (1) Flat; (2) Dished; (3) Ellipsoidal; (4) Hemispherical.

6(b). Boiler Tubes

Diameter	Thickness	Material Spec. No., Grade

6(c). Headers No. _____
(Box or sinuous or round; Material spec. no.; Thickness)

Heads or Ends _____ Hydro. Test _____
(Shape; Material spec. no.; Thickness)

6(d). Staybolts _____
(Material spec. no.; Diameter; Size telltale; Net area)

Pitch _____ Net Area _____ MAWP _____
(Horizontal and Vertical) (Supported by one bolt)

6(e). Mud Drum _____ Hydro. test _____
(For sect. header boilers. State Size; Shape; Material spec. no.; Thickness) (Shape; Material spec. no.; Thickness)

7(a). Waterwall Headers

No.	Size and Shape	Material Spec. No.	Thickness	Heads or Ends			Hydro. Test	7(b). Waterwall Tubes		
				Shape	Thickness	Material Spec. No.		Diameter	Thickness	Material Spec. No.

8(a). Economizer Headers

No.	Size and Shape	Material Spec. No.	Thickness	Shape	Thickness	Material Spec. No.	Hydro. Test	8(b). Economizer Tubes		
								Diameter	Thickness	Material Spec. No.
2	7.625" Rnd.	SA-106-B	.438"	Ellip.	.438"	SA234WPB		2"	.105"	SA-210-A1

(09/06)

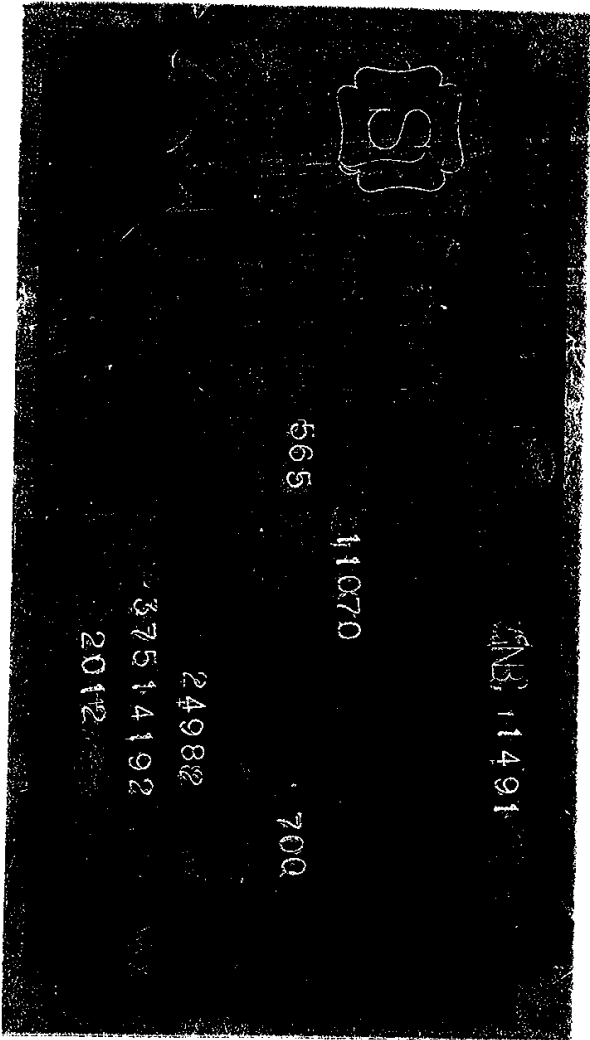
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T. J. Hall
01-16-2012

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ANB 11491

11070

665

700

24982

37514192

2012



Jul
01-16-2012

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ECONOMASTERS L.L.C.

HYDROSTATIC TEST CERTIFICATE

E.M.L.L.C. JOB NO.

11070

CUSTOMER JOB NO.

J-1348

CUSTOMER P.O. NO.

J-1348-6

THE UNIT NOTED ABOVE WAS HYDROSTATIC TESTED ON

DATE

11/13/12

AS FOLLOWS:

TESTED AT

848

P.S.I.

FOR

1

Hr(s).

Sally Thom
ECONOMASTERS L.L.C. Q.C.

Bob West 11/13/12
CUSTOMER REPRESENTATIVE

Quality
Record

Thom
01-16-2012

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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure
 RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
 O.F.D. = Object-to-film distance
 S.O.D. + O.F.D. = S.F.D.

Customer: ECONOMASTERS Radiographer: Chris Cole Level II

Customer P.O. No.: _____ Job No.: 11070 Date: 1-12-12

TESTING VARIABLES

Ir ¹⁹² Co ⁶⁰ X-Ray : Ci 50 kV _____ mA _____ EFSS: 114

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

EXPOSURE: DWE/SWV DWE/DWV SWE/SWV

FILM: TYPE 80 CLASS I SENSITIVITY 2-2T

FILM USAGE: 3 1/2 x 8 1/2 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<u>TUBS WELDS</u>	<u>7"</u>	<u>105</u>	<u>1 E+L</u>	<u>105</u>	<div style="font-size: 2em; opacity: 0.3; position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); pointer-events: none;"> PRELIMINARY </div> <u>1/13/12</u>
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Jull 01-17-20



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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure
 RT 1, 2, 2A, 6, 7 - Single Wall Exposure
 RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
 O.F.D. = Object-to-film distance
 S.O.D. + O.F.D. = S.F.D.

Customer <i>ECONOMASTERS</i>	Radiographer <i>Chris Cole</i>	Level II
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Customer P.O. No.:	Job No.: <i>11076</i>	Date: <i>1-12-12</i>
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TESTING VARIABLES

Ir ¹⁹² Co ⁶⁰ X-Ray : Ci 50 kV _____ mA _____ EFSS: 114

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

EXPOSURE: DWE/SWV DWE/DWV SWE/SWV

FILM: TYPE 80 CLASS I SENSITIVITY 2-2T

FILM USAGE: 3 1/2 x 8 1/2 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<i>TUBS WELDS</i>	<i>7"</i>	<i>.105</i>	<i>29 ORL</i>	<i>.105</i>	<div style="font-size: 4em; opacity: 0.3; position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); pointer-events: none;"> PRELIMINARY </div> OK 1/13/12 <i>CF</i> REWORK OK 1/13/12 <i>CF</i> OK 1/13/12 <i>CF</i>
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			<i>64</i>		
			<i>55</i>		



Jan 17 2012

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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure
RT 1, 2, 2A, 6, 7 - Single Wall Exposure
RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
O.F.D. = Object-to-film distance
S.O.D. + O.F.D. = S.F.D.

Customer <i>Economaster</i>	Radiographer <i>Chris Cato</i>	Level II
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Customer P.O. No.:	Job No.: <i>11070</i>	Date: <i>1-7-12</i>
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TESTING VARIABLES

Ir ¹⁹² Co ⁶⁰ X-Ray : Ci *70* kV _____ mA _____ EFSS: *14*

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

EXPOSURE: DWE/SWV DWE/DWV SWE/SWV

FILM: TYPE *20* CLASS *I* SENSITIVITY *2-5T*

FILM USAGE: 3 1/2 x 8 1/2 _____ 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<i>TUBS WELDS</i>	<i>7"</i>	<i>105</i>	<i>56 E+L</i>	<i>105</i>	
			<i>57</i>		
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			<i>78</i>		<i>OK 1/9/12 [Signature]</i>
			<i>79</i>		
			<i>80</i>		
			<i>81</i>		
			<i>82</i>		
			<i>83</i>		
			<i>84</i>		
			<i>85</i>		
			<i>86</i>		
			<i>87</i>		<i>REWORK OK 1/14/12 [Signature]</i> <i>OK 1/9/12 [Signature]</i>
			<i>88</i>		
			<i>89</i>		

1/17/12 01-17-2012



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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure

RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance

O.F.D. = Object-to-film distance

S.O.D. + O.F.D. = S.F.D.

Customer: Economaster Radiographer: Chris Cals Level II

Customer P.O. No.: _____ Job No.: 11070 Date: 1-7-12

TESTING VARIABLES

Ir ¹⁹² Co ⁶⁰ X-Ray : Ci 70 kV _____ mA _____ EFSS: .14

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

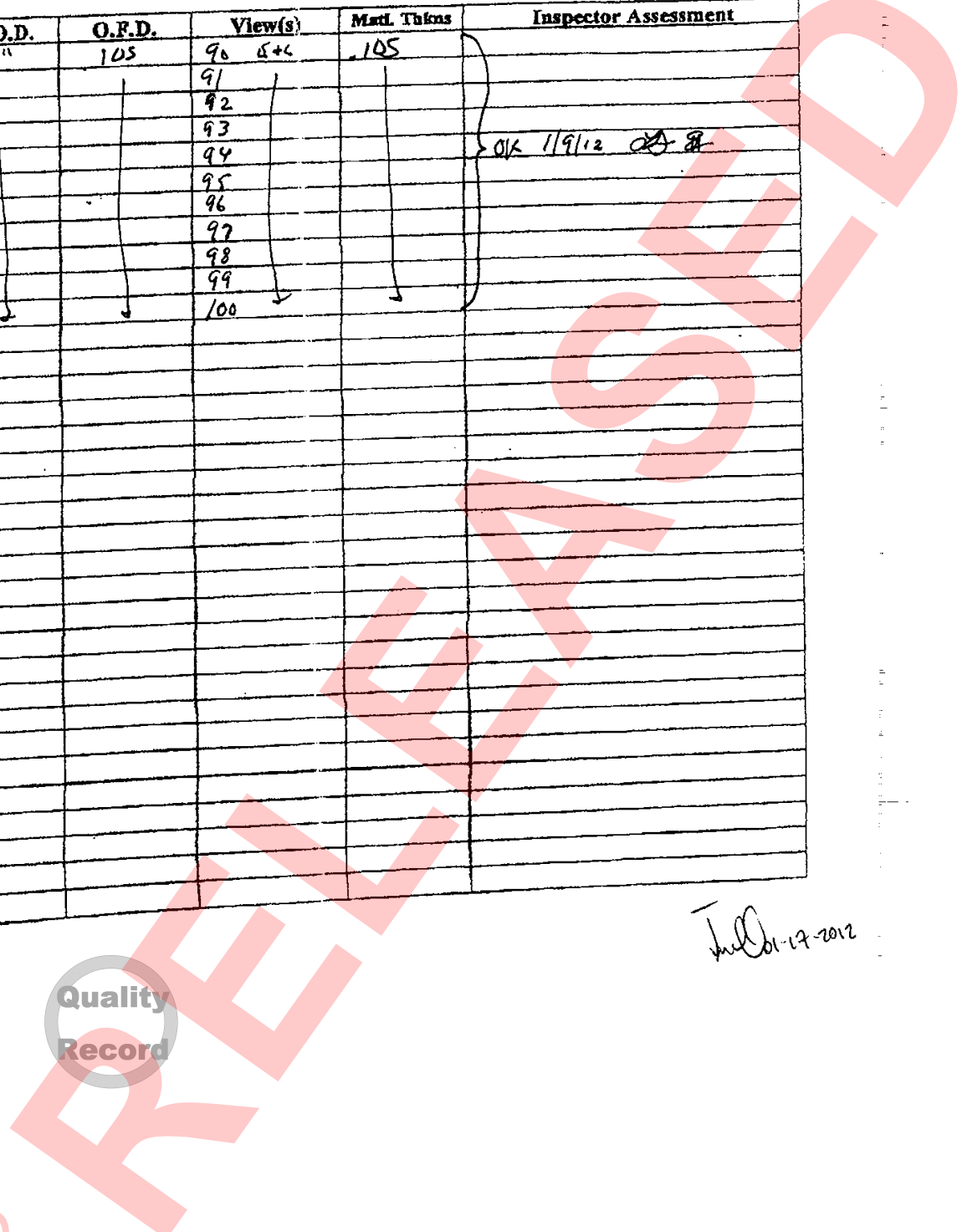
EXPOSURE: DWE/SWV DWE/DWV SWE/SWV

FILM: TYPE 20 CLASS I SENSITIVITY 2-2T

FILM USAGE: 3 1/2 x 8 1/2 _____ 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<u>TRABE WELDS</u>	<u>7"</u>	<u>105</u>	<u>90 & 91</u>	<u>.105</u>	<u>OK 1/9/12 CR</u>
			<u>92</u>		
			<u>93</u>		
			<u>94</u>		
			<u>95</u>		
			<u>96</u>		
			<u>97</u>		
			<u>98</u>		
			<u>99</u>		
			<u>100</u>		

1/9/12



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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure
RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
O.F.D. = Object-to-film distance
S.O.D. + O.F.D. = S.F.D.

