



**Manufactured for  
PENCO GROUP**

**Installation, Operation and  
Maintenance Manual**

**Nautilus Crane Model 340LA-140  
Serial Number 059801C**



**CRANE SALES · PARTS · SERVICE · RENTALS  
WORLDWIDE**

1180 MULBERRY RD. HOUMA, LA. 70363 U.S.A. PHONE: (985) 868-0630 FAX: (985) 873-0787

# MAJOR COMPONENT LIST

Crane Model .....340LA-140  
Serial Number .....059801C

Manufacture Date ..... December 1998

Engine.....N47101-006  
Serial Number ..... 64Z27266  
Arrangement Number..... 131-2993

Main Hoist.....N46760-001  
Serial Number .....9806574

Auxiliary Hoist.....N46433-002  
Serial Number .....9705072

Boom Hoist .....N46430-002  
Serial Number .....9800916

Load Block (Main) .....N46831-139  
Serial Number .....9816585

Load Block (Auxiliary).....N46832-031  
Serial Number .....9816927

Ballring .....N46397-002  
Serial Number ..... 10867-1

## Swing Drive Assembly:

Motor.....N45375-003  
Gearboxes.....N47103-001  
Brakes.....N45955-001  
Pinions.....N61503-001

ORIGINAL

LICENSE NO. 2C-0007


# American Petroleum Institute

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APPLIED HYDRAULIC SYSTEMS, INC.

Houma, Louisiana

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Effective Date November 8 19 98  
Expiration Date November 8 20 01



AMERICAN PETROLEUM INSTITUTE,

*B. William Frick*

Secretary

## TABLE OF CONTENTS

FOREWORD  
INTRODUCTION  
SAFETY ALERT SYMBOL  
SERVICE ASSISTANCE

### CRANE DESCRIPTION .....SECTION 1

API 2C PLACARD  
CRANE GENERAL ARRANGEMENT DRAWING N98SK4-099, REV. D  
LIFTING LOAD CAPACITY CHART N98SK3-078, REV. A  
CRANE TEST REPORT  
SERVICE ASSISTANCE

### INSTALLATION .....SECTION 2

SERVICE ASSISTANCE  
WARNING  
RECOMMENDED BOLT TORQUE PROCEDURE  
    BALLRING TO PEDESTAL  
    BALLRING TO UPPERSTRUCTURE  
GENERAL BOLT TORQUES  
RECOMMENDED WIRE ROPE ANCHORING AT DEAD END  
RECOMMENDED ANCHORING ON A HOIST  
WIRE ROPE BREAK-IN PROCEDURE  
REEVING DIAGRAMS  
    12 PART REEVING  
    6 PART REEVING  
    4 PART REEVING  
    1 PART REEVING  
ELECTRIC SWIVEL BRACKET DRAWING N61638-008, REV. -

### CRANE OPERATION .....SECTION 3

SERVICE ASSISTANCE  
OPERATION GUIDELINES  
GENERAL OPERATION OF CRANE  
OPERATION CAUTION  
CRANE CONTROL LEVER OPERATION (2 PAGES)  
CAB ARRANGEMENT (3 PAGES)  
HAND SIGNAL CHART  
EMERGENCY LOAD LOWERING PROCEDURE  
BOOM HIGH/LOW ANGLE KICKOUT ADJUSTMENT PROCEDURE  
SWING LOCK OPERATION AND ADJUSTMENT  
RETURN FILTER ELEMENT ASSEMBLY

### MAINTENANCE .....SECTION 4

SERVICE ASSISTANCE  
MAINTENANCE INTRODUCTION  
MAINTENANCE PRECAUTIONS (2 PAGES)



**MAINTENANCE..... SECTION 4**

**ROUTINE INSPECTION AND SERVICE**

**DAILY FUNCTIONAL TEST**

**NOTES AND PRECAUTIONS**

**MAINTENANCE SCHEDULE**

**INSPECTION/REPLACEMENT**

**LUBRICATION**

**LUBRICATION DIAGRAMS**

**LOAD BLOCK AND OVERHAUL BALL**

**BOOM POINT SHEAVE PINS**

**BOOM FOOT PINS**

**BALLRING**

**GEARBOX**

**MAIN HOIST**

**AUXILIARY HOIST**

**BOOM HOIST**

**GANTRY SHEAVE PIN**

**BOOM STOP**

**BRIDLE SHEAVE PIN**

**CONTROL VALVE LINKAGE**

**HYDRAULIC ACTUATOR**

**BOOM IDLER**

**FLOODLIGHT**

**SWING LOCK**

**RECOMMENDED FLUID AND LUBRICANTS**

**HYDRAULIC OIL**

**GEAR OIL (2 PAGES)**

**BALLRING, PINS, BUSHINGS, SWIVEL, ENGINE, COOLANT,**

**START SYSTEM OIL, SWING BRAKE, PERSONNEL**

**HANDLING, HYDRAULIC ACTUATORS, WIRE ROPE**

**MAINTNEANCE MALFUNCTION DIAGNOSIS (TROUBLE SHOOTING)**

**MANUFACTURER BALLRING DATA**

**WIRE ROPE BREAK-IN PROCEDURE**

**MANUFACTURES ENGINE DATA**

**REPAIR (REPAIR & REPLACE) .....SECTION 5**

**SERVICE ASSISTANCE, ORDERING REPLACEMENT PARTS**

**BILL OF MATERIAL**

**HOSE LIST**

**PARTS LIST**

**DRAWING - CRANE GENERAL ARRANGEMENT**

**DRAWING - POWER UNIT GENERAL ARRANGEMENT**

**DRAWING - HYDRAULIC SCHEMATIC**

**ENGINE HOSE DIAGRAM**

**TABLE OF CONTENTS (CONTINUED)**

**REPAIR (REPAIR & REPLACE) .....SECTION 5**

**DRAWING - ELECTRIC SCHEMATIC**

**DRAWING - ELECTRICAL WIRING DIAGRAM**

**PARTS DRAWINGS**

**CAB ARRANGEMENT (3 PAGES)**

**CAB LEFT SIDE VIEW**

**CONTROL VALVE LINKAGE ASSEMBLY**

**SWING LOCK ASSEMBLY**

**LOAD INDICATOR SYSTEM**

**BOOM HIGH/LOW ANGLE KICKOUT ASSEMBLY**

**SWING DRIVE ASSEMBLY**

**GANTRY SHEAVE CASE ASSEMBLY**

**BOOM HOIST GUARD/RATCHET & PAWL ASSEMBLY**

**BOOM STOP ASSEMBLY**

**PENDANT/BOOM POINT DETAIL**

**BRIDLE ASSEMBLY**

**FLOODLIGHT & BRACKET**

**MAIN ANTI-TWO BLOCK VALVE ASSEMBLY**

**AUXILIARY ANTI-TWO BLOCK VALVE ASSEMBLY**

**HOIST WIRE ROPE ANCHORINGS**

**BOOM IDLER ASSEMBLY**

**BOOM ANGLE INDICATOR ASSEMBLY**

**RETURN FILTER**

**PIN SUMMARY**

**SPACER KIT**

**HYDRAULIC SYSTEM**

**MAIN LOAD INDICATOR SYSTEM**

**ELECTRIC SWIVEL MAINTENANCE MANUAL**

**AIR CONDITIONER INSTALLATION INSTRUCTIONS MANUAL**

**APPENDIX**

**MATERIAL CERTIFICATES**

**PIN CERTIFICATES**

**BALLRING CERTIFICATES**

**BALLRING CLEARANCE REPORTS**

**BOLT CERTIFICATES**

**WIRE ROPE CERTIFICATES**

**LOAD BLOCK CERTIFICATES**

**OVERHAUL BALL CERTIFICATES**

**BACKLASH REPORTS**

**MISCELLANEOUS**

## **FOREWORD**

Oil States Industries Houma, LA is pleased with the high quality of workmanship observed in the design, manufacture and testing of your Nautilus Crane. Maximum crane performance and utilization can be maintained only by PROPER OPERATION and equally as important, PROPER MAINTENANCE. In return, you will assure yourself a long lifespan of reliable operation and service.

Should, on the other hand, anything arise requiring service, Oil States Industries Service Department will provide you the assistance or quality maintenance you may require.

## **INTRODUCTION**

Specifications and information in this manual are current at the time of printing. Oil States Industries reserves the right to change and/or amend these specifications at any time without notice.

This manual has been prepared to assist you in the operation and maintenance of your Nautilus Crane. However, correct and prudent operation of a crane rests with the operator who must thoroughly understand the operation of the crane and the necessary maintenance requirements. The first scheduled maintenance of your Nautilus Crane starts from day one of operation.

## SAFETY ALERT SYMBOL

Throughout this manual, you will see this symbol.



This is the universal safety alert symbol (SAE J284A) and simply means **"ATTENTION"**.

An example is shown below:



# SERVICE ASSISTANCE & ORDERING INFORMATION

24 Hours a Day

## INTRODUCTION

This section contains information for ordering replacement parts for the equipment.



**NOTE:** CERTIFIED OEM REPLACEMENT PARTS CONTAIN NAUTILUS PART NUMBERS. INFORMATION ON PARTS NOT LISTED IN THIS MANUAL MUST BE RECEIVED FROM OSI NAUTILUS CRANE FOR PROPER VALIDATION AS NON-OEM PARTS MAY NOT MEET PERFORMANCE STANDARDS. ANY REPAIRS MADE WITH NON-OEM PARTS COULD EFFECT SAFE OPERATIONS OF THE CRANE AND CAUSE POSSIBLE PERSONNEL INJURY.

## PARTS DELIVERY

To ensure prompt delivery of parts, be sure to give the correct name, address, town, state and country to which the parts are to be shipped. Include the Zip Code, if applicable, and specify the type of shipment. If the type of shipment is not specified, parts will be shipped by the best available means as determined by Oil States Industries.

## PARTS AND SERVICE INQUIRIES

If difficulty is encountered with the repair of any assembly / component or if replacement parts are needed for any reason, contact the Oil States Industries Parts and Service Department for assistance at the following:

*Oil States Industries*  
1180 Mulberry Road  
Houma, LA 70363 USA

Telephone: (985) 868-0630  
Toll Free: (800) 247-5530  
Fax: (985) 851-0778

*Oil States Industries Thailand Ltd.*  
450 Sukhumvit Road,  
No. 102  
Tambol Huaypong  
Amphur Muang  
Rayong 21150  
Thailand

Telephone: + 66 (0) 38 691 643  
Fax: + 66 (0) 38 691 644

# **SECTION 1**

## **CRANE DESCRIPTION**

# API SPEC 2C

FIFTH EDITION 1995



2C-0007

DATE MANUFACTURED

DECEMBER 1998

MANUFACTURER'S MODEL NO.

340LA-140

DESIGN SERVICE TEMPERATURE

+68

DEG. F.

MANUFACTURER SERIAL NUMBER

059801C

MANUFAC-  
TURED BY

APPLIED HYDRAULIC SYSTEMS, INC  
NAUTILUS MARINE CRANES

ADDRESS

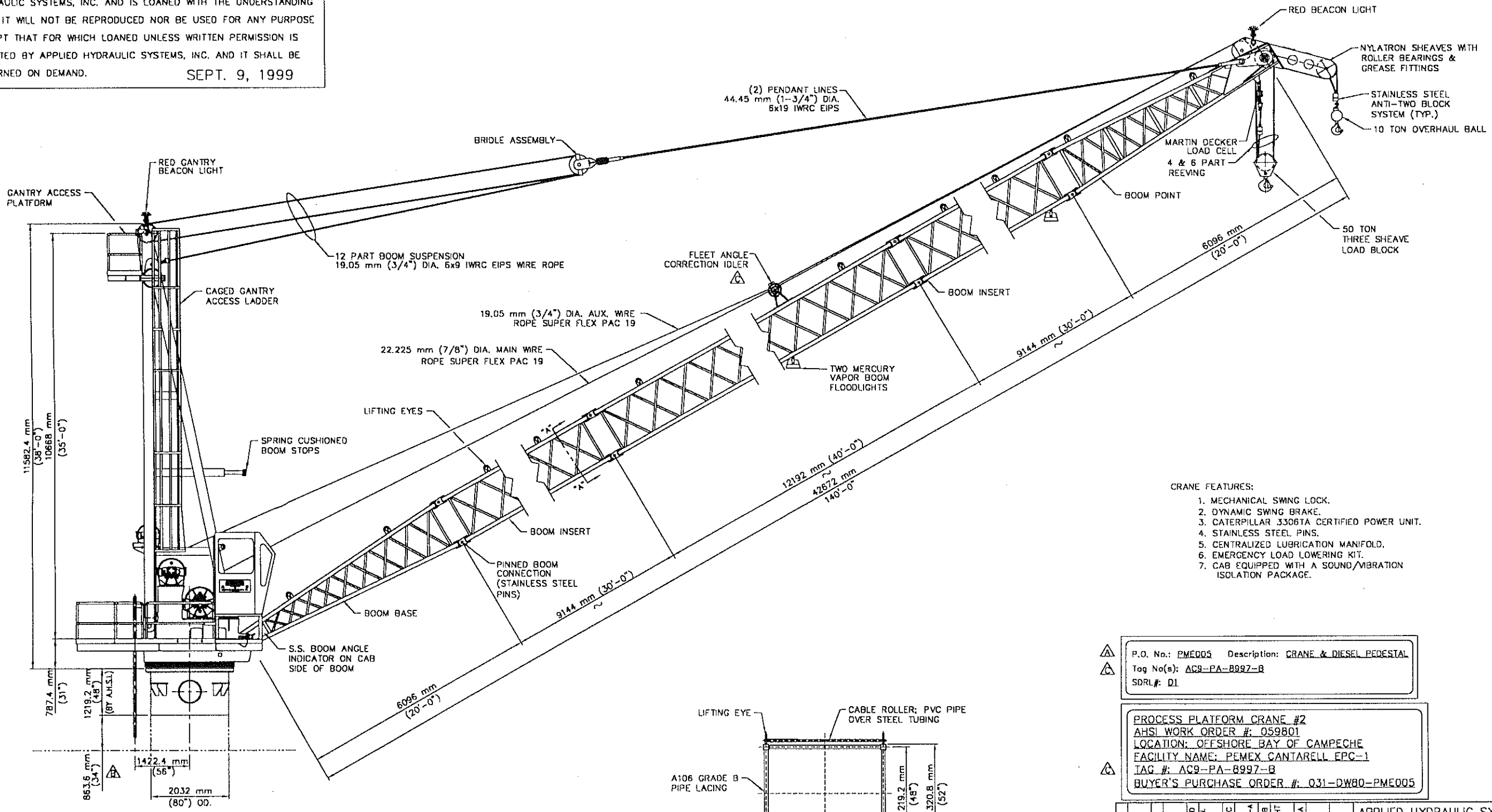
HOUMA, LOUISIANA 70363

# **CRANE GENERAL ARRANGEMENT DRAWING**



THIS DRAWING INCLUDING ALL NOVEL AND PATENTED OR PATENTABLE SUBJECT MATTERS EMBODIES CONFIDENTIAL INFORMATION OF APPLIED HYDRAULIC SYSTEMS, INC. AND IS LOANED WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR BE USED FOR ANY PURPOSE EXCEPT THAT FOR WHICH LOANED UNLESS WRITTEN PERMISSION IS GRANTED BY APPLIED HYDRAULIC SYSTEMS, INC. AND IT SHALL BE RETURNED ON DEMAND.

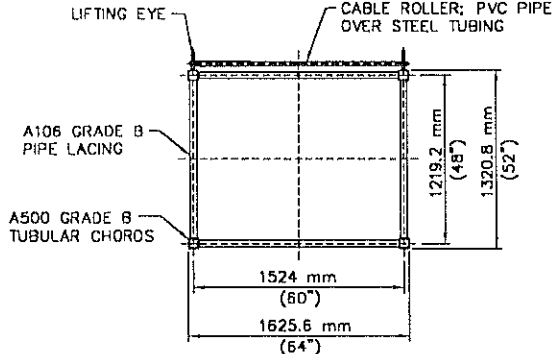
SEPT. 9, 1999




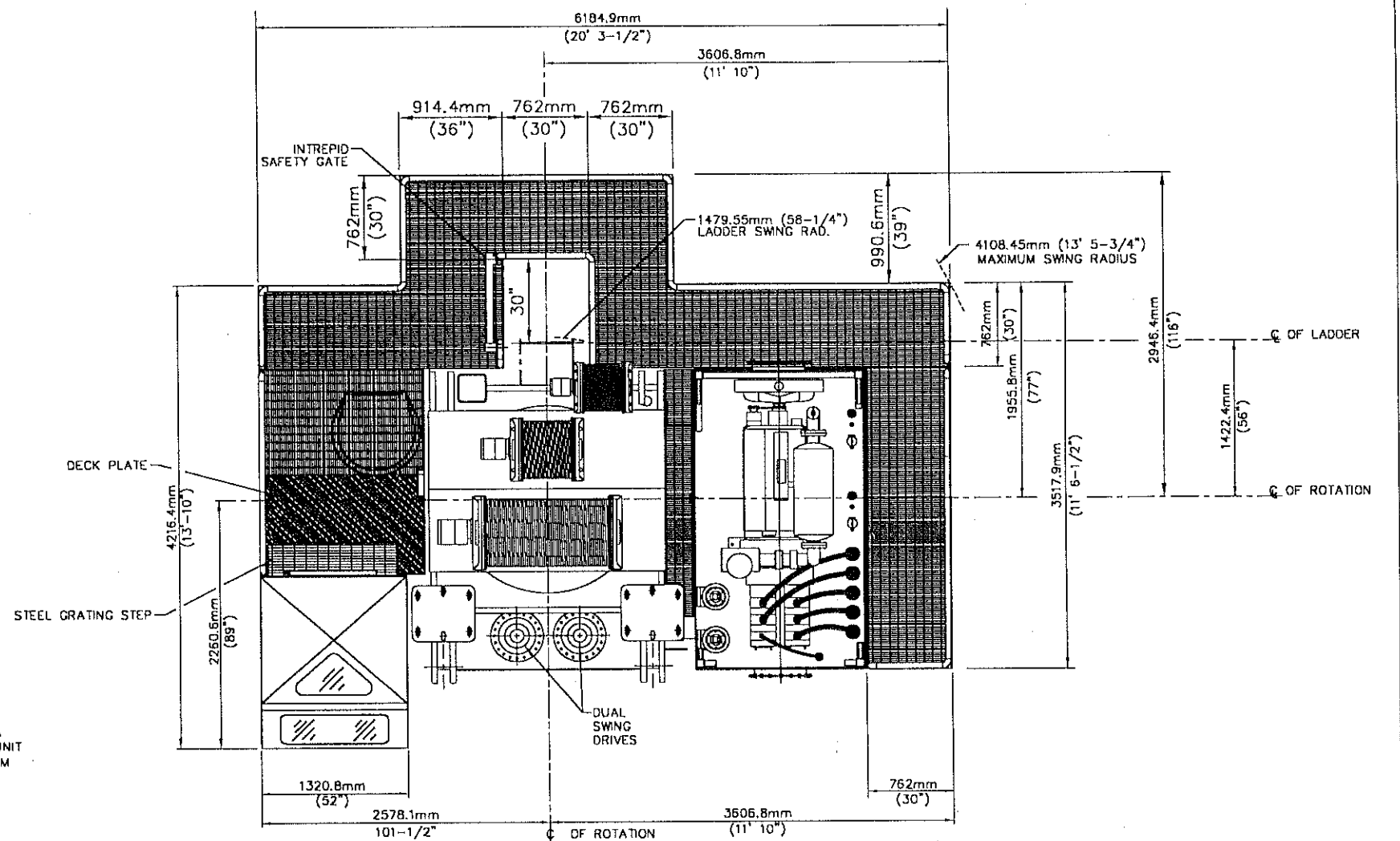
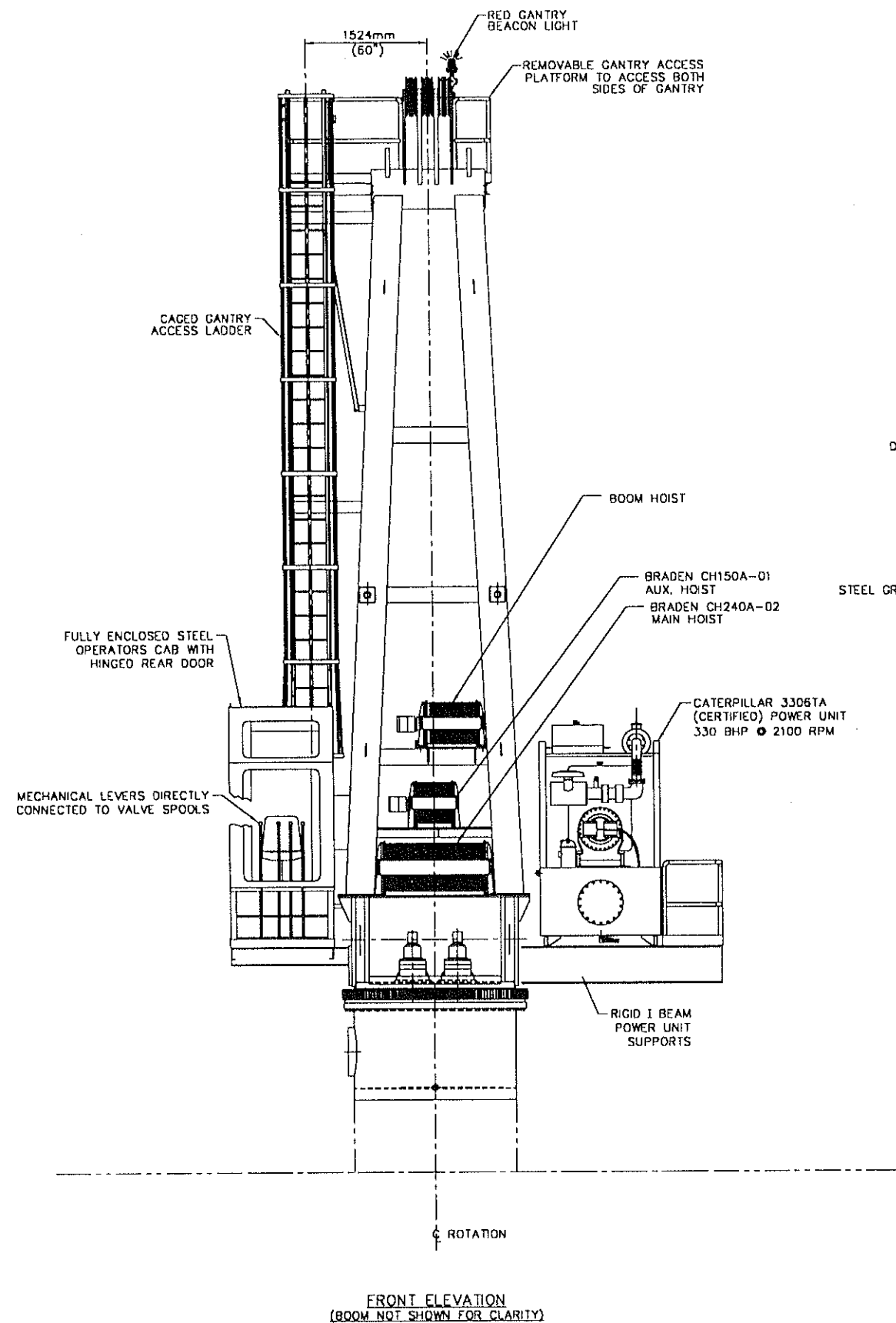
- CRANE FEATURES:
1. MECHANICAL SWING LOCK.
  2. DYNAMIC SWING BRAKE.
  3. CATERPILLAR 3306TA CERTIFIED POWER UNIT.
  4. STAINLESS STEEL PINS.
  5. CENTRALIZED LUBRICATION MANIFOLD.
  6. EMERGENCY LOAD LOWERING KIT.
  7. CAB EQUIPPED WITH A SOUND/VIBRATION ISOLATION PACKAGE.

P.O. No.: PMEQ05 Description: CRANE & DIESEL PEDESTAL  
Tag No(s): AC9-PA-8997-B  
SDRL#: D1

PROCESS PLATFORM CRANE #2  
AHSI WORK ORDER #: 059801  
LOCATION: OFFSHORE BAY OF CAMPECHE  
FACILITY NAME: PEMEX CANTARELL EPC-1  
TAG #: AC9-PA-8997-B  
BUYER'S PURCHASE ORDER #: 031-DW80-PMEQ05



APPLIED HYDRAULIC SYSTEMS, INC.									
Manufacturer of <b>NAUTILUS</b> Marine Cranes									
Sales & Service (504) 851-5600 Fax No. (504) 851-0754					Manufacturing Plant 204 Industrial Ave. C Houma, LA 70363				
DESCRIPTION					REVIEWS				
BY: _____		DATE: _____		BY: JANELLE		DATE: 9/9/99		REVISED TAG # FROM AC9-PA-4997-A	
APPD: _____		DATE: _____		BY: ROB		DATE: 7/2/99		ADDED DECK HEIGHT	
BY: _____		DATE: _____		BY: JANELLE		DATE: 10/13/98		ADDED BLOCK WITH P.O. ECT.	
APPD: _____		DATE: _____		BY: JANELLE		DATE: 9/2/98			
This drawing, including all novel and patented or patentable subject matters embodied herein, is confidential in nature of Applied Hydraulic Systems, Inc., and is loaned with the understanding that it will not be reproduced nor be used for any purpose except that for which loaned unless written permission is granted by Applied Hydraulic Systems, Inc. and it shall be returned on demand.									
DWG. NO. <b>N98SK4-099</b> 									
SCALE: 1/4"=1'-0"						DRAWN BY: <b>DANNY</b>			
DATE: 6/24/98				APPD BY: <b>AS</b>		SHI: 1 OF 2			



P.O. No.: PME005 Description: CRANE & DIESEL PEDESTAL  
Tag No(s): AC9-PA-8997-B  
SDRL#: Q1

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SEPT. 9, 1999

APPLIED HYDRAULIC SYSTEMS, INC.	
Manufacturer of <b>NAUTILUS</b> Marine Cranes	
Sales & Service (504) 851-3600 Fax No. (504) 851-0754	Manufacturing Plant 204 Industrial Ave. C Houma, LA 70363
GENERAL ARRANGEMENT MODEL 340LA-140 PEMEX	
DWG. NO. N98SK4-099	
SCALE: 3/8"=1'-0"	DRAWN BY: JANNY
DATE: 6/24/98	APPROD BY: AS
SHEET 2 OF 2	

APPLIED HYDRAULIC SYSTEMS, INC.  
204 INDUSTRIAL AVENUE C  
HOUMA, LOUISIANA 70363  
(504) 851-5600

**NAUTILUS**  
MARINE CRANES

# LIFTING LOAD CAPACITY CHART NAUTILUS MODEL 340LA-140 MARINE CRANE



RADIUS (M)	BOOM ANGLE (DEG.)	MAIN HOIST				AUXILIARY HOIST		
		4 PART REEVING		6 PART REEVING		1 PART REEVING		PERSONNEL (Kg)
		STATIC (Kg)	DYNAMIC (Kg)	STATIC (Kg)	DYNAMIC (Kg)	STATIC (Kg)	DYNAMIC (Kg)	
8.2	81	25571	25571	38075	27742			
9.1	80	25571	25047	38075	25047			
10.7	77	25571	21842	33285	21842			
12.2	76	25571	19513	29791	19513			
13.7	73	25571	17726	27110	17726			
15.2	71	24967	16297	24967	16297			
16.7	69	23197	15116	23196	15116			
18.2	67	21694	14115	21694	14115			
19.8	65	20390	13246	20390	13246			
21.3	62	19238	12478	19238	12478			
22.8	60	18078	11704	18078	11704			
24.3	58	16623	10734	16623	10734			
26.0	55	15335	9875	15335	9875			
27.4	53	14187	9110	14187	9110			
29.0	50	13157	8423	13157	8423			
30.4	47	12229	7805	12229	7805			
32.0	44	11386	7243	11386	7243			
33.5	41	10618	6731	10618	6731			
35.0	38	9916	6262	9916	6262			
36.5	35	9270	5832	9270	5832			
38.1	31	8675	5435	8675	5435			
39.6	27	8123	5067	8123	5067			
41.1	22	7610	4725	7610	4725			
42.6	15	7130	4405	7130	4405			
44.2	0	6398	3918	6398	3918			

NOTE: - MAIN HOIST CAPACITIES ARE BASED ON 4 OR 6 PART REEVING OF 22.2 mm DIAMETER, SUPER FLEX PAC 19 WIRE ROPE. (BREAKING STRENGTH = 39735 Kg) 665 M OF ROPE IS REQUIRED.  
 - AUXILIARY HOIST CAPACITIES ARE BASED ON SINGLE PART LINE OF 19 mm DIAMETER, SUPER FLEX PAC 19 WIRE ROPE. (BREAKING STRENGTH = 29302 Kg) 175 M OF ROPE IS REQUIRED.  
 - SHEAVE EFFICIENCY IS INCLUDED.  
 - ALL RATINGS IN ACCORDANCE WITH API SPECIFICATION 2C (SPEC 2C), FIFTH EDITION, APRIL 1995.  
 - A DYNAMIC COEFFICIENT (Cb) OF 2.0 IS USED.  
 - THE ABOVE RATINGS ARE CONSIDERED NET RATINGS AS THE MAIN LOAD BLOCK WEIGHT OF 1043 Kg. AND AUXILIARY OVERHAUL BALL WEIGHT OF 165 Kg HAVE BEEN SUBTRACTED.

S/N: 059801C

TAG#: AC9-PA-8997-B

P/N: N96SK3-078  
REV. - A

# *Crane Acceptance Test Procedure and Report*



Nautilus Model 340LA-<sup>140 AB</sup>~~100~~ Marine Crane

*for*


Brown & Root / Pemex

Serial Number 059801C

Tag Number ~~AC8-PA-4997-A~~ <sup>AB</sup> AC9-PA-8997-B

December 30, 1998

  
(Applied Hydraulic Systems, Inc. Representative)

  
(Brown & Root / Pemex Representative)

### SECTION 1 - Gauges:

Accept	Not Accept	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hydraulic Pressure ( <i>Main Hoist</i> )
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hydraulic Pressure ( <i>Auxiliary Hoist</i> )
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hydraulic Pressure ( <i>Boom</i> )
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hydraulic Pressure ( <i>Swing</i> )
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hydraulic Pressure ( <i>Return</i> )
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Engine Oil Pressure
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Accumulator Pressure
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Engine Water Temperature
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hydraulic Oil Temperature
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Engine Tachometer
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hydraulic Oil Level
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Diesel Fuel Level
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Load Cell

### SECTION 2 - Function Test the Following:

Accept	Not Accept	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Engine Start
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Engine Throttle
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Engine Air Intake Shutdown
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Engine Shutdown
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Main Line Anti-Two Block
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Auxiliary Line Anti-Two Block
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Swing Park Brake
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mechanical Swing Lock
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dynamic Swing Brake
<input checked="" type="checkbox"/>	<input type="checkbox"/>	High Angle Kickout
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Low Angle Kickout
<input checked="" type="checkbox"/>	<input type="checkbox"/>	High Boom Angle Kickout Override
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Low Oil Pressure/High Water Temperature Shutdown
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Engine Overspeed Shutdown
<input checked="" type="checkbox"/>	<input type="checkbox"/>	360° Continuous Rotation

### SECTION 3 - Electrical:

Accept	Not Accept	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Boom Floodlights (2)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Boom Tip Beacon (Red)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gantry Beacon (Red)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Cab Light
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Power On Light
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circuit Breaker
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Attention Horn
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Air Conditioner
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Anti-two Block Audible and Visual Alarms

### SECTION 4 - Baseline Pressure Readings with no Load:

FUNCTION	BOOM ANGLE (Degrees)	CRACKING PRESSURE NO LOAD (PSI)	FULL SPEED PRESSURE NO LOAD (PSI)
Boom Up:	50°	600	1,000
Boom Down:	50°	700	1,800
Main Hoist Up:	50°	300	800
Main Hoist Down:	50°	700	1,600
Auxiliary Hoist Up:	50°	300	600
Auxiliary Hoist Down:	50°	700	1,200
Swing CW:	50°	100	1,250
Swing CCW:	50°	100	1,250

# SECTION 5 - Load Test:

Main Hoist: 6-Part Reeving

Test No.	Radius (M.)	Static Rated Load (Kg.)	Test Load (Kg.)	Percent of Rated Load	Cracking Pressure Hoist (PSI)		Full Speed Pressure Main (PSI)		Swing Pressure (PSI)		Boom Pressure (PSI)		Load Cell (Kg.)	Hook Speed (FPM)
					Up	Down	Up	Down	CCW	CW	Up	Down		
1	9.1	38,075	38,056	100	2,400	600	2,900	1,350	-0-	400	2,000	700	38,250	43
2	41.1	7,610	7,650	100	650	650	1,300	1,450	600	300	1,500	700	7,750	

Auxiliary Hoist: 1-Part Reeving

Test No.	Radius (M.)	Static Rated Load (Kg.)	Test Load (Kg.)	Percent of Rated Load	Cracking Pressure Hoist (PSI)		Full Speed Pressure Hoist (PSI)		Swing Pressure (PSI)		Boom Pressure (PSI)		Hook Speed (FPM)
					Up	Down	Up	Down	CCW	CW	Up	Down	
3	26.0	4,515	4,536	100	2,400	600	2,700	1,000	250	100	900	700	282

## TEST WEIGHTS

1	SLG +	I +	E +	D +	F +	1RD WT	
	483	12,025	16,601	8,164	606	177	= 38,056 Kg
2	SLG +	G +	F +	2RD WTS			
	45	6,645	606	354			= 7,650 Kg.
3	SLG +	B +	2RD WTS				
	45	4,137	354				= 4,536 Kg.

# SERVICE ASSISTANCE & ORDERING INFORMATION

24 Hours a Day

## INTRODUCTION

This section contains information for ordering replacement parts for the equipment.



**NOTE:** CERTIFIED OEM REPLACEMENT PARTS CONTAIN NAUTILUS PART NUMBERS. INFORMATION ON PARTS NOT LISTED IN THIS MANUAL MUST BE RECEIVED FROM OSI NAUTILUS CRANE FOR PROPER VALIDATION AS NON-OEM PARTS MAY NOT MEET PERFORMANCE STANDARDS. ANY REPAIRS MADE WITH NON-OEM PARTS COULD EFFECT SAFE OPERATIONS OF THE CRANE AND CAUSE POSSIBLE PERSONNEL INJURY.

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*Oil States Industries*  
1180 Mulberry Road  
Houma, LA 70363 USA

Telephone: (985) 868-0630  
Toll Free: (800) 247-5530  
Fax: (985) 851-0778

*Oil States Industries Thailand Ltd.*  
450 Sukhumvit Road,  
No. 102  
Tambol Huaypong  
Amphur Muang  
Rayong 21150  
Thailand

Telephone: + 66 (0) 38 691 643  
Fax: + 66 (0) 38 691 644

## **SECTION 2**

# **CRANE INSTALLATION**



# SERVICE ASSISTANCE & ORDERING INFORMATION

24 Hours a Day

## INTRODUCTION

This section contains information for ordering replacement parts for the equipment.