Customer	Radiographer <i>S. Hawec</i>	Level II
Customer P.O. No.:	Job No.: <i>11070</i>	Date: <i>1-9-12</i>

TESTING VARIABLES

Ir Co X-Ray : Ci *46* kV _____ mA _____ EFSS: _____
 PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM
 EXPOSURE: DWE/SWV DWE/DWV SWE/SWV
 FILM: TYPE *80* CLASS *I* SENSITIVITY _____
 FILM USAGE: 3 1/2 x 8 1/2 _____ 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<i>Tube wrap</i>	<i>135</i>	<i>7</i>	<i>101 E+L</i>	<i>.105</i>	<i>OK 1/10/12 [Signature]</i>
			<i>102</i>		
			<i>103</i>		
			<i>104</i>		
			<i>105</i>		
			<i>106</i>		
			<i>107</i>		
			<i>108</i>		
			<i>109</i>		
			<i>110</i>		
			<i>111</i>		
			<i>112</i>		
			<i>113</i>		
			<i>114</i>		<i>L-rupture } OK 1/14/12 [Signature]</i> <i>L-rupture }</i>
			<i>115</i>		
			<i>116</i>		
			<i>117</i>		
			<i>118</i>		
			<i>119</i>		
			<i>120</i>		
			<i>121</i>		
			<i>122</i>		
			<i>123</i>		<i>OK 1/10/12 [Signature]</i>
			<i>124</i>		
			<i>125</i>		
			<i>126</i>		
			<i>127</i>		
			<i>128</i>		
			<i>129</i>		
			<i>130</i>		
			<i>131</i>		
			<i>132</i>		
			<i>133</i>		
			<i>134</i>		

Jill
01-16-2012



FREE

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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure
 RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
 O.F.D. = Object-to-film distance
 S.O.D. + O.F.D. = S.F.D.

Customer	Radiographer <i>S. Howard</i>	Level II
Customer P.O. No.:	Job No.: <i>11070</i>	Date: <i>1-10-12</i>

TESTING VARIABLES

Ir 192 Co 60 X-Ray : Ci *69* kV _____ mA _____ EFSS: *00A*

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

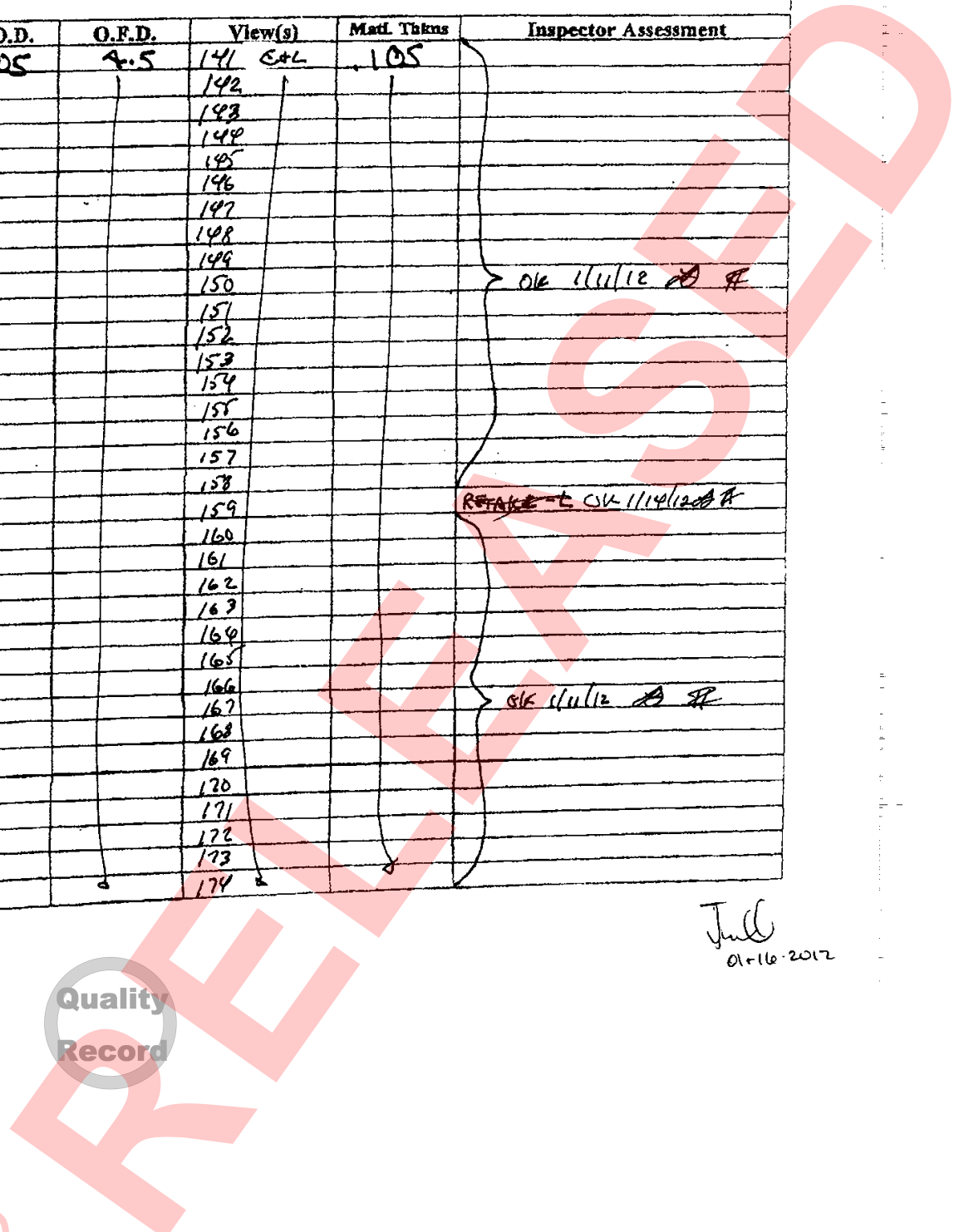
EXPOSURE: DWE/SWV DWE/DWV SWE/SWV

FILM: TYPE *80* CLASS *I* SENSITIVITY *2.2T*

FILM USAGE: 3 1/2 x 8 1/2 _____ 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<i>TURBOWELPS</i>	<i>105</i>	<i>4.5</i>	<i>141 CAL</i>	<i>105</i>	<i>OK 1/11/12 AS #</i> <i>RE-EXAM - E SW 1/14/12 AS #</i> <i>OK 1/11/12 AS #</i>
			<i>142</i>		
			<i>143</i>		
			<i>144</i>		
			<i>145</i>		
			<i>146</i>		
			<i>147</i>		
			<i>148</i>		
			<i>149</i>		
			<i>150</i>		
			<i>151</i>		
			<i>152</i>		
			<i>153</i>		
			<i>154</i>		
			<i>155</i>		
			<i>156</i>		
			<i>157</i>		
			<i>158</i>		
			<i>159</i>		
			<i>160</i>		
			<i>161</i>		
			<i>162</i>		
			<i>163</i>		
			<i>164</i>		
			<i>165</i>		
			<i>166</i>		
			<i>167</i>		
			<i>168</i>		
			<i>169</i>		
			<i>170</i>		
			<i>171</i>		
			<i>172</i>		
			<i>173</i>		
			<i>174</i>		

Just
01-16-2012



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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure
RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
O.F.D. = Object-to-film distance
S.O.D. + O.F.D. = S.F.D.

Customer	Radiographer <i>S. Howard</i>	Level II
Customer P.O. No.:	Job No.: <i>11070</i>	Date: <i>1-10-12</i>

TESTING VARIABLES

Ir 192 Co 60 X-Ray : Ci *69* kV _____ mA _____ EFSS: *004*

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

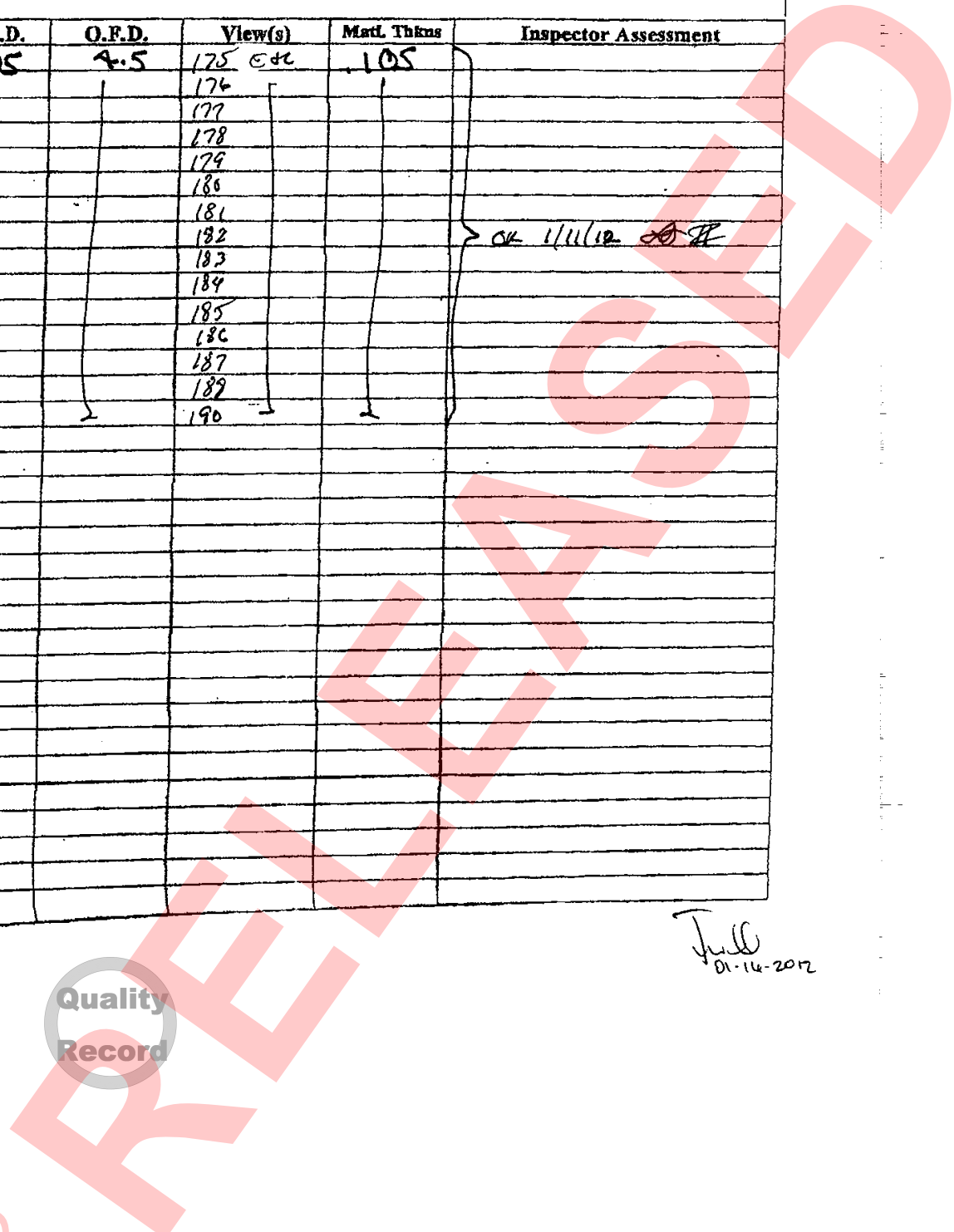
EXPOSURE: DWE/SWV DWE/DWV SWE/SWV

FILM: TYPE *80* CLASS *I* SENSITIVITY *2.25*

FILM USAGE: 3 1/2 x 8 1/2 _____ 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<i>TUBEWALL</i>	<i>105</i>	<i>4.5</i>	<i>175 etc</i>	<i>105</i>	} <i>OK 1/11/12 SHH</i>
			<i>176</i>		
			<i>177</i>		
			<i>178</i>		
			<i>179</i>		
			<i>180</i>		
			<i>181</i>		
			<i>182</i>		
			<i>183</i>		
			<i>184</i>		
			<i>185</i>		
			<i>186</i>		
			<i>187</i>		
			<i>188</i>		
			<i>190</i>		

Full
01-14-2012



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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure

RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance

O.F.D. = Object-to-film distance

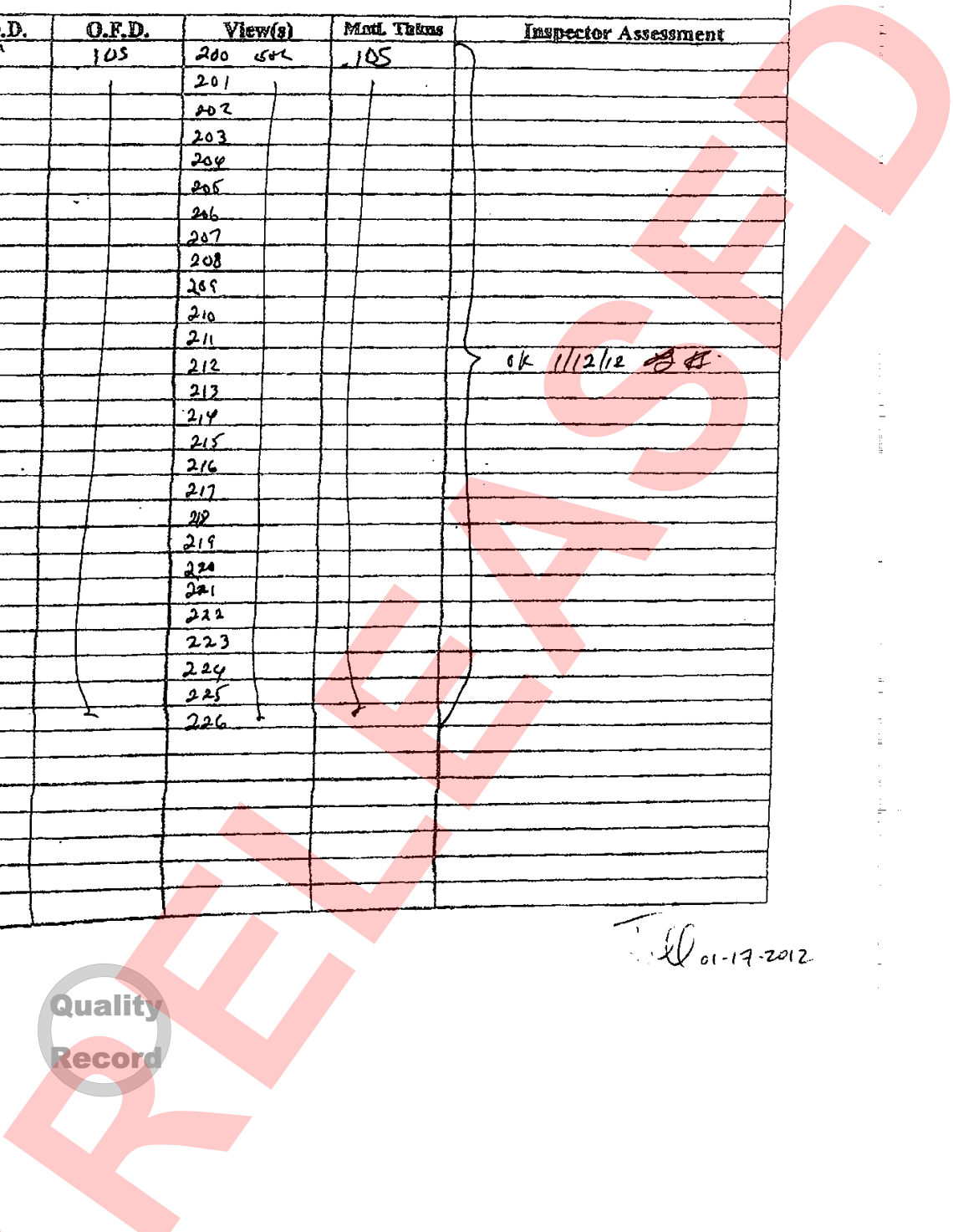
S.O.D. + O.F.D. = S.F.D.

Customer: Economaster Radiographer: Chris Cato Level: II
 Customer P.O. No.: Job No.: 11070 Date: 1-11-12

TESTING VARIABLES
 Ir 192 Co 60 X-Ray : Ci 70 kV _____ mA _____ EFSS: 14
 PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM
 EXPOSURE: DWE/SWV DWE/DWV SWE/SWV
 FILM: TYPE 20 CLASS I SENSITIVITY 2-5T
 FILM USAGE: 3 1/2 x 8 1/2 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Mntl. Thoms	Inspector Assessment
<u>TRAPS W/ALPS</u>	<u>7"</u>	<u>105</u>	<u>200</u> <u>50x</u>	<u>105</u>	} <u>ok 1/12/12</u> <u>CC</u>
			<u>201</u>		
			<u>202</u>		
			<u>203</u>		
			<u>204</u>		
			<u>205</u>		
			<u>206</u>		
			<u>207</u>		
			<u>208</u>		
			<u>209</u>		
			<u>210</u>		
			<u>211</u>		
			<u>212</u>		
			<u>213</u>		
			<u>214</u>		
			<u>215</u>		
			<u>216</u>		
			<u>217</u>		
			<u>218</u>		
			<u>219</u>		
			<u>220</u>		
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			<u>223</u>		
			<u>224</u>		
			<u>225</u>		
			<u>226</u>		

Tell 01-17-2012



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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure
RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
O.F.D. = Object-to-film distance
S.O.D. + O.F.D. = S.F.D.

Customer: Econmaster Radiographer: Chris Cals Level II
Customer P.O. No.: Job No.: 11070 Date: 1-11-12

TESTING VARIABLES
 Ir 102 Co 40 X-Ray : Ci 70 kv _____ mA _____ EFSS: 14
 PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM
 EXPOSURE: DWE/SWV DWE/DWV SWE/SWV
 FILM: TYPE 20 CLASS I SENSITIVITY 2-2T
 FILM USAGE: 3 1/2 x 8 1/2 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<u>TRUCK WHEELS</u>	<u>7"</u>	<u>105</u>	<u>227 c+l</u>	<u>105</u>	
			<u>228</u>		
			<u>229</u>		
			<u>230</u>		
			<u>231</u>		
			<u>232</u>		
			<u>233</u>		
			<u>234</u>		
			<u>235</u>		
			<u>236</u>		
			<u>237</u>		
			<u>238</u>		
			<u>239</u>		
			<u>240</u>		
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			<u>245</u>		
			<u>246</u>		
			<u>247</u>		
			<u>248</u>		
			<u>249</u>		
			<u>250</u>		
			<u>251</u>		
			<u>252</u>		
			<u>253</u>		
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			<u>256</u>		
			<u>257</u>		
			<u>258</u>		
			<u>259</u>		
			<u>260</u>		

OK 1/12/12

[Signature]
01-10-2012



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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure
RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
O.F.D. = Object-to-film distance
S.O.D. + O.F.D. = S.F.D.

Customer: Economaster Radiographer: Chris Cals Level: II

Customer P.O. No.: _____ Job No.: 11070 Date: 1-12-12

TESTING VARIABLES

Ir ¹⁹² Co ⁶⁰ X-Ray : Ci 70 kV _____ mA _____ EFSS: 14
 PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM
 EXPOSURE: DWE/SWV DWE/DWV SWE/SWV
 FILM: TYPE 20 CLASS I SENSITIVITY 2-2T
 FILM USAGE: 3 1/2 x 8 1/2 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
TUBS WELDS	7"	105	261 CWL	.105	OK 1/13/12 <i>[Signature]</i>
			262		
			263		
			264		
			265		
			266		
			267		
			268		
			269		
			270		
			271		
			272		
			273		
			274		
			275		
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			290		
			291		
			292		
			293		
			294		



[Signature]
01-10-2010

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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure
RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
O.F.D. = Object-to-film distance
S.O.D. + O.F.D. = S.F.D.

Customer: Economaster Radiographer: Chris Cals Level: II

Customer P.O. No.: _____ Job No.: 11070 Date: 1-12-12

TESTING VARIABLES

Ir ¹⁹² Co ⁶⁰ X-Ray : Ci 70 kV _____ mA _____ EFSS: 14

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

EXPOSURE: DWE/SWV DWED/DWV SWE/SWV

FILM: TYPE 20 CLASS I SENSITIVITY 2-2T

FILM USAGE: 3 1/2 x 8 1/2 _____ 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thkns	Inspector Assessment
<u>TUBES WALLS</u>	<u>7"</u>	<u>105</u>	<u>308 6+L</u>	<u>105</u>	<u>OK 1/13/12 [Signature]</u>
			<u>309</u>		<u>OK 1/14/12 [Signature]</u>
			<u>310</u>		
			<u>311</u>		
			<u>312</u>		
			<u>313</u>		
			<u>314</u>		
			<u>315</u>		
			<u>316</u>		
			<u>317</u>		
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			<u>320</u>		
			<u>321</u>		
			<u>322</u>		
			<u>323</u>		
			<u>324</u>		<u>OK 1/13/12 [Signature]</u>
			<u>325</u>		
			<u>326</u>		
			<u>327</u>		
			<u>328</u>		
			<u>329</u>		
			<u>330</u>		
			<u>331</u>		
			<u>332</u>		
			<u>333</u>		
			<u>334</u>		
			<u>335</u>		
			<u>336</u>		
			<u>337</u>		
			<u>338</u>		



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01-16-2012

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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure
RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
O.F.D. = Object-to-film distance
S.O.D. + O.F.D. = S.F.D.