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*Oil States Industries*  
1180 Mulberry Road  
Houma, LA 70363 USA

Telephone: (985) 868-0630  
Toll Free: (800) 247-5530  
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*Oil States Industries Thailand Ltd.*  
450 Sukhumvit Road,  
No. 102  
Tambol Huaypong  
Amphur Muang  
Rayong 21150  
Thailand

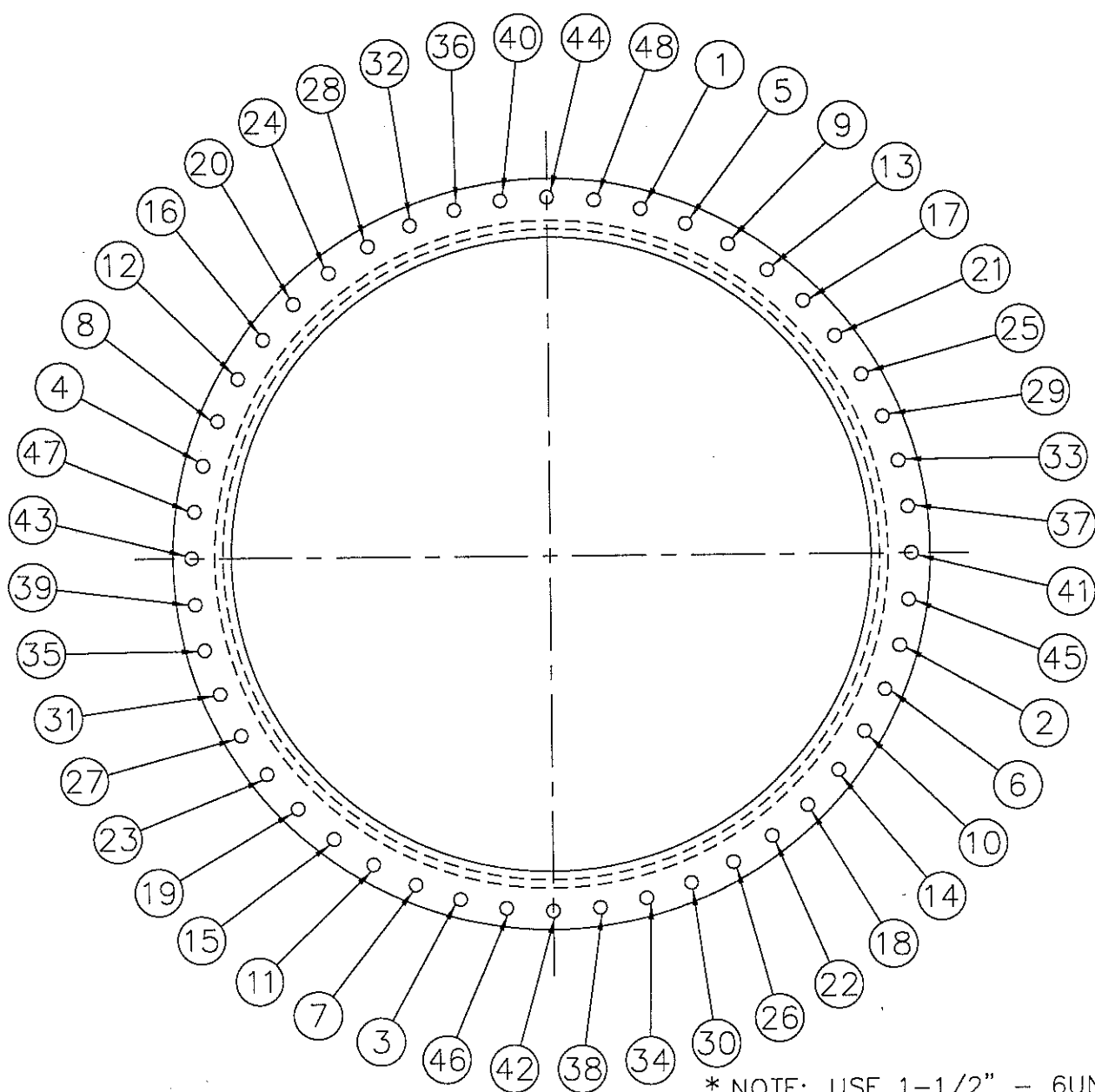
Telephone: + 66 (0) 38 691 643  
Fax: + 66 (0) 38 691 644

# WARNING



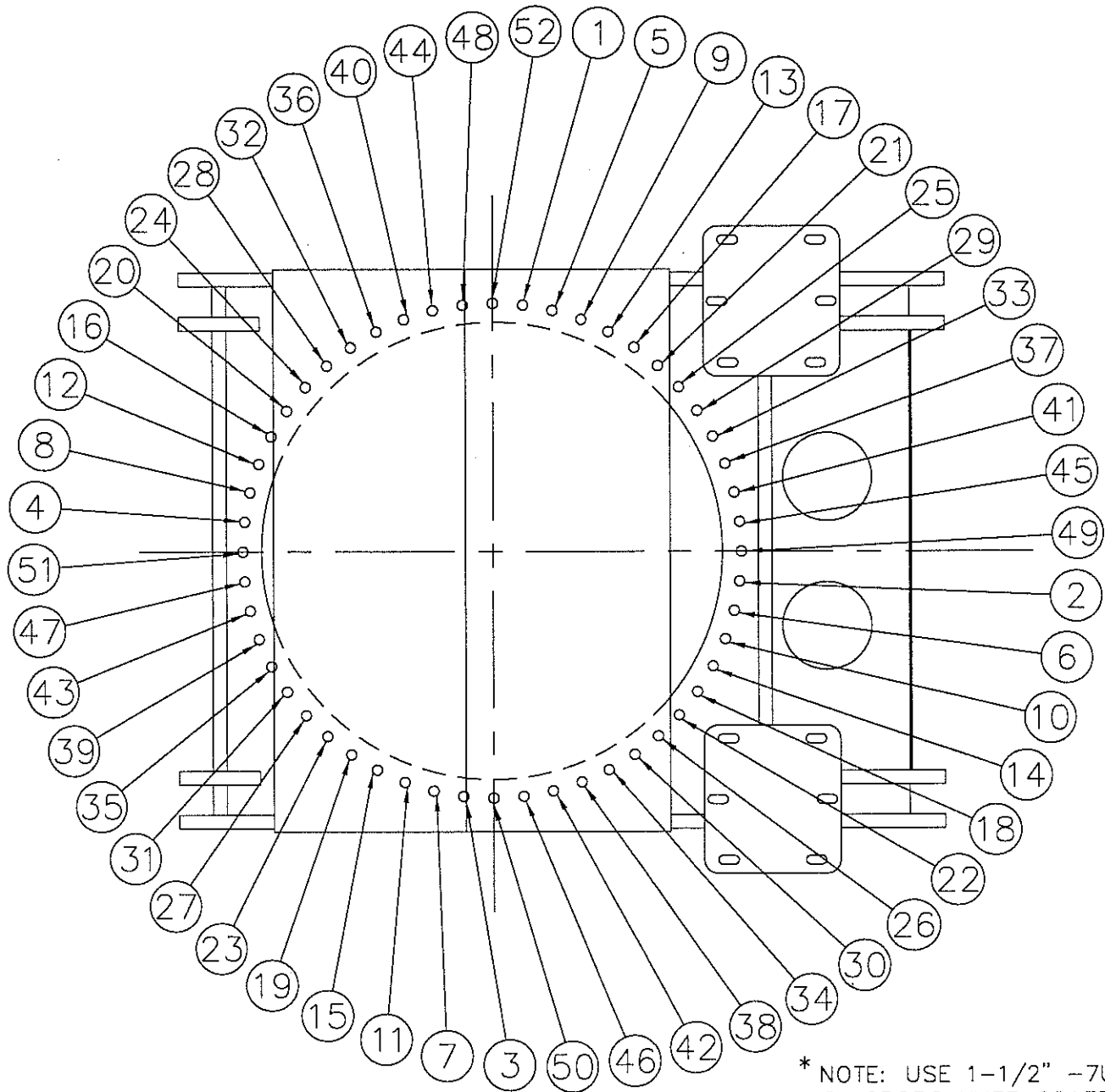
FAILURE TO USE PROPER BALLRING FASTENERS  
COULD RESULT IN PROPERTY DAMAGE, SEVERE  
PERSONAL INJURY, OR DEATH.

REPLACEMENT FASTENERS MUST MEET THE  
SPECIFIC REQUIREMENTS OF API SPECIFICATION  
2C, SECTION 13.5, FIFTH EDITION.



## BOLT TORQUING PROCEDURE BALLRING TO PEDESTAL

1. Do not use oil or grease.
2. Diagram shows the sequence bolts are to be tightened.
3. Bolts are to be torqued in 100 ft. lb. increments until 1900\* ft. lbs. is reached.
4. Bolt torques applicable only for fluoropolymer coated bolts.



## BOLT TORQUING PROCEDURE BALLRING TO UPPERSTRUCTURE

1. Do not use oil or grease.
2. Diagram shows the sequence bolts are to be tightened.
3. Bolts are to be torqued in 100 ft. lb. increments until 1900\* ft. lbs. is reached.
4. Bolt torques applicable only for fluoropolymer coated bolts.

## TORQUE FOR PLATED FASTENERS



### WARNING

DO NOT APPLY TO CRANE MOUNTING BEARING.

- Threads must be free of debris, damage, and coated with hydraulic oil or a light machine oil. The torque values are not valid for threads with grease or anti-seizing compound.

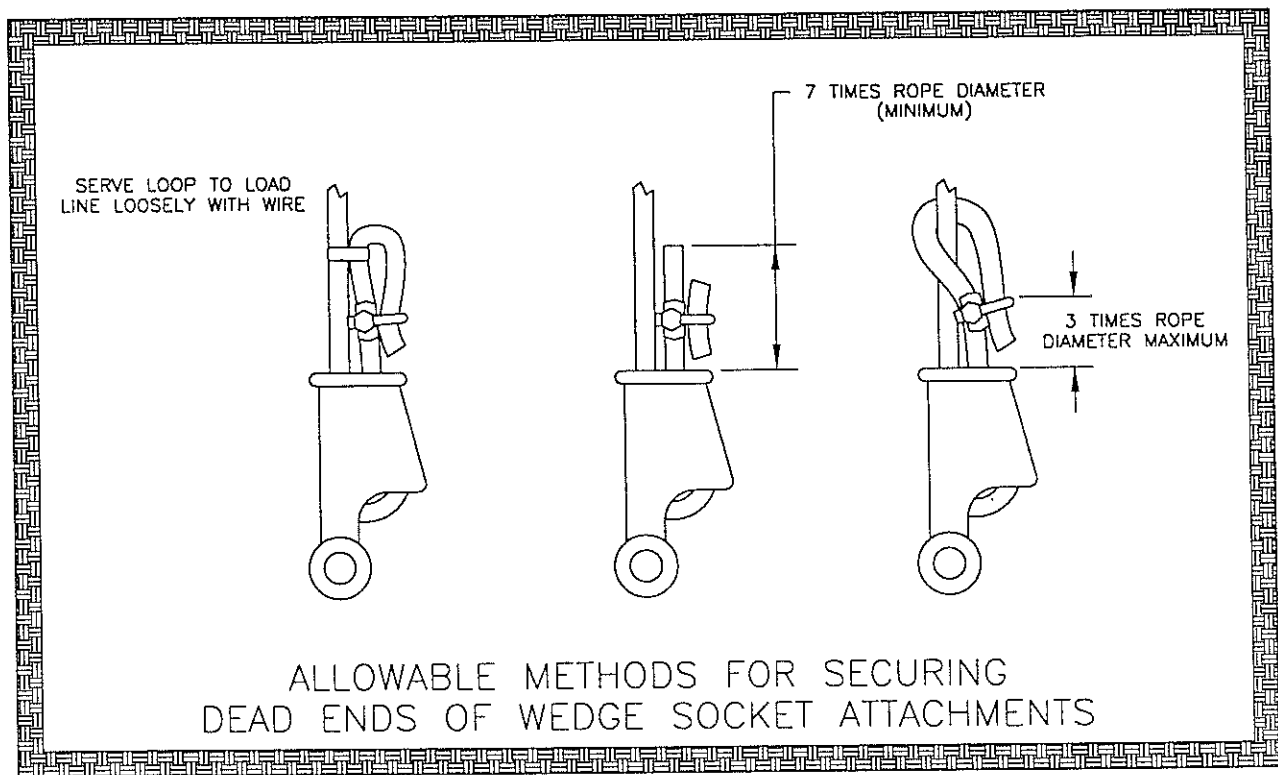
GRADE 8			
NOMINAL BOLT SIZE (IN)	MINIMUM (FT/LBS)	MID-RANGE (FT/LBS)	MAXIMUM (FT/LBS)
3/8 - 16	33	35	37
1/2 - 13	76	80	84
9/16 - 12	104	110	115
5/8 - 11	161	170	178
3/4 - 10	266	280	294
7/8 - 9	437	460	483
1 - 8	646	680	714
1-1/4 - 7	1,292	1,360	1,428
1-3/8 - 6	1,691	1,780	1,869
1-1/2 - 6	2,242	2,360	2,478

GRADE 5			
NOMINAL BOLT SIZE (IN)	MINIMUM (FT/LBS)	MID-RANGE (FT/LBS)	MAXIMUM (FT/LBS)
3/8 - 16	21	23	24
1/2 - 13	62	65	68
9/16 - 12	76	80	84
5/8 - 11	104	110	115
3/4 - 10	190	200	210
7/8 - 9	285	300	315
1 - 8	418	440	462
1-1/4 - 7	798	840	882
1-3/8 - 6	1,045	1,100	1,155
1-1/2 - 6	1,387	1,460	1,533

FASTENER MARKINGS		
	GRADE 5	GRADE 8
BOLT SAE J429		
NUT SAE J995	OR	OR

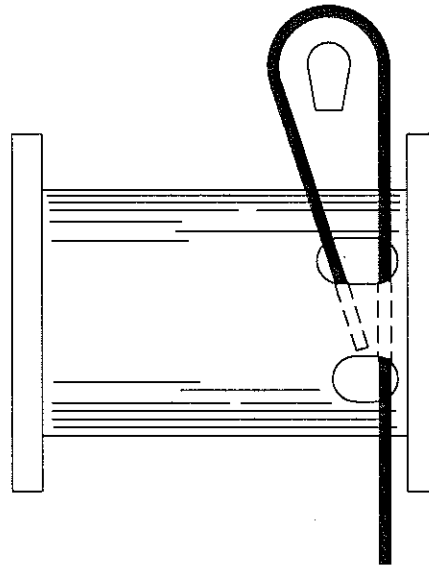
# RECOMMENDED ANCHORING OF WIRE ROPE AT DEAD END

## DEAD END — WEDGE SOCKET



# ANCHORING WIRE ROPE

INSERT CABLE ANCHOR  
SMALL END FIRST.



CH240A

MAIN HOIST - 7/8" WIRE ROPE

Anchoring wire rope on the hoist is very easy. Take the free end of the wire rope and insert it through the small opening of the anchor pocket. Loop the wire rope and push the free end about 3/4 of the way back through the pocket. Install the wedge, then pull the slack out of the wire rope. The wedge will slip into the pocket and secure the wire rope into the drum.

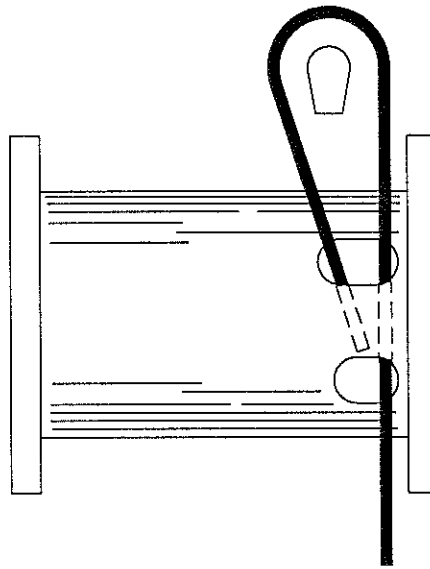
**WARNING:**



The cable anchor alone on hoists are not designed to hold rated loads. Therefore, a minimum of 5 wraps of cable must be left on the drum barrel to achieve rated load.

# ANCHORING WIRE ROPE

INSERT CABLE ANCHOR  
SMALL END FIRST.



CH150A

AUXILIARY HOIST – 3/4" WIRE ROPE

Anchoring wire rope on the hoist is very easy. Take the free end of the wire rope and insert it through the small opening of the anchor pocket. Loop the wire rope and push the free end about 3/4 of the way back through the pocket. Install the wedge, then pull the slack out of the wire rope. The wedge will slip into the pocket and secure the wire rope into the drum.

**WARNING:**

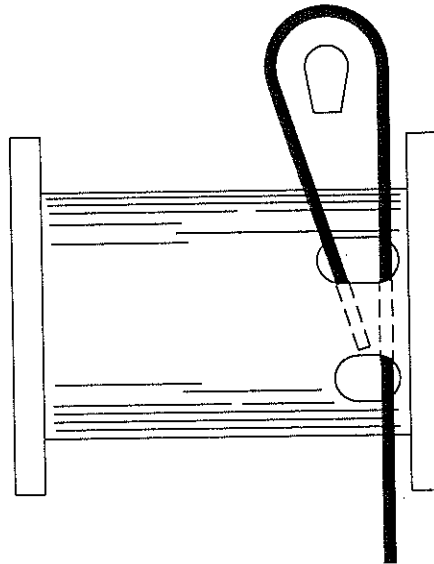


The cable anchor alone on hoists are not designed to hold rated loads. Therefore, a minimum of 5 wraps of cable must be left on the drum barrel to achieve rated load.



# ANCHORING WIRE ROPE

INSERT CABLE ANCHOR  
SMALL END FIRST.



CH230A

BOOM HOIST - 3/4" WIRE ROPE

Anchoring wire rope on the hoist is very easy. Take the free end of the wire rope and insert it through the small opening of the anchor pocket. Loop the wire rope and push the free end about 3/4 of the way back through the pocket. Install the wedge, then pull the slack out of the wire rope. The wedge will slip into the pocket and secure the wire rope into the drum.

**WARNING:**



The cable anchor alone on hoists are not designed to hold rated loads. Therefore, a minimum of 5 wraps of cable must be left on the drum barrel to achieve rated load.



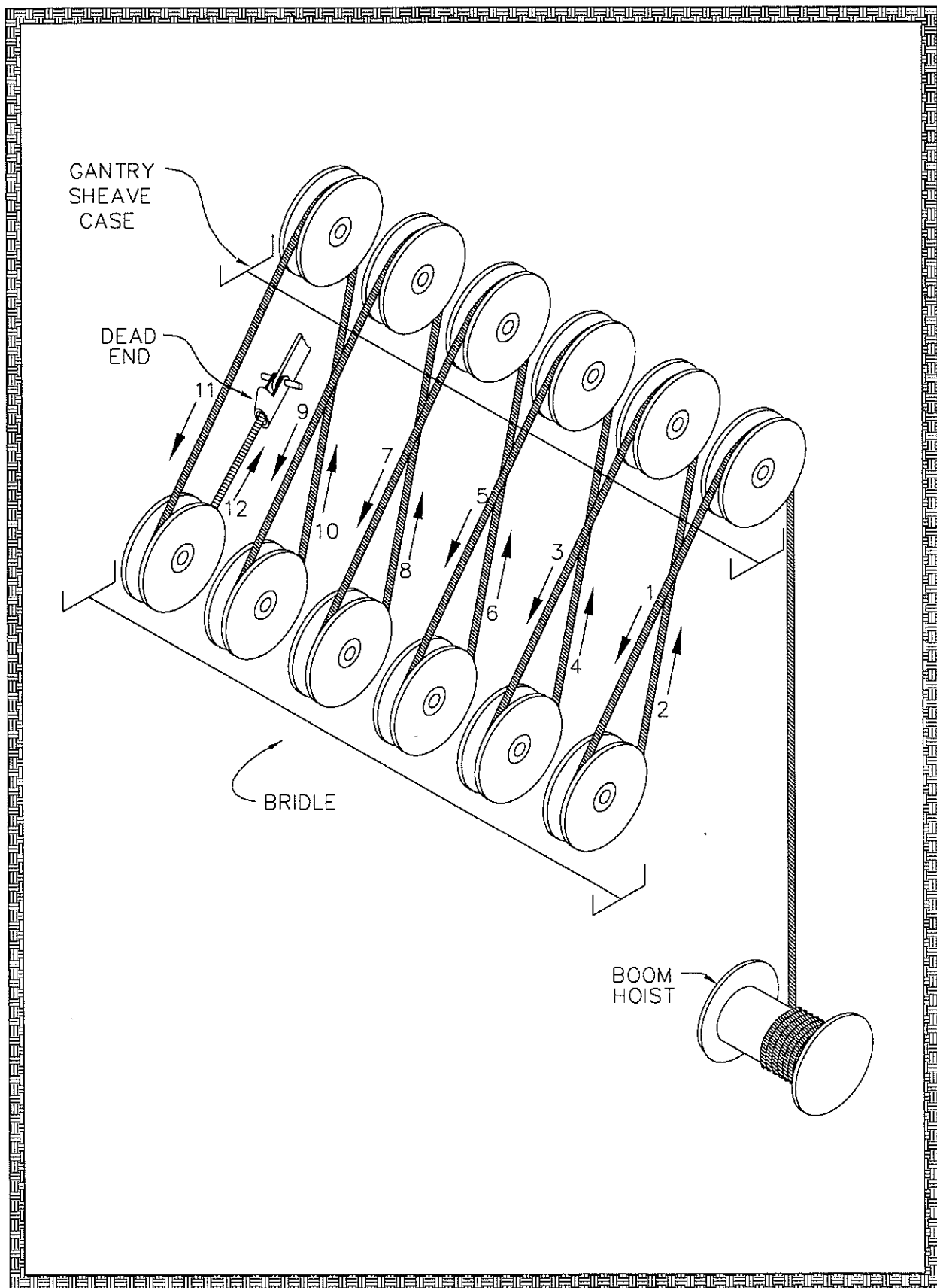
## ***WIRE ROPE BREAK – IN PROCEDURE***

After properly installing the new rope, run the new rope through the crane operating cycle several times under a light load at a reduced line speed.

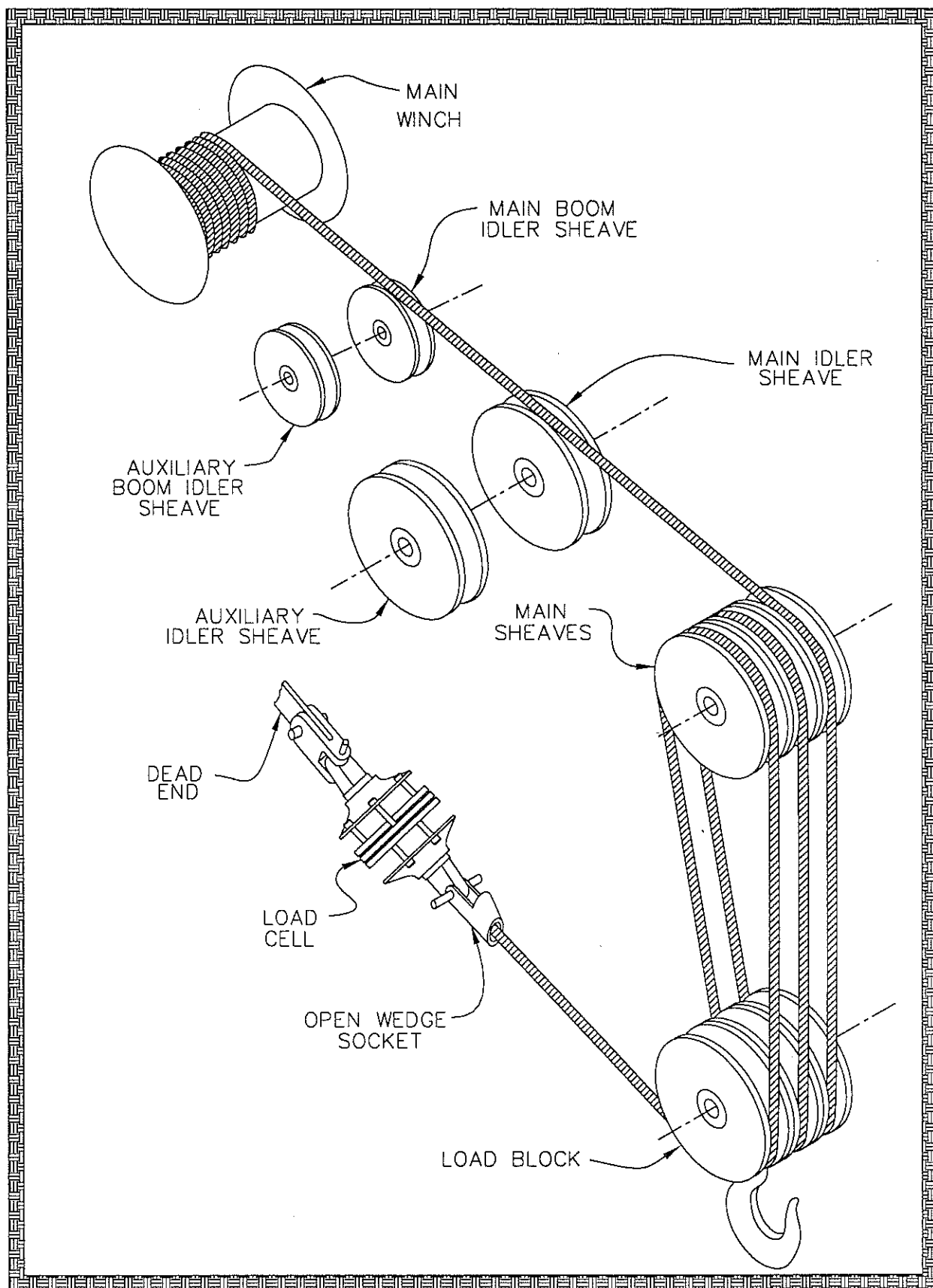
Progressively increase the loads until reaching the entire range of expected lifts.

As you increase the loads, run each load weight from light to maximum expected load at least six times before proceeding, especially when the crane operator will make a series of heavy lifts with new ropes.

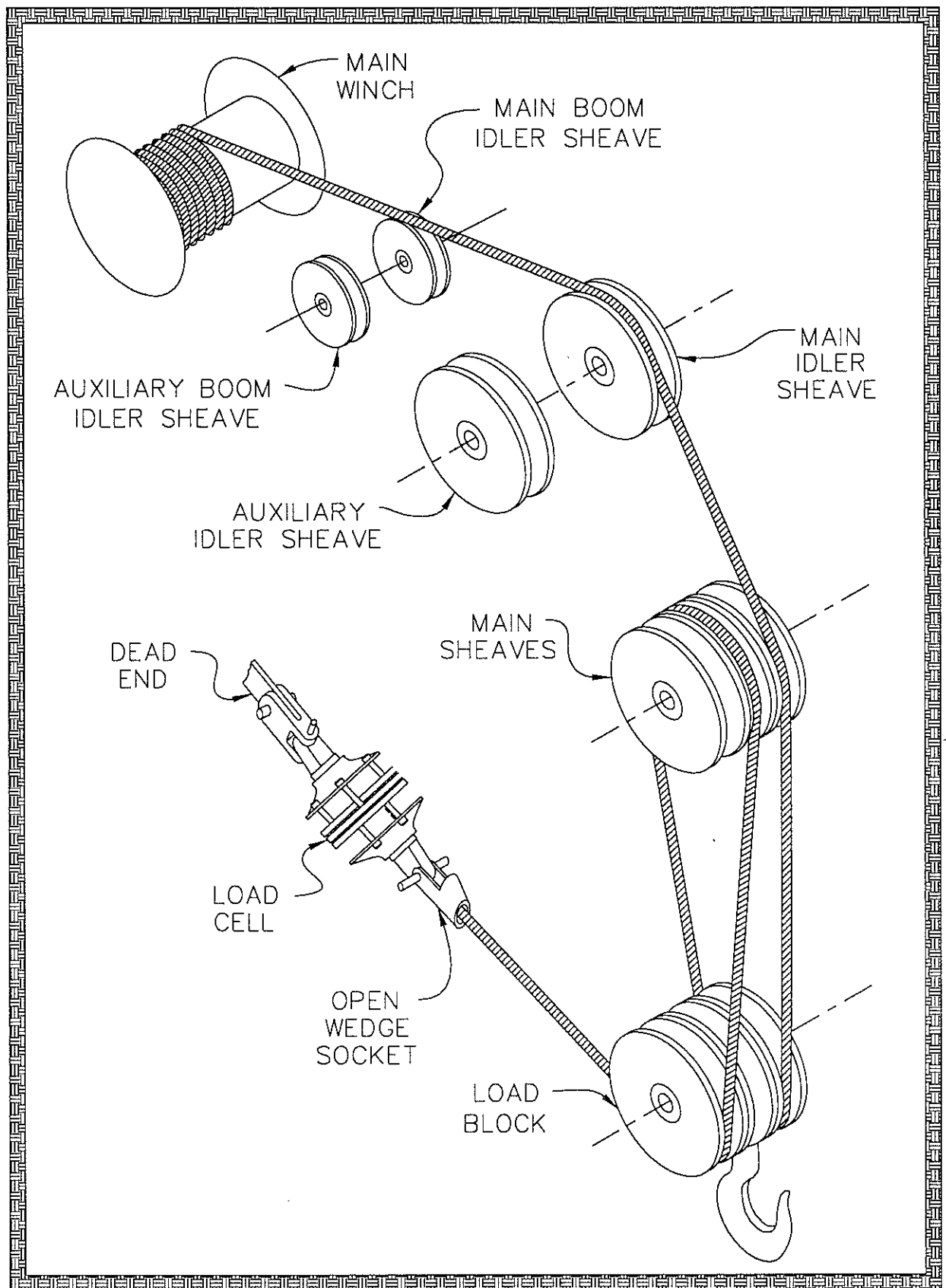
This allows the rope to adjust gradually to working conditions, enables the strands to become settled and allows for slight stretching and diameter reduction to occur.



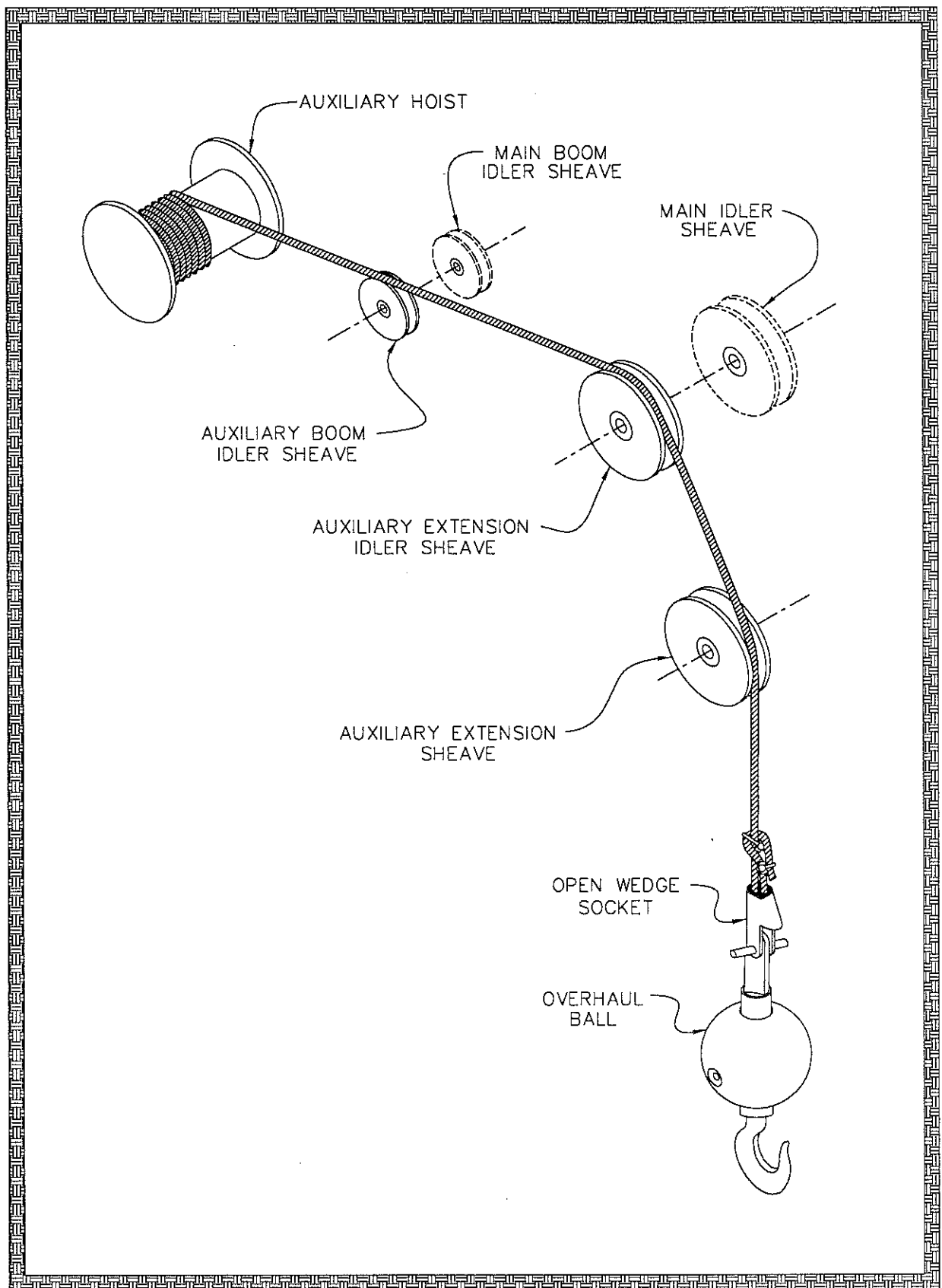
REEVING DIAGRAM  
12 PART LINE



REEVING DIAGRAM  
6 PART LINE



REEVING DIAGRAM  
4 PART LINE



REEVING DIAGRAM  
1 PART LINE

# **ELECTRICAL SWIVEL BRACKET**





## **SECTION 3**

# **CRANE OPERATION**

# SERVICE ASSISTANCE & ORDERING INFORMATION

24 Hours a Day

## INTRODUCTION

This section contains information for ordering replacement parts for the equipment.



**NOTE:** CERTIFIED OEM REPLACEMENT PARTS CONTAIN NAUTILUS PART NUMBERS. INFORMATION ON PARTS NOT LISTED IN THIS MANUAL MUST BE RECEIVED FROM OSI NAUTILUS CRANE FOR PROPER VALIDATION AS NON-OEM PARTS MAY NOT MEET PERFORMANCE STANDARDS. ANY REPAIRS MADE WITH NON-OEM PARTS COULD EFFECT SAFE OPERATIONS OF THE CRANE AND CAUSE POSSIBLE PERSONNEL INJURY.

## PARTS DELIVERY

To ensure prompt delivery of parts, be sure to give the correct name, address, town, state and country to which the parts are to be shipped. Include the Zip Code, if applicable, and specify the type of shipment. If the type of shipment is not specified, parts will be shipped by the best available means as determined by Oil States Industries.

## PARTS AND SERVICE INQUIRIES

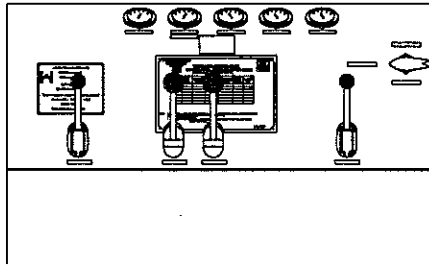
If difficulty is encountered with the repair of any assembly / component or if replacement parts are needed for any reason, contact the Oil States Industries Parts and Service Department for assistance at the following:

*Oil States Industries*  
1180 Mulberry Road  
Houma, LA 70363 USA

Telephone: (985) 868-0630  
Toll Free: (800) 247-5530  
Fax: (985) 851-0778

*Oil States Industries Thailand Ltd.*  
450 Sukhumvit Road,  
No. 102  
Tambol Huaypong  
Amphur Muang  
Rayong 21150  
Thailand

Telephone: + 66 (0) 38 691 643  
Fax: + 66 (0) 38 691 644



## GENERAL OPERATION OF CRANE



1. Always operate crane within the capacity rating (see your lifting chart). Know the weight of the load you are lifting.
2. Never operate with anyone under the load or swing over personnel.
3. Know and follow recommended hand signals.
4. Do not leave crane unattended while load in suspended or crane is operating.
5. Parking brake should always be set before leaving crane.