Customer <u>Economaster</u>	Radiographer <u>Chh Chh</u>	Level II
Customer P.O. No.:	Job No.:	Date: <u>1-15-12</u>

TESTING VARIABLES

Ir ¹⁹² Co ⁶⁰ X-Ray : Ci 70 kV _____ mA _____ EFSS: 14

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

EXPOSURE: DWE/SWV DWED/DWV SWE/SWV

FILM: TYPE EU CLASS _____ SENSITIVITY 2.2T

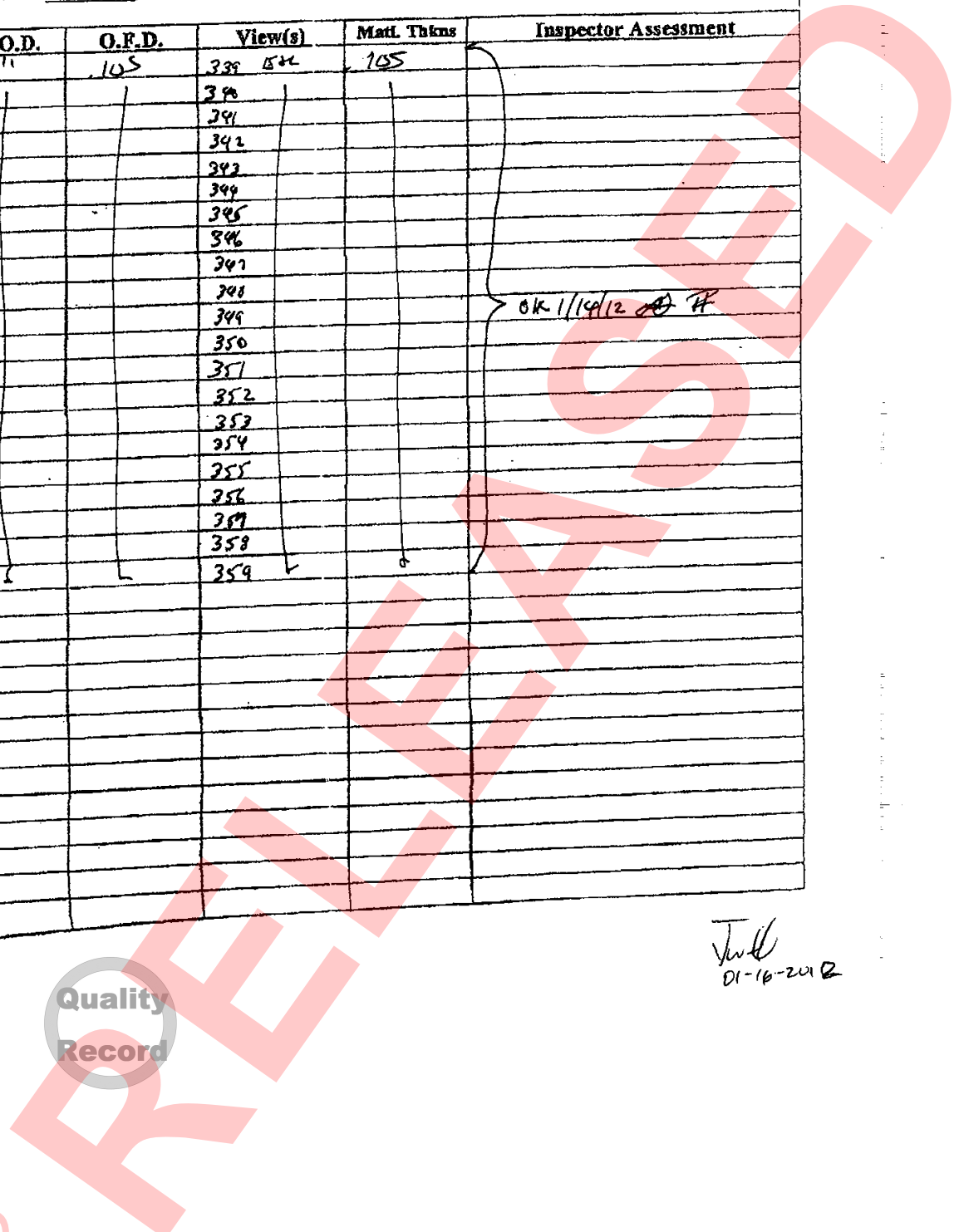
FILM USAGE: 3 1/2 x 8 1/2 3 1/2 x 10 _____ 3 1/2 x 17 _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Mat. Thkns	Inspector Assessment
<u>Tube Weld</u>	<u>7"</u>	<u>105</u>	<u>339 5H</u>	<u>105</u>	} <u>OK 1/14/12 JH</u>
			<u>339</u>		
			<u>341</u>		
			<u>342</u>		
			<u>343</u>		
			<u>344</u>		
			<u>345</u>		
			<u>346</u>		
			<u>347</u>		
			<u>348</u>		
			<u>349</u>		
			<u>350</u>		
			<u>351</u>		
			<u>352</u>		
			<u>353</u>		
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			<u>357</u>		
			<u>358</u>		
			<u>359</u>		



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01-16-2012

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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedure

RT 1, 2, 2A, 6, 7 - Single Wall Exposure

RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance

O.F.D. = Object-to-film distance

S.O.D. + O.F.D. = S.F.D.

Customer <i>Economaster</i>	Radiographer <i>Chris Coombs</i>	Level II
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Customer P.O. No.:	Job No.: <i>11070</i>	Date: <i>1-13-12</i>
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TESTING VARIABLES

Ir Co X-Ray : Ci *70* kV _____ mA _____ EFSS: *.14*

PROCESSING: MANUAL AUTOMATIC SINGLE FILM COMPOSITE FILM

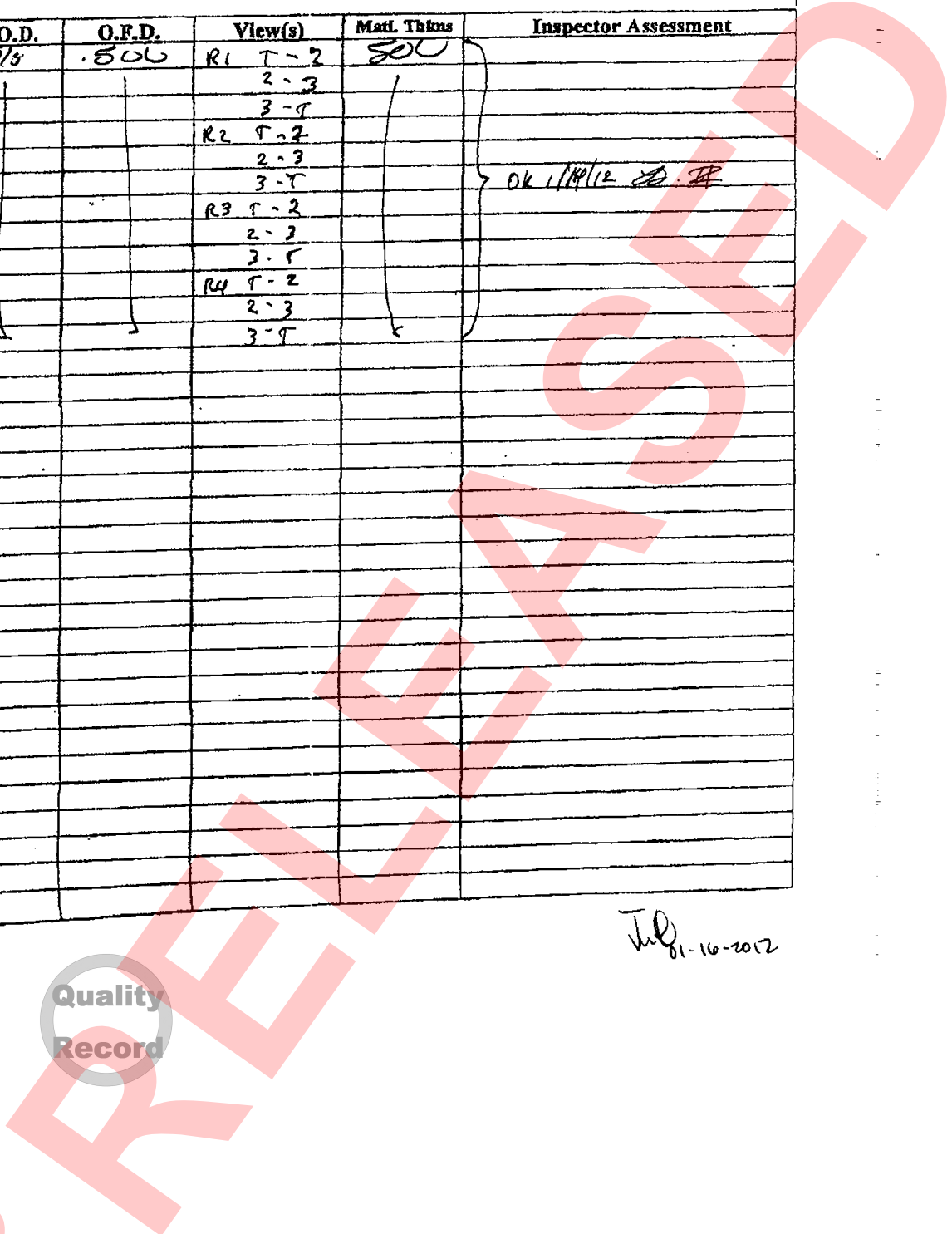
EXPOSURE: DWE/SWV DW/DWV SWE/SWV

FILM: TYPE *SO* CLASS *T* SENSITIVITY *-015*

FILM USAGE: 3 1/2 x 8 1/2 _____ 3 1/2 x 10 _____ 3 1/2 x 17 *X* _____ 4 1/2 x 10 _____ 4 1/2 x 17 _____
 14 x 17 _____ 7 x 8 1/2 _____ 7 x 17 _____ 8 x 10 _____ 70 mm _____ Other _____

Part	S.O.D.	O.F.D.	View(s)	Mat. Thkns	Inspector Assessment
<i>HORS.</i>	<i>87 1/2</i>	<i>806</i>	<i>R1 T-2</i>	<i>SO</i>	<i>OK 1/14/12 [Signature]</i>
			<i>2-3</i>		
			<i>3-4</i>		
			<i>R2 T-2</i>		
			<i>2-3</i>		
			<i>3-4</i>		
			<i>R3 T-2</i>		
			<i>2-3</i>		
			<i>3-4</i>		
			<i>R4 T-2</i>		
			<i>2-3</i>		
			<i>3-4</i>		

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RADIOGRAPHIC INTERPRETATION REPORT

IRISNDT Procedures
 RT 1, 2, 2A, 6, 7 - Single Wall Exposure
 RT 3, #A, 4, 5, 8 - Double Wall Exposure

S.O.D. = Source-to-object distance
 O.F.D. = Object-to-film distance
 S.O.D. + O.F.D. = S.F.D.

Customer <i>Economaster</i>	Radiographer <i>Chris Cuh</i>	Level II
Customer P.O. No.:	Job No.: <i>11070</i>	Date: <i>1-15-12</i>
TESTING VARIABLES		
Ir <input checked="" type="checkbox"/> Co <input type="checkbox"/> X-Ray <input type="checkbox"/> : Ci	kv _____	mA _____
PROCESSING: MANUAL <input type="checkbox"/> AUTOMATIC <input checked="" type="checkbox"/>	SINGLE FILM <input checked="" type="checkbox"/>	COMPOSITE FILM <input type="checkbox"/>
EXPOSURE: DWE/SWV <input checked="" type="checkbox"/> DWE/DWV <input type="checkbox"/>	SWE/SWV <input type="checkbox"/>	
FILM: TYPE <i>90</i>	CLASS <i>I</i>	SENSITIVITY <i>.010</i>
FILM USAGE: $3\frac{1}{2} \times 8\frac{1}{2}$ _____ $3\frac{1}{2} \times 10$ <input checked="" type="checkbox"/> $3\frac{1}{2} \times 17$ _____	$4\frac{1}{2} \times 10$ _____ $4\frac{1}{2} \times 17$ _____	70 mm _____ Other _____
14 x 17 _____ $7 \times 8\frac{1}{2}$ _____	7 x 17 _____	8 x 10 _____

Part	S.O.D.	O.F.D.	View(s)	Matl. Thins	Inspector Assessment
<i>HDR5</i>	<i>670</i>	<i>.432</i>	<i>R5 T-2</i>	<i>.472</i>	} <i>OK 1/19/12</i>
<i> </i>	<i> </i>	<i> </i>	<i>2-2</i>	<i> </i>	
<i> </i>	<i> </i>	<i> </i>	<i>3-T</i>	<i> </i>	
<i> </i>	<i> </i>	<i> </i>	<i>R6 T-2</i>	<i> </i>	
<i> </i>	<i> </i>	<i> </i>	<i>2-3</i>	<i> </i>	
<i> </i>	<i> </i>	<i> </i>	<i>3-T</i>	<i> </i>	



J.W. 01-16-2012

APPROVED

Approved

120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21
 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61
 Z → 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 ← Z
 → 396 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 ← Z
 159 158 157 156 155 154 153 152 151 150 149 148 147 146 145 144 143 142 141 140
 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359

EMLIC 11076
ECO S-1348

Pictures END

WELPST - 0
WALDGRA - 2

[Signature]
01-13-2012



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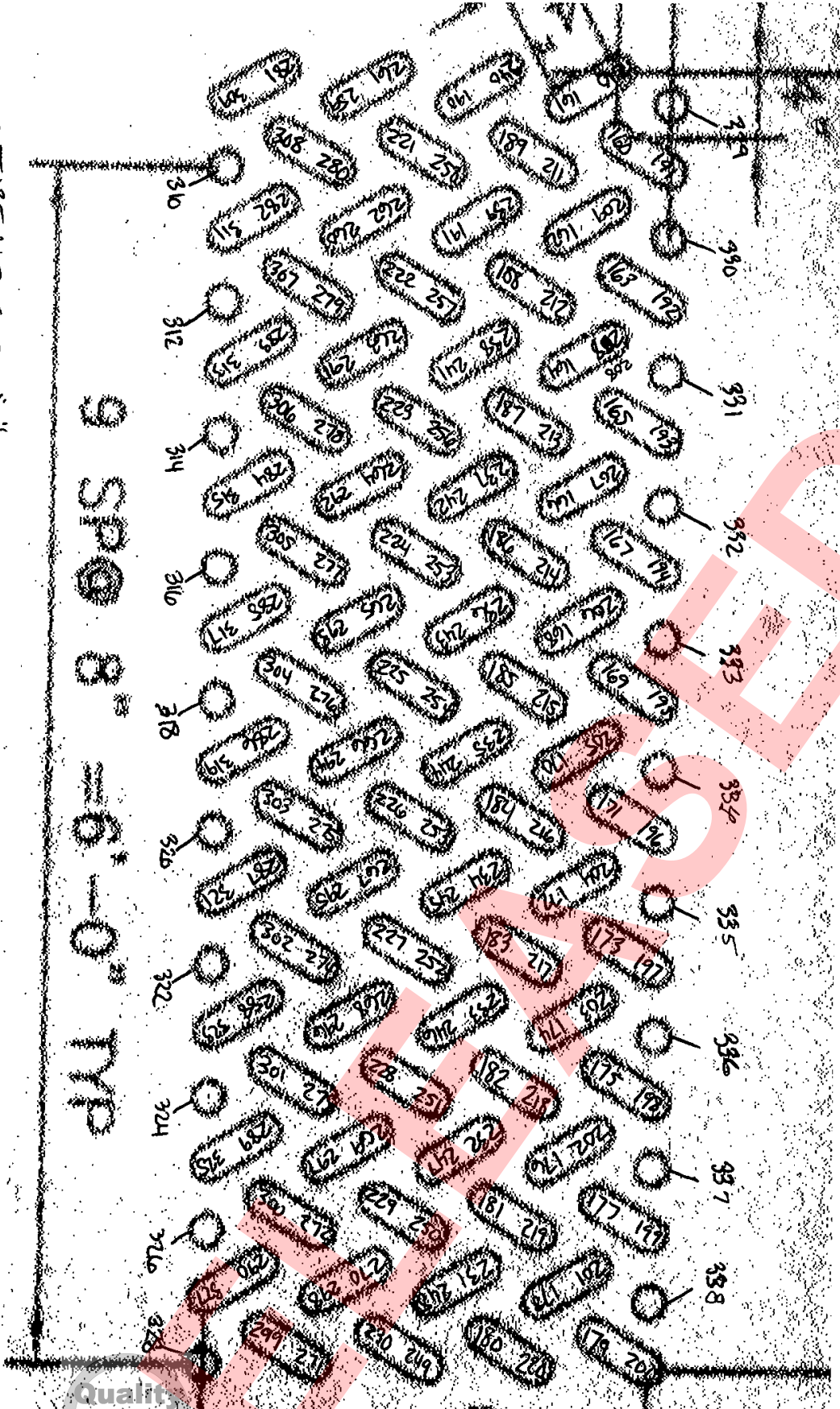
Approved

• TUBE LEADS BY "0"
• WARDEN STUBS TO TUBE BY "0"

① EMUC - 11670
② EUD - 5-1948

TERMINAL END

9 SP0 8" = 6" - 0" TYP



Tracy
10-17-2016

COIL

Quality
Record

REVIEWED

APPROVED

Approved

Mannesmannrohr Sachsen GmbH (A01) Mannesmannrohr Sachsen GmbH Mannesmannstrasse 11 01619 Zeltsein	 VALLOUREC & MANNESMANN TUBES Vallorec Group	MATERIAL TEST REPORT (A02) 3.1 EN 10204:2004
		No.: 70056Zh11 (A03) Page: 1 / 4 Date: 17.10.2011

(A12) MATERIAL TEST REPORT	
(A01) Mannesmannrohr Sachsen GmbH	(A06.1) V&M-Order-No. 84049352
	(A06.2) Suborder LE4614
(A06.1) Customer METSU POWER 3430 TORINGDON WAY,S.201 USA CHARLOTTE, NC 28277	
(A06.2) Orderer V&M USA CORP. / SUITE 150	(A07.2) Order-No. 21001982 Date 25.05.2011
(B01, B02, B04) Description of the product	HOT FINISHED SEAMLESS STEEL TUBES RESIDUAL MAGNETISM DOES NOT EXCEED 20 GAUSS ENDS PLAIN, SQUARE CUT, DEBURRED TUBE ENDS CLOSED BY PLASTIC PLUGS INSIDE AND OUTSIDE FREE FROM LOOSE SCALE AT DELIVERY INSIDE WITHOUT RUST PROTECTION OUTSIDE DRY VARNISH BUNDELED ACCORDING TO TYPE 2, STU EL 572-Q, PAGE 3/5 BUNDLE WEIGHT MAX. 2250 KG, SEPARATED ACC. TO HEAT WITH CERTIFICATE: MERCHANDISE IS FREE OF MERCURY CONTAMINATION AND NO WELD REPAIR WAS PERFORMED REFERENCE-NUMBER METSU PO NO 590/9005 V & M FRANCE NO/TEM LE4614/03 ASME SA 210, EDITION 2010 ASME SA 450, EDITION 2010 ASME BOILER AND PRESSURE VESSEL CODE, SECTION II, PART A, EDITION 2010 SPEC. PTDD-07-M, REV. 4, DATED JANUARY 21-1998 V&M COMMENTS 2009/39/PTH/OH, REV. 0, DATED AUGUST 12-2009 GRADE A 1 IN CONNECTION WITH SPEC. T22002353, REV.3, DATED JUNE 04-2007
(B03)	US-TEST ACC. TO ASTM E 213, FOR LONGITUDINAL DEFECTS, RECTANGULAR NOTCH, WIDTH MAX. 1,5 MM, LENGTH MAX. 50 MM, DEPTH MAX. 12,5 % OF WALL THICKNESS, HOWEVER MIN. 0,3 MM, MAX. 1,5 MM: SATISFACTORY

Quality
Record

11670

11/13/12

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01-16-2012

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Approved

Mannesmannrohr Sachsen GmbH (A01) Mannesmannrohr Sachsen GmbH Mannesmannstrasse 11 01619 Zeithain	 VALLOUREC & MANNESMANN TUBES Valloirec Group	MATERIAL TEST REPORT (A02) 3.1 EN 10204:2004
		No. : 70056Zh11 (A03) Page: 2 / 4 Date: 17.10.2011

(A15) V&M Item	(A09) Cust. Item	(B14) Item text	(B08) Dimensions	(B10) Single length
3			O.D. 2 IN X MINWL. 0,105 IN OUTSIDE DIAMETER TOLERANCE + 0,015 / - 0,015 IN WALLTHICKNESS TOLERANCE +35,000 / - 0,000 %	FIXED LENGTH 20,580 FT SINGLE LENGTH TOLERANCE IN IN + 0,60 / - 0,00

(A15) V&M Item	(A09) Cust. Item	(B08) Quantity	(B11) Total length ft	(B13) Weight lbs
3		184	3.788,88	9.366

(C71)

HEAT CHEMICAL ANALYSIS

(B07.1) Heat	(B15) Process	C %	Si %	Mn %	P %	S %	Cu %	Sn %			
min	-	-	0.100	-	-	-	-	-			
max	-	0.230	-	0.63	0.035	0.0350	0.300	0.0300			
253030	Oxygen (BOF)	0.090	0.220	0.46	0.011	0.0030	0.030	0.0020			

Heats fully killed

TENSILE TEST RESULTS

Type (C10.1)	TUBE STRIP TEST SPECIMEN
Test temperature (C03)	ROOM TEMPERATURE
Direction (C07)	longitudinal
Location (C01.1)	0 DEGREE

(B07.1) Heat	(C00.1) Test Piece	(C10) Dimension	(C11) YS	(C12) TS	(C13) Elong.	(C14.1) Ratio				
		mm	ReH psi	R _m psi	2" %	R/R _m				
min		-	37000	60000	30.0	-				
max		-	-	-	-	-				
253030	77669	13.20X03.10	50326	60814	35.6	0.83				
253030	77670	14.00X03.05	51342	61784	34.8	0.83				

HARDNESS TEST RESULTS

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01-10-2012

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Mannesmannrohr Sachsen GmbH (A01) Mannesmannrohr Sachsen GmbH Mannesmannstrasse 11 01619 Zeithain	 VALLOUREC & MANNESMANN TUBES Vallourec Group	MATERIAL TEST REPORT (A02) 3.1 EN 10204:2004
		No. : 70056Zh11 (A03) Page: 3 / 4 Date: 17.10.2011

HARDNESS TEST RESULTS

(B07.1) Heat	(C00.1) Test Piece	(C31) Value									
		HRB									
min		-									
max		79.0									
253030	77969	72.0									
253030	77970	73.0									

(D54)


OTHER TESTS ON PIPE

Test	Conditions	Test rate	Result
HEAT TREATMENT	HOT FINISHED IN THE RANGE OF NORMALIZING TEMPERATURE		
FLATTENING TEST			SATISFACTORY
FLARING TEST			SATISFACTORY
APPEARANCE AND DIMENSIONS (D01)		EACH PIPE/ TUBE	SATISFACTORY
VERIFICATION TEST		EACH PIPE /TUBE	SATISFACTORY
MERCHANDISE IS FREE OF MERCURY CONTAMINATION AND NO WELD REPAIR WAS PERFORMED..			
PIPE PRODUCTION METHOD	SEAMLESS, HOT-ROLLED		

EDDY CURRENT TEST ACC. TO ASTM E 309 (ASME SA 450):
SATISFACTORY

(A04, B06)

MARKING, IDENTIFICATION

3		CONTINUOUSLY PAINT STENCILED MANUFACTURER'S MARK TERMS OF DELIVERY SA210 A-1 PROCESS OF MANUFACTURE HF HEAT-NO. US WA GERMANY MANUFACTURER'S NAME 2 X 0,105 ORDER LENGTH CUSTOMER ORDER-NO. 21001982 METSO PO NO REFERENCE-NUMBER METSO PO NO 590/9005 SHIPPING LABELS CUSTOMER ORDER-NO. 21001982 METSO PO NO REFERENCE-NUMBER METSO PO NO 590/9005 PORT OF HOUSTON TERMS OF DELIVERY SA210 A-1 HEAT-NO. 2 X 0,105 FEET PER BUNDLE WEIGHT PER BUNDLE LBS GERMANY
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(Z01)

The supplied products are in compliance with the requirements of the order

11070

11/13/12


July 01-10-2012

Quality Record

RELEASABLE

APPROVED

Approved

Mannesmannrohr Sachsen GmbH (A01) Mannesmannrohr Sachsen GmbH Mannesmannstrasse 11 01619 Zehlenn	 VALLOUREC & MANNESMANN TUBES Vallourec Group	MATERIAL TEST REPORT (A02) 3.1 EN 10204:2004
		No. : 70056Zh11 (A03) Page: 4 / 4 Date: 17.10.2011

(A05, Z02, Z03)

Date	17.10.2011
Validated by	Inspection Representative
	RACZ <i>Racz</i>
☎	(03525) 792318
☎	(03525) 791146
@	ULRIKE.RACZ@SMP-TUBES.DE
Stamp	

Indication in parentheses correspond to attributes according to EN 10168

This testimonial and certification respectively may neither be modified nor used for other products. Offences are regarded as falsification of documents and will be subject to criminal prosecution.