## WARNING



FAILURE TO FOLLOW ABOVE PROCEDURES COULD  
RESULT IN PROPERTY DAMAGE, SEVERE PERSONAL  
INJURY, OR DEATH!

# OPERATION CAUTION

Do not operate crane unless you thoroughly understand the controls and operation of the crane and required maintenance has been performed on the crane.

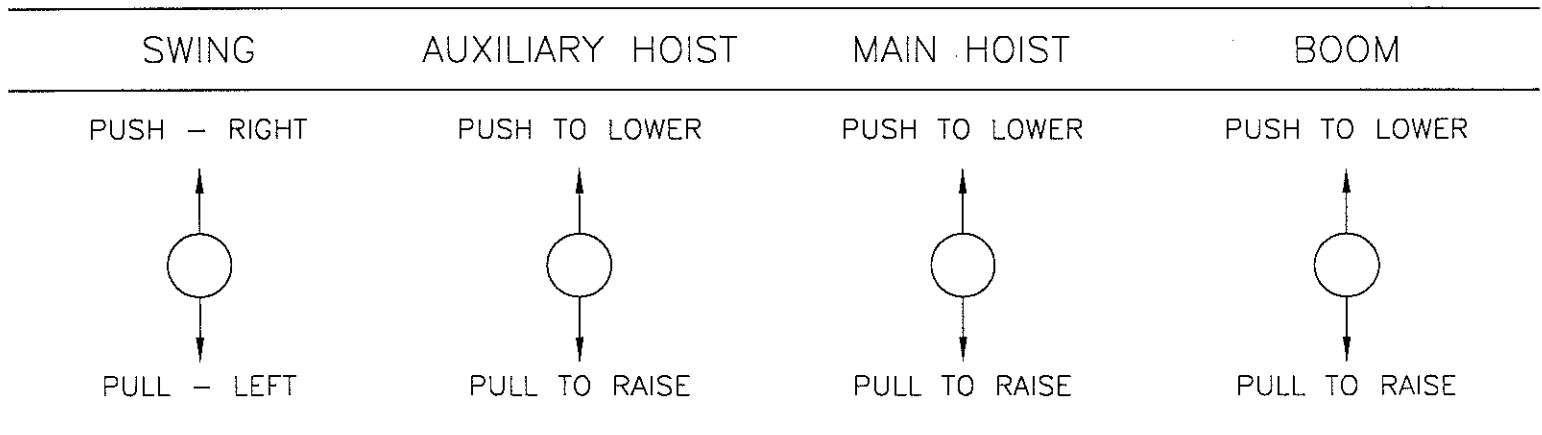
## CAUTION



1. Check all scheduled maintenance items, including proper lubrication of ballring and hydraulic oil level.
2. Check all pin connections and inspect ballring bolts for looseness and corrosion.
3. Start prime mover and check crane operation - without load.
4. Always be certain that wire rope reeving is in correct position before operating crane.

# CRANE OPERATION

## LEVER CONTROLS: BASIC FOUR LEVER CRANE CONTROL DIAGRAM (VIEWED FROM OPERATOR'S STATION)



### FOUR LEVER CRANE CONTROL FUNCTIONS

#### CONTROL

- |                            |   |
|----------------------------|---|
| 1. SWING CONTROL           | Push lever to swing crane to the right. The center (neutral) is to stop. Pull lever to swing crane to the left. |
| 2. AUXILIARY HOIST CONTROL | Push lever to lower load. The center (neutral) is to stop. Pull lever to hoist load.                            |
| 3. MAIN HOIST CONTROL      | Push lever to lower load. The center (neutral) is to stop. Pull lever to raise load.                            |
| 4. BOOM HOIST CONTROL      | Push lever to lower boom. The center (neutral) is to stop. Pull lever to raise boom.                            |

#### CAUTION:



During operation, the control lever should be metered slowly when starting or stopping an operation to prevent harsh stresses on the hydraulic system and the equipment. All movements should be smooth. Avoid jerking. Extra caution should be taken when boom is in a full horizontal position or when moving heavy loads.

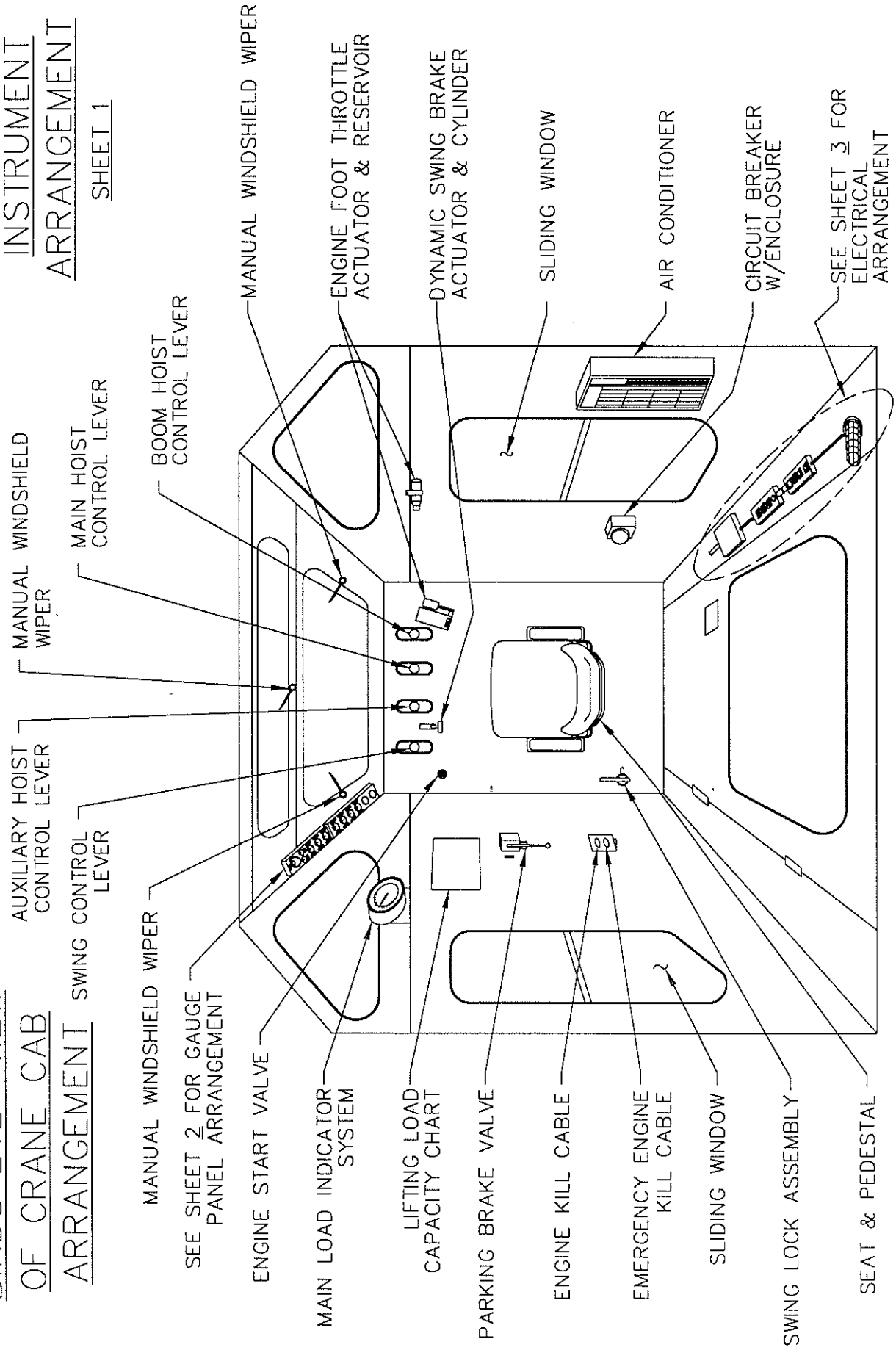
- |                                   |  |
|-----------------------------------|--|
| 5. SWING LOCK ASSEMBLY            | Located on the cab floor to the left of the operator. Pull lever to engage swing lock. Push to disengage swing lock.   |
| 6. EMERGENCY ENGINE<br>KILL CABLE | Located on the cab wall to the left of the operator. Pull handle to shut off air intake causing engine to shut down.   |
| 7. ENGINE KILL CABLE              | Located on the cab wall to the left of the operator. Pull handle to shut off fuel intake causing engine to shut down.  |
| 8. PARKING BRAKE VALVE            | Located on the cab wall to the left of the operator. Lever must be depressed to set the parking brake. Set the parking brake only when crane has stopped swinging. |

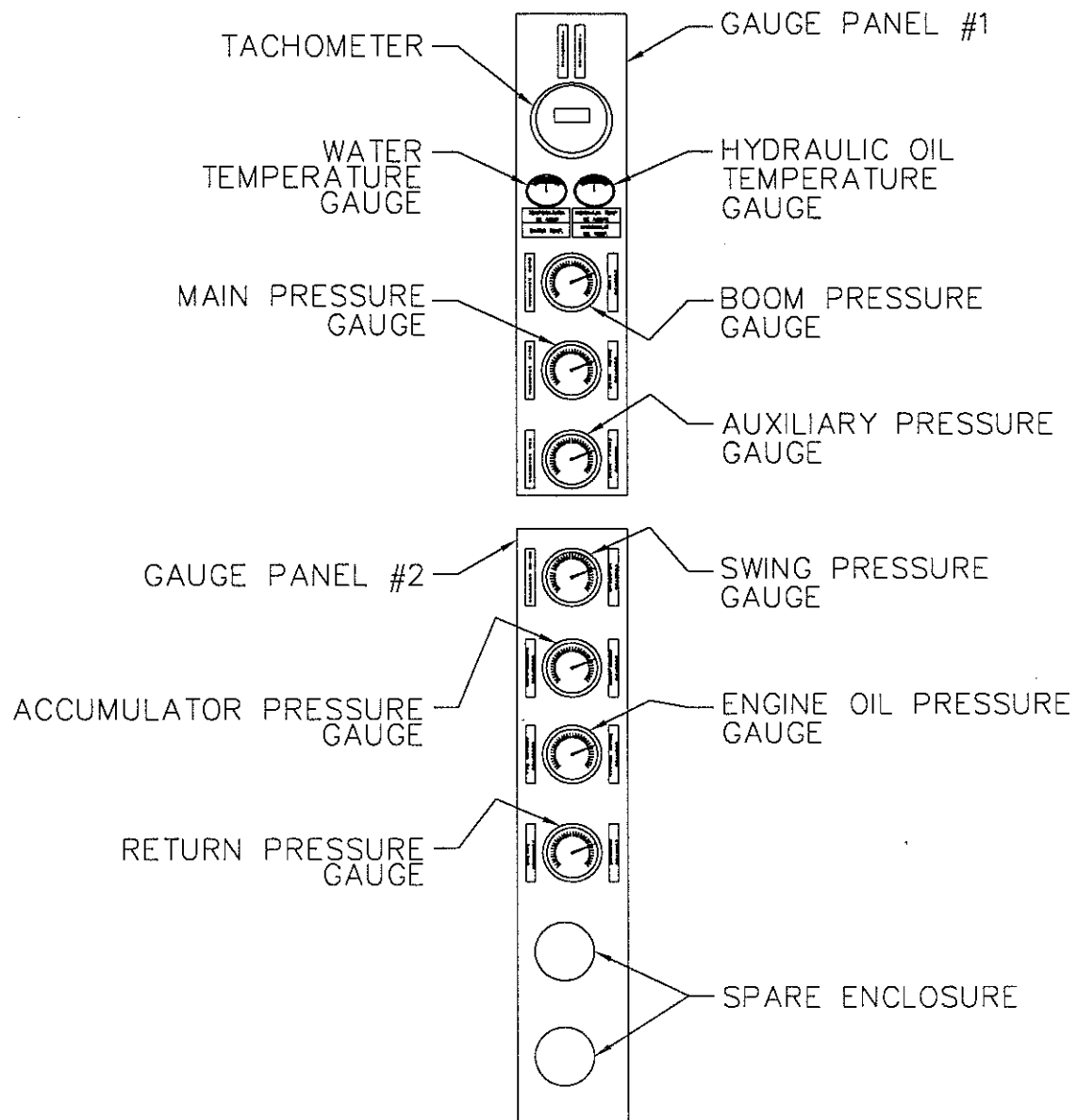
**CAUTION:** This crane is equipped with free swing capability. Crane must be completely stopped before engaging parking brake. Do not use parking brake to stop swing of crane.



- |   |  |
|---|--|
| 9. ENGINE START VALVE<br>PUSH-BUTTON          | Located on the cab floor to the left of the operator. Push button down to start engine.  |
| 10. DYNAMIC SWING BRAKE<br>ACTUATOR           | Located on the cab front floor of the left of the operator. Push pedal down slowly to stop swing of crane.   |
| 11. ENGINE FOOT THROTTLE<br>ACTUATOR          | Engine power and speed is controlled by using the foot pedal located on the right side of the cab floor. Depress the pedal to accelerate the engine. Release to idle the engine. Pedal is spring loaded to idle. |
| 12. BOOM HIGH ANGLE KICKOUT<br>OVERRIDE VALVE | Located to the rear of the operator, outside the cab. Handle must be pushed and held to override the high boom limit valve.  |
| 13. BOOM LOW ANGLE KICKOUT<br>OVERRIDE VALVE  | Located to the rear of the operator outside the cab. Handle must be pushed and held to override the low boom limit valve.  |

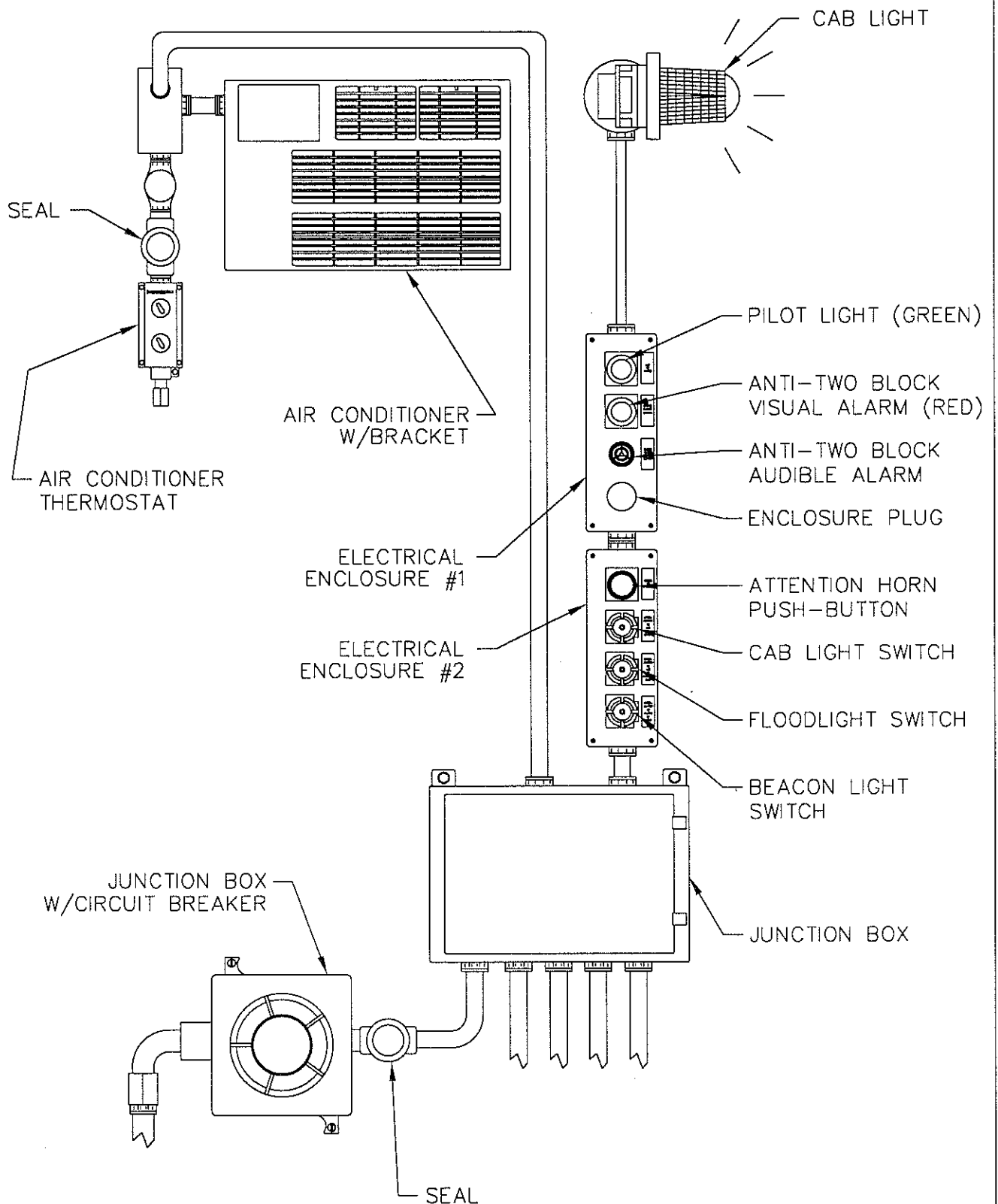
# "BIRDS EYE" VIEW OF CRANE CAB ARRANGEMENTS





CAB GAUGE PANEL ARRANGEMENTS  
SHEET 2



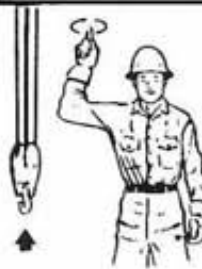


# ELECTRICAL ARRANGEMENTS SHEET 3

# CRANE SIGNALS



**Nautilus Marine Cranes**  
Houma, Louisiana (985) 868-0630



**HOIST**  
With forearm vertical, forefinger pointing up, move hand in small horizontal circle



**LOWER**  
With arm extended downward, forefinger pointing down, move hand in small horizontal circles



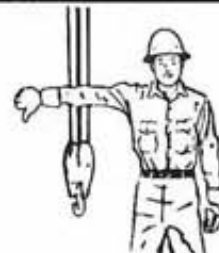
**USE MAIN HOIST**  
Tap fist on head; then use regular signals



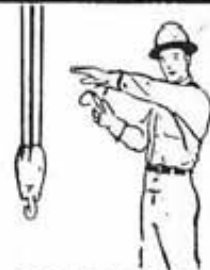
**USE WHIP LINE**  
(Auxiliary Hoist)  
Tap elbow with one hand; then use regular signals



**RAISE BOOM**  
Arm extended, fingers closed thumb pointing upward



**LOWER BOOM**  
Arm extended, fingers closed, thumb pointing downward



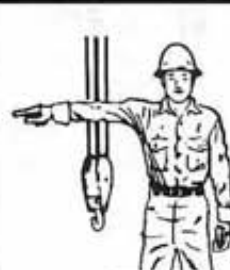
**MOVE SLOWLY**  
Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist Slowly shown as example)



**RAISE THE BOOM AND LOWER THE LOAD**  
With arm extended thumb point up, flex fingers in and out as long as load movement is desired.



**LOWER THE BOOM AND RAISE THE LOAD**  
With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.



**SWING**  
Arm extended point with finger in direction of swing of boom



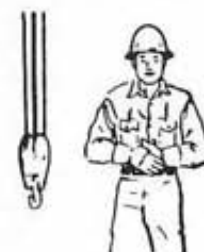
**STOP**  
Arm extended, palm down, hold position rigidly.



**EMERGENCY STOP**  
Arm extended, palm down, move hand rapidly right and left.



**TRAVEL**  
Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

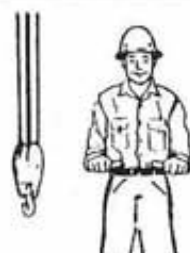


**DOG EVERYTHING**  
Clasp hands in front of body.

## CRANE SIGNALS FOR TELESCOPING BOOM



**EXTEND BOOM**  
Both fists in front of body with thumbs pointing outward.



**RETRACT BOOM**  
Both fists in front of body with thumbs pointing toward each other.



**EXTEND BOOM**  
One Hand Signal. One fist in front of chest with thumb tapping chest.



**RETRACT BOOM**  
One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.



# EMERGENCY LOWERING PROCEDURE

## CH SERIES HOIST ONLY

1. DISCONNECT THE BRAKE RELEASE HOSE FROM THE BRAKE TEST NEEDLE VALVE, PUT 1/4" JIC CAP (ITEM 11) ON OPEN FITTING, REMOVE LOCKWIRE ON BRAKE TEST NEEDLE VALVE AND CLOSE VALVE. (REF. SHEET 1)
2. INSTALL 1/4" UNION (ITEM 14) IN BRAKE RELEASE HOSE DISCONNECTED FROM NEEDLE VALVE.
3. INSTALL PRESSURE GAUGE (ITEM 2), HOSE (ITEM 5), 1/4" TEE (ITEM 3) AND 1/4" ADAPTER (ITEM 4) ON HAND PUMP (ITEM 1). (REF. SHEET 1)
4. ATTACH HAND PUMP HOSE (ITEM 5) TO 1/4" UNION (ITEM 14).
5. REMOVE BOTH MAIN HOSES FROM THE MOTOR AND ATTACH A STAND PIPE TO THE MOTOR PORT ON THE OPPOSITE SIDE OF THE MOTOR FROM THE BRAKE VALVE USING ITEMS 7, 8 & 9. THE STAND PIPE MUST BE INSTALLED VERTICALLY. (REF. SHEET 1)
6. INSTALL 1-1/2" ANCHOR FLANGE (ITEM 7) ON BRAKE VALVE WITH PLUG (ITEM 10).
7. FILL THE STAND PIPE (ITEM 9) WITH HYDRAULIC OIL.

### !CAUTION!

THIS EMERGENCY LOWERING PROCEDURE OPENS THE MULTIPLE-DISC BRAKE WHILE LEAVING THE BRAKE VALVE CLOSED. SINCE GEAR TYPE MOTORS ARE NOT ZERO LEAK DEVICES, INTERNAL MOTOR LEAKAGE PERMITS THE LOAD TO SLOWLY ROTATE THE MOTOR EVEN THOUGH THE OUTLET IS BLOCKED BY THE CLOSED BRAKE VALVE AND THE PLUG (ITEM 10). THIS PROCEDURE WILL NOT WORK IF THERE IS LITTLE OR NO OIL IN THE MOTOR. ATTEMPTING TO USE THIS PROCEDURE WITH NO OIL IN THE MOTOR WILL CAUSE THE LOAD TO FREE FALL. THE PURPOSE OF THE STAND PIPE IS TO INSURE THAT THE MOTOR IS FULL OF OIL. THE STAND PIPE IS SIMPLY A LENGTH OF PIPE ABOUT ONE (1) FOOT LONG (31 CM), ATTACHED TO A 90° ELBOW. THE OTHER END OF THE ELBOW IS ATTACHED TO A SHORT FITTING SUITABLE FOR MOUNTING ON THE MOTOR PORT OR MANIFOLD. THE STAND PIPE IS INSTALLED WITH THE PIPE POINTED IN A VERTICAL POSITION. WHILE LOWERING, OIL SHOULD BE ADDED TO THE STAND PIPE AS NECESSARY. THE PIPE DIAMETER SHOULD BE EQUAL TO OR LARGER THAN THE MOTOR PORT DIAMETER.

8. WITH THE HAND PUMP, SLOWLY APPLY 500-750 LBS. HYDRAULIC PRESSURE TO THE BRAKE RELEASE PORT WHILE CONSTANTLY MONITORING THE DESCENT OF THE LOAD. RELEASING THE PRESSURE ON THE HAND PUMP WILL CAUSE THE BRAKE TO RE-APPLY AND STOP THE LOAD. IF A CHATTERING NOISE IS HEARD WHILE THE LOAD IS COMING DOWN, PUMP THE HAND PUMP TO A HIGHER PRESSURE (DO NOT EXCEED 1000 PSI) UNTIL THE NOISE STOPS. DO NOT TOUCH THE MOTOR OR STAND PIPE WHILE USING THIS PROCEDURE; THESE ITEMS BECOME VERY HOT.
9. WHEN LOAD LOWERING IS COMPLETED, REVERSE THIS PROCEDURE AND SAFETY WIRE THE BRAKE TEST NEEDLE VALVE OPEN.

APPLIED HYDRAULIC SYSTEMS, INC.

Manufacturer of  
**NAUTILUS**  
Marine Cranes

Sales & Service  
(504) 851-5800  
Fox No. (504) 851-0754  
Manufacturing Plant  
204 Industrial Ave. C  
Houma, LA 70363

EMERGENCY LOWERING  
PROCEDURE  
CH HOIST ONLY

DWG. NO. N95SK5-040

SCALE: NOT TO SCALE  
DATE: 11/28/93  
DRAWN BY: PH/L  
APP'D BY: E-4

SHT. 2 OF 2

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DATE:	DATE:
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BY:	BY:

SHT. 2 OF 2

N95SK5-040

DWG. NO.

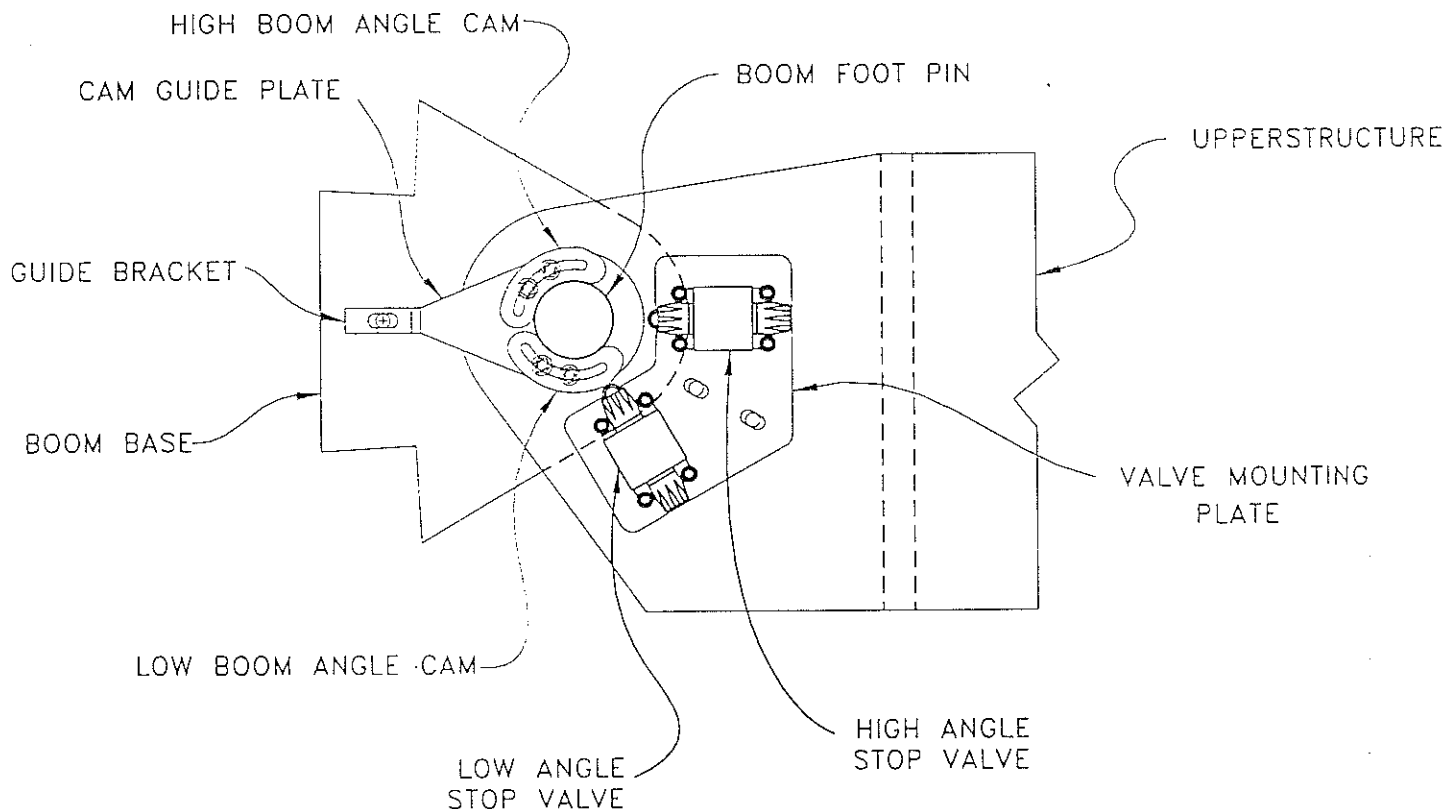
## BOOM ANGLE HIGH/LOW KICKOUT ADJUSTMENT PROCEDURE

The boom angle high/low kickout assembly hydraulically limits maximum (80 deg.) and minimum (0 deg.) boom angles. Adjustment is made by loosening locking nuts and positioning adjustment screws to properly engage valve actuator cam with boom kickout valve. Be sure to tighten locking nuts after adjustment screws are properly positioned.

### WARNING:



CORRECT POSITIONING OF CAMS IS ESSENTIAL FOR SAFE CRANE OPERATION. INCORRECT POSITIONING OF CAMS COULD CAUSE THE BOOM TO BE OPERATED BEYOND ITS LIMITS AND POSSIBLY RESULT IN DAMAGE TO STRUCTURAL COMPONENTS.



## SWING LOCK OPERATION AND ADJUSTMENT

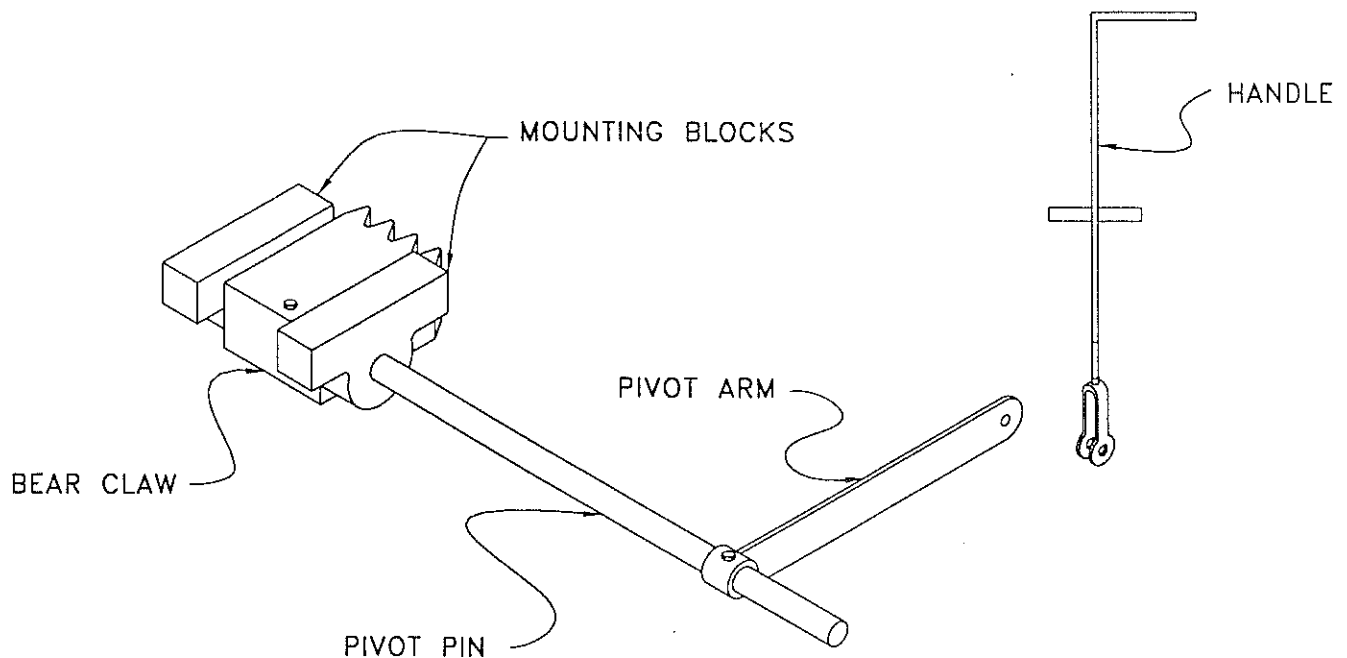
The mechanical swing lock is manipulated by raising or lowering the swing lock handle located on the cab floor right of the operator's seat. To engage swing lock, pull handle vertically upward until the locking mechanism lines up with ballring. The crane swing lever may have to be bumped to align gear rack with ballring external gear. To disengage, pull handle until bearclaw has cleared ballring.

Adjustment of swing lock is performed by loosening the mounting bolts and jam nuts on adjustment bolts. Use adjustment bolts to position gear rack to obtain proper tooth engagement with ballring external gear. After proper positioning of gear rack is obtained, tighten mounting bolts and lock adjustment bolts with jam nuts. See tabulated bolt tightening torque sheet for proper tightening torques.

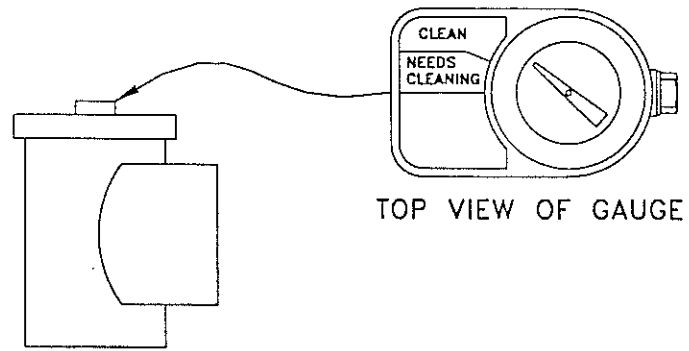
### WARNING:



NEVER ATTEMPT TO SWING CRANE WITH SWING LOCK ENGAGED AS DAMAGE TO CRANE SWING ASSEMBLY AND SWING LOCK MECHANISM MAY RESULT. NEVER ENGAGE SWING LOCK WITH TURRET IN MOTION. THIS MAY RESULT IN CATASTROPHIC FAILURE OF CRANE STRUCTURAL COMPONENTS.

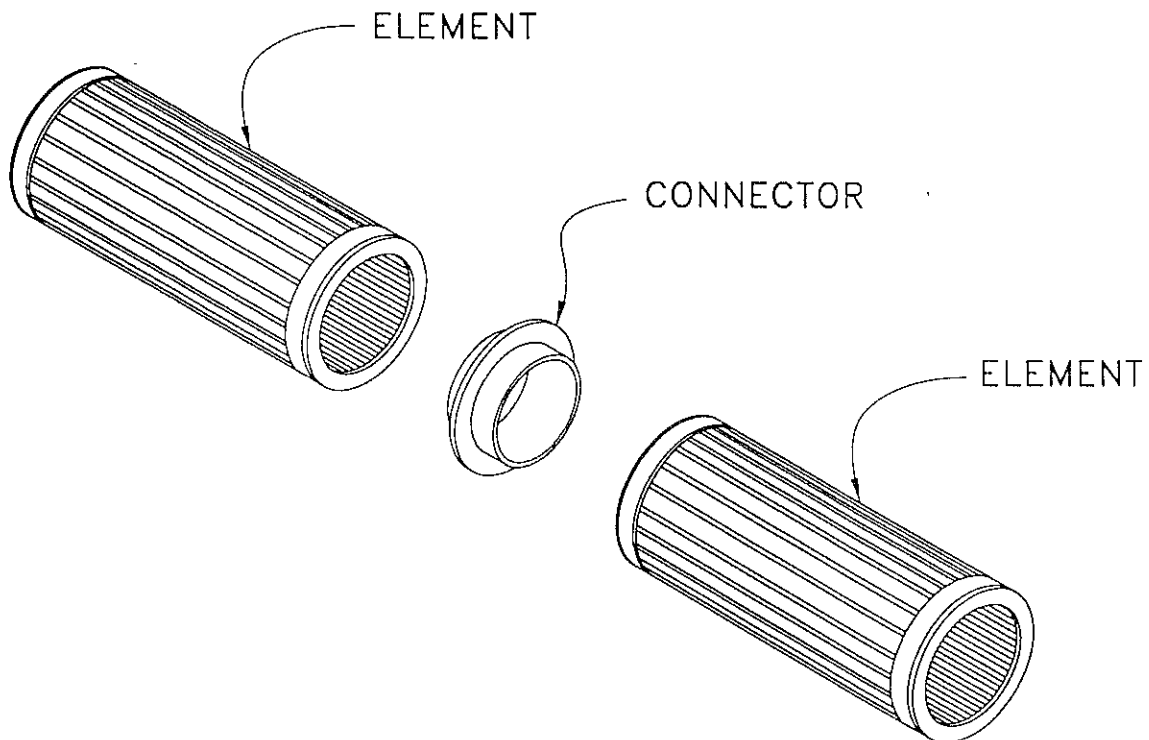


# RETURN FILTER ELEMENT ASSEMBLY



## INSTRUCTIONS TO INSTALL CONNECTOR -

Compress elements together until both end caps are locked to the connector. The connector holds the elements together. Connectors are not supplied with replacement elements and cannot be reused.



## **SECTION 4**

# **CRANE MAINTENANCE**



# SERVICE ASSISTANCE & ORDERING INFORMATION

24 Hours a Day

## INTRODUCTION

This section contains information for ordering replacement parts for the equipment.



**NOTE:** CERTIFIED OEM REPLACEMENT PARTS CONTAIN NAUTILUS PART NUMBERS. INFORMATION ON PARTS NOT LISTED IN THIS MANUAL MUST BE RECEIVED FROM OSI NAUTILUS CRANE FOR PROPER VALIDATION AS NON-OEM PARTS MAY NOT MEET PERFORMANCE STANDARDS. ANY REPAIRS MADE WITH NON-OEM PARTS COULD EFFECT SAFE OPERATIONS OF THE CRANE AND CAUSE POSSIBLE PERSONNEL INJURY.

## PARTS DELIVERY

To ensure prompt delivery of parts, be sure to give the correct name, address, town, state and country to which the parts are to be shipped. Include the Zip Code, if applicable, and specify the type of shipment. If the type of shipment is not specified, parts will be shipped by the best available means as determined by Oil States Industries.

## PARTS AND SERVICE INQUIRIES

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Tambol Huaypong  
Amphur Muang  
Rayong 21150  
Thailand

Telephone: + 66 (0) 38 691 643  
Fax: + 66 (0) 38 691 644



## MAINTENANCE PRECAUTIONS

Before maintenance, adjustment, or repair is started on a crane, take the following precautions:

1. Place crane where it will cause the least interference with other equipment or operations in the area.
2. Shut power off and put control in neutral.
3. Set the mechanical swing lock if your crane has a swing lock.
4. Set swing parking brake if your crane is equipped with a manually operated parking brake.
5. Lower boom, if possible, onto boom rest.
6. Lower load block and overhaul ball if needed.
7. Prior to hydraulic system maintenance, bleed off all pressure in each hydraulic circuit. Operate each control lever in a back and forth motion to bleed off the hydraulic circuit pressure.
8. Prior to electrical system maintenance, insure power is off and disconnects are open. Physically disconnect the power supply to the electrical system.

# SECTION IV MAINTENANCE

## INTRODUCTION

### MAXIMUM CRANE PERFORMANCE IS MAINTAINED BY PROPER UPKEEP AND MAINTENANCE.

The maintenance section provides guidelines for proper upkeep of the crane. The maintenance of your crane falls into two areas (1) Routine Inspection and Service and (2) Scheduled Maintenance. Routine Inspection and Service should be performed each day the crane is operated or each 8 hours of operation. The Routine Inspection & Scheduled Maintenance of your engine, generator\*, winch, hydraulic pump, load, and moment indicator system\* are specified in the manufacturer's maintenance operation manuals. These manuals are located in Section V - Repair.

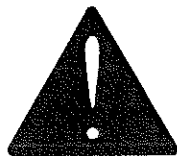
\* These manuals are included only when these options are installed on crane.

# MAINTENANCE PRECAUTIONS

Page 2



AFTER ADJUSTMENTS AND REPAIRS  
HAVE BEEN MADE, THE CRANE  
SHALL NOT BE RETURNED TO SERVICE  
UNTIL ALL GUARDS HAVE BEEN  
RE-INSTALLED, TRAPPED AIR REMOVED  
FROM HYDRAULIC SYSTEM IF REQUIRED,  
SAFETY DEVICES REACTIVATED, AND  
MAINTENANCE EQUIPMENT REMOVED.



WHEN CRANE IS NOT IN OPERATION  
FOR EXTENDED PERIODS OF TIME,  
LUBRICATION OF BALLRING SHOULD  
STILL BE PERFORMED AT LEAST EVERY  
THREE MONTHS AND A THOROUGH  
INSPECTION OF THE WIRE ROPE (S) MADE.

# ROUTINE INSPECTION AND SERVICE

CHECK EACH DAY CRANE IS IN OPERATION (BEFORE OPERATING)

UPPERSTRUCTURE/GANTRY CONNECTION PINS	
UPPERSTRUCTURE/GANTRY CONNECTION BOLTS	
SHEAVE PINS (MAIN/AUXILIARY/BRIDLE/GANTRY)	
BOOM FOOT PINS	
BALLRING/BALLRING BOLTS	
WEDGE SOCKET CONNECTIONS	
HOISTS AND WIRE ROPES (MAIN/AUXILIARY/BOOM/PENDENT)	
PENDANT LINES	
HYDRAULIC HOSES	
PIN KEEPERS AND BOLTS	
HYDRAULIC OIL LEVEL	
ENGINE FUEL LEVEL	
ENGINE OIL LEVEL	
ENGINE COOLANT LEVEL	
ELECTRICAL SWIVEL	
BOOM SECTIONS (CONNECTION PINS)	
LOAD BLOCK (SAFETY LATCH)	
OVERHAUL BALL (SAFETY LATCH)	

## DAILY FUNCTIONAL TEST

PERFORM FUNCTIONAL TESTS EACH DAY CRANE IS OPERATED.

TEST MAIN ANTI-TWO BLOCK FUNCTION BY RAISING LOAD BLOCK	
TEST AUX. ANTI-TWO BLOCK FUNCTION BY RAISING OVERHAUL BALL	
TEST PARKING BRAKE VALVE	
TEST BOOM HIGH/LOW ANGLE KICKOUT ASSEMBLY	
TEST ANTI-TWO BLOCK/BOOM LOW ANGLE KICKOUT OVERRIDE VALVE FUNCTION	
TEST ELECTRICAL COMPONENTS	
ACTIVATE ENGINE KILL CABLE	
TEST SWING LOCK FUNCTION	

# MAINTENANCE SCHEDULE

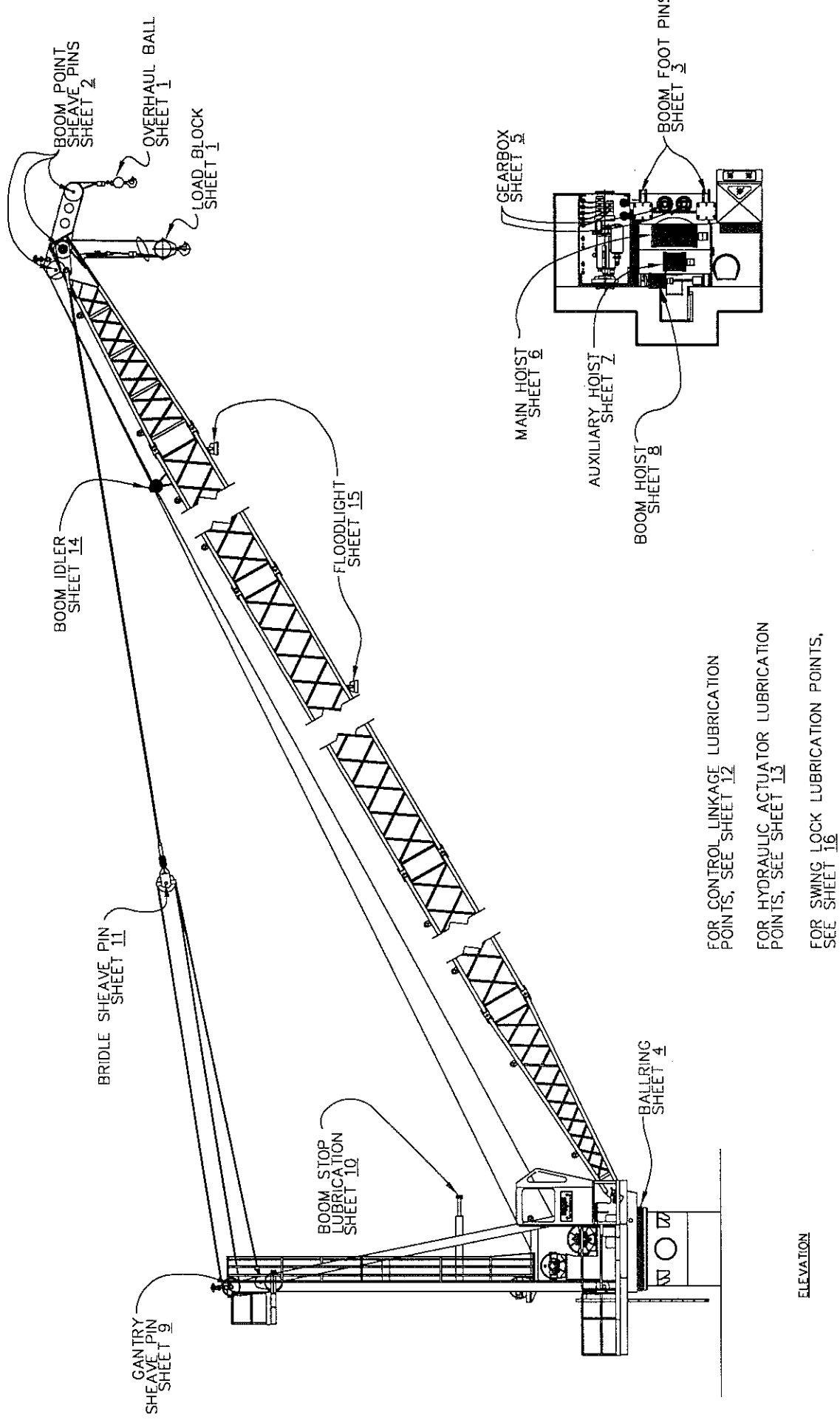
## NOTES AND PRECAUTIONS

The following maintenance schedule outlines the minimum frequency for thorough inspection, lubrication, and changing specific items.

The lubrication frequency is the maximum length of time between lubrications. The necessary lubrication frequency is dependant on the environment conditions. Over-lubrication of non-sealed fittings (sheave pins, valve spools, wheel bearings, etc.) will not harm the fittings or components, but under-lubrication will definitely lead to a shorter lifetime. Grease fittings that are worn and will not hold the grease gun, or those that have a stuck ball, must be replaced.

On plug-type check points, the oil levels are to be at the bottom edge of the fill point.

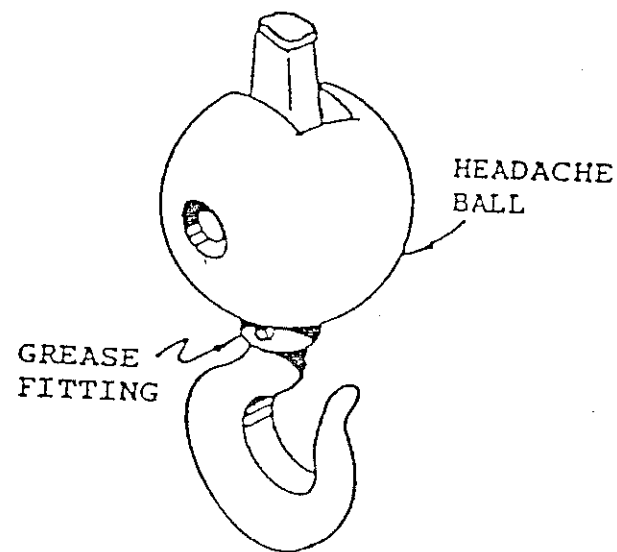
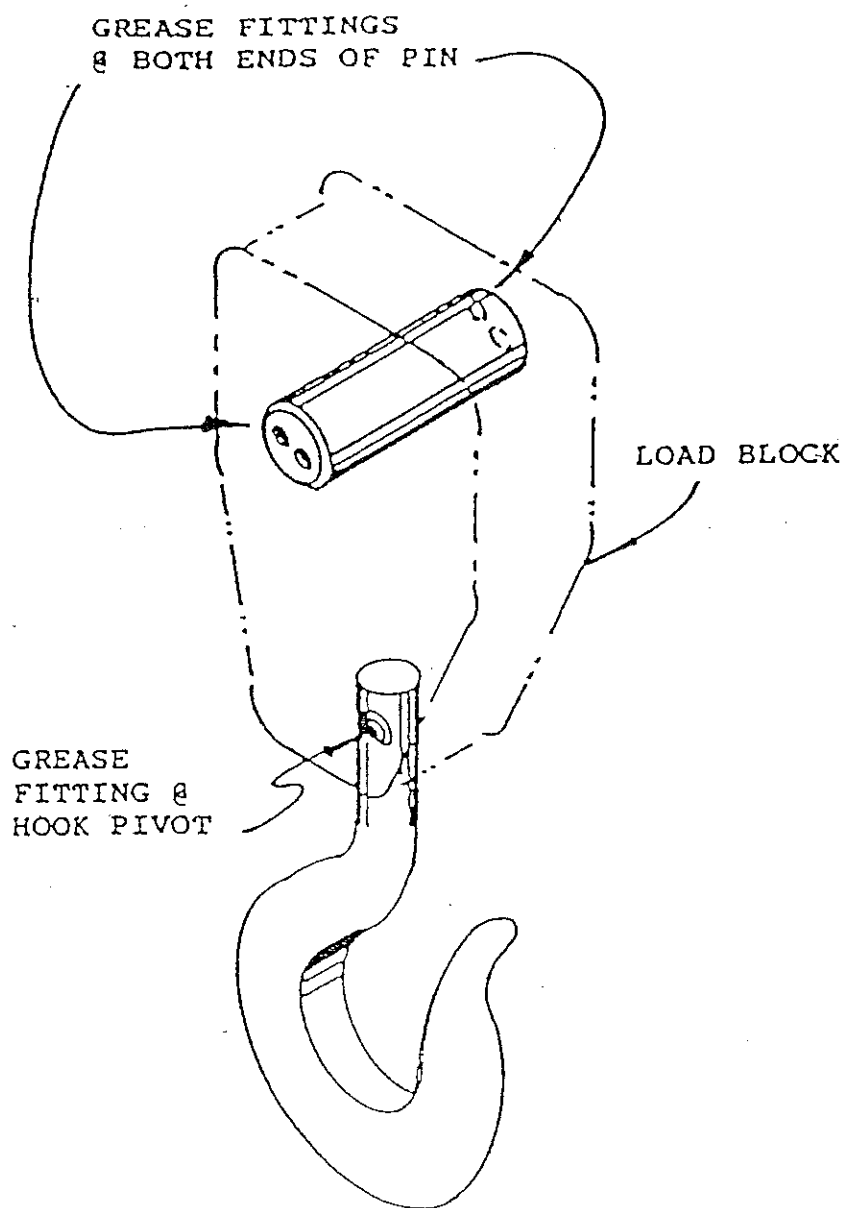
An extensive wire rope inspection should be made at least every 100 hours of operation or every three (3) months. A comprehensive explanation of the wire rope inspection is given in the API Recommended Practice 2D (RP2D). Inspect the wire rope for any types of deterioration; distortion, corrosion, broken strands, etc. The listed lubrication frequency is the maximum length of time between lubrications. The necessary lubrication frequency is dependant on the environmental conditions.



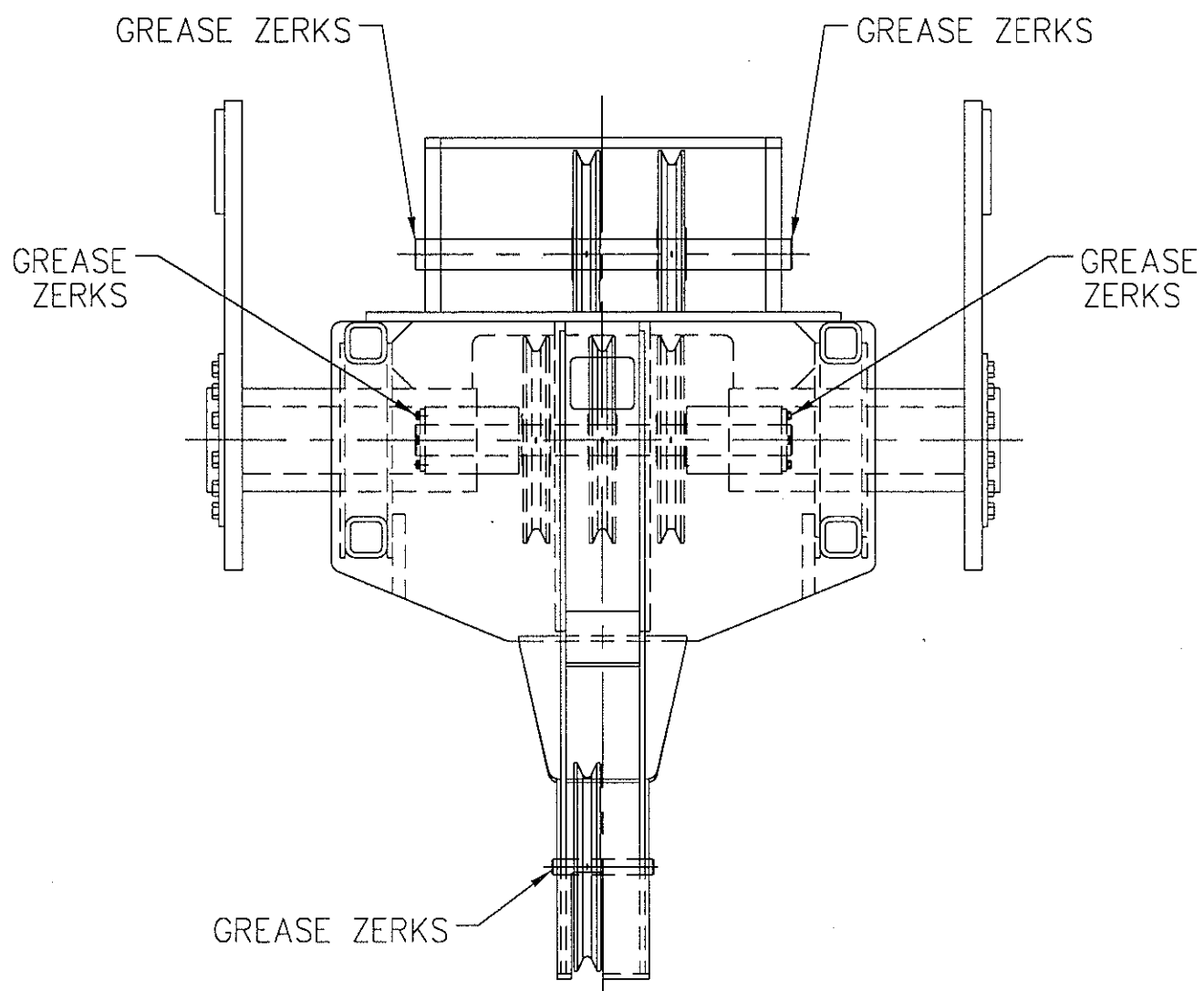
# ROUTINE SERVICE LUBRICATION POINTS GREASE FITTINGS – SEE RECOMMENDED LUBRICATION CHART



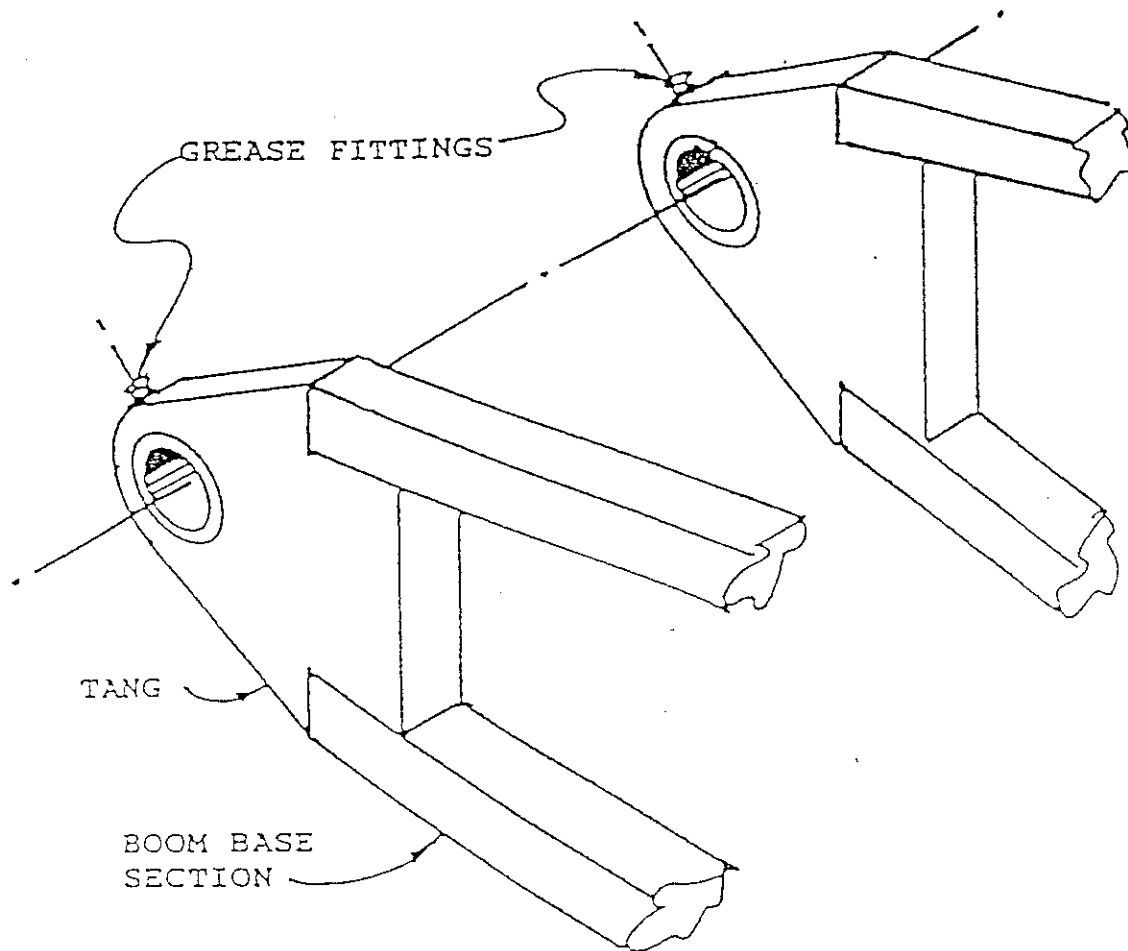




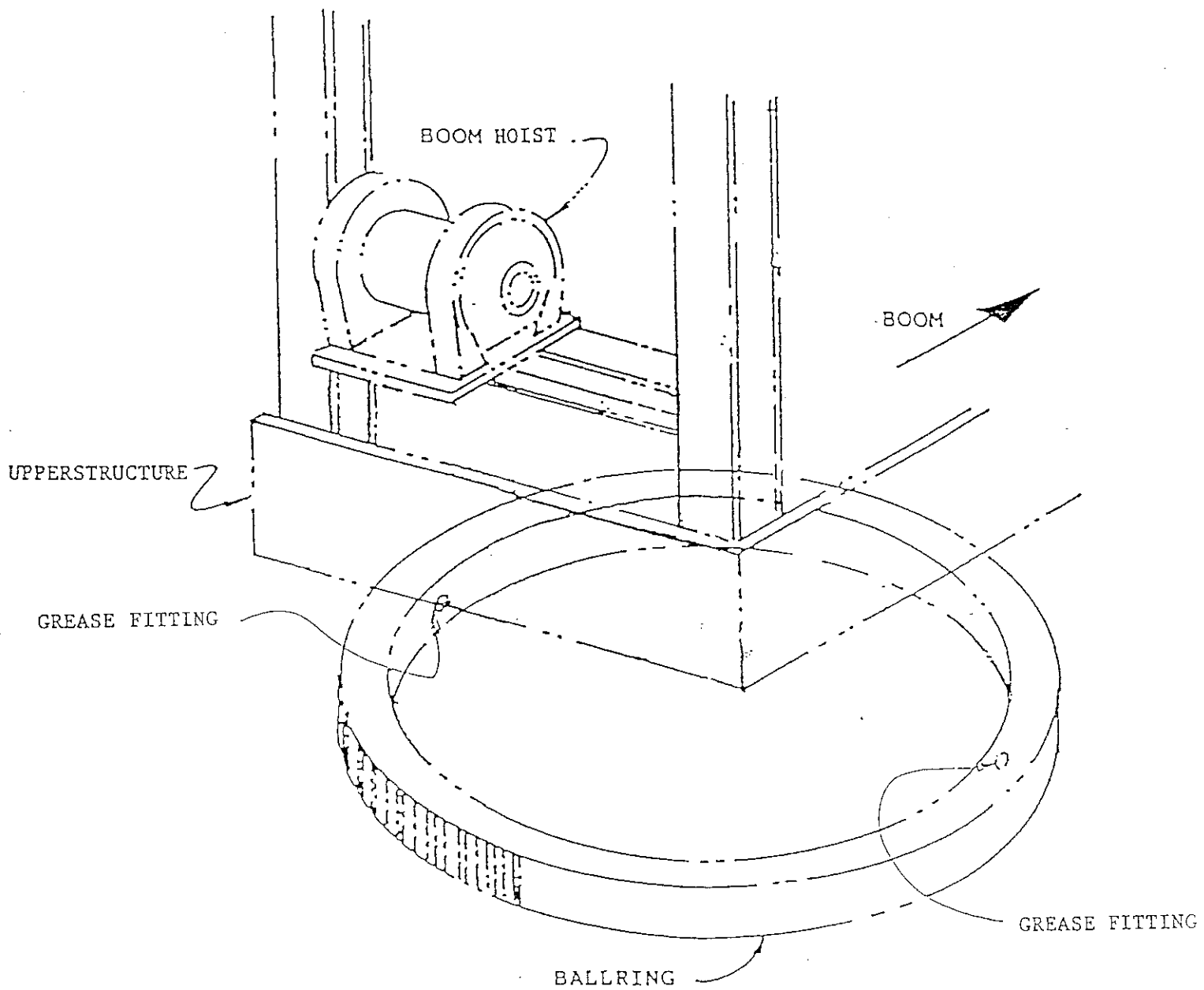
LOAD BLOCK & OVERHAUL BALL  
LUBRICATION POINTS  
SHEET 1



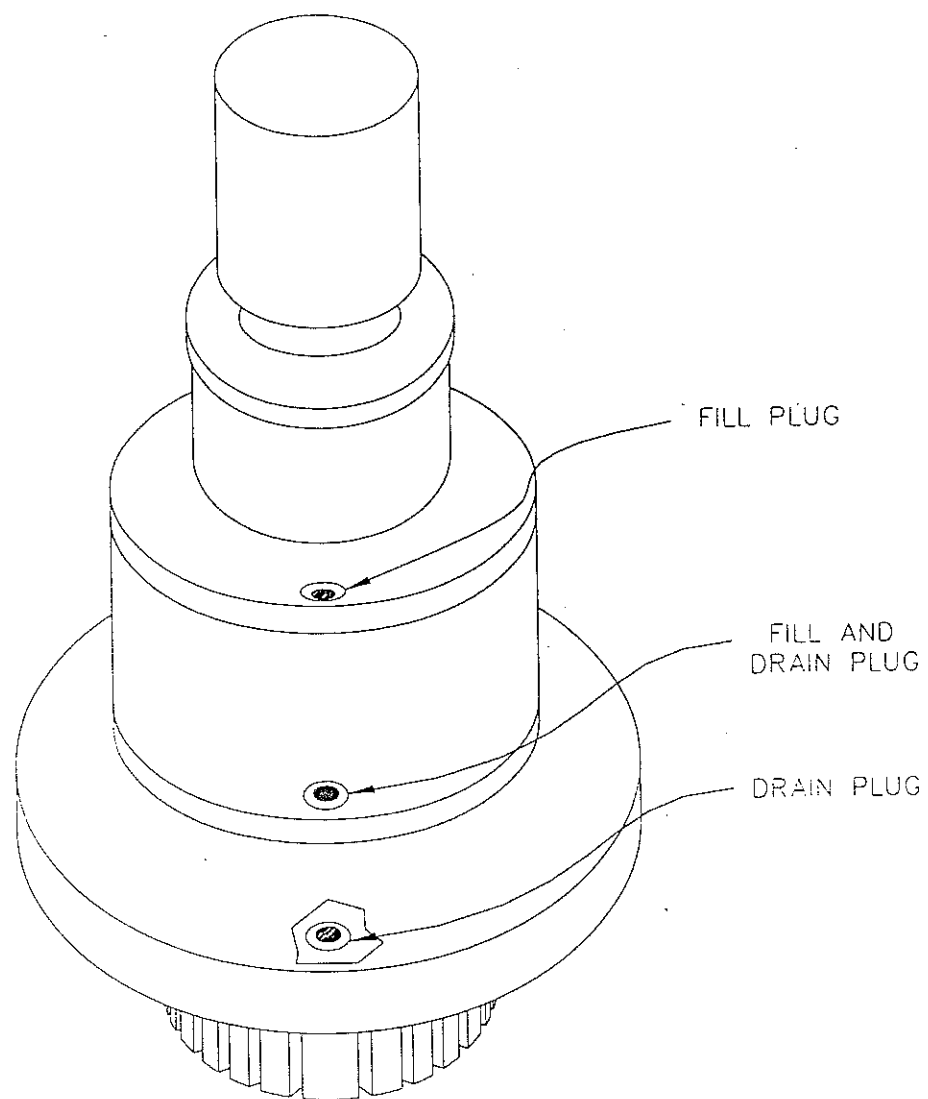
BOOM POINT ASSEMBLY LUBRICATION POINTS  
SHEET 2



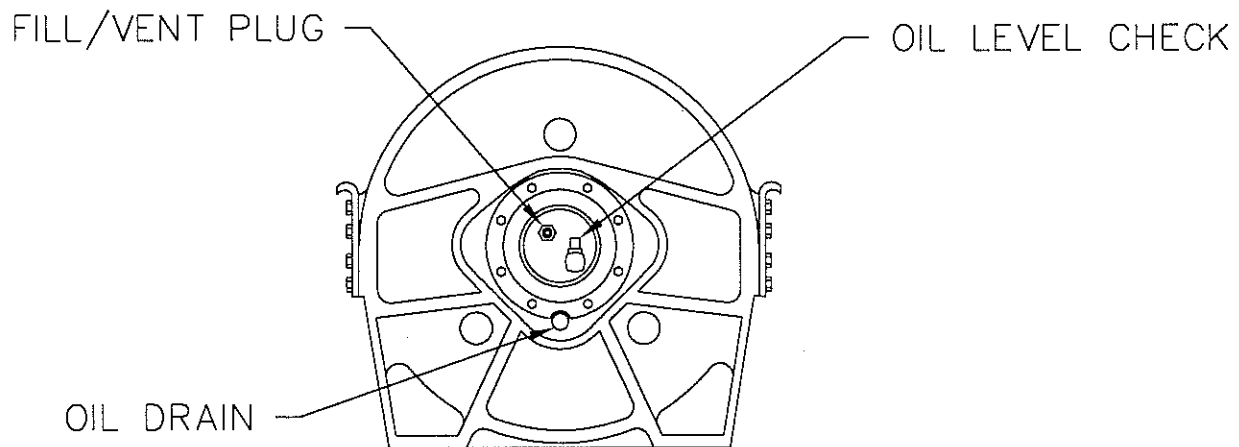
BOOM FOOT PINS  
LUBRICATION POINTS  
SHEET 3



BALLRING  
LUBRICATION POINTS  
SHEET 4



GEARBOX LUBRICATION POINTS  
SHEET 5



### MAIN HOIST

**OIL LEVEL:** TO CHECK OIL LEVEL, REMOVE THE 1/8" PIPE PLUG. THE OIL SHOULD BE LEVEL WITH THE BOTTOM OF THE OPENING. IF MORE OIL IS NEEDED, USE TEXACO MEROPA 220 OR EQUIVALENT API GL-2/3, MEETING API CLASSIFICATION GL-5.

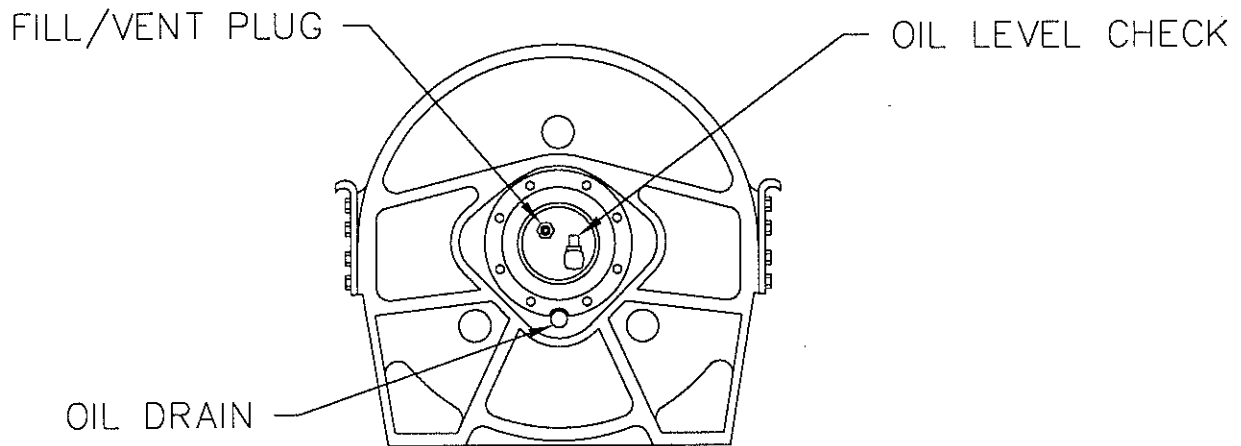
**OIL FILL AND VENT:** THE HOIST FILL PLUG AND VENT ARE LOCATED AS SHOWN. IT IS VERY IMPORTANT THAT THIS VENT BE KEPT CLEAR AND UNPLUGGED. DO NOT PAINT OVER VENT OPENING. NEVER REPLACE VENT WITH A SOLID PLUG.