RELEASED

11070

11/13/12

J. Wild
01.10.2012

Quality
Record

APPROVED

Approved

CERTIFIED MATERIAL TEST REPORT
Hackney Ladish Inc.

708 South Elmira Avenue - Russellville, AR 72802
Phone: (800) 527-4500 Fax: (479) 964-6231

Heat Code	Description / Specifications			
107HFS	8" X 6" XH CONC WELD RED	A/SA 234 - 07	WPB (SMLS)	
	H60 7 W60397	STRESS RELIEVED	NACE MR0175	

Chemical Analysis

Heat Code	Test	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al
107HFS	M	.160	.600	.008	.002	.250	.130	.060	.060	.010	.0290

Chemical Analysis (cont.)

Heat Code	N	V	B	Ti	Cb	Sn	W	Pb	Co	CE
107HFS	.0077	.001	.0001	.0230	.001	.008				.286

Physical Properties

Heat Code	Tensile KSI	Type	Thickness	Yield KSI	% Elong. (4D)	% RA	Hardness HB
107HFS	67.0	L		38.0	36.0	69.0	122

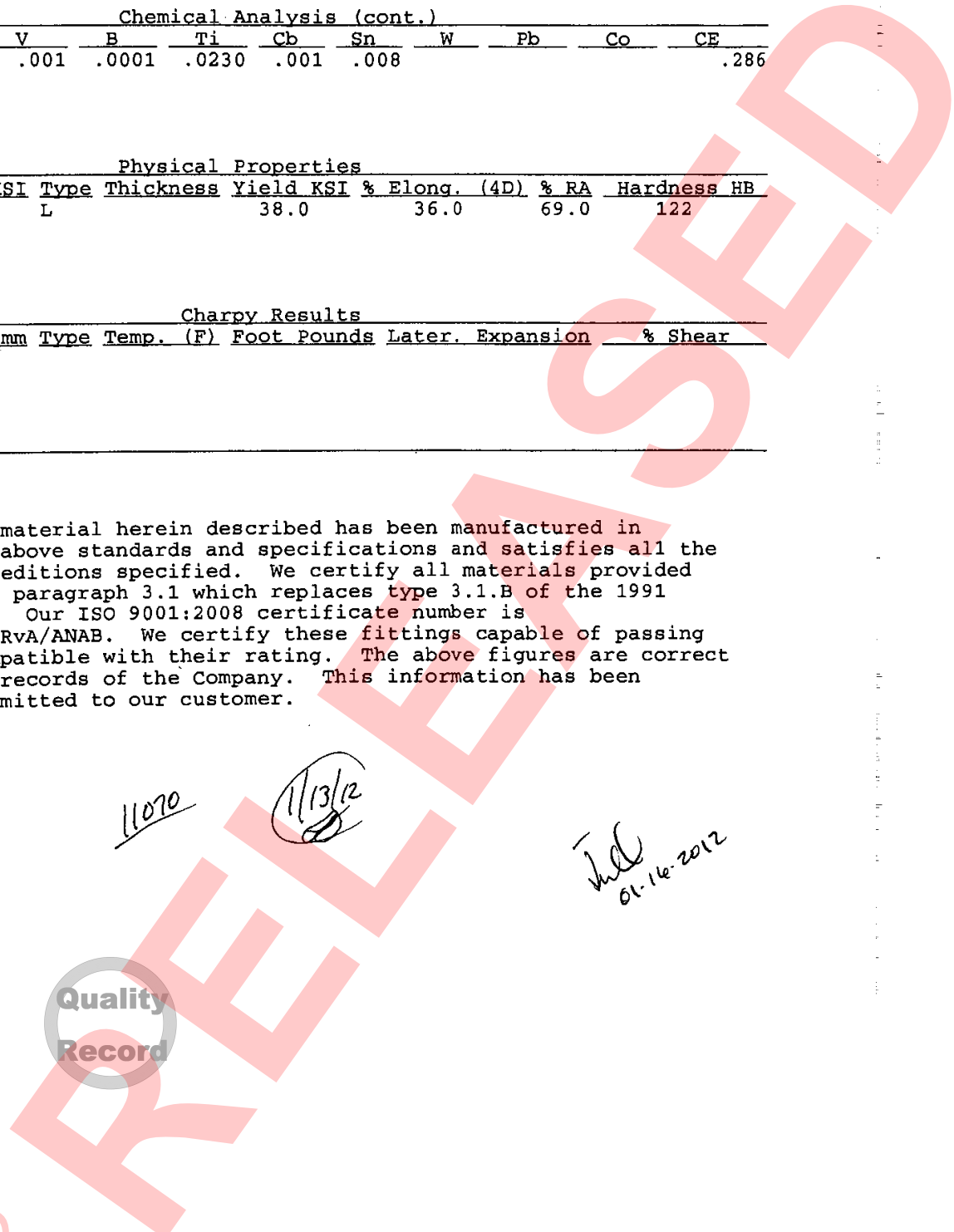
Charpy Results

Heat Code	Size x 10mm	Type	Temp. (F)	Foot Pounds	Later. Expansion	% Shear
107HFS						

Test: M=Mill Product
Type: L=Longitudinal

We certify that the material herein described has been manufactured in accordance with the above standards and specifications and satisfies all the requirements of the editions specified. We certify all materials provided comply with EN 10204 paragraph 3.1 which replaces type 3.1.B of the 1991 edition of EN 10204. Our ISO 9001:2008 certificate number is CERT-11763-2007-USA-RvA/ANAB. We certify these fittings capable of passing hydrostatic test compatible with their rating. The above figures are correct as contained in the records of the Company. This information has been electronically transmitted to our customer.

11070
11/13/12
Jal
01-16-2012



APPROVED

Approved



**Phoenix * Capitol * Camco
Cap Products**

Commanding a Higher Standard.

Certified Mill Test Report

7/11/2011

Customer
MATTSCO SUPPLY CO
PO BOX 2925
TULSA, OK 74101

P.O. 756-S-11

Heat No 109061
Heat Code 77EEE
Phoenix Order # 778653

Material ASTM A105-2009 / ASME SA105-2007 Edition, 2008 Addend

Part Number
12203410

Description
1" FS HEX HD PLUG

Chemical Properties

C	Mn	P	S	Si	Cu	Cr	Ni	C Eq. Long	
0.2000	0.9100	0.0110	0.0240	0.1900	0.2100	0.0970	0.0800	0.4020	
Mo	V	Co	Al	Cb	N	Pb	Sn	Ta	Ti
0.0310	0.0270								

Additional Chemical Properties

Cr + Cu + Ni
0.3870

Mechanical Properties

Tensile (PSI)	Yield (PSI)	Elong. % in 2 in.	R of A	HBW	HBW2
84,500	56,500	26.0%	63.0%	170	170

Charpy Minimum Impact - ft/lbs

Test 1	Test 2	Test 3	Average
N/A	N/A	N/A	N/A

11020
11/13/12
[Signature]

This material meets the requirements of the governing specifications. We certify that the above material has been inspected and tested in accordance with the methods prescribed in the governing specification and the results of such inspections and test conform with applicable requirements.

We further certify this material was inspected with independent inspectors conforming to the requirements of EN 10204 Section 3.1B.

Comments:

Meets ASME SA-181-70 2007 Edition, 2008 Addenda and hardness requirements of NACE MRO175 latest edition. Manufactured in the USA. No weld repair has been performed on these products. This material was not exposed to Mercury or any other metal alloy that is liquid at ambient temperatures during processing or while in our possession.

Capitol Manufacturing
1125 Capitol Road
Crowley, LA 70526

Ind
01-16-2012



APPROVED

Approved



**Phoenix * Capitol * Camco
Cap Products**

Commanding a Higher Standardsm

Certified Mill Test Report

4/6/2011

Customer
MATTSCO SUPPLY CO
PO BOX 2925
TULSA, OK 74101

P.O. 664-S-11

Heat No M38489
Heat Code 39E
Phoenix Order # 756396

Material ASTM A105-2009 / ASME SA105-2007 Edition, 2008 Addend

Part Number
12811250

Description
36-3 X 1 3M THRD TOC

Chemical Properties

C	Mn	P	S	Si	Cu	Cr	Ni	C Eq. Long	
0.2000	0.8800	0.0080	0.0340	0.2400	0.1800	0.1200	0.0800	0.3948	
Mo	V	Co	Al	Cb	N	Pb	Sn	Ta	Ti
0.0300	0.0040								

Additional Chemical Properties

Cr + Cu + Ni
0.3800

Mechanical Properties

Tensile (PSI)	Yield (PSI)	Elong. % in 2 in.	R of A	HBW	HBW2
81,000	55,500	27.0%	64.0%	170	170

Charpy Minimum Impact - ft/lbs

Test 1	Test 2	Test 3	Average
N/A	N/A	N/A	N/A

11070
11/13/12

This material meets the requirements of the governing specifications. We certify that the above material has been inspected and tested in accordance with the methods prescribed in the governing specification and the results of such inspections and test conform with applicable requirements.

We further certify this material was inspected with independent inspectors conforming to the requirements of EN 10204 Section 3.1B.

Comments:

Meets ASME SA-181-70 2007 Edition, 2008 Addenda and hardness requirements of NACE MRO175 latest edition. Manufactured in the USA. No weld repair has been performed on these products. This material was not exposed to Mercury or any other metal alloy that is liquid at ambient temperatures during processing or while in our possession.

Capitol Manufacturing
1125 Capitol Road
Crowley, LA 70526

JTD
01-10-2012



APPROVED

Approved

6600 SOUTH HARLEM AVENUE
 ARGO, IL 60501-1700
 PHONE: (708) 594-1700
 FAX: (708) 458-0106



MATTISCO SUPPLY CO
 5740 EAST ADMIRAL PLACE
 TULSA, OK 74115-8615
 Attn: Julie Spelman

Description											Heat Number			Steel Producer			
C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Cb*	V	Ten	Yield	Elong	ROA	BHN	CE	Revt
4" x 2" XS Reducing Tee											09326			SUMTOMO			
0.11	1.32	0.012	0.003	0.26	0.02	0.02	0.11	0.002	0.002	0.002	68300	44600	35.6	N/A	138	0.355	06
3" x 2" XS Reducing Tee											J8K4289			SUMTOMO			
0.2	0.68	0.011	0.007	0.22	0.02	0.02	0.04	0.01	0.002	0.002	72964	52794	38	N/A	144	0.326	06A
8" XS Cap											10143			MITTAL			
0.27	1.19	0.005	0.002	0.186	0.015	0.011	0.017	0.001	0.001	0.001	79100	58500	31.9	N/A	158	0.474	06A
6" XS Cap											09089			NUCOR STEEL			
0.04	1	0.012	0.002	0.203	0.12	0.05	0.03	0.01	0.013	0.002	73300	59600	25.7	N/A	152	0.226	06A
4" XS Cap											09187			GALLATIN			
0.18	0.92	0.014	0.006	0.2	0.09	0.05	0.05	0.01	0.003	0.005	73000	53400	27.3	N/A	152	0.395	06A
2" XS Cap											08368			MITTAL			
0.09	1.15	0.008	0.007	0.13	0.02	0.02	0.02	0.02	0.008	0.008	60100	55600	31.6	N/A	131	0.294	06A
1" x 1/2" XS Concentric Reducer											724Z			N/A			
0.2	0.8	0.009	0.027	0.21	0.17	0.07	0.1	0.03	N/A	0.005	72300	45000	32.2	N/A	197	N/A	07

All Flanges meet the requirements of ASTM A-105 (and SA-105)
 All fittings meet the requirements of ASTM-A-234 WPB, (and SA-234)
 and are seamless unless noted.
 Starting Material Seamless Pipe for elbows, tees and reducers; plate for
 and welded fittings.
 ISO 9001:2008 CERTIFIED MANUFACTURER
 All Flanges and fittings meet NACE MR0-175 - Latest Revision
 All Flanges and fittings meet NACE MR0-103 - Latest Revision



Mark Torres - MTR Coordinator
 October 15, 2010
 Quality Assurance Department
 Test Results herein are correct as contained in
 test records retained by the company
 in accordance with EN 10 204 Para 3.1
 in accordance with PED 97/23/EC, 7/2

11070
 11/3/12
 01-16-2012

APPROVED

Quality Record
 FREE

08/29/2011 FROM: MATTISCO SUPPLY CO

Approved

Piping Products, Inc.

FORGED STEEL FLANGES AND SPECIAL FITTINGS
1681 Kress St., Houston, Texas 77020
Phone: 713-675-5374, 800-775-5374, Fax: 713-675-7910

*** MILL TEST REPORT ***

S MATTSO
O PO BOX 2925
L
D TULSA, OK 74101

S MATTSO
H 5740 E. ADMIRAL PL
I
P TULSA, OK 74115

CUST #: MAT01
CUST PO: 529-S-11-ADD
DATE: 12/17/10
PPI S/O #: 258740
TAG #:

ITEM DESCRIPTION
10 6 500 WN RF STD SAI05N 125-250 AARH

ITEMS

ITEM	HEAT NO.	C	SIL	MIN	PHOS	SUL	GR	NI	MO	N	CO	CU	V	AL	NI	CEG
10	COLK	0.190	0.220	1.040	0.008	0.025	0.080	0.080	0.019	0.000	0.000	0.230	0.003	0.000	0.001	0.404

CHEMICAL PROPERTIES

ITEM	YIELD STRENGTH	TENSILE STRENGTH	ELONG. % IN 2"	RED. AREA HARDNESS	BHN	CHARPY TEST	LAT. EXPAN	SHEAR FRAC.	TEST TEMP
10	47,000	75,800	28.00	58.00	146-146			0.00	

PHYSICAL PROPERTIES

10 NORMALIZED @ 1675F @ 4.0 HRS. AIR COOLED.

ITEM NOTES

ORDER NOTES

Additional Notes or Comments:

We hereby certify that all test results and process information contained herein are correct and true as contained in the records of the company.

[Signature]
Quality Assurance Asst. Mgr.

11070

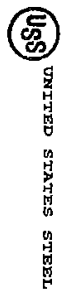
11/13/12

11/16/2012

08/29/2011 From: MATTSO SUPPLY CO.

To: RCU
Quality Record

APPROVED



TUBULAR PRODUCTS
CERTIFIED TEST REPORT

DATE: 02/17/11
TIME: 09:10:05
SERIAL NO: F0063191

(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "Type 3.1")

MILL ORDER/ITEM NO DS45711 01	SHIPPER NO X28032	P.O. NUMBER 43817-2	VEHICLE ID 116/TF6943
SOLD TO ADDRESS MATSCO SUPPLY CO P O BOX 2925 TULSA OK 74101-2925		MAIL TO ADDRESS MATSCO SUPPLY CO P O BOX 2925 TULSA OK 74101-2925	
VENDOR USS TUBULAR PRODUCTS USS FAIRFIELD WORKS P.O. BOX 599 FAIRFIELD ALABAMA 35064			

PIPE CARBON SMLS STD PIPE API 5L-44TH ED DTD OCT 2007 AND ISO 3183:2007 MOD PSI-1 GRADE B AND GRADE X42 R N OR Q ASTM A53-*07 ASTM A106-*08 GRADE B QUAD STENCIL ASME SA53-*2010 EDITION ASME SA106-*2010 EDITION GRADE B BIK RFG MILL COAT PE BEV 30 DEG KEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2003/COR.1:2005 AND MR0103-2007

AS-ROLLED
OD: 8.625 (219.075)
WALL: 0.500 (12.700)

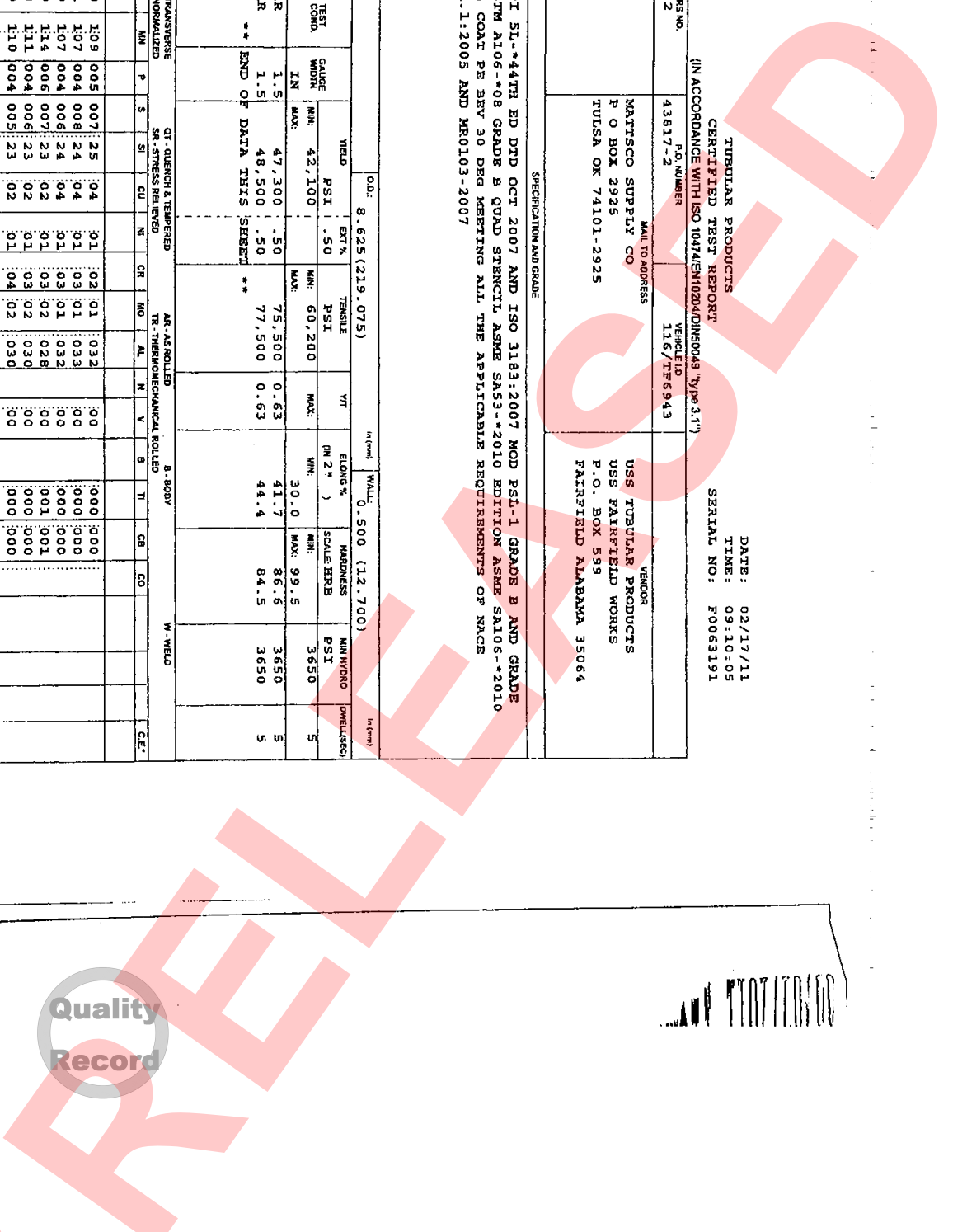
PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD		ELONG % (IN 2")	MIN HYDRO	DIMENSIONS
				PSI	MPa			
C08007 *NOTE A STRIP/L/B	AR	1.5	1.5	47,300	50	75,500	0.63	41.7
U03105 *NOTE B STRIP/L/B	AR	1.5	1.5	48,500	50	77,500	0.63	44.4
				MIN: 42,100	MAX: 60,200	MIN: 60,200	MAX: 30.0	MIN: 86.5
				MIN: 48,500	MAX: 77,500	MIN: 84.5	MAX: 99.5	MIN: 3650
				MIN: 50	MAX: 50	MIN: 84.5	MAX: 84.5	MIN: 3650

LEGEND: L-1 LONGITUDINAL T-TRANSVERSE QI-QUENCH & TEMPERED AR-AS ROLLED B-BODY W-WELD
U-UPSET NM-NORMALIZED SR-STRESS RELIEVED TR-THERMO-MECHANICAL ROLLED

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN VERTICAL DOTTED LINE OR DECIMAL POINT.
419591005 TQ109B01 0158554007 CAA 3-0-0 PAGE 1 OF 2

11/3/12

01-16-2012



APPROVED

Approved



UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT
(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "Type 3.1")

DATE: 02/17/11
TIME: 09:10:05
SERIAL NO: F0065191

MATERIAL COMB:	AS-ROLLED	SHIPPER'S NO:	Y28032	3817-2	O.D.:	8.625 (219.075)	WALL:	0.500 (12.700)
PRODUCT IDENTIFICATION:	FLAT	BEND:	OK	MIN. COLLAPSE:	DIR. TEST LOC.:	TEMP. DEG.:	SIZE:	TEST COMB.:
C08007								
U03105								

LEGEND	L - LONGITUDINAL	T - TRANSVERSE	B - BODY	W - WELD	HAZ - HEAT AFFECTED ZONE
FULL LENGTH VISUAL	X				
FULL LENGTH EMI	X				
FULL LENGTH MPI					
FULL LENGTH UT					
END AREA INSPECTION (PLAIN END)		X			
SPECIAL END AREA (SEAL) MSP					
FULL LENGTH DRIFT					

TEST/INSPECTION	YES	TESTING/INSPECTION INFORMATION	RESULTS/COMMENTS
FULL LENGTH VISUAL	X	OD	UT X 10.0/10.0% NOTCH
FULL LENGTH EMI	X	ODID	
FULL LENGTH MPI		ID	UT
FULL LENGTH UT		MPI X	UT
END AREA INSPECTION (PLAIN END)	X	MPI	UT
SPECIAL END AREA (SEAL) MSP		DRIFT MAANDREL SIZE:	
FULL LENGTH DRIFT			

ALL MELTING AND MANUFACTURING TOOK PLACE IN THE USA.
 MANUFACTURED IN AN ISO 9001 CERTIFIED FACILITY - CERTIFICATE #30727.
 NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.
 *NOTE A SEE ATTACHED REPORT FOR TENSILE RESULTS.
 *NOTE B SEE ATTACHED REPORT FOR TENSILE RESULTS.
 ** END OF DATA **

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.
 PREPARED BY THE OFFICE OF: J. MAJIKZAK - MANAGER, Q.A.
 DATE: 02/17/11

419591005 TQ103801 0158554007
 CAA 3-0-0 PAGE 2 OF 2
 11/2/12
 11020
 01-16-2012

09/02/2011 From: MATWESCO SUPPLY CO.