**OIL CHANGE:** OIL SHOULD BE CHANGED AFTER THE FIRST ONE HUNDRED HOURS OF OPERATION. OIL SHOULD THEN BE CHANGED EVERY THOUSAND HOURS OF OPERATING TIME, OR EVERY SIX MONTHS.

**OIL CAPACITY:** CH240 -- 90 PINTS

**OIL DRAIN:** TO DRAIN THE OIL FROM THE HOIST, FIRST ALIGN THE DRAIN PLUG IN THE DRUM WITH THE HOLE IN THE SUPPORT END PLATE, THEN SCREW IN A SHORT PIECE OF 1" PIPE TO PREVENT THE OIL FROM DRAINING DOWN THE SIDE OF HOIST. INSERT A 3/8" DRIVE EXTENSION THROUGH THE 1" PIPE TO REMOVE THE DRAIN PLUG.

## MAIN HOIST LUBRICATION POINTS SHEET 6



### AUXILIARY HOIST

**OIL LEVEL:** TO CHECK OIL LEVEL, REMOVE THE 1/8" PIPE PLUG. THE OIL SHOULD BE LEVEL WITH THE BOTTOM OF THE OPENING. IF MORE OIL IS NEEDED, USE TEXACO MEROPA 220 OR EQUIVALENT API GL-2/3, MEETING API CLASSIFICATION GL-5.

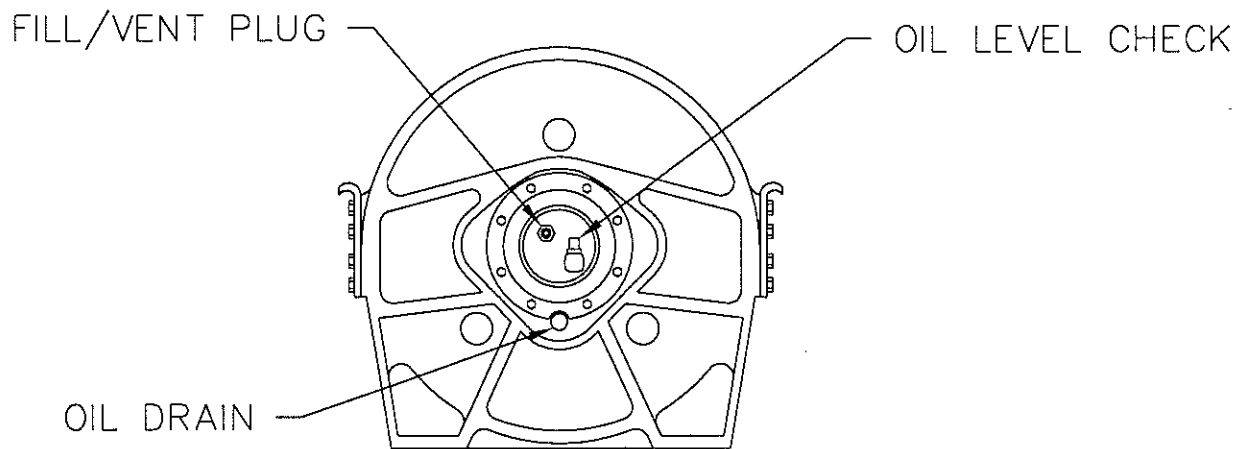
**OIL FILL AND VENT:** THE HOIST FILL PLUG AND VENT ARE LOCATED AS SHOWN. IT IS VERY IMPORTANT THAT THIS VENT BE KEPT CLEAR AND UNPLUGGED. DO NOT PAINT OVER VENT OPENING. NEVER REPLACE VENT WITH A SOLID PLUG.

**OIL CHANGE:** OIL SHOULD BE CHANGED AFTER THE FIRST ONE HUNDRED HOURS OF OPERATION. OIL SHOULD THEN BE CHANGED EVERY THOUSAND HOURS OF OPERATING TIME, OR EVERY SIX MONTHS.

**OIL CAPACITY:** CH150 - 9 PINTS

**OIL DRAIN:** TO DRAIN THE OIL FROM THE HOIST, FIRST ALIGN THE DRAIN PLUG IN THE DRUM WITH THE HOLE IN THE SUPPORT END PLATE, THEN SCREW IN A SHORT PIECE OF 1" PIPE TO PREVENT THE OIL FROM DRAINING DOWN THE SIDE OF HOIST. INSERT A 3/8" DRIVE EXTENSION THROUGH THE 1" PIPE TO REMOVE THE DRAIN PLUG.

## AUXILIARY HOIST LUBRICATION POINTS SHEET 7



### BOOM HOIST

**OIL LEVEL:** TO CHECK OIL LEVEL, REMOVE THE 1/8" PIPE PLUG. THE OIL SHOULD BE LEVEL WITH THE BOTTOM OF THE OPENING. IF MORE OIL IS NEEDED, USE TEXACO MEROPA 220 OR EQUIVALENT API GL-2/3, MEETING API CLASSIFICATION GL-5.

**OIL FILL AND VENT:** THE HOIST FILL PLUG AND VENT ARE LOCATED AS SHOWN. IT IS VERY IMPORTANT THAT THIS VENT BE KEPT CLEAR AND UNPLUGGED. DO NOT PAINT OVER VENT OPENING. NEVER REPLACE VENT WITH A SOLID PLUG.

**OIL CHANGE:** OIL SHOULD BE CHANGED AFTER THE FIRST ONE HUNDRED HOURS OF OPERATION. OIL SHOULD THEN BE CHANGED EVERY THOUSAND HOURS OF OPERATING TIME, OR EVERY SIX MONTHS.

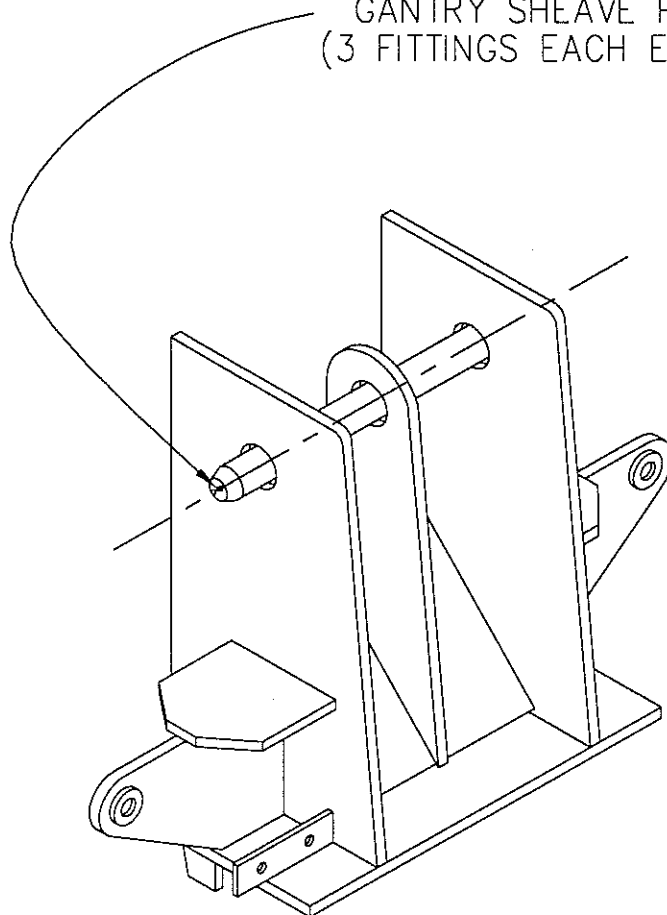
**OIL CAPACITY:** CH230 - 16 PINTS

**OIL DRAIN:** TO DRAIN THE OIL FROM THE HOIST, FIRST ALIGN THE DRAIN PLUG IN THE DRUM WITH THE HOLE IN THE SUPPORT END PLATE, THEN SCREW IN A SHORT PIECE OF 1" PIPE TO PREVENT THE OIL FROM DRAINING DOWN THE SIDE OF HOIST. INSERT A 3/8" DRIVE EXTENSION THROUGH THE 1" PIPE TO REMOVE THE DRAIN PLUG.

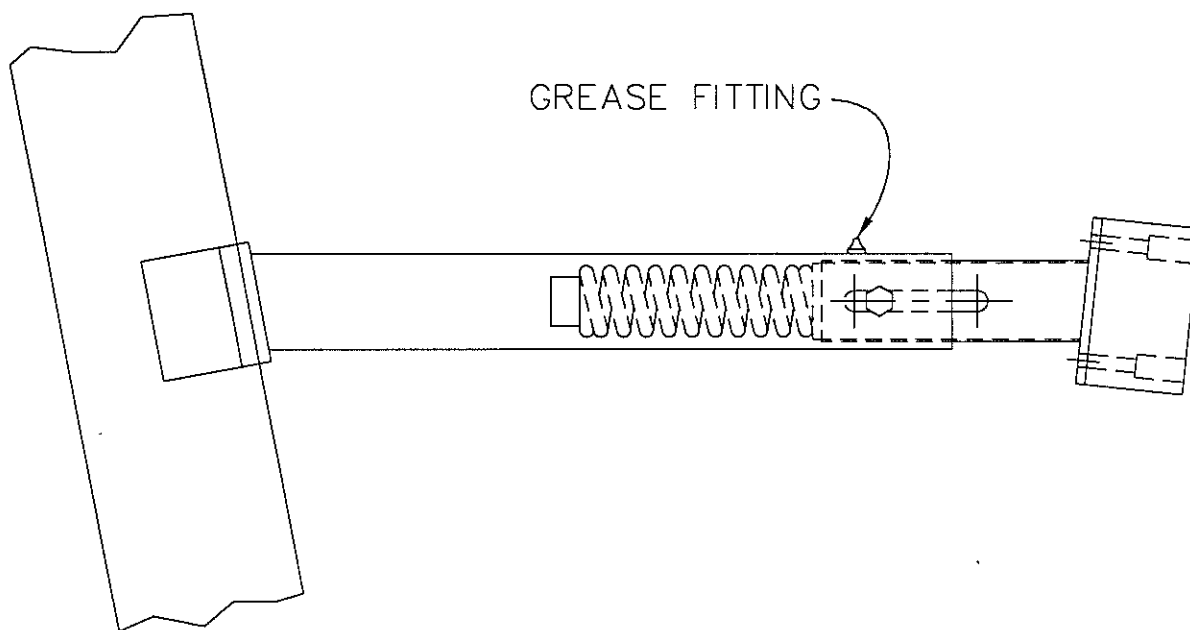
## BOOM HOIST LUBRICATION POINTS SHEET 8



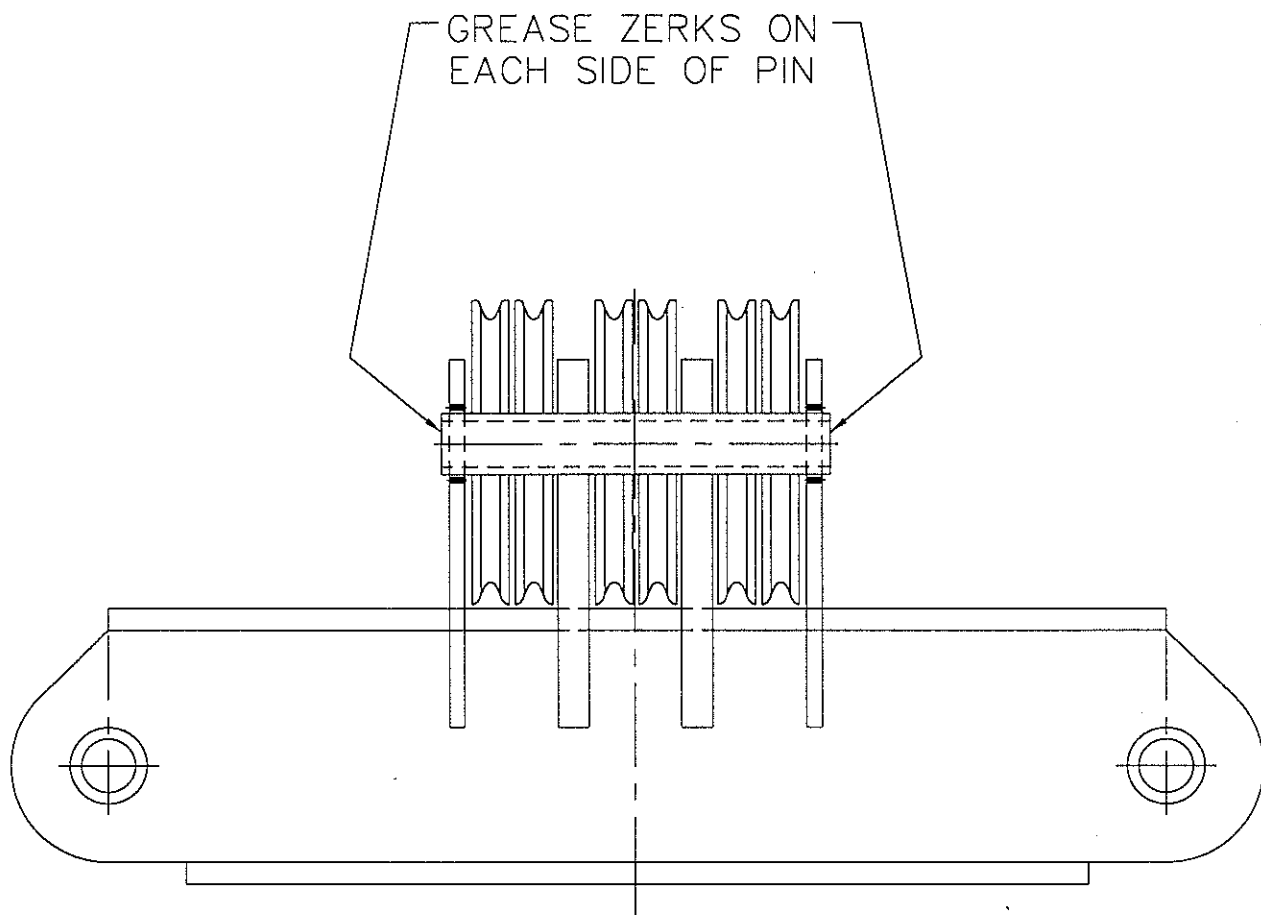
GANTRY SHEAVE PIN  
(3 FITTINGS EACH END)



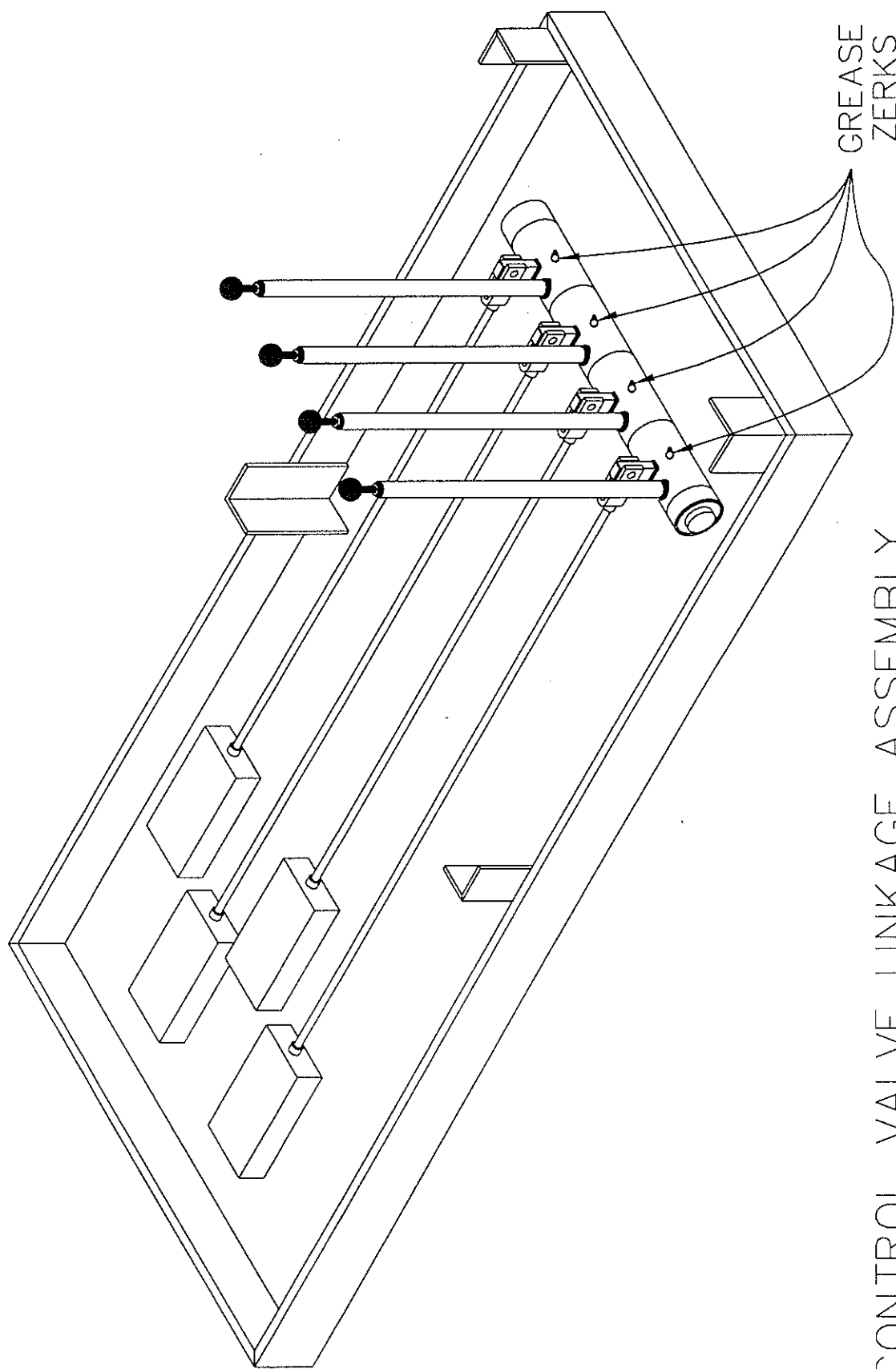
GANTRY SHEAVE CASE  
LUBRICATION POINTS  
SHEET 9



BOOM STOP LUBRICATION POINTS  
SHEET 10



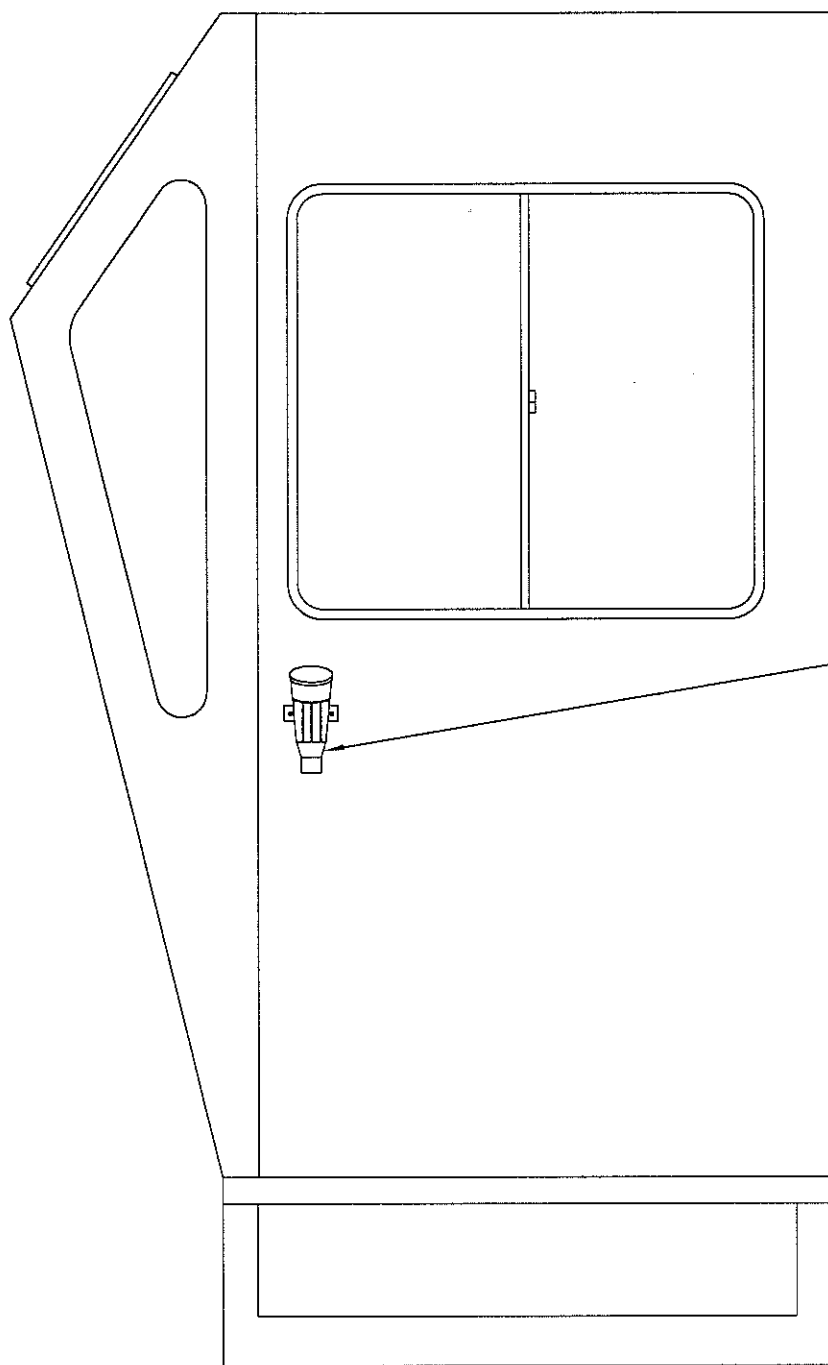
BRIDGE SHEAVE PIN LUBRICATION POINTS  
SHEET 11



GREASE  
ZERKS

CONTROL VALVE LINKAGE ASSEMBLY

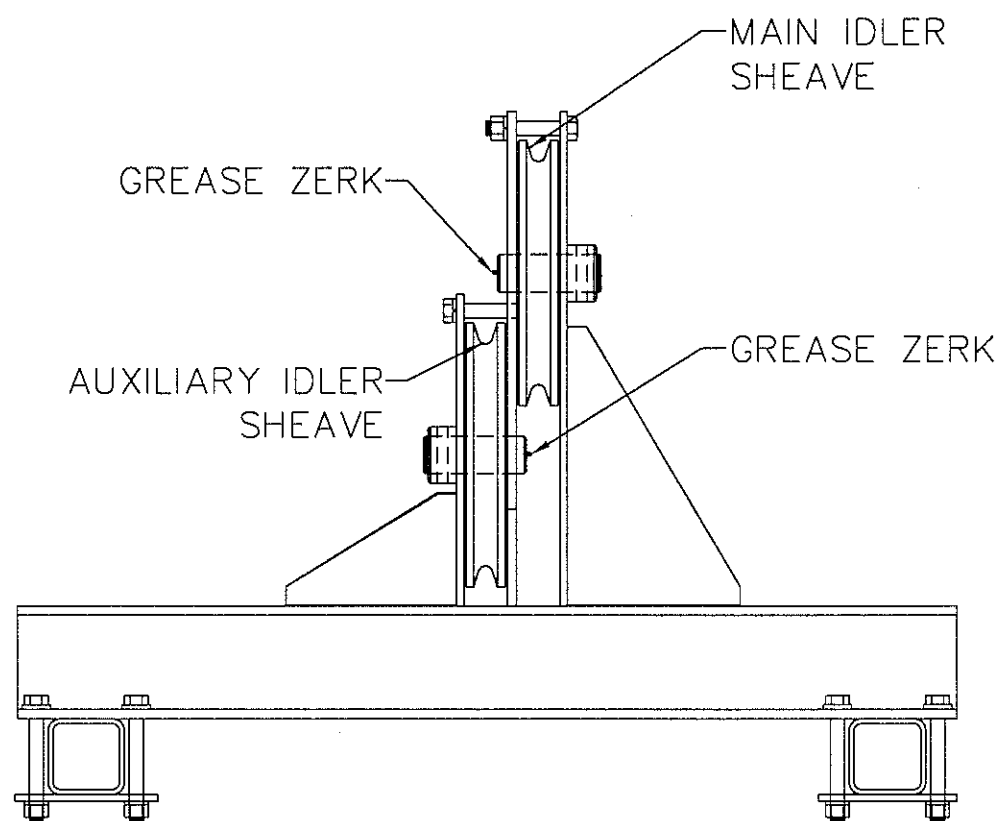
SHEET 12



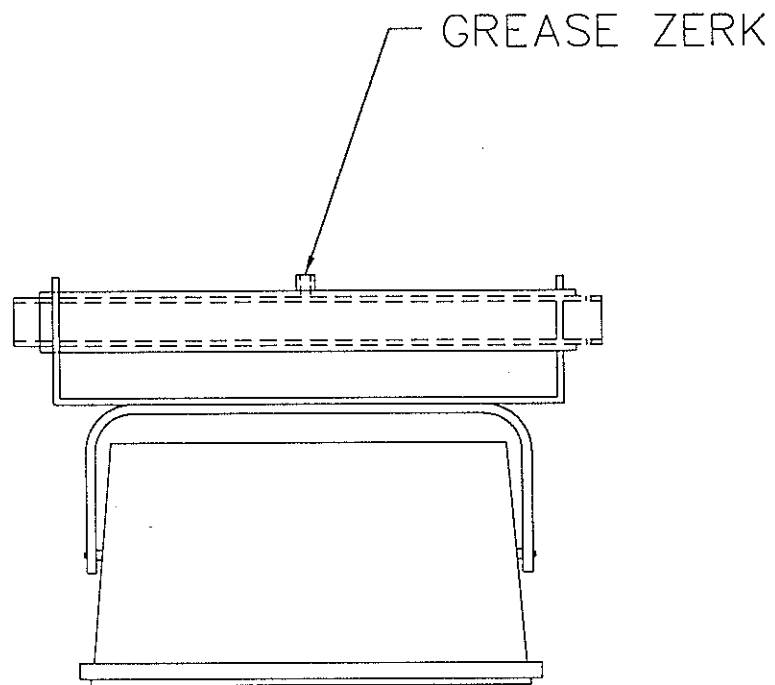
DYNAMIC SWING  
BRAKE ACTUATOR  
RESERVOIR

INSIDE CAB  
(LEFT WALL)

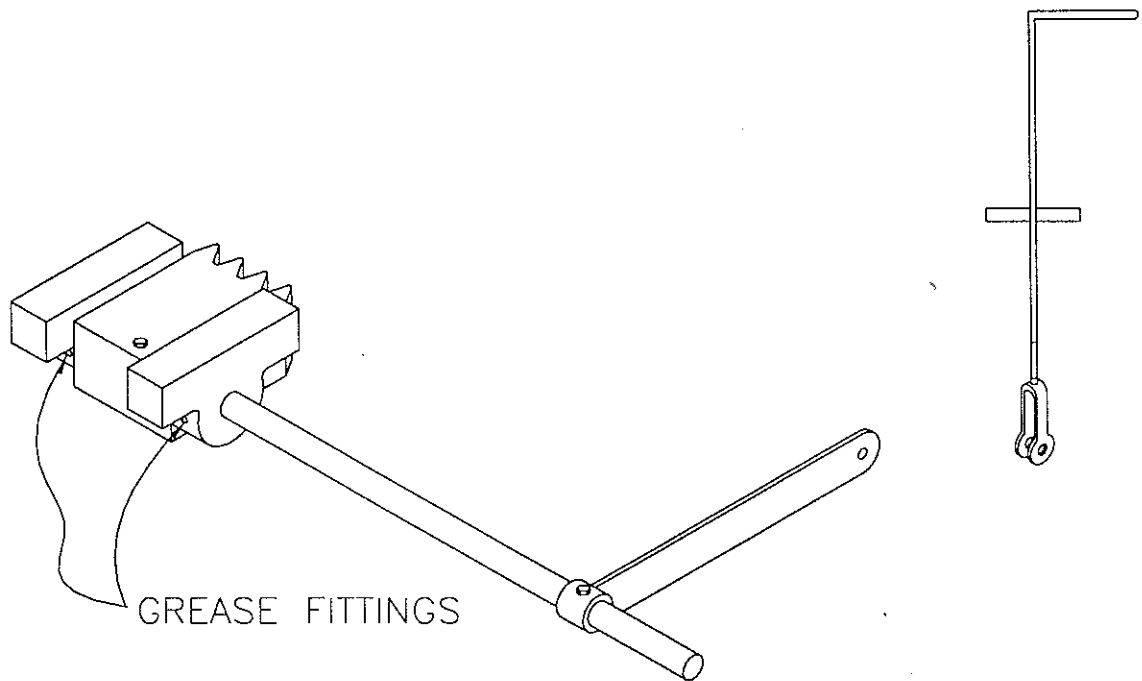
HYDRAULIC ACTUATOR RESERVOIR  
SHEET 13



BOOM IDLER LUBRICATION POINTS  
SHEET 14

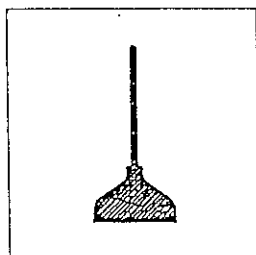


FLOODLIGHT LUBRICATION POINT  
SHEET 15



SWING LOCK LUBRICATION POINTS  
SHEET 16





## HYDRAULIC OIL

### RECOMMENDED FLUIDS AND LUBRICANTS

- Viscosity 150-225 SSU @ 100°F
- Viscosity Index 90 Minimum
- Pour Point No Higher Than 20°F
- Neutralization Point 0-05 Maximum
- Compounds For Wear
- Compounds For Anti-Foam
- Compounds For Anti-Rust

SUPPLIER	DESIGNATION
Arco	Duro AW 46 Hydraulic Oil
Conoco	Super Hydraulic Oil 32
CITGO	AW Hydraulic 32
Exxon	NUTO 32
Gulf	Harmony 32 AW
Mobil	DTE 24
Pennzoil	Pennzoil AW 32
Phillips	Magnus A 32
Shell	Tellus 32 (Winter)/ 46 (Summer)
Sun	Sunvis 816 WR
Tenneco	EP 300
Texaco	Rando HD 32
Union	UNAS AW 32



DO NOT USE PHOSPHATE ESTERS.

DO NOT USE SYNTHETIC FLUIDS.

SEALS ARE COMPATIBLE WITH MINERAL BASE FLUIDS ONLY.

# GEAR OIL

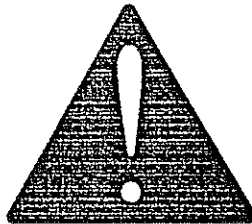
## RECOMMENDED HOIST LUBRICANTS

SUPPLIER	DESIGNATOR	AMBIENT TEMPERATURE
TEXACO	Meropa 220/ Equivalent API GL-2/3	+ 50 TO + 130°F
TEXACO	Meropa 150/Equivalent API GL-2/3	- 10 to + 50°F
MOBIL	SCH630 Synthetic	- 40 TO - 10°F

## SAE 85w/ 140 - SWING DRIVE

SUPPLIER	DESIGNATION
Conoco	Universal Gear 140w
CITGO	Premium Gear Oil 140w
Exxon	Gear Oil GX 140
Gulf	Multi-Purpose G.L. 140
Mobil	Mobilube HD 140w
Pennzoil	Pennzoil - 140w
Phillips	Philube SMP 140
Shell	Spirex HD 140w
Sun	Sunfleet GL 5 140w
Tenneco	
Texaco	Multigear EP 140w
Union	MP Gear Lube LS 140w

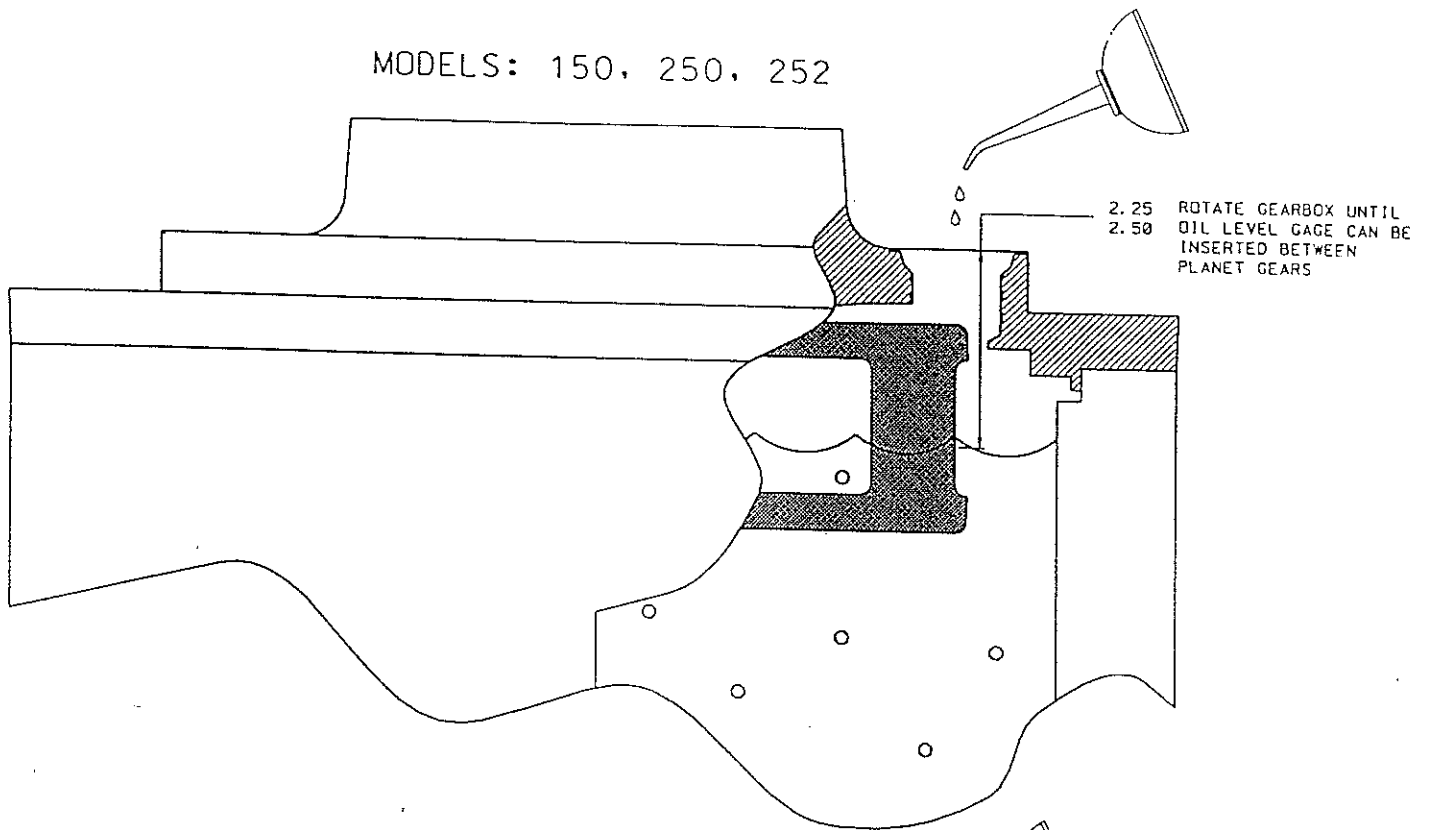
# WARNING



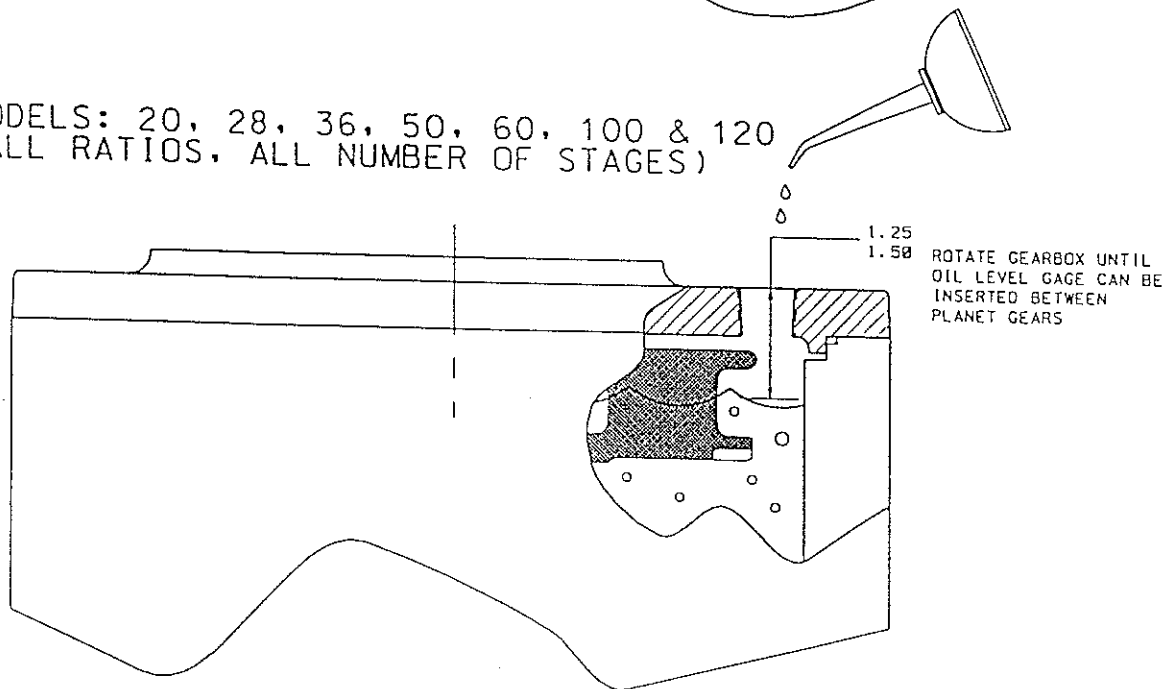
Failure to use the proper type and viscosity of planetary gear oil could result in property damage, severe personal injury, or death.

# OIL FILL AND LEVEL CHECK FOR ESKRIDGE GEARDRIVES (VERTICAL, PINION DOWN APPLICATIONS)

MODELS: 150, 250, 252



MODELS: 20, 28, 36, 50, 60, 100 & 120  
(ALL RATIOS, ALL NUMBER OF STAGES)



### BALLRING, PINS, BUSHINGS, SWIVEL

GREASE – General Purpose

Lithium based grease with "EP" additives and rust inhibitors (use Grade #2 for temperatures above 32°F and Grade #1 for temperatures under 32°F.)

### ENGINE

FUEL  
LUBE OIL ] – SEE ENGINE OPERATORS GUIDE

### COOLANT

Depends on environmental requirements; complete analysis provided in engine service manual (50% anti-freeze, 50% water normal mix). (See also engine manual.)

### START SYSTEM OIL

Automatic Transmission Fluid – Dexron

### SWING BRAKE

Automatic Transmission Fluid – Type F

### FOR PERSONNEL HANDLING

Check oil level in winches every 2 weeks and brake test every quarter. Disassemble and inspect all wear parts annually.

### HYDRAULIC ACTUATORS

HYDRAULIC OIL – Use a quality oil as prescribed for the hydraulic system.

### WIRE ROPE

Esgard

# MAINTENANCE - MALFUNCTION DIAGNOSIS

The following chart list malfunctions which may occur during equipment operation, followed immediately by the possible cause and solution. These are not all inclusive but are designed to help isolate the problem.

CONDITION	POSSIBLE CAUSE	POSSIBLE SOLUTION
<i>No response to control</i>	Load too heavy	Check Capacity Chart
	Low hydraulic fluid supply pressure	Check and fill as required
	Broken hydraulic pressure line	Replace as required
	Incorrect relief valve setting	Call OSI* Service
	Relief valve sticking	Call OSI* Service
<i>Poor hydraulic system performance</i>	Low hydraulic supply flow	Call OSI* Service
	Relief valve sticking	Call OSI* Service
	Relief setting too low	Call OSI* Service
	Boom holding valves out of adjustment	Warm oil or use less viscous oil
	Lines restricted	Check lines; clean and repair as necessary
	Internal valve crack	Replace valve
	Load too heavy	Check Capacity Chart and reduce load
<i>Swing moves erratic or loosely</i>	Loose turntable bearing	Torque bearing mounting and call OSI* Service
	Loose swing gearbox mounting bolts	Tighten bolts
	Worn gears or bearing	Replace worn parts or adjust gearbox spacing
	Operator control of lever too erratic	Operate controls smoothly
	Brake not releasing	Check pressure in brake release line

The following chart list malfunctions which may occur during equipment operation, followed immediately by the possible cause and solution. These are not all inclusive but are designed to help isolate the problem.

CONDITION	POSSIBLE CAUSE	POSSIBLE SOLUTION
<i>Swing will not turn</i>	Attempting to swing up too much on incline	Level machine
	Turn circuit relief valves sticking	Clean and check circuit pressure
	Turntable bearing drag	Lubricate thoroughly as rotating boom
	Brake not releasing	Use bleed screw on brake to remove air
<i>Excessive noise during operation</i>	Low oil temperature	Allow unit to warm up
	Low hydraulic oil supply	Check and fill
	Suction line kinked, collapsed or blocked	Clear blockage
	Hydraulic oil too thick	Warm oil use oil more applicable to environment
	Plugged suction strainers	Remove from tank and clean
	Relief valve chatting	Dirt in relief valve or damaged relief
	Swing brake dragging	Use bleed screw on brake to remove air
	Hydraulic tubing vibration	Check for loose tubing
<i>Cylinders drift loosely</i>	Tank breather plugged	Clean breather
	Not getting oil to cylinders	Clean and replace as required
	Worn or damaged piston seals	Replace as required
	Air in hydraulic oil	Cylinder operate crane cylinder to remove air
	Loose holding valve	Tighten valve
	Dirt in holding or check valve	Clean valve

The following chart list malfunctions which may occur during equipment operation, followed immediately by the possible cause and solution. These are not all inclusive but are designed to help isolate the problem.

CONDITION	POSSIBLE CAUSE	POSSIBLE SOLUTION
<b><i>Winch will not lift or hold load</i></b>	Load too heavy.	Check load and change to applicable multipart reeving
	Relief valve setting too low	Check and adjust if required
	Motor worn excessive.	Replace motor
	Counterbalance valve defective or leaking	Clean and replace as necessary
	Brake worn out	Repair or replace brake
** Boom chatters during extension or retraction or does not sequence	Boom section needs lubrication.	Grease boom
	Worn wear pads	Replace pads
	Locks inoperative	Clean and grease dirty locks or replace worn/broken parts
	Worn locks	Remove burrs or slightly worn areas with a file. Replace if major wear is evident
*** Boom winch chatters	Ratchet and pawl not releasing	Adjust

\* OSI Service (985)851-5600

\*\* If Telescopic Crane Only

\*\*\* If Lattice Boom Crane Only

## **BALLRING DATA**



## Lubrication

Unless otherwise specified, Avon turntable bearings are packed with Grade O extreme pressure grease at the factory. For normal low speed, heavily loaded applications, periodic relubrication with Grade 2 extreme pressure lube is recommended. For operation below 32°F, Grade O is recommended.

In order to provide protection under heavy loads, these EP lubricants are quite viscous. They impose substantial frictional torque which may be objectionable in lightly loaded applications, such as manually rotated turntables. Torque may be reduced in such lightly loaded applications by the use of low viscosity ball bearing grease. The EP lubes are not required if bearing loading is less than 25 percent of catalog capacity.

Bearings are equipped with one or more grease fittings. It is preferable to rotate the bearing while greasing in order to uniformly distribute the lube and to most effectively flush out the old lube and contaminants. In many applications it will be necessary to install an extension tube to one lube port in order to bring the fitting to a location which can be safely lubed while the bearing is rotating. The bearing should be turned through two full revolutions while greasing through any one fitting.

If the bearing cannot be rotated during greasing, it should be lubricated through each fitting. Greasing should be continued until clean grease can be seen exiting at the seals.

### Lubrication Frequency

Equipment in storage or used very seldomly should be relubricated at least every six months.

Equipment operating frequently in extreme environments should be lubricated at least every 8 hours.

Most applications fall between the above extremes. Relubrication every 50 to 100 operating hours is a popular initial recommenda-

## Recommended Lubricants

Bearing				
Supplier	Trade Name	For Operation Below 32°F & For Storage	For Operation Above 32°F	Gear
CHEVRON	Dura Lith	EP0	EP2	Pinion Grease MS
EXXON	Lidok	EP0	EP2	Surret N 80K
MOBIL	Mobilux	EP0	EP2	Mobilnac 375
SHELL	Alvania	EPR0	EP2	Omalia H
SOHIO	Bearing Guard	LT0	2	Gear EP O.G.
SUN	Prestige	740EP	742EP	Sun EP Compound 250 SP
TEXACO	Multifak	EP0	EP2	Crater Fluid
UNION	Unoba	EP0	EP2	Geariti HVY

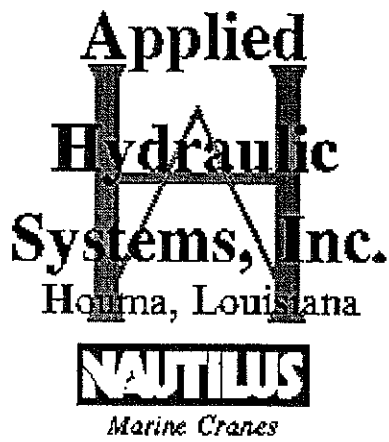
Note: The above table lists typical lubricants. Comparable lubricants produced by other reputable manufacturers may also be used.

Please refer to ABC Engineering for recommendations on lubricants for high speeds, extreme temperatures, or military use, or other specialized requirements.

tion for most low speed, intermediate rotation applications. If the old grease is noted to be in good condition and free of contaminants, the interval may be extended. Conversely, if the old lube is contaminated or deteriorated, the interval should be shortened.

### Gear Lubrication

Enclosed gearing may be lubricated with the same grease which is recommended for the bearing. Low speed open gearing may be lubed with one of the very tenacious lubes recommended for gears in the accompanying table.



## ***WIRE ROPE BREAK – IN PROCEDURE***

After properly installing the new rope, run the new rope through the crane operating cycle several times under a light load at a reduced line speed.

Progressively increase the loads until reaching the entire range of expected lifts.

As you increase the loads, run each load weight from light to maximum expected load at least six times before proceeding, especially when the crane operator will make a series of heavy lifts with new ropes.

This allows the rope to adjust gradually to working conditions, enables the strands to become settled and allows for slight stretching and diameter reduction to occur.

# **MANUFACTURER ENGINE DATA**

# CATERPILLAR 3300 ENGINE MAINTENANCE INFORMATION

CONSULT OPERATOR'S MANUAL FOR FURTHER INFORMATION

## LUBRICATION SYSTEM

ENGINE/CRANKCASE REFILL CAPACITY AND OIL FILTER NO.

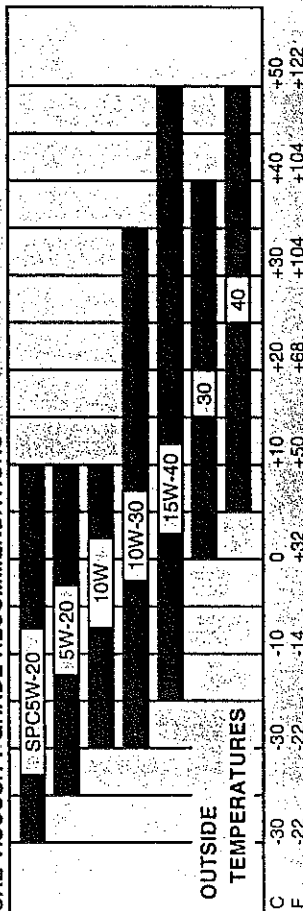
ENGINE	U.S. GAL.	IMP. GAL.	LITERS	ELEMENT NO.	NO. REQ'D
3304	5	4	19	1R-0739	1
3306	7.25	6	27.5	1R-0739	1

FILL CAPACITY MUST BE ADJUSTED WHEN USING AUXILIARY FILTERS  
OIL AND FILTER CHANGE PERIOD

OIL CLASSIFICATION	SERVICE HOUR INTERVAL (ALL ENGINES)				
CD (MIL-L-2104D)	100	200	250	300	400

CD ENGINE OIL IS REQUIRED. IF FUEL SULFUR CONTENT IS GREATER THAN 0.5% THE CD ENGINE OIL MUST HAVE A TOTAL BASE NUMBER (TBN) OF TWENTY TIMES THE PERCENTAGE OF SULPHUR IN THE FUEL.

## SAE VISCOSITY GRADE RECOMMENDATIONS



NOTICE: DO NOT INCREASE ENGINE RPM OR ADD LOAD UNTIL OIL PRESSURE IS NORMAL. STOP ENGINE IF PRESSURE IS NOT NORMAL WITHIN 15 SECONDS.

## COOLING SYSTEM

MAINTAIN 3% TO 6% CONCENTRATION OF COOLING SYSTEM CONDITIONER REGARDLESS OF ANTI-FREEZE CONCENTRATION. ADD CATERPILLAR COOLING SYSTEM CONDITIONER EVERY 250 HOURS IN THE RATIO OF 0.5 LITERS (1 PINT) FOR EACH 15 LITERS (4 U.S. GALLONS) OF COOLING SYSTEM CAPACITY. IF NECESSARY DRAIN SUFFICIENT COOLANT TO ADD THE ADDITIONAL CONDITIONER.

NEVER USE BOTH THE LIQUID COOLING SYSTEM CONDITIONER AND COOLANT CONDITIONER ELEMENTS AT THE SAME TIME.

NOTICE: DO NOT USE CATERPILLAR COOLING SYSTEM CONDITIONER WITH DOW THERM 209 FULLFILL COOLANT.

OR

(1) COOLING SYS. CAPACITY (LITERS)	(2) PRECHARGE ELEMENT PART NO.	(3) MAINTENANCE ELEMENT PART NO.	PRECHARGE OR MAINTENANCE ELEMENT CHANGE INTERVAL SERVICE HOURS
34-48	9N-6123	9N-3718	250
49-60	9N-3366	9N-3717	250

(1) COOLING CAPACITY VALUE PROVIDED BY OEM MANUFACTURER

(2) ON THE INITIAL FILL, OR AFTER CLEANING THE COOLING SYSTEM, INSTALL THE PRECHARGE ELEMENT

(3) EVERY 250 SERVICE HOURS INSTALL THE MAINTENANCE ELEMENT TO MAINTAIN THE PROPER CONCENTRATION OF CONDITIONER IN THE COOLING SYSTEM.

## FUEL SYSTEM

CHANGE FILTER - 1R-0750 - WHEN NECESSARY. AFTER CHANGING FILTERS, BLEED FUEL SYSTEM TO REMOVE AIR BUBBLES.

DRAIN WATER AND SEDIMENT FROM FUEL TANK DAILY.

# Supplement

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## **Caterpillar Commercial Diesel Engine Fluids Recommendations For Lubricants, Diesel Fuel, and Coolants**

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Includes Electrical Power Generation, Industrial, Marine,  
Petroleum, and Locomotive Engine Applications.  
For All Commercial Diesel Engines Except 3600 Series Engines.

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# Table of Contents

## Lubricant Section

Lubricant Specifications .....	2
--------------------------------	---

## Fuel Section

Fuel Specifications .....	10
---------------------------	----

## Coolant Section

Coolant Specifications .....	11
------------------------------	----

## Introduction

The information provided in this publication is the latest fluids recommendations for Caterpillar commercial diesel engines. This information supersedes all other recommendations which have been published for Caterpillar commercial diesel engines and Caterpillar marine transmissions.



Other Caterpillar fluids recommendations publications are:

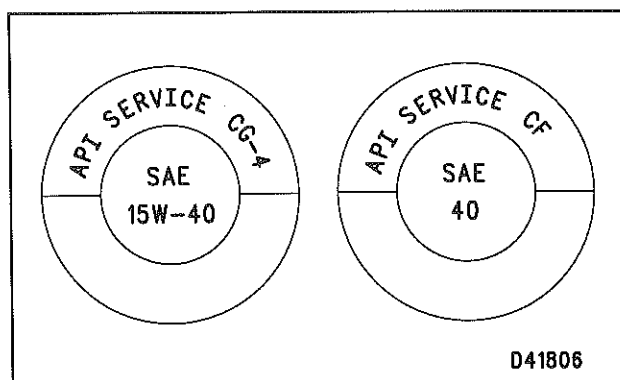
- SEBU6250, Caterpillar Built Machine Fluids Recommendations
- SEBU6385, Caterpillar On-Highway Diesel Truck Engine Fluids Recommendations
- SEBU6400, Lubrication Recommendations for Caterpillar Gaseous Fueled Spark Ignited Engines
- SEBU7003, Caterpillar 3600 Series Diesel Engine Fluids Recommendations

# Lubricant Specifications

## General Information

### API Licensed Oils

Caterpillar recognizes and supports the American Petroleum Institute (API) "Engine Oil Licensing and Certification System" for engine oils. The API publication No. 1509, 13th edition, contains the detailed information concerning this system. Engine oils bearing the API symbol are licensed by the API.



Examples of the API symbol.

Diesel engine oil classifications CD, CD-2, and CE are obsolete API categories. Caterpillar will only reference those categories that are currently licensed by the API. The following chart summarizes the status of the categories.

Oil Classification Status	
Current	Obsolete
CF	CC, CD
CF-2 <sup>1</sup>	CD-2 <sup>1</sup>
CF-4, CG-4	CE

<sup>1</sup>CD-2 and CF-2 are oil categories for two cycle diesel engines. Caterpillar does not sell engines that utilize CD-2 and CF-2 category oils.

NOTE: CF is NOT the same as CF-4. API CF oils are only recommended for Caterpillar engines with precombustion chamber (PC) fuel systems.

In previous lubricant specifications, Caterpillar referred to U.S. Military oil specifications (MIL) and to European Comité des Constructeurs d'Automobile Marche Commun (CCMC) diesel engine oil specifications. Those specifications do not provide identical performance to API CF, CF-4 or API CG-4 engine oils. Therefore, Caterpillar will not make reference to MIL or to CCMC specifications in this publication.

## Oil Viscosity

Lubricant viscosity charts are included in this publication for Caterpillar direct injection (DI) diesel engines, for Caterpillar precombustion chamber (PC) diesel engines, and for Caterpillar marine transmissions.

## Grease

The National Lubricating Grease Institute (NLGI) classifies grease, based on the American Society for Testing and Materials (ASTM) D217-68 Worked Penetration characteristics. Grease characteristics are given a defined consistency number.

## Terminology

Some abbreviations follow the Society of Automotive Engineers (SAE) J754 nomenclature. Some classifications follow the SAE J183 abbreviations. The definitions other than Caterpillar's will be of assistance in selecting lubricants.

## Transmission/Drive Train Oil

Transmission and drive train oils are classified by the Caterpillar TO-4 specification developed by Caterpillar for use in Caterpillar transmissions and final drives.

## Caterpillar Diesel Engine Oil (DEO)

Caterpillar Oils have been developed, tested, and approved by Caterpillar to provide the full performance and service life that has been designed and built into Caterpillar diesel engines. Caterpillar oils are currently used for factory fill in diesel engines. These oils are offered by Caterpillar dealers for continued refill use. Consult with your Caterpillar dealer for more information on these oils.

Due to significant variations in the quality and in the performance of commercially available oils, Caterpillar recommends:

**Caterpillar Diesel Engine Oil (DEO) 15W40**  
**Caterpillar Diesel Engine Oil (DEO) 10W30**

Caterpillar multi-grade DEO is formulated with detergents, dispersants, and sufficient alkalinity to provide superior performance in Caterpillar diesel engines. Multi-grade DEO is blended in two viscosity grades: SAE 15W40 and SAE 10W30. Refer to the Lubricant Viscosities For Ambient Temperatures chart to choose the correct viscosity grade based on ambient temperatures. Multi-grade oils provide the correct viscosity for a broad range of operating temperatures and for cold engine starts. Multi-grade oils are also effective in maintaining low oil consumption and low levels of piston deposits.

Caterpillar multi-grade DEO is recommended for use in the 3000, 3100, 3200, 3300, 3400, and 3500 Series Caterpillar engines.

Caterpillar multi-grade DEO is also qualified for use in other diesel engines and in gasoline engines. Refer to the engine manufacturer's guide for the recommended specifications. Compare the recommendations to the specifications of Caterpillar multi-grade DEO. The current Caterpillar multi-grade DEO industry specifications are listed on the product labels and on the product data sheets.

Contact your Caterpillar dealer for part numbers and available container sizes.

## Commercial Diesel Engine Oils

The performance of commercial diesel engine oils is based on API categories. API categories are developed to provide commercial lubricants for a wide variety of diesel engines that operate in various conditions.

If Caterpillar multi-grade DEO is not used, the following commercial oils are recommended.

- API CG-4 (multi-grade)
- API CF-4 (multi-grade)

The following explanations of these API categories can be used to make the proper choice of a commercial oil.

**CG-4:** CG-4 is the newest heavy duty diesel oil category. CG-4 oils can be used in Caterpillar diesel engines where CF-4 oils are recommended. Compared to CF-4 oils, CG-4 oils provide improved piston cleanliness, improved viscosity control, and improved crankcase cleanliness, especially in applications where oil soot is a problem. Although CG-4 oils were primarily developed for diesel engines operating on 0.05 percent sulfur diesel fuel, CG-4 oils can be used with higher sulfur fuels. The new oil TBN determines the maximum fuel sulfur level for CG-4 and CF-4 oils. Refer to the TBN and Fuel Sulfur topics in this publication.

CG-4 oils are the first oils to pass industry tests for foam control and viscosity shear loss. CG-4 oils must also pass recently developed tests for metals corrosion and wear.

**CF-4** oils service a wide variety of modern diesel engines. This oil classification was developed with 0.40 percent sulfur diesel fuel. The fuel used in the CF-4 category represents the type of diesel fuels commonly available world wide. CF-4 oils provide improved piston deposit control and improved oil control when compared to the CE category oils. CF-4 oils also provide improved oil soot dispersancy compared to CD or CF category oils.

Some commercial oils meeting these API specifications may require shortened oil change intervals as determined by close monitoring of oil condition and wear metals (Caterpillar's S•O•S Oil Analysis Program preferred).

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### NOTICE

Failure to follow these oil recommendations can cause shortened engine service life due to deposits and/or excessive wear.

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### **Synthetic Base Stock Oils**

Synthetic base stock oils are acceptable for use in Caterpillar engines if these oils meet the performance requirements specified by Caterpillar.

Synthetic base stock oils generally outperform non-synthetic oils in two areas:

- Improved low temperature viscosity characteristics, especially in Arctic conditions
- Improved oxidation stability, especially at high operating temperatures

Some synthetic base stock oils have performance characteristics that enhance the useful service life of the oil. However, Caterpillar does NOT recommend the "automatic" extension of oil change intervals for any oil, including synthetic base stock oils. For Caterpillar diesel engines, oil change intervals can only be adjusted through an oil analysis program that contains the following elements: oil condition and wear metals (Caterpillar's S•O•S Oil Analysis preferred), trend analysis, fuel consumption, and oil consumption.

### **Re-Refined Base Stock Oils**

Re-refined base stock oils are acceptable for use in Caterpillar engines if these oils meet the performance requirements specified by Caterpillar. Re-refined oils can be used exclusively in a finished oil or in combination with new base stocks. The U.S. Military and other heavy equipment manufacturers have also accepted the use of re-refined base stock oils with the same criteria.

The re-refining process should be adequate to remove all wear metals and oil additives that were present in the used oil. This type of re-refining is generally accomplished by vacuum distillation and hydrotreating the used oil. Filtering alone is inadequate for producing a high quality re-refined base stock from used oil.

### **Arctic Lubricants**

For starting and operating engines in ambient temperatures below  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ), use a multi-grade oil with a 0W or 5W low temperature viscosity grade.

For starting and operating engines with ambient temperatures below  $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ), use a synthetic base stock multi-grade oil with a 0W or 5W low temperature viscosity grade and a pour point of  $-50^{\circ}\text{C}$  ( $-58^{\circ}\text{F}$ ) or lower.

Because the number of lubricants acceptable for use in Arctic conditions is limited, Caterpillar has special recommendations for these situations. Caterpillar recommends the following engine oils, in order of preference, for use in Arctic conditions:

- First Choice: API CG-4 or CF-4 oils with an SAE 0W20, 0W30, 5W30, or 5W40 viscosity grade
- Second Choice: Oils with a CG-4 or CF-4 type additive package and an SAE 0W20, 0W30, 5W30, or 5W40 viscosity grade

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#### **NOTICE**

Shortened engine service life could result if second choice oils are used.

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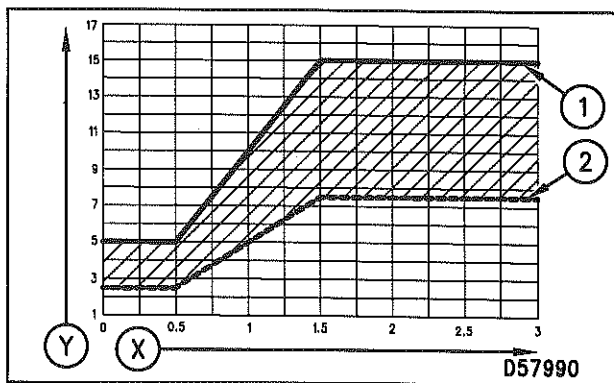
### **After-Market Oil Additives**

Caterpillar does NOT recommend the use of after-market oil additives. After-market oil additives are not necessary to achieve service life predictions or to achieve rated performance. Fully formulated finished oils are made up of base stocks and commercial additive packages. The additive packages are blended into the base stocks at precise percentages to produce finished oils with performance characteristics that meet lubricant industry standards.

Lubricant industry standard tests do not exist to evaluate the performance of after-market oil additives. There are no lubricant industry standard tests to evaluate the compatibility of after-market additives in a finished oil. After-market additives could be incompatible with the finished oil additive package, reducing the performance of the finished oil. The after-market additives could fail to mix with the finished oil, producing a sludge in the crankcase. Caterpillar discourages the use of after-market additives in finished oils.

## Total Base Number (TBN) and Fuel Sulfur Levels For Caterpillar DI Diesel Engines

The TBN required in a new oil depends on the sulfur level of the fuel used. For direct injection engines running on distillate diesel fuel, the minimum new oil TBN (by ASTM D2896) should be 10 times the fuel sulfur level, and the minimum TBN is 5 regardless of a low fuel sulfur level— refer to the following graph.



Y = oil TBN shown by ASTM D2896.  
X = percent of fuel sulfur by weight.  
New oil TBN (1).  
Change oil when the used oil TBN limit (2) is reached.

In areas where the fuel sulfur exceeds 1.5 percent, choose an oil with the highest TBN that is within the API CF-4 or CG-4 categories, and shorten the oil change interval based on oil analysis. The oil analysis should evaluate oil condition and wear metals. High TBN oils that are not within the API CF-4 or CG-4 categories can produce excessive piston deposits, leading to a loss of oil control and bore polishing.

### NOTICE

Operating DI diesel engines with fuel sulfur levels over 1.0 percent may require shortened oil change intervals in order to maintain adequate wear protection.

## Lubricant Viscosity Recommendations For Caterpillar DI Engines

The proper SAE viscosity grade oil is determined by the minimum outside temperature at cold engine start up, and the maximum outside temperature during engine operation. Use the minimum temperature column on the chart to determine the oil viscosity required for starting a "cold soaked" engine. Use the maximum temperature column on the chart to select the viscosity for operation at the highest temperature anticipated. In general, use the highest viscosity oil available that still meets the start up temperature requirements.

Caterpillar DEO API CG-4 & CF-4 Viscosity Grade	Engine Oil Viscosity Protection Ambient Temperature	
	Minimum °C (°F)	Maximum °C (°F)
SAE 0W20	-40 (-40)	10 (50)
SAE 5W30	-30 (-22)	30 (86)
SAE 5W40	-30 (-22)	40 (104)
SAE 10W30	-20 (-4)	40 (104)
SAE 15W40	-15 (5)	50 (122)

## Precombustion Chamber (PC) Engines

### Caterpillar Oil

Due to significant variations in the quality and in the performance of commercially available oils, Caterpillar recommends:

### Caterpillar Diesel Engine Oil (DEO)

Caterpillar DEO is formulated with detergents, dispersants, and sufficient alkalinity to provide superior performance in Caterpillar precombustion chamber (PC) diesel engines. Multi-grade DEO is blended in two viscosity grades: SAE 10W30 and SAE 15W40. Single-grade DEO is blended in three viscosity grades: SAE 10W, SAE 30, and SAE 40. Refer to the Lubricant Viscosity Recommendations for Caterpillar Precombustion Chamber Diesel Engines chart to choose the correct viscosity grade based on ambient temperatures. Compared to single-grade oils, multi-grade oils provide the correct viscosity for a broad range of operating temperatures and for cold engine starts. Multi-grade oils are also effective in maintaining low oil consumption and low levels of piston deposits.

### Commercial Diesel Engine Oils

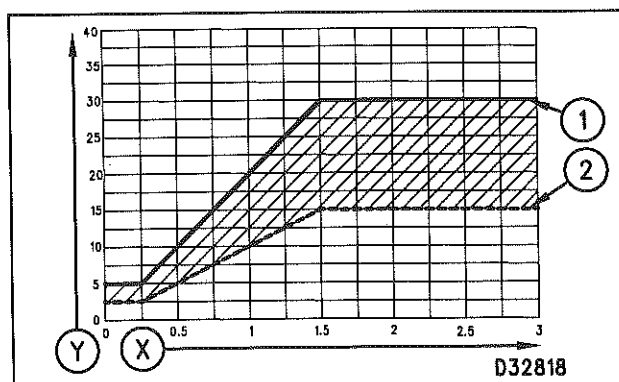
If Caterpillar DEO is not used, the following commercial oils are recommended for Caterpillar PC engines:

- API CG-4
- API CF-4
- API CF

CF oils are developed to service diesel engines that utilize a PC fuel system and those diesel engines designed to use single-grade oils.

### Total Base Number (TBN) and Fuel Sulfur Levels For Caterpillar PC Diesel Engines

The TBN for a new oil depends on the sulfur level of the fuel used. For PC engines running on distillate fuel, the minimum new oil TBN (by ASTM D2896) should be 20 times the fuel sulfur level. The minimum TBN of new oil is 5, regardless of a low fuel sulfur level—refer to the following graph.



Y = oil TBN shown by ASTM D2896.

X = percent of fuel sulfur by weight.

New oil TBN (1).

Change oil when the used oil TBN limit (2) is reached.

In areas where the fuel sulfur exceeds 1.5 percent, choose an oil with the highest TBN that is within the API CF-4 or CG-4 or CF categories, and shorten the oil change interval based on oil analysis. The oil analysis should evaluate oil condition and wear metals.

### Lubricant Viscosity Recommendations for Caterpillar PC Engines

The proper SAE viscosity grade oil is determined by the minimum outside temperature at cold engine start up, and the maximum outside temperature during engine operation. Use the minimum temperature column on the chart to determine the oil viscosity required for starting a "cold soaked" engine. Use the maximum temperature column on the chart to select the viscosity for operation at the highest temperature anticipated. In general, use the highest viscosity oil available that still meets the start up temperature requirements.

Engine Oil Viscosity Protection		
Caterpillar DEO API CG-4, CF-4 & CF Viscosity Grade	Ambient Temperature	
	Minimum °C (°F)	Maximum °C (°F)
SAE 0W20	-40 (-40)	10 (50)
SAE 0W30	-40 (-40)	30 (86)
SAE 5W30	-30 (-22)	30 (86)
SAE5W40	-30 (-22)	40 (104)
SAE 10W	-20 (-4)	10 (50)
SAE 10W30	-20 (-4)	40 (104)
SAE 15W40	-15 (5)	50 (122)
SAE 20W40	-10 (14)	50 (122)
SAE 30	0 (32)	40 (104)
SAE 40	5 (41)	50 (122)

#### NOTICE

Operating PC engines at fuel sulfur levels over 1.0 percent may require shortened oil change intervals to maintain adequate wear protection.

## Caterpillar Marine Transmissions

Caterpillar Transmission/Drive Train Oil (TDTO) is balanced to give maximum frictional material service life in Caterpillar transmissions. TDTO has passed the requirements for the Caterpillar TO-4 oil specification which includes the frictional requirements and gear wear requirements. TDTO is offered in different viscosity grades, including SAE 50, for maximum component service life at high ambient temperatures and heavy duty cycles.

For maximum transmission service life and performance, Caterpillar recommends:

Caterpillar Transmission/Drive Train Oil (TDTO)

Caterpillar TDTO Lubricant Viscosities For Operating Temperatures			
Compartment or System	Oil Viscosities	Minimum °C (°F)	Maximum °C (°F)
Transmission Raw/Sea Water Cooled	SAE 30	-15 (5)	80 (176)
	SAE 50	-5 (23)	95 (203)
Transmission Jacket Water Cooled	SAE 50	-5 (23)	95 (203)

Contact your Caterpillar dealer for part numbers and available container sizes.

### NOTICE

This oil is formulated for transmissions and drive trains only, and should not be used in engines. Shortened engine service life will result.

Do not use Caterpillar Gear Oil (GO) in marine transmissions. Gear Oil can cause seal material to fail and possibly leak. Gear Oil also may not be compatible with friction materials and can reduce transmission efficiency.

NOTE: Multi-grade oils are not currently blended by Caterpillar for use in transmissions. Multi-grade oils which use high molecular weight polymers as viscosity index improvers lose their viscosity effectiveness by permanent and temporary shear of the viscosity index improver. Therefore, multi-grade oils are not recommended for transmissions. The Caterpillar TO-4 specification does include a test for multi-grade oil shear stability. Multi-grade oils with adequate shear stability may be available in the future.

## Commercial Transmission/Drive Train Oils

If Caterpillar Transmission/Drive Train Oil is not used, commercial oils meeting the Caterpillar TO-4 specification must be used in Caterpillar marine transmissions:

- TO-4 Specification Oils, single grade only

## Commercial Marine Transmissions

For marine transmissions which are not manufactured by Caterpillar, refer to the marine transmission or vessel OEM lubrication recommendations.

## S•O•S Oil Analysis

Caterpillar's Scheduled Oil Sampling (S•O•S) Oil Analysis should be a part of an engine's overall maintenance program. The S•O•S program monitors the engine and transmission through used oil analysis. The oil analysis measures wear metals and oil condition. Deviations from established limits or trend lines can diagnose an impending problem before the problem becomes apparent, costly, and destructive.

See your Caterpillar dealer for more information regarding S•O•S Oil Analysis and how the program can help you manage your engine and transmission.

## Engine Lubricant Recommendations Summary

To achieve all the performance that was built into a Caterpillar engine, follow these guidelines:

- Select the proper Caterpillar oil or commercial oil that meets the API specifications
- Select the proper oil viscosity based on the applicable Lubricant Viscosities chart
- Replace the engine oil and oil filter(s) at the intervals specified in the Operation and Maintenance Manual
- Perform maintenance according to the Operation and Maintenance Manual

**Caterpillar Lubricating Grease**

Caterpillar provides grease for a variety of applications and extreme temperature conditions. The descriptions of these products follow.