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Approved



UNITED STATES STEEL

TUBULAR PRODUCTS
TENSILE TEST REPORT

DATE: 02/17/11
TIME: 09:10:35
PAGE: 1

MAIL ORDER ITEM NO. DS45711 01 SUPPLIER NO. Y28032 P.O. NUMBER 43817-2 HEAT SERIAL NUMBER: F0063191

BUYER TO ADDRESS
MATSCO SUPPLY CO
P O BOX 2925
TULSA OK 74101-2925

MAIL TO ADDRESS

USS TUBULAR PRODUCTS
USS FAIRFIELD WORKS
P.O. BOX 599
FAIRFIELD ALABAMA 35064

HEAT	PIPE/LOT	TYPE/DIR/LOC	TEST COND	YIELD	EXT%	TENSILE	Y/T	ELONG & AREA	REDUC
C08007 2011		STRIP/L/B	AR	47,300	0.50	75,500	0.63	41.7	
C08007 2010		STRIP/L/B	AR	47,300	0.50	75,500	0.63	42.5	
C08007 1039		STRIP/L/B	AR	48,000	0.50	76,000	0.63	42.7	
C08007 1038		STRIP/L/B	AR	49,400	0.50	77,500	0.64	45.2	
U03105 1032		STRIP/L/B	AR	48,500	0.50	77,500	0.63	44.4	
U03105 1031		STRIP/L/B	AR	50,000	0.50	77,000	0.65	45.8	

11070

1/13/12

Jul 01-10-2012

09/02/2011 From: MATSCO SUPPLY CO.

Quality Record

APPROVED

Approved

CUST-O-BEND INCORPORATED

11070

MATERIAL TEST REPORT

Date: August 16, 2011

Sold To: ECO, INC
3101 N Hemlock Circle, Ste 110-F
Broken Arrow, OK 74012-1125

ECO Purchase Order: J-1348-3

Cust-O-Bend Job: HF11-337

Qty	Description	Heat Code
170	2" OD x .105" MW x A/SA234 WPB S58 x 4" C/C 180° Return Bends	164

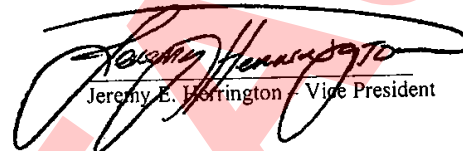
Heat	Raw Material	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V
164	SA519-1026	.22	.73	.017	.008	.22	.02	.01	.05	<.01	<.01

Yield: 65,500 Tensile: 85,500 Elongation in 1" %: 25 HBW: 159

Hot formed fittings, air-cooled – no heat treat required per ASTM A234 paragraph 7.2.1 – “Hot formed WPB, WPC, and WPR fittings upon which the final forming operation is completed at a temperature above 1150° F and below 1800° F need not be heat treated provided they are cooled in still air.”

We certify that the fittings covered by this report were manufactured from the seamless raw material, as noted and that the physical and chemical properties are those reflected in the records of the company. Fittings conform to the requirements of the applicable sections of ASTM, ASME, or ANSI specifications.
Conforms to Code Year and Addenda: ASTM A234/A234M-10 and ASME SA234-08a.

These fittings were made in the United States of America.


Jeremy E. Herrington - Vice President

11070

11/3/12


J.E.
01-16-2012

(918) 241-0514 • Fax (918) 241-0516
1350 S. 74th West Ave. • Tulsa, OK 74127 • P.O. Box 548 • Sand Springs, OK 74063
Visit our website at www.custobend.com

Record

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TERMS AND CONDITIONS OF SALE

1.0 CONTRACT

Acknowledgement and acceptance of Customer's Purchase Order by ECO, Incorporated ("ECO") shall be conditioned, however, upon Customer's assent to all of the terms and conditions contained herein. No terms or conditions other than those stated herein, whether contained in Customer's Purchase Order or shipping release or elsewhere, and no written or oral agreement that purports to vary these terms and conditions, shall be binding upon ECO unless hereafter set forth in writing signed by ECO. Additional terms listed on the reverse side hereof, if inconsistent with the terms and conditions set forth herein, shall be controlling and shall be deemed a part of the terms and conditions hereof. All negotiations, proposals and representations, if any, made prior and with reference hereto are merged herein, and this writing shall constitute a complete and exclusive statement of the terms of the agreement between Customer and ECO.

Customer's assent to these terms and conditions of sale shall be conclusively presumed from Customer's submission of a Purchase Order or from receipt of any material ordered or services rendered.

2.0 TERMS OF PAYMENT

- 2.1 Unless otherwise specified, payment of all amounts due shall be due in U.S. currency upon receipt of Invoice.
- 2.2 Any and all sums not paid when due shall bear interest at the rate of eighteen percent (18%) per annum until paid.
- 2.3 Customer agrees that he shall not retain any sums due under ECO'S Invoice without prior written approval of ECO.
- 2.4 Should materials and/or subcontractors' services total more than Fifty Thousand Dollars (\$50,000.00), such materials and/or subcontractor services will be invoiced at cost upon receipt of proper invoices covering such materials and for subcontractor services.

3.0 PRICES

- 3.1 All prices are F.O.B. point of manufacture.
- 3.2 Prices do not include and Customer shall pay any and all sales, excise, use taxes or any other duty which may be imposed by federal, state, local, foreign or other governmental authority.
- 3.3 Unless otherwise specified, prices are firm for a period of thirty (30) consecutive days from the date of ECO's proposal. After such period, Customer agrees to pay the prices adjusted as of the date of acceptance of Customer's Purchase Order.

4.0 TRANSPORTATION

- 4.1 All orders accepted by ECO will be shipped F.O.B. point of manufacture with any and all freight, storage and other transportation charges for Customer's account, without recourse, to ECO. Freight charges, if necessary, shall be estimated based upon current rates, tariffs and classifications. Any changes in additional transportation charges shall be for the Customer's account.
- 4.2 Prepaid freight charges are not subject to discount and are due and payable by Customer upon receipt of Invoice from ECO.

5.0 FORCE MAJEURE

- 5.1 ECO shall be excused for any default or delay caused by any contingency beyond its control, including, without limitation, acts of God, wars, riots, embargoes, restraints affecting shipping, strikes, lockouts, fires, accidents, floods, droughts, earthquakes, high winds, other natural calamities, shortage of raw materials, demands or requirements of any government or other agency.

6.0 MILL OVER RUNS

- 6.1 Where tubular materials are included in a proposal, the Customer will be obligated to accept shipment of any mill over-run that ECO has been obligated to accept from its suppliers. This over-run will be limited to ten percent (10%) of any size and grade of material. All over-runs will be billed at mill price plus freight to destination.

7.0 ENGINEERING DRAWING & DATA REQUIREMENTS

- 7.1 Unless otherwise stated in our proposal, only one reproducible copy of approval and final drawings and data will be issued to the Customer. If other quantities or style of these documents are required, additional pricing can be quoted on request.

8.0 BACK CHARGES

- 8.1 No back charges will be accepted by ECO, unless the Customer first notifies ECO of the defects requiring repair and gives ECO or its suppliers the reasonable opportunity to inspect same. ECO reserves the right to return the work to the point of original manufacture for correction or make repairs at the job site with crews of its own choosing without union hindrance or permit the Customer to make on site repairs for a previously agreed upon maximum price.

9.0 CANCELLATIONS

- 9.1 In the event the Purchase Order is cancelled for any reason, a charge will be made for work already complete, including any work done by ECO suppliers, and a reasonable fee to cover lost profit.

10.0 WARRANTY AND EXCLUSION OF OTHER WARRANTIES

- 10.1 ECO warrants, to the original Customer only, the equipment sold to Customer to conform to the specifications set forth in the Proposal and Invoice and shall be tested to indicate that same are free from structural defects in material and workmanship under normal recommended use for a period of one (1) year from the date of delivery to the original Customer.
- 10.2 ECO warrants the equipment to perform at the minimum thermal efficiency and maximum pressure drop stated in the proposal for a period of one (1) year from date of delivery to the original customer. These values are understood to apply only when the unit is operated in accordance with the design process conditions stipulated in the proposal and in a new and clean condition. ECO does not warrant against erosion, corrosion, natural wear or faulty operation.
- 10.3 This warranty does not apply to equipment or accessories manufactured by manufacturers other than ECO, which are separately warranted by such other manufacturers (appropriate adjustments thereto being provided by their respective manufacturers); and any of the equipment which has been altered, subjected to misuse, negligence or accident.
- 10.4 The obligation of ECO under this warranty shall be limited to the repair or replacement of any part which is judged defective by ECO. ECO will not be liable for transport time or income, or any other special or consequential damages of any kind or nature. Implied warranties, if any, shall be limited to the duration of this written limited warranty.
- 10.5 The Customer, at his option and cost, may conduct a performance test to determine if the performance warranties are being met. The Customer shall provide sufficient notice to ECO so that a representative of ECO can witness the test. Additionally, ECO will be given access to all operating data and laboratory analysis that would bear on the final determination of performance. All analysis of operation data will be done in accordance with generally accepted engineering practices and using published physical data and procedures.
- 10.6 ECO shall not be liable for special or consequential damages, such as, but not limited to, damage for cost of replacement goods, or damages for claims of third parties against the Customer, or damages for loss of profits.
- 10.7 Notification of any warranty claim arising within the applicable warranty period, as set forth and mentioned above, must be made in writing by the original Customer within thirty (30) days after the discovery of the alleged basis for any warranty claim.
- 10.8 In no event shall the liability of ECO under this warranty exceed the purchase price of the specific item or items to which such warranty claim relates.
- 10.9 THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE, WHETHER ARISING BY LAW, CUSTOM OR CONDUCT.
THE FOREGOING RIGHTS AND REMEDIES ARE EXCLUSIVE AND IN LIEU OF ANY OTHER RIGHTS OR REMEDIES WHATSOEVER, WHETHER STATUTORY OR OTHERWISE, AND WHETHER BASED ON A CONTRACT, TORT OR OTHERWISE.
- 10.10 During the applicable warranty period, as set forth above, warranty repairs will be made without charge by ECO at its designated point of manufacture and repair. Transportation to and from Oklahoma, in connection with any such warranty repair, will be at the Customer's expense. All warranty repairs will be subject to the authorization of factory-trained personnel of ECO whose decision will be final.

11.0 WAIVER OF BREACH

- 11.1 Any waiver by ECO of any breach of any term or condition shall not constitute a waiver of any subsequent breach of the same, or of any other term or condition. The invalidity in whole or in part of any term or condition hereof shall not affect the validity of any other term or condition herein.

12.0 RIGHTS IN INVENTIONS

- 12.1 Customer agrees that all drawings, reports, designs, data and technical and other information emanating from or pertaining to the equipment manufactured pursuant hereto or to the materials supplied or services rendered, all information provided by ECO to Customer and all information becoming known to Customer concerning ECO's inventions, discoveries, improvements, processes or methods, business plans, ventures or practices, manufacturing or other plant design, or any other information affecting the business or professional operations of ECO, shall be maintained confidentially by Customer and shall not be published, disseminated, revealed in any manner or to any party, or used in the design, manufacture, use or operation of the plant or business, or the performance of services without ECO's prior written consent; provided, however, that these provisions shall not apply to such information which was known to Customer at the same time it was obtained from ECO or is acquired by Customer from a third party without such third party being under an obligation of confidentiality or is or becomes available other than by violation of the confidentiality obligations herein.

13.0 INDEPENDENT CONTRACTOR

- 13.1 Customer and ECO agree that the status of ECO to Customer shall be that of an independent contractor.

14.0 PERMITS

- 14.1 Customer agrees to procure, at its sole cost and expense, any and all permits and licenses necessary for the performance hereof.

15.0 CHOICE OF LAW

- 15.1 The agreement arising hereunder shall be construed in all respects according to the applicable laws of the State of Oklahoma.

16.0 ENTIRE AGREEMENT

- 16.1 The Invoice, together with all documents, shall constitute the entire agreement between ECO and Customer, superceding any and all oral or written understandings between the parties hereto relating to the items purchased hereunder.

17.0 ASSIGNMENT

- 17.1 Neither the purchase documents, nor any rights, or obligations are transferable (as security for advances or otherwise) without ECO's prior written consent.

Quality
Record

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Approved