Contact your Caterpillar dealer for part numbers and available container sizes.

NOTE: One grease may be incompatible with another grease. When using commercial grease, make sure the grease is compatible with the grease used in your system, or make sure to purge the system. Contact your supplier regarding grease compatibility questions.

**Multipurpose Grease****Multipurpose Lithium Complex Grease (MPG)**

MPG is a NLGI No.2 general purpose lithium complex grease for light to medium duty applications. MPG has good high temperature characteristics, with a minimum dropping point of 260°C (500°F). MPG contains unleaded extreme pressure additives and anti-wear and corrosion inhibitors to provide extra protection in a variety of construction, agricultural and automotive applications.

MPG meets the requirements for extended service intervals of automotive chassis points and wheel bearings with disc brakes, particularly in passenger cars, vans, light trucks and taxi fleets. MPG meets NLGI GC-LB certification. MPG normal operating temperatures range from -28 to 149°C (-18 to 300°F). MPG is also available as a white lithium complex grease.

**Multipurpose Lithium Complex Grease With Molybdenum (MPGM)**

MPGM is a NLGI No.2 general purpose lithium complex grease for light to medium duty applications. MPGM is fortified with molybdenum disulfide and polymer for extra lubricity and protection. MPGM contains unleaded additives and anti-wear and oxidation/corrosion inhibitors for protection and lubrication in many environments. MPGM is formulated with a high viscosity base fluid and contains polymer additive to help protect against water washout, enhance retention, and withstand heavy loads.

MPGM is recommended for heavily loaded pin joints, journal bearings, heavy duty automotive, agricultural, industrial, steel mill, mining, and off road equipment. MPGM meets NLGI GC-LB certification. MPGM normal operating temperatures range from -28 to 149°C (-18 to 300°F).

NOTE: If MPGM is not available, use a multipurpose type grease that contains three to five percent molybdenum.

**Special Purpose Grease****Bearing Lubricant**

Bearing Lubricant is a NLGI No.2 lubricating grease with a polyurea thickener. Bearing Lubricant is recommended for high temperature anti-friction bearings in applications such as electric motors, alternators, fan drives, starters, and generators. Bearing Lubricant has an effective operating range from -29 to 177°C (-20 to 350°F).

**Water and Temperature Resistant Grease (WTR)**

WTR grease is designed for applications where water washout, severe corrosion, or higher operating temperatures are a concern. WTR is an environmentally friendly grease that provides extreme pressure, anti-wear, oxidation and corrosion protection without using barium, zinc, antimony, phosphorous, lead, or sulfur additives. WTR is very shear stable and resists breakdown in the presence of water.

WTR grease performs extremely well in marine, automotive, agricultural, and industrial applications, in construction equipment, and in washer equipment bearings. WTR meets NLGI GC-LB certification. WTR normal operating temperatures range from -40° to 204°C (-40 to 400°F).

## Caterpillar Premium Grease

### Desert Gold

Desert Gold is a heavy duty premium synthetic extreme pressure lubricating grease developed for the most harsh operating environments. Desert Gold is formulated with a high viscosity synthetic base fluid, polymers, and molybdenum disulfide. Desert Gold has a high viscosity index and a high dropping point. Desert Gold has excellent adhesion and stability characteristics, and provides longer protection than other greases. Desert Gold is an environmentally friendly grease which does not contain antimony, sulfur, barium, zinc, lead, or phosphorous.

Desert Gold will lubricate and protect equipment against heavy shock loads and corrosion in extremely hot, moist, or dusty conditions. Desert Gold operating temperatures range from -6 to 230°C (20 to 450°F). Desert Gold can operate at higher temperatures for short time periods and has additional extreme pressure protection for heavily loaded pin joints.

### Arctic Platinum

Arctic Platinum is a super-premium extreme pressure synthetic lubricating grease developed for lubrication in sub-zero to moderate operating temperatures. Arctic Platinum has a high drop point and contains five percent molybdenum disulfide for protection against extra heavy loads. Arctic Platinum provides excellent protection against corrosion and oxidation. Arctic Platinum is an environmentally friendly grease which does not contain antimony, sulfur, barium, zinc, or phosphorous.

Arctic Platinum is designed for lubrication of horizontal pivot and lower link bearings, steering cylinders, king pin/king bolt bearings, upper hitch link bearings, and ejector carrier roller bearings. Arctic Platinum is extra tacky for retention on excavator car-body bearings and has additional extreme pressure protection for heavily loaded pin joints. Arctic Platinum is available in NLGI grades No.000, No.00, No.0, No.1 and No.2 to assure pumpability in central lube systems in a variety of ambient temperatures, ranging from -60 to 18°C (-76 to 65°F).

## Caterpillar Reference Materials for Lubricants

PEHP5026, Data Sheet- Caterpillar Diesel Engine Oils (DEO) (CG4/CF-4) (North America and selected International)  
PEHP1026, Data Sheet- Caterpillar Diesel Engine Oil (DEO) (CF-4) (International only)  
PEHP0003, Data Sheet- Multipurpose Lithium Complex Grease (MPG)  
PEHP0002, Data Sheet- Multipurpose Lithium Complex Grease with Molybdenum (MPGM)  
PEHP0017, Data Sheet- Special Purpose Grease (SPG) Bearing Lubricant  
PECP4025, One Safe Source  
SEBD0640, Oil and Your Engine  
SEBU5898, Cold Weather Recommendations

## Additional Reference Material

EMA Lubricating Oils Data Book

Engine Manufacturers Association  
401 N. Michigan Ave.  
Chicago, Illinois, USA 60611  
Phone (312) 644-6610

Society of Automotive Engineers (SAE) Specifications can be found in your SAE handbook or can be obtained from your local technological society, library, or college, or contact

SAE International  
400 Commonwealth Drive  
Warrendale, PA USA 15096-0001

American Society for Testing and Materials (ASTM) Specifications can normally be obtained from your local technological society, library, or college, or contact:

American Society for Testing and Materials  
1916 Race St.  
Philadelphia, PA 19103

## Fuel Specifications

### Distillate Diesel Fuel

Diesel fuels that meet the specifications in the chart below will provide rated engine performance and full component service life. In North America, diesel fuel identified as No.1-D and No.2-D in ASTM D975 generally meet these specifications. This chart is for diesel fuels that are distilled from crude oil. Diesel fuels from other sources could exhibit detrimental properties that are not defined or controlled by this specification.

Caterpillar Distillate Diesel Fuel Specifications	
Specifications (ASTM Test)	Requirements
Aromatics (D1319)	35% maximum
Ash (D482)	0.02% weight maximum
Carbon Residue On 10% Bottoms (D524)	1.05% weight maximum
Cetane Number (D613)	35 minimum (PC engines) 40 minimum (DI engines)
Cloud Point (D97)	maximum not above lowest expected ambient temperature
Copper Strip Corrosion (D130)	No. 3 maximum
Distillation (D86)	10% at 282°C (540°F) maximum 90% at 360°C (680°F) maximum
Flash Point (D93)	legal minimum
API Gravity (D287)	30 minimum/45 maximum
Pour Point (D97)	6°C (10°F) minimum below ambient temperature
Sulfur <sup>1</sup> (D3605 or D1552)	3% maximum
Viscosity <sup>2</sup> (D445) Kinematic at 40°C (104°F)	1.4 cSt minimum 20.0 cSt maximum
Water and Sediment (D1796)	0.1% maximum
Water (D1744)	0.1% maximum
Sediment (D473)	0.05% weight maximum
Gums & Resins (D381)	10 mg/100 ml maximum (5.8 grains/US gal) maximum

<sup>1</sup> Caterpillar fuel systems and engine components can operate on high sulfur fuels. However, fuel sulfur levels effect exhaust particulate emissions. High sulfur fuels increase the potential for internal component corrosion. Fuel sulfur levels above 1.0 percent may SIGNIFICANTLY shorten the oil change interval. Refer to the TBN and Fuel Sulfur topic for additional information.

<sup>2</sup> The Viscosity limits are for the fuel as delivered to the fuel injection pump. If low viscosity fuels such as JP-8 or No.1D diesel are used, fuel cooling may be required to maintain 1.4 cSt at the fuel injection pump. Conversely, when using high viscosity fuels or when operating in low temperature conditions, fuel heaters may be required in order to reduce viscosity to 20 cSt. Refer to SEBD0717, Diesel Fuel And Your Engine, for additional information.

There are many other diesel fuel specifications published by governments and technical societies. Those diesel fuel specifications usually do not contain all of the parameters addressed by Caterpillar in this specification. To assure optimum engine performance, a complete fuel analysis should be obtained prior to engine operation. The fuel analysis should include all of the properties listed in the Distillate Fuel Recommendations chart. If a particular fuel does not meet the minimum Caterpillar requirements, the engine could exhibit excessive fuel system wear, fuel system failure, or excessive engine wear caused by deposits or corrosion.

### 0.05 Percent Sulfur Diesel Fuel

In the U.S.A., 0.05 percent sulfur diesel fuel has been used in all on-highway diesel truck engines since January 1, 1994. This low sulfur fuel was mandated as a means of directly reducing particulate emissions from diesel truck engines. This low sulfur fuel will also be used in Caterpillar commercial diesel engines where low emissions are required and where supply sources provide this type of fuel. Caterpillar has not seen any detrimental effects with 0.05 percent sulfur fuel in Caterpillar commercial diesel engines.

#### NOTICE

Heavy Fuel Oil (HFO), Residual fuel, or Blended fuel must NOT be used in Caterpillar diesel engines (except in certain 3600 Series HFO engines). Severe component wear and component failures will result if HFO type fuels are used.

### Caterpillar Reference Materials for Fuels

SEBD0717, Diesel Fuels and Your Engine

#### Additional Reference Material

American Society for Testing and Materials (ASTM) Specifications can normally be obtained from your local technological society, library, or college, or contact:

American Society for Testing and Materials  
1916 Race St.  
Philadelphia, PA 19103

# Coolant Specifications

## General Coolant Information

Many engine failures are related to the cooling system. Problems such as overheating, water pump leaking, plugged radiators, and cylinder liner pitting can be avoided with proper cooling system maintenance. Cooling system maintenance is as important as fuel and lubricating system maintenance. Coolant quality is as important as the quality of fuel and lubricating oil.

Coolant is normally composed of three elements:

- Water
- Additives
- Glycol

## Water

### NOTICE

Never use water alone without Supplemental Coolant Additives (SCA) or without inhibited coolant. Water alone is corrosive at engine operating temperatures. Water alone does not provide adequate anti-freeze or anti-boil protection.

Distilled or deionized water is recommended for use in engine cooling systems. DO NOT use hard tap water or salt softened tap water in engine cooling systems. If distilled or deionized water is not available, use water that meets the minimum acceptable requirements listed in the following chart.

Caterpillar Water Quality Limits	
Water Property (ASTM Test)	mg/L (grains/US gal)
Chloride (D512b or D512d or D4327)	40 (2.4) Maximum
Sulfate (D516b or D516d)	100 (5.9) Maximum
Total Hardness (D1126)	170 (10) Maximum
Total Solids (D1888a)	340 (20) Maximum
pH (D1293)	5.5 to 9.0

Contact your Caterpillar dealer, your local water department, agricultural agent, or an independent laboratory for water analysis.

## Additives

Additives must be added to all coolant mixtures. Additives help prevent the formation of rust, scale, and mineral deposits. Additives protect metals from corrosion, prevent liner cavitation, and contain anti-foaming agents. Additives deplete during engine operation and need to be replenished. This can be done by treating conventional coolants with Supplemental Coolant Additives (SCA) or by treating Extended Life Coolant (ELC) with Extender.

Additives must be added at the proper concentration. Over-concentration of additives can cause the inhibitors to drop out of the solution and form a gel in the radiator. An over-concentration of additives produces excessive deposits on water pump seals that can cause the water pump seal to leak. Under-concentration of additives can produce pitting, cavitation, erosion, rust, scale, and foaming.

## Glycol

Glycol in the coolant provides anti-boil and freeze protection, prevents water pump cavitation, and reduces cylinder liner pitting. **For optimum performance, Caterpillar recommends a 50/50 glycol/water coolant mixture.**

NOTE: All Caterpillar engines equipped with air-to-air aftercooling (ATAAC) require a MINIMUM of 30 percent glycol to prevent water pump cavitation.

Ethylene glycol is used in most conventional heavy duty (HD) coolant/antifreezes. However, propylene glycol may also be used. Both ethylene glycol and propylene glycol have similar fluid properties in a 50/50 glycol/water mixture. Both ethylene glycol and propylene glycol provide similar heat transfer, freeze protection, corrosion control, and seal compatibility. The following charts define the temperature protection provided by the two types of glycol.



Ethylene Glycol		
Concentration % Glycol/% Water	Protection	
	Anti-Freeze °C (°F)	Anti-Boil °C (°F)
50/50	-36 (-33)	106 (223)
60/40	-51 (-60)	108 (226)

#### NOTICE

Do not use propylene glycol in concentrations that exceed 50 percent glycol because of propylene glycol's reduced heat transfer capability. Use ethylene glycol in conditions that require additional anti-boil or anti-freeze protection.

Propylene Glycol		
Concentration % Glycol/% Water	Protection	
	Anti-Freeze °C (°F)	Anti-Boil °C (°F)
50/50	-37 (-35)	106 (222)

Caterpillar recommends the use of a refractometer for checking the glycol concentration. Use the 1U-7298 Coolant Tester (°C) or use the 1U-7297 Coolant Tester (°F). The testers give immediate, accurate readings and can be used with ethylene or propylene glycol.

## Coolant Recommendations

#### NOTICE

DO NOT use a commercial coolant/antifreeze that ONLY meets the ASTM D3306 or D4656 specification. This type of coolant/antifreeze is made for light duty automotive applications.

The primary types of coolant used in Caterpillar commercial diesel engines are:

- Preferred – Caterpillar Extended Life Coolant (ELC), or...  
a commercial ELC meeting the Caterpillar EC-1 specification
- Acceptable – Caterpillar Diesel Engine Antifreeze/Coolant (DEAC), or...  
a commercial heavy duty (HD) coolant/antifreeze meeting ASTM D5345 or D4985 specifications, or ...  
a mixture of Caterpillar SCA and distilled or deionized water, or ...  
a mixture of commercial SCA and distilled or deionized water

Caterpillar ELC will provide the best coolant service life, corrosion protection, water pump seal service life, and radiator service life.

Caterpillar recommends a 50/50 glycol/water mixture for optimum ELC performance and for optimum conventional HD coolant/antifreeze performance.

NOTE: Caterpillar DEAC does not require SCA treatment at initial fill. Commercial HD coolant/antifreezes meeting the ASTM D5345 or D4985 specification DO REQUIRE SCA treatment at initial fill.

In those stationary and marine engine applications that do not require anti-boil or anti-freeze protection, a mixture of SCA and water is acceptable. Caterpillar recommends a six to eight percent concentration of SCA in those cooling systems. Distilled or deionized water is preferred. Water which has the properties listed in the Caterpillar Water Quality Limits chart may be used.

Coolant Service Life	
Coolant Type	Service Life
Caterpillar ELC	6000 Hours or Four Years
Caterpillar DEAC	3000 Hours or Two Years
Commercial heavy duty coolant/antifreeze meeting ASTM D5345	3000 Hours or One Year
Commercial heavy duty coolant/antifreeze meeting ASTM D4985	
Caterpillar SCA and Water	3000 Hours or Two Years
Commercial SCA and Water	3000 Hours or One Year

### Caterpillar Extended Life Coolant (ELC)

Caterpillar provides Extended Life Coolant (ELC) for use in heavy duty diesel engines, natural gas engines, and automotive engines. The Caterpillar ELC anti-corrosion package is totally different from conventional coolants. Caterpillar ELC is an ethylene glycol based coolant which contains organic acid corrosion inhibitors and anti-foaming agents. Caterpillar ELC has fewer nitrites than other coolants. Caterpillar ELC has been formulated with the correct levels of additives to provide superior corrosion protection for all metals in diesel engine cooling systems.

Caterpillar ELC extends coolant service life to 6000 service hours or Four years. Caterpillar ELC does not require frequent additions of SCA. A "one time only" coolant Extender is the only maintenance addition required. The Extender should be added to the cooling system at 3000 service hours or Two Years.

Caterpillar ELC is available Premixed with distilled water in a 50/50 concentration. The Premixed ELC provides anti-freeze protection to  $-36^{\circ}\text{C}$  ( $-33^{\circ}\text{F}$ ). The Premixed ELC is recommended for initial fill and for topping off the cooling system. ELC Concentrate is available to lower the freezing point to  $-51^{\circ}\text{C}$  ( $-60^{\circ}\text{F}$ ) for Arctic conditions. ELC Concentrate should be used to adjust the coolant freeze point as required where Caterpillar ELC Premixed freeze protection is not acceptable.

Contact your Caterpillar dealer for part numbers and available container sizes.

NOTE: The Caterpillar EC-1 Specification is an industry standard developed by Caterpillar. The EC-1 specification defines all of the performance requirements that an engine coolant must meet in order to be sold as an extended life coolant for Caterpillar engines. Caterpillar ELC can be used in most OEM diesel, gasoline, and natural gas engines. Caterpillar ELC meets the industry performance requirements of ASTM D4985 and D5345 for heavy duty low silicate coolant/antifreezes. Caterpillar ELC also meets the industry performance requirements of ASTM D3306 and D4656 for automotive applications.

### Caterpillar ELC Cooling System Maintenance

#### Caterpillar ELC Extender

Caterpillar ELC Extender is added to the cooling system halfway through the ELC service life. The cooling system should be treated with Extender at 3000 service hours or one half of the coolant service life. Use the chart below to determine the proper amount of Caterpillar Extender required.

Contact your Caterpillar dealer for part numbers and available container sizes.

Caterpillar ELC Extender Additions By Cooling System Capacity	
Cooling System Capacity	Extender Addition
22 to 30 L (6 to 8 US gal)	0.57 L (20 fl oz)
31 to 38 L (8 to 10 US gal)	0.71 L (24 fl oz)
39 to 49 L (11 to 13 US gal)	0.95 L (32 fl oz)
50 to 64 L (14 to 17 US gal)	1.18 L (40 fl oz)
65 to 83 L (18 to 22 US gal)	1.60 L (54 fl oz)
84 to 114 L (23 to 30 US gal)	2.15 L (72 fl oz)
115 to 163 L (31 to 43 US gal)	3.00 L (100 fl oz)
164 to 242 L (44 to 64 US gal)	4.40 L (148 fl oz)

#### ELC Cooling System Cleaning

NOTE: CLEAN WATER is the only system cleaning/flushing agent required when ELC is drained from the cooling system.

ELC can be recycled. The drained coolant mixture can be "distilled" to remove the ethylene glycol and water for reuse. Contact your Caterpillar dealer for more information.

After draining and refilling the cooling system, operate the engine with the radiator filler cap removed until the coolant reaches normal operating temperature and the coolant level stabilizes. Add ELC mixture as necessary to fill the system to the proper level.

**Changing to Caterpillar ELC**

To switch the cooling system from conventional HD coolant/antifreeze to Caterpillar ELC, perform the following steps:

1. Drain the cooling system.
2. Flush the system with clean water to remove any debris.
3. Clean the cooling system with Caterpillar Cooling System Cleaner. Follow the instructions on the label.
4. Flush the cooling system with clean water. It is very important to remove all of the cleaning agent.
5. Fill the cooling system with clean water. Operate the engine until the cooling system temperature is 49° to 66°C (120° to 150°F).
6. Drain the cooling system. Flush the cooling system with clean water.
7. Repeat steps 5 and 6. Continue to flush the cooling system with clean water until the draining water is also clean.
8. Fill the cooling system with Caterpillar ELC.
9. Attach a label to the cooling system to indicate the system has been switched over to Caterpillar ELC.

**ELC Cooling System Contamination****NOTICE**

Mixing ELC with other products reduces the effectiveness of the ELC and shortens the ELC service life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for premixed or concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations can result in shortened cooling system component life.

ELC cooling systems can withstand contamination of up to ten percent of conventional HD coolant/antifreeze. If the contamination exceeds ten percent of the total system capacity, perform either one of the following two procedures:

- Drain the cooling system. Flush the system with clean water. Refill the system with ELC.
- Maintain the cooling system as if the system is filled with conventional HD coolant/antifreeze.

**Commercial ELC**

If Caterpillar extended life coolant is not used, select a commercial extended life coolant that meets the Caterpillar EC-1 specification. Do not use a product that is labeled as an extended life coolant but does not meet the Caterpillar EC-1 specification. Follow the coolant maintenance guidelines of the commercial ELC supplier. In all cases, use distilled or deionized water or use water that has the properties listed in the Caterpillar Water Quality Limits chart.

**Caterpillar Diesel Engine Antifreeze/Coolant (DEAC)**

Caterpillar recommends the use of Caterpillar Diesel Engine Antifreeze/Coolant (DEAC) in conventional HD cooling systems. DEAC is an alkaline type, single-phase, ethylene glycol-based antifreeze/coolant. DEAC contains inorganic corrosion inhibitors and anti-foaming agents.

Contact your Caterpillar dealer for part numbers and available container sizes.

Caterpillar DEAC is available premixed with distilled water in a 50/50 concentration. If DEAC concentrate is used, Caterpillar recommends mixing the concentrate with distilled or deionized water. If distilled or deionized water is not available, use water that has the properties listed in the Caterpillar Water Quality Limits chart.

**Caterpillar Supplemental Coolant Additive (SCA)**

Caterpillar Supplemental Coolant Additive (SCA) is effective in preventing corrosion on all metals. Caterpillar SCA also prevents the formation of mineral deposits, prevents liner cavitation, and eliminates coolant foaming.

Caterpillar DEAC is formulated with the correct level of Caterpillar SCA. Additional SCA is NOT needed when the cooling system is initially filled with DEAC.

Contact your Caterpillar dealer for part numbers and available container sizes.

## Commercial Heavy Duty (HD) Coolant/Antifreeze and SCA

If Caterpillar DEAC is not used, select a low silicate commercial HD coolant/antifreeze that meets ASTM D5345 or D4985 specifications.

When a commercial HD coolant/antifreeze is used, the cooling system should be treated with three to six percent Caterpillar SCA by volume. Refer to the Caterpillar SCA Requirements for Heavy Duty Coolant/Antifreeze chart. If Caterpillar SCA is not used, select a commercial SCA. The commercial SCA must provide a minimum of 1200 mg/L or 1200 ppm (70 grains/US gal) nitrites in the final coolant mixture. Follow the coolant maintenance guidelines of the commercial SCA supplier.

HD coolant/antifreezes that meet ASTM D5345 or D4985 specifications **DO** require SCA treatment at initial fill, and on a maintenance basis.

When mixing concentrated coolants, use distilled or deionized water or use water that has the properties listed in the Caterpillar Water Quality Limits chart.

## Heavy Duty Coolant/Antifreeze Cooling System Maintenance

### NOTICE

Never operate an engine without thermostats in the cooling system. Thermostats maintain the engine coolant at the proper operating temperature. Cooling system problems can develop without thermostats.

Check the coolant/antifreeze solution (glycol content) frequently to ensure adequate anti-boil and anti-freeze protection. Caterpillar recommends the use of a refractometer for checking the glycol concentration. Use the 1U-7298 Coolant Tester (°C) or use the 1U-7297 Coolant Tester (°F). The testers give immediate, accurate readings and can be used with ethylene or propylene glycol.

Caterpillar commercial engine cooling systems should have the SCA concentration tested every 250 hours. Your Caterpillar dealer has test kits to evaluate SCA concentration. Test the SCA concentration or submit a coolant sample to your Caterpillar dealer every 250 hours (refer to the S•O•S Coolant Analysis topic).

SCA additions are based on the test results or based on the coolant analysis results. Liquid SCA or a SCA maintenance element (if equipped) may be needed every 250 service hours.

The following chart lists the amount of Caterpillar SCA needed at initial fill to treat commercial HD coolant/antifreeze.

The chart also lists SCA additions for liquid SCA and for SCA maintenance elements at 250 hours. The additions apply to both Caterpillar DEAC and commercial HD coolant/antifreezes.

Caterpillar SCA Requirements For Heavy Duty Coolant/Antifreeze			
Cooling System Capacity L (US gal)	SCA At Initial Fill <sup>1</sup> ASTM D5345 ASTM D4985 HD Coolant L (fl oz)	SCA At 250 Hours For All HD Type Coolants <sup>2</sup> L (fl oz)	SCA Element At 250 Hours For All HD Type Coolants <sup>3</sup> Part No. (Qty)
22 to 30 (6 to 8)	0.95 (32)	0.24 (8)	111-2370 (1)
31 to 38 (9 to 10)	1.18 (40)	0.36 (12)	111-2369 (1)
39 to 49 (11 to 13)	1.42 (48)	0.36 (12)	111-2369 (1)
50 to 64 (14 to 17)	1.90 (64)	0.47 (16)	9N-3368 (1)
65 to 83 (18 to 22)	2.37 (80)	0.60 (20)	111-2371 (1)
84 to 114 (23 to 30)	3.32 (112)	0.95 (32)	9N-3718 (1)
115 to 163 (31 to 43)	4.75 (160)	1.18 (40)	111-2371 (2)
164 to 242 (44 to 64)	7.60 (256)	1.90 (64)	9N-3718 (2)

<sup>1</sup> SCA is NOT required for Caterpillar DEAC at initial fill.

<sup>2</sup> Do not exceed the six percent maximum concentration. Check the SCA concentration with a SCA test kit.

<sup>3</sup> Do not use both the SCA maintenance element and SCA liquid at the same time.

NOTE: Due to specific engine applications, maintenance practices may need periodic re-evaluation in order to properly maintain the engine's cooling system.

## Heavy Duty Coolant/Antifreeze Cooling System Cleaning

Caterpillar Cooling System Cleaners are designed to clean the cooling system of harmful scale and corrosion. Caterpillar cleaners dissolve mineral scale, corrosion products, light oil contamination, and sludge.

Clean the cooling system:

- after draining used coolant and before filling the cooling system with new coolant
- whenever the coolant is dirty or foaming

### SCA and Water Cooling Systems

NOTE: All Caterpillar engines equipped with air-to-air aftercooling (ATAAC) require a MINIMUM of 30 percent glycol to prevent water pump cavitation.

In stationary and marine engine cooling systems that use Supplemental Coolant Additive (SCA) and water alone, Caterpillar recommends the use of Caterpillar SCA to prevent corrosion, mineral deposition, liner cavitation, and coolant foaming. If Caterpillar SCA is not used, select a commercial SCA. The commercial SCA must provide a minimum of 2400 mg/L or 2400 ppm (140 grains/US gal) of nitrites in the final coolant mixture.

Water quality is a very important factor in this type of cooling system. Caterpillar recommends the use of distilled or deionized water. If distilled or deionized water is not available, use water that has the properties listed in the Caterpillar Water Quality Limits chart.

A cooling system using SCA and water only needs more SCA than a cooling system using a glycol/water mixture. The SCA concentration in a SCA and water cooling system should be six to eight percent by volume. Refer to the following chart for the amount of Caterpillar SCA required for various cooling system capacities.

Caterpillar SCA Requirements For SCA And Water Cooling Systems		
Cooling System Capacity L (US gal)	Caterpillar SCA At Initial Fill L (fl oz)	Caterpillar SCA At 250 Hours L (fl oz)
22 to 30 (6 to 8)	1.75 (64)	0.44 (15)
31 to 38 (9 to 10)	2.30 (80)	0.57 (20)
39 to 49 (11 to 13)	3.00 (100)	0.75 (25)
50 to 64 (14 to 17)	3.90 (128)	0.95 (32)
65 to 83 (18 to 22)	5.00 (168)	1.25 (42)
84 to 110 (23 to 29)	6.60 (224)	1.65 (56)
111 to 145 (30 to 38)	8.75 (296)	2.19 (74)
146 to 190 (39 to 50)	11.50 (392)	2.88 (98)
191 to 250 (51 to 66)	15.00 (512)	3.75 (128)

### SCA and Water Cooling System Maintenance

Except for the amount of SCA additions, maintenance of a SCA and water system is the same as maintenance for a system using a HD coolant/antifreeze. See the Caterpillar SCA Requirements for SCA and Water Cooling Systems chart for the amount of SCA required.

NOTE: The 8T-5296 Conditioner Test Kit can be used to evaluate the SCA concentration in water and SCA cooling systems, with the following modifications to step 3 and step 5:

STEP 3 - Add tap water to the vial up to the 20 ml mark.

STEP 5 - With the defined procedure, the six to eight percent concentration will yield a 20 to 27 drop range. Fewer drops indicate under-concentration of SCA. More drops indicate over-concentration of SCA. Adjust SCA the concentration as needed.

## S•O•S Coolant Analysis

Coolant testing is available at your Caterpillar dealer. S•O•S Coolant Analysis is the best way to monitor the condition of your coolant and your cooling system. S•O•S Coolant Analysis is a two-level program, based on periodic samples.

### Level I: Basic Analysis

Recommended at every oil change or every 250 service hours. Level I tests for:

- glycol
- SCA concentration
- pH
- conductivity

Level I coolant analysis reports results and makes recommendations.

### Level II: Comprehensive Analysis

Recommended semi-annually or every 1000 service hours or whenever indicated by Level I results.

- Performs full Level I analysis
- Inspects visual properties
- Identifies metal corrosion and contaminants
- Identifies built-up impurities that point to corrosion and scaling problems BEFORE they lead to costly repairs

Level II coolant analysis reports results and makes recommendations.

See your Caterpillar dealer for more information on coolant analysis and how it can help you manage your equipment.

## Caterpillar Reference Materials for Coolants

PEHP4036, Data Sheet- Caterpillar Coolant  
PEHP5033, S•O•S Coolant Analysis  
PECP4025, One Safe Source  
SEBD0518, Know Your Cooling System  
SEBD0970, Coolant and Your Engine

### Additional Reference Material

American Society for Testing and Materials (ASTM)  
Specifications can normally be obtained from your local technological society, library, or college, or contact:

American Society for Testing and Materials  
1916 Race St.  
Philadelphia, PA 19103

## **SECTION 5**

# **CRANE REPAIR**

# SERVICE ASSISTANCE & ORDERING INFORMATION

24 Hours a Day

## INTRODUCTION

This section contains information for ordering replacement parts for the equipment.



**NOTE:** CERTIFIED OEM REPLACEMENT PARTS CONTAIN NAUTILUS PART NUMBERS. INFORMATION ON PARTS NOT LISTED IN THIS MANUAL MUST BE RECEIVED FROM OSI NAUTILUS CRANE FOR PROPER VALIDATION AS NON-OEM PARTS MAY NOT MEET PERFORMANCE STANDARDS. ANY REPAIRS MADE WITH NON-OEM PARTS COULD EFFECT SAFE OPERATIONS OF THE CRANE AND CAUSE POSSIBLE PERSONNEL INJURY.

## PARTS DELIVERY

To ensure prompt delivery of parts, be sure to give the correct name, address, town, state and country to which the parts are to be shipped. Include the Zip Code, if applicable, and specify the type of shipment. If the type of shipment is not specified, parts will be shipped by the best available means as determined by Oil States Industries.

## PARTS AND SERVICE INQUIRIES

If difficulty is encountered with the repair of any assembly / component or if replacement parts are needed for any reason, contact the Oil States Industries Parts and Service Department for assistance at the following:

*Oil States Industries*  
1180 Mulberry Road  
Houma, LA 70363 USA

Telephone: (985) 868-0630  
Toll Free: (800) 247-5530  
Fax: (985) 851-0778

*Oil States Industries Thailand Ltd.*  
450 Sukhumvit Road,  
No. 102  
Tambol Huaypong  
Amphur Muang  
Rayong 21150  
Thailand

Telephone: + 66 (0) 38 691 643  
Fax: + 66 (0) 38 691 644



# 340LA-140 BILL OF MATERIALS

## BILL OF MATERIAL

### REFERENCE DRAWINGS

M98SK4- 099 CRANE GENERAL ARRANGEMENT (FOR MANUAL USE)

M98SK4- 100 POWER UNIT GENERAL ARRANGEMENT (FOR MANUAL USE)

M98SK1- 220 HYDRAULIC SCHEMATIC (FOR MANUAL USE)

M98SK1- 221 ELECTRICAL SCHEMATIC (FOR MANUAL USE)

M98SK1- 222 WIRING DIAGRAM (FOR MANUAL USE)

<u>HOSE LIST</u>					
ITEM	QTY	HOSE ID (IN)	PART NUMBER	LOCATION TO	LOCATION FROM
1	1	1-1/4	N76620-478	Auxiliary Control Valve (Inlet)	Hydraulic Pump #1
2	1	1/4	N76404-204	Auxiliary Pressure Gauge	Auxiliary Control Valve (Inlet)
3	1	1-1/2	N76124-552	Engine Oil Cooler	Auxiliary Control Valve (Outlet)
4	1	1-1/2	N76124-370	Return Manifold	Engine Oil Cooler
5	1	1-1/4	N76620-416	Auxiliary Hoist (Down)	Auxiliary Control Valve (Down)
6	1	1-1/4	N76620-270	Auxiliary Dump Valve (Inlet)	Auxiliary Control Valve (Up)
7	1	1-1/4	N76620-190	Auxiliary Hoist (Up)	Auxiliary Dump Valve (Outlet)
8	1	1-1/4	N76620-484	Boom Control Valve (Inlet)	Hydraulic Pump #2
9	1	1/4	N76404-244	Boom Pressure Gauge	Boom Control Valve (Inlet)
10	1	1-1/4	N76620-532	Boom Control Valve (Inlet)	Hydraulic Pump #6
11	1	2	N76132-330	Return Manifold	Boom Control Valve (Outlet)
12	1	1-1/2	N7A1124-470	Boom Dump Valve (Down)	Boom Control Valve (Down)
13	1	1-1/2	N7A1124-500	Boom Hoist (Down)	Boom Dump Valve (Down)
14	1	1-1/2	N7A1124-522	Boom Dump Valve (Up)	Boom Control Valve

# 340LA-140 BILL OF MATERIALS

<u>HOSE LIST</u>					
ITEM	QTY	HOSE ID (IN)	PART NUMBER	LOCATION TO	LOCATION FROM
15	1	1-1/2	N7A1124-550	Boom Hoist (Up)	Boom Dump Valve (Up)
16	1	1	N76616-498	Main Control Valve (Inlet)	Hydraulic Pump #3
17	1	1/4	N76404-216	Main Pressure Gauge	Main Control Valve (Inlet)
18	1	1-1/4	N76620-530	Main Control Valve (Inlet)	Hydraulic Pump #4
19	1	1-1/2	N76124-300	Return Manifold	Main Control Valve (Outlet)
20	1	1-1/2	N7A1124-356	Main Hoist (Down)	Main Control Valve (Down)
21	1	1-1/2	N7A1124-320	Main Dump Valve #1 (Inlet)	Main Control Valve
22	1	1-1/2	N7A1124-150	Main Dump Valve #2 (Inlet)	Main Dump Valve #1 (Outlet)
23	1	1-1/2	N7A1124-144	Main Hoist (Up)	Main Dump Valve #2 (Outlet)
24	1	1-1/4	N76620-520	Swing Control Valve (Inlet)	Hydraulic Pump #5
25	1	1/4	N76404-148	Swing Pressure Gauge	Swing Control Valve (Inlet)
26	1	1-1/2	N76124-290	Return Manifold	Swing Control Valve (Outlet)
27	2	3/4	N76412-240	Swing Motor #1	Swing Control Valve (Tee)
28	2	3/4	N76412-250	Swing Motor #2	Swing Control Valve (Tee)
29	1	1/4	N76412-242	Swing Brake #1	Swing Control Valve – Check Valve (Tee)
30	1	1/4	N76404-090	Swing Brake #2	Swing Brake #1
31	1	1/4	N76404-144	Parking Brake Valve	Swing Control Valve – Check Valve (Tee)
32	1	1/4	N76404-410	Hydraulic Tank	Parking Brake Valve (Outlet)
33	1	1/4	N76404-230	Dynamic Brake #1 (Tee)	Dynamic Brake Actuator
34	1	1/4	N76404-092	Dynamic Brake #2	Dynamic Brake #1 (Tee)
35	1	1/2	N76508-224	Auxiliary Dump Valve – Check Valve (Tee)	Boom Dump Valve – Check Valve (Down)

# 340LA-140 BILL OF MATERIALS

HOSE LIST					
ITEM	QTY	HOSE ID (IN)	PART NUMBER	LOCATION TO	LOCATION FROM
36	1	1/2	N76508-070	Main Dump Valve #1 – Check Valve (Tee)	Auxiliary Dump Valve – Check Valve (Tee)
37	1	1/2	N76508-048	Main Dump Valve #2 – Check Valve (Tee)	Main Dump Valve #1 – Check Valve (Tee)
38	1	1/2	N76508-270	Stainless Steel Tubing (Union- Pressure)	Main Dump Valve #2 – Check Valve (Tee)
39	1	1/2	N76508-276	Stainless Steel Tubing (Tank-Union)	Hydraulic Tank
40	2	1/2	N77208-140	Anti-Two Block Hoses (Tee on Tip)	Anti-Two Block (Union)
41	2	1/2	N76508-200	Main Anti-Two Block Valve	Anti-Two Block Valve Hoses (Tee on Tip)
42	2	1/2	N76508-400	Auxiliary Anti-Two Block Valve	Anti-Two Block Valve Hoses (Tee on Tip)
43	1	1/4	N76404-170	Main Hoist Case Drain	Auxiliary Hoist Case Drain
44	1	1/4	N76804-027	Hydraulic Tank	Boom Hoist Case Drain
45	1	1/4	N76804-024	Hydraulic Tank	Main Hoist Case Drain
46	3	1/4	N76404-072	Boom Hoist	Ratchet and Pawl
47	1	1/2	N76408-524	Boom High Angle Override Valve (In)	Boom Dump Valve (Up) – Check Valve
48	1	3/8	N76406-210	Boom High Angle Limit Valve (In)	Boom High Angle Override Valve
49	1	3/8	N76406-060	Boom High Angle Limit Valve (Tee-Out)	Boom Low Angle Limit Valve (Out)
50	1	1/2	N76408-492	Boom Low Angle Override Valve	Boom Dump Valve (Down) – Check Valve
51	1	3/8	N76406-408	Hydraulic Tank	Boom High Angle Limit Valve (Tee-Out)
52	1	1/4	N76404-380	Return Pressure Gauge	Return Manifold
53	1	3	N76348-312	Return Manifold #1	Hydraulic Filter #1
54	1	3	N76348-292	Return Manifold #2	Hydraulic Filter #1
55	1	3	N76348-300	Return Manifold #1	Hydraulic Filter #2
56	1	3	N76348-280	Return Manifold #2	Hydraulic Filter #2
57	1	1/4	N76904-150	Load Cell	Load Indicator Gauge

# 340LA-140 BILL OF MATERIALS

<u>HOSE LIST</u>					
ITEM	QTY	HOSE ID (IN)	PART NUMBER	LOCATION TO	LOCATION FROM
58	1	3/8	N76406-104	Boom Low Angle Override Valve (Inlet)	Boom Low Angle Override Valve (Outlet)
59	1	2-1/2	N76740-108	Hydraulic Pump #1	Hydraulic Tank
60	1	2	N76732-108	Hydraulic Pump #2	Hydraulic Tank
61	1	1-1/2	N76724-096	Hydraulic Pump #3	Hydraulic Tank
62	1	2-1/2	N76740-080	Hydraulic Pump #4	Hydraulic Tank
63	1	2-1/2	N76740-080	Hydraulic Pump #5	Hydraulic Tank
64	1	2	N76732-080	Hydraulic Pump #6	Hydraulic Tank
65	1	3/8	N74806-128	Fuel Pump	Fuel Tank
66	1	1/4	N74804-160	Fuel Tank	Fuel Return
67	1	1/2	N76508-256	Hand Recharge Pump	Hydraulic Start System Overhead Reservoir
68	1	3/8	N76406-160	Unloading Relief Valve (Tee)	Hand Recharge Pump
69	1	1/2	N76508-080	Start Motor	Soft Engage Valve
70	1	1/2	N76508-260	Hydraulic Start System Overhead Reservoir	Start Motor
71	1	3/8	N76406-260	Engine Driven Pump	Hydraulic Start System Overhead Reservoir
72	1	3/8	N76406-140	High Pressure Filter	Engine Driven Pump
73	1	3/8	N76406-100	Unloading Relief Valve (In)	High Pressure Filter
74	1	3/8	N76406-256	Accumulator	Unloading Relief Valve (Out)
75	1	1/2	N76508-052	Unloading Relief Valve (Vent)	Unloading Relief Valve (Vent)
76	1	1/2	N76508-230	Hydraulic Start System Overhead Reservoir	Unloading Relief Valve (Vent)
77	1	1/2	N76508-570	Engine Start Valve	Accumulator
78	1	1/2	N76508-532	Soft Engage Valve	Engine Start Valve
79	1	1/4	N76404-174	Accumulator Pressure Gauge	Engine Start Valve

## 340LA-140 BILL OF MATERIALS

<u>HOSE LIST</u>					
ITEM	QTY	HOSE ID (IN)	PART NUMBER	LOCATION TO	LOCATION FROM
80	1	1/4	N76404-052	Water Temperature Valve (Probe)	Engine Oil (Pressure)
81	1	1/4	N76404-160	Engine Oil Vent	Water Temperature Valve (Probe)
82	1	1/4	N76404-180	Air Intake Shutdown Valve	Water Temperature Valve (Probe)
83	1	1/4	N76404-096	Overspeed Valve	Air Intake Shutdown Valve
84	1	1/4	N76404-060	Engine Oil Vent	Overspeed Valve
85	1	1/4	N76404-540	Engine Oil Pressure Gauge	Engine Oil (Pressure)
86	1	1/4	N76404-570	Foot Throttle Cylinder	Foot Throttle Actuator
87	-	-	-	-	-
88	-	-	-	-	-
89	-	-	-	-	-
90	-	-	-	-	-
91	-	-	-	-	-
92	-	-	-	-	-
93	-	-	-	-	-
94	-	-	-	-	-
95	-	-	-	-	-
96	-	-	-	-	-
97	-	-	-	-	-
98	-	-	-	-	-
99	-	-	-	-	-
100	-	-	-	-	-
101	-	-	-	-	-

# 340LA-140 BILL OF MATERIALS

<u>LUBRICATION MANIFOLD HOSE LIST</u>					
ITEM	QTY	HOSE ID (IN)	PART NUMBER	LOCATION TO	LOCATION FROM
102	1	1/4	N76804-080	Auxiliary Idler Sheave	Boom Lubrication Manifold
103	1	1/4	N76804-081	Main Idler Sheave	Boom Lubrication Manifold
104	1	1/4	N76804-149	Lower Auxiliary Sheave Pin	Boom Lubrication Manifold
105	1	1/4	N76804-145	Upper Main Sheave Pin	Boom Lubrication Manifold
106	1	1/4	N76804-146	Upper Auxiliary Sheave Pin	Boom Lubrication Manifold
107	1	1/4	N76804-144	Lower Main Sheave Pin (Left)	Boom Lubrication Manifold
108	1	1/4	N76804-142	Lower Main Sheave Pin (Center)	Boom Lubrication Manifold
109	1	1/4	N76804-141	Lower Main Sheave Pin (Center)	Boom Lubrication Manifold
110	-	-	-	-	-
111	-	-	-	-	-
112	-	-	-	-	-
113	-	-	-	-	-
114	-	-	-	-	-
115	-	-	-	-	-
116	-	-	-	-	-
117	-	-	-	-	-
118	-	-	-	-	-
119	-	-	-	-	-
120	-	-	-	-	-
121	-	-	-	-	-
122	-	-	-	-	-

# 340LA-140 BILL OF MATERIALS

## PARTS LIST

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>BOOM AND RIGGING</u>			
123	1	N61586-001	Boom Base Weldment (Rev. E)
124	1	N60980-009	Boom Base Roller (Front)
125	1	N60980-010	Boom Base Roller (Rear)
126	2	N61595-001	Boom Foot Pins
127	2	N00018-010	Boom Foot Pin Insert Bushings
128	1	N45916-001	Boom Angle Indicator (Right Hand)
129	1	N60255-005	Boom Angle Indicator Needle
130	12	N60986-004	Boom Connection Pins
131	1	N61587-040	Boom Mid Weldment (Rev. B)
132	1	N61587-030	Boom Mid #1 Weldment (Rev. A)
133	1	N61587-030	Boom Mid #2 Weldment (Rev. A)
134	10	N60980-004	Boom Mid Roller
135	2	N46046-005	Floodlights
136	2	N46046-505	Floodlight Bulbs
137	2	N61629-001	Floodlight Brackets
138	2	N46547-003	Outlet Boxes
139	1	N61588-001	Boom Point Weldment (Rev. K)
140	1	N60980-011	Boom Point Roller (Front)
141	1	N60980-012	Boom Point Roller (Rear)
142	1	N46238-003	Beacon Light
143	1	N46238-501	Beacon Light Bulb
144	1	N80402-006	Beacon Light Mounting Bracket
145	1	N46547-003	Outlet Box

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>BOOM AND RIGGING (CONT'D)</u>			
146	1	N61604-001	Main/Auxiliary Idler Sheave Pin
147	1	N45931-014	Main Idler Sheave
148	1	N45422-007	Main Idler Sheave Bearing
149	2	N61991-003	Main Idler Sheave Bearing Retainers
150	1	N61604-001	Main Sheave Pin
151	3	N45931-014	Main Sheaves
152	3	N45422-007	Main Sheave Bearings
153	6	N61991-003	Main Sheave Bearing Retainers
154	2	N60646-004	Load Cell Pins
155	1	N60645-001	Extended Wedge Socket Pin
156	1	N30602-008	Main Open Wedge Socket
157	1	N30606-014	Main Rope Clamp
158	4	N30601-006	Main Shackles
159	2	N45315-060	Main Anti-Two Block Suspension Cables
160	1	N45943	Main Anti-Two Block Valve
161	1	N46831-139	Load Block
162	1	N46831-139-1	Load Block Safety Latch
163	1	N45931-012	Auxiliary Idler Sheave
164	1	N45422-007	Auxiliary Idler Sheave Bearing
165	2	N61991-003	Auxiliary Idler Sheave Bearing Retainers
166	1	N61605-001	Auxiliary Extension Sheave Pin
167	1	N45931-012	Auxiliary Extension Sheave
168	1	N45422-007	Auxiliary Extension Sheave Bearing



# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>BOOM AND RIGGING (CONT'D)</u>			
169	2	N61991-003	Auxiliary Extension Sheave Bearing Retainers
170	2	N60989-010	Auxiliary Anti Two Block Hangers
171	4	N30601-006	Auxiliary Shackles
172	2	N45315-060	Auxiliary Anti Two Block Suspension Cables
173	1	N30606-012	Auxiliary Rope Clamp
174	1	N30617-006	Auxiliary Open Wedge Socket
175	1	N45943	Auxiliary Anti Two Block Valve
176	1	N46832-031	Overhaul Ball
177	1	N46832-031-1	Overhaul Ball Safety Latch
178	1	N95SK1-104	Boom Fleet Angle Idler Assembly
179	2	N95SK1-104-9	Boom Fleet Angle Idler Main/Auxiliary Sheave Pin
180	2	N60014-010	Boom Fleet Angle Idler Main/Auxiliary Sheave Pin Keepers
181	2	N20208-076	Boom Fleet Angle Idler Main/Auxiliary Sheave Pin Keeper Bolts w/Lock Nuts
182	1	N45421-039	Boom Fleet Angle Idler Main Sheave
183	1	N45421-034	Boom Fleet Angle Idler Auxiliary Sheave
184	2	N45422-006	Boom Fleet Angle Idler Main/Auxiliary Sheave Bearings
185	4	N61991-002	Boom Fleet Angle Idler Main/Auxiliary Sheave Bearing Retainers
186	1 set	N46501-095	Pendant Lines
187	2	N61597-001	Pendant Anchor Plates
188	2	N61594-001	Pendant Keepers

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

ITEM	QTY	NUMBER	PART DESCRIPTION
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### BOOM AND RIGGING (CONT'D)

189	1	N61591-001	Bridle Weldment (Rev.D)
190	1	N61603-001	Bridle Sheave Pin
191	6	N45931-012	Bridle Sheaves
192	6	N45422-007	Bridle Sheave Bearings
193	12	N61991-003	Bridle Sheave Bearing Retainers
194	1	N61242-024	Boom Lubrication Manifold (Not Shown)
195	-	-	-
196	-	-	-
197	-	-	-
198	-	-	-
199	-	-	-

### UPPERSTRUCTURE

200	1	N98SK1-219	Pedestal Weldment (Rev. C)
201	1	N96SK1-463	Grounding System (Not Shown)
202	1	N46397-002	Ballring
*203	1	N46499-001	Ballring To Upperstructure Bolt Kit
*204	1	N46499-002	Ballring To Pedestal Bolt Kit
205	1	N47021-027	Electric Swivel

**\* WARNING:** These are special bolts meeting SAE Grade 8 and API Specification 2C requirements and must be purchased from Applied Hydraulic Systems, Inc. Standard off the shelf Grade 8 bolts **MUST NOT BE USED** as they do not meet the requirements of API Spec 2C.

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>UPPERSTRUCTURE (CONT'D)</u>			
206	2	N46837-002	Seals
207	1	N46547-005	Outlet Box
208	1	N61584-001	Upperstructure Weldment, (Rev. M)
-	1	N61585-001	Upperstructure Machining, (Rev. B)
209	1	N46500-001	Upperstructure/Gantry Bolt Kit (Not Shown)
210	1	N61589-018	Upperstructure Walkways and Supports
211	1	N46579-005	Upperstructure Safety Gate
212	1	N98SK1-333	Crane Access Ladder
213	1	N60756-007	Boom High/Low Angle Kickout Assembly
214	1	N45401-001	Boom High Angle Kickout Valve
215	1	N45401-001	Boom Low Angle Kickout Valve
216	2	N45686-006	Swing Motors
217	2	N45955-001	Dynamic Brakes
218	2	N47103-001	Gearboxes
219	2	N61503-001	Pinion Gears
220	2	N60265-004	Pinion Cap Plates
221	2	N61196-004	Pinion Guards
222	1	N45045-001-SA	Relay Box
223	1	N46150-002	Relay Socket Base
224	1	N46830-003	Time Delay Relay
225	2	N46837-002	Seals
226	1	N61627-004	Return Manifold

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>UPPERSTRUCTURE (CONT'D)</u>			
227	1	N61627-005	Return Manifold
228	5	N80299-002	Dump Valves
229	6	N45674-011	Check Valves
230	3	N93SK1-058	Dump Valve Modification (Not Shown)
231	3	N46248-004	Go Switch
232	3	N46248-502	Pressure Seals
233	2	N46547-004	Outlet Boxes
234	1	N46547-005	Outlet Box
235	1	N61583-001	Gantry Weldment (Rev. P)
236	1	N61606-001	Gantry Platform
237	1	N46579-001	Gantry Safety Gate (Not Shown)
238	1	N61608-001	Gantry Ladder
239	1	N61607-001	Gantry Ladder Supports
240	1	N61603-001	Gantry Sheave Pin
241	6	N45931-012	Gantry Sheaves
242	6	N45422-007	Gantry Sheave Bearings
243	12	N61991-003	Gantry Sheave Bearing Retainers
244	1	N30602-007	Gantry Wedge Socket
245	1	N30606-012	Gantry Rope Clamp (Not Shown)
246	1	N46238-003	Beacon Light
247	1	N46238-501	Beacon Light Bulb
248	1	N46547-003	Outlet Box

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>UPPERSTRUCTURE (CONT'D)</u>			
249	2	N60982-001	Boom Stops
250	2	N47008-001	Boom Stop Bumpers
251	2	N15969-001	Boom Stop Springs
252	2182 ft.	N00163-014	Main Wire Rope
253	1	N46647-001	Main Wire Rope Anchor
254	1	N46760-001	Main Hoist
-	1	<b>N80376-004</b>	<b>Main Hoist Check Valve Poppet Modifications</b>
255	1	N46419-006	Main Hoist Bolt Kit
256	2	N61975-005	Main Hoist Spacers
257	577 ft.	N00163-012	Auxiliary Wire Rope
258	1	N46647-003	Auxiliary Wire Rope Anchor
259	1	N46433-002	Auxiliary Hoist
-	1	<b>N80376-004</b>	<b>Auxiliary Hoist Check Valve Poppet Modifications</b>
260	1	N46419-001	Auxiliary Hoist Bolt Kit
261	840 ft.	N00034-012	Boom Wire Rope
262	1	N46647-001	Boom Hoist Anchor
263	1	N46430-002	Boom Hoist
264	1	N46419-001	Boom Hoist Bolt Kit
265	1	N45002-502	Boom Hoist Ratchet and Pawl
-	1	N47140-002	Boom Hoist Ratchet and Pawl Installation
266	1	N46865-003	Attention Horn
267	1	N46866-004	Modular

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
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### UPPERSTRUCTURE (CONT'D)

268	1	N46057-001	Mirror
269	1	N80196-003	Emergency Load Lowering Kit (Not Shown)
270	2	N46474-002	Junction Boxes
271	2	N61596-001	Upperstructure/Gantry Pins (Not Shown)
272	-	-	-
273	-	-	-
274	-	-	-

### CAB

275	1	N80278-006	Cab Weldment (Rev. A)
276	2	N46621-001	Cab Sliding Windows
-	1	N80278-213	Cab Door Latch
-	1	N80278-214	Cab Door Handle
-	as req'd	N80278-220	Cab Door Gasket
-	1	N98SK1-323	Cab Restraint
-	5	N46099-002	Cab Vibration Isolators
277	3	N45906-001	Manual Windshield Wipers
278	1	N61117-023	Cab Tray
279	1	N47010-001	Swing Control Valve
280	1	N47010-001	Auxiliary Hoist Control Valve
281	1	N47010-001	Main Hoist Control Valve
282	1	N47010-001	Boom Hoist Control Valve

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>CAB (CONT'D)</u>			
283	1	N80344-144	Control Linkage Assembly
284	1	N80344-144	Swing Control Lever
285	1	N80344-144	Auxiliary Hoist Control Lever
286	1	N80344-144	Main Hoist Control Lever
287	1	N80344-144	Boom Hoist Control Lever
288	4	N45130-004	Control Lever Knobs
289	1	N46638-001	Seat
290	1	N46638-501	Seat Pedestal
291	1	N83SK1-047	Start Valve
292	1	N89SK1-403	Dynamic Swing Brake Actuator
293	1	N45813-002	Dynamic Swing Brake Actuator Reservoir
294	1	N45813-003	Dynamic Brake Cylinder
295	1	N45358-001	Foot Throttle Actuator
296	1	N45813-008	Foot Throttle Actuator Reservoir
297	1	N61644-003	Swing Lock Assembly
298	1	N61502-002	Swing Lock Handle
299	1	N61498-002	Swing Lock Lever Arm
300	1	N61499-002	Swing Lock Pivot Pin
301	1	N61500	Swing Lock Bearing Rest
302	1	N61501	Swing Lock Bear Claw
303	1	N61502-002	Swing Lock Handle
304	1	N45727-037	Load Indicator System
305	1	N45727-037-1	Gauge
306	1	N45727-037-2	Load Cell

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>CAB (CONT'D)</u>			
307	2	N45727-037-3	Hoses
308	1	N45727-037-4	Clevis
309	2	N45727-037-5	Disconnect Coupling (Female)
310	2	N45727-037-6	Disconnect Coupling (male)
-	1	N45727-037-7	Hand Pump
-	1	N45727-037-8	Fluid
311	1	N93SK1-083	Load Gauge Bracket
312	1	N45025-001	High Boom Angle Override Valve
313	1	N45025-502	High Boom Angle Override Valve Handle
314	1	N45025-501	High Boom Angle Override Valve Spring Kit
315	1	N45025-001	Low Boom Angle Override Valve
316	1	N45025-502	Low Boom Angle Override Valve Handle
317	1	N45025-501	Low Boom Angle Override Valve Spring Kit
318	1	N46018-300	Engine Kill Cable
319	1	N46018-300	Emergency Engine Kill Cable
320	1	N45025-001	Parking Brake Valve
321	1	N45025-502	Parking Brake Valve Handle
322	1	N45025-501	Parking Brake Valve Spring Kit
323	1	N45674-009	Check Valve
324	1	N98SK1-223	Crane Name Plate (Rev. B)
325	1	N98SK3-078	Lifting Load Capacity Chart (Rev. A)
326	1	N45376-001	Hand Signal Chart



# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>CAB (CONT'D)</u>			
327	1	N61322-027	Gauge Panel #1
328	1	N46017-004	Tachometer
329	1	N46748-012	Water Temperature Gauge
330	1	N46748-012	Hydraulic Oil Temperature Gauge
331	1	N45844-022	Boom Pressure Gauge
332	1	N45844-022	Main Pressure Gauge
333	1	N45844-022	Auxiliary Pressure Gauge
334	1	N61322-026	Gauge Panel #2
335	1	N45844-021	Swing Pressure Gauge
336	1	N45844-022	Accumulator Pressure Gauge
337	1	N45844-014	Engine Oil Pressure Gauge
338	1	N45844-013	Return Pressure Gauge
339	1	N46782-003	Air Conditioner
340	1 set	N46782-503	Air Conditioner Mounting Bracket
341	1	N47045-003	Air Conditioner Thermostat w/Enclosure
342	1	N46868-015	Cab Light
343	1	N46868-515	Cab Light Bulb
344	1	N47045-003	Electrical Enclosure #1
345	1	N46540-002	Power On Pilot Light (Green)
346	1	N46540-001	Anti-Two Block Visual Alarm (Red)
347	1	N46545-002	Anti-Two Block Audible Alarm
348	1	N46535-001	Enclosure Plug

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
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### CAB (CONT'D)

349	1	N47045-003	Electrical Enclosure #2
350	1	N46536-001	Attention Horn Push-Button
351	1	N46537-001	Floodlight Switch
352	1	N46537-001	Beacon Light Switch
353	1	N46535-001	Enclosure Plug
354	1	N45217-002	Junction Box
355	1	N46726-004	Junction Box w/Circuit Breaker
356	2	N46837-002	Seals
357	-	-	-
358	-	-	-
359	-	-	-
360	-	-	-
361	-	-	-
362	-	-	-

### POWER UNIT

363	1	N62100-002	Power Unit Weldment (Rev. -)
-	570 gal.	N13764-001	Hydraulic Oil (Storage Capacity)
-	225 gal.	N13764-001	Fuel (Storage Capacity)
364	2	N45012-002	Cleanout Covers
365	2	N46178-012	Ball Valve
366	1	N45125-001	Hydraulic Oil Fill/Vent
367	1	N45690-030	Hydraulic Oil Level Gauge

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
			<u>POWER UNIT</u>
368	1	N45125-001	Fuel Fill/Vent
369	1	N45690-030	Fuel Level Gauge
370	5	N45020-148	Suction Strainers
371	1	N45020-124	Suction Strainer
372	2	N60863-001	Return Filter Assemblies
373	2	N45460-003	Return Filters
374	4	N45460-503	Return Filter Elements
375	2	N45460-502	Return Filter Element Connectors
376	1	N61843-002	Hydraulic Start System Reservoir
377	1	N45746-003	Breather
378	1	N45775-003	Sight Plug
379	1	N46912-001	Accumulator
380	2	N83SK1-045	Accumulator Brackets
381	1	N45282-026	Engine Belt
382	1	N45697-015	Engine Oil Cooler
383	1	N47011-001	Funk Pump Gearbox
384	1	N46785-209	Hydraulic Pump #1
385	1	N46785-208	Hydraulic Pump #2
386	1	N83SK1-043	High Pressure Filter
387	1	N46119-001	High Pressure Filter Element
388	1	N46897-001	Unloading Relief Valve
389	1	N45923-001	Tachometer Magnetic Pickup
390	1	N45683	Soft Engage Valve

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>POWER UNIT (CONT'D)</u>			
391	1	N83SK1-044	Hand Recharge Pump
392	1	N45844-026	Accumulator Pressure Gauge
393	1	N46094-002	Start Motor
394	1	N46823-002	Engine Driven Gear Pump
395	1	N45820-001	Water Temperature Valve
-	1	N45113-001	Orifice
396	1	N45846-003	Air Intake Shutdown Valve
397	1	N45414-009	Overspeed Valve
-	1	N45344-004	Right Angle Adaptor
398	1	N46101-019	Rain Cap
399	1	N61922-049	Exhaust Outlet Weldment
400	1	N45272-005	Spark Arrestor Silencer
401	1	N61921-113	Exhaust System Flex Piping Weldment
402	1	N47101-006	Engine
403	1	N47101-544	Radiator
404	1	N47101-502	Radiator Cap
405	1	N47101-555	Fuel Priming Pump
406	1	N47101-531	Secondary Fuel Filter
407	1	N47101-518	Fuel Pressure Gauge
408	1	N47101-556	Oil Filter
409	1	N47101-512	Air Cleaner Assembly
410	1	N47101-548	Air Cleaner Element
411	1	N47101-549	Air Cleaner Element

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
<u>POWER UNIT (CONT'D)</u>			
412	1	N47101-519	Instrument Panel
413	1	N47101-527	Water Temperature Gauge
414	1	N47101-528	Hydraulic Oil Pressure Gauge
415	1	N46178-004	Ball Valve
416	-	-	-
417	-	-	-
418	-	-	-
419	-	-	-

### THE FOLLOWING ITEMS ARE NOT SHOWN ON POWER UNIT GENERAL ARRANGEMENT

420	1	N47101-503	Radiator Fan Guard
421	1	N47101-529	Radiator Shroud
422	1	N47101-505	Engine Hood
423	1	N47101-506	Engine Side Panels
424	1	N47101-554	Transfer Pump
425	1	N47101-509	Primary Fuel Filter
426	1	N47101-520	Fan Pulley System
427	1	N47101-521	Belt Tensioner
428	1	N47101-557	Flywheel
429	1	N47101-558	Water Pump
430	1	N47101-524	Fan Blade
431	1	N47101-515	Engine Mounted Hourmeter
432	1	N47101-540	Upper Radiator Hose
433	1	N47101-525	Lower Radiator Hose

# 340LA-140 BILL OF MATERIALS

## PARTS LIST (CONT'D)

<u>ITEM</u>	<u>QTY</u>	<u>NUMBER</u>	<u>PART DESCRIPTION</u>
-------------	------------	---------------	-------------------------

## POWER UNIT (CONT'D)

THE FOLLOWING ITEMS ARE NOT SHOWN ON POWER UNIT GERERAL ARRANGEMENT

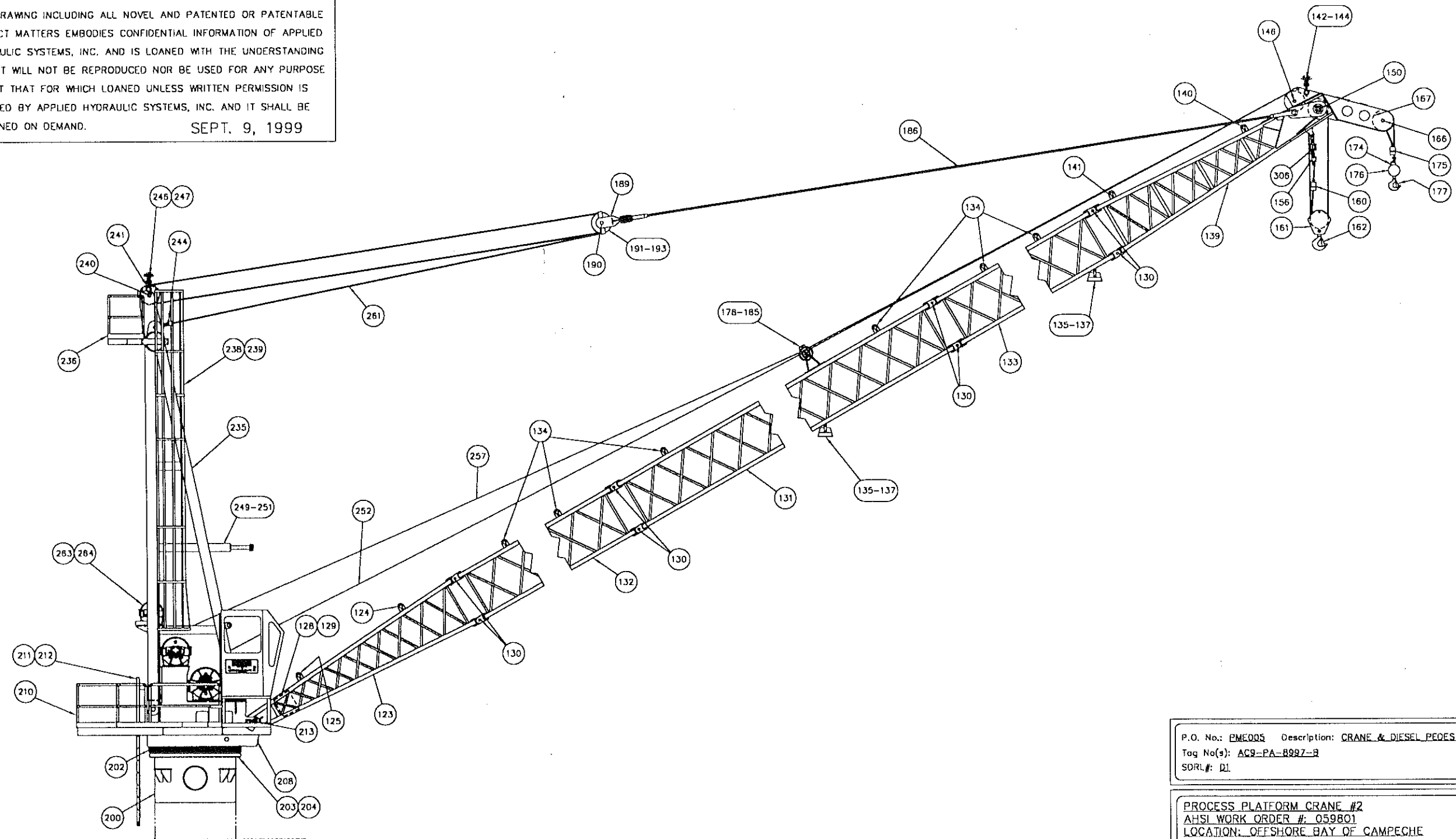
434	1	N47101-516	Engine Fan Belt
435	1	N61628-017	Return Filter Piping
436	1	N61628-018	Return Filter Piping
437	1	N46270-001	Ball Joint
438	1	N91SK1-343	Throttle Bracket
439	1	N97SK1-413	Amot Bracket
440	1	N61981-002	Amot Bracket
441	-	-	-
442	-	-	-
443	-	-	-
444	-	-	-
445	-	-	-
446	-	-	-

## MISCELLANEOUS

447	as req'd.	N45044-017	Electrical MC Cable (12/3)
448	as req'd.	N45044-013	Electrical MC Cable (12/4)
449	as req'd.	N46608-002	Electrical MC Cable (2/0) Red
450	as req'd.	N46608-001	Electrical MC Cable (2/0) Black
451	-	-	-
452	-	-	-
453	-	-	-

# **CRANE GENERAL ARRANGEMENT DRAWING**

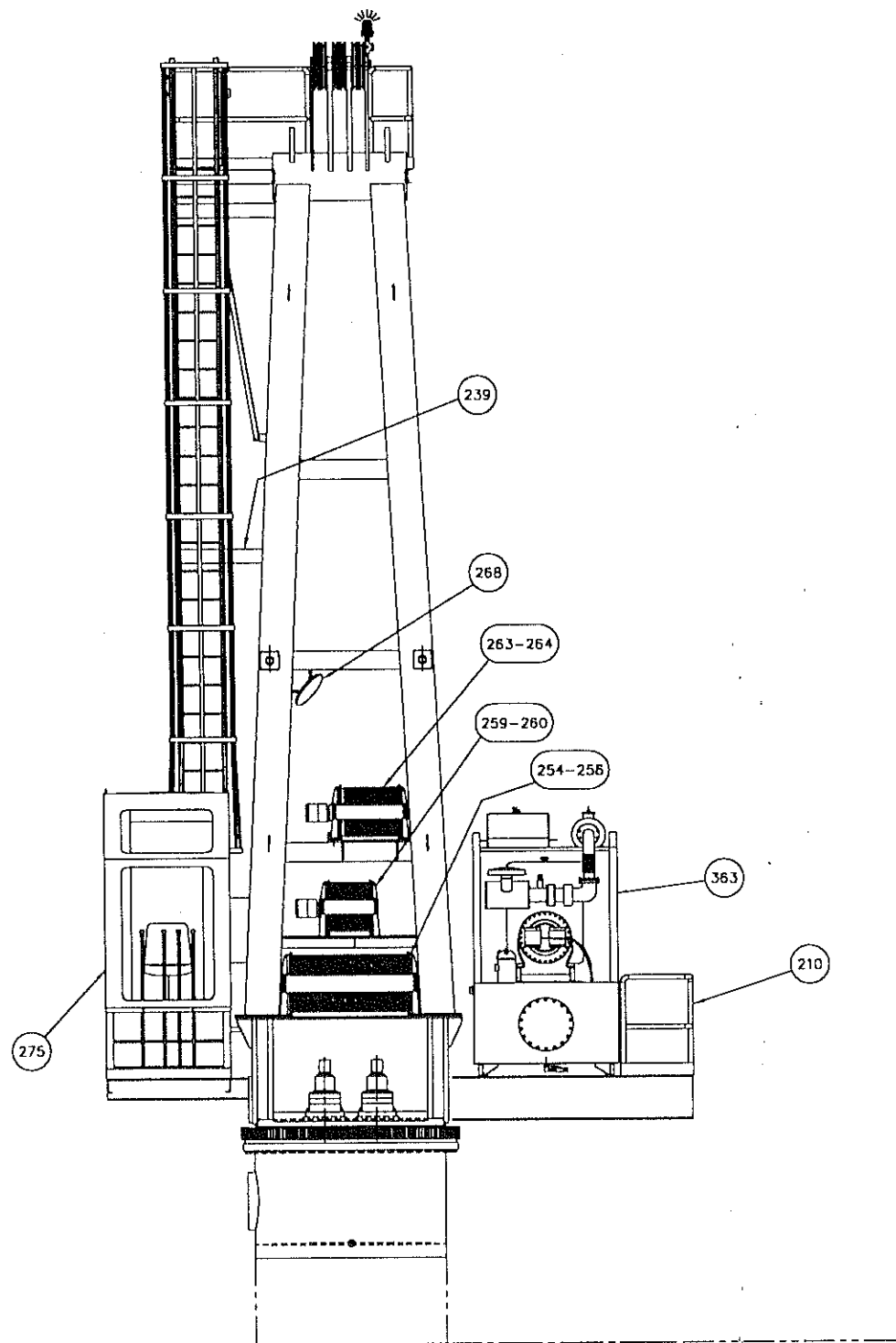
SEPT. 9, 1999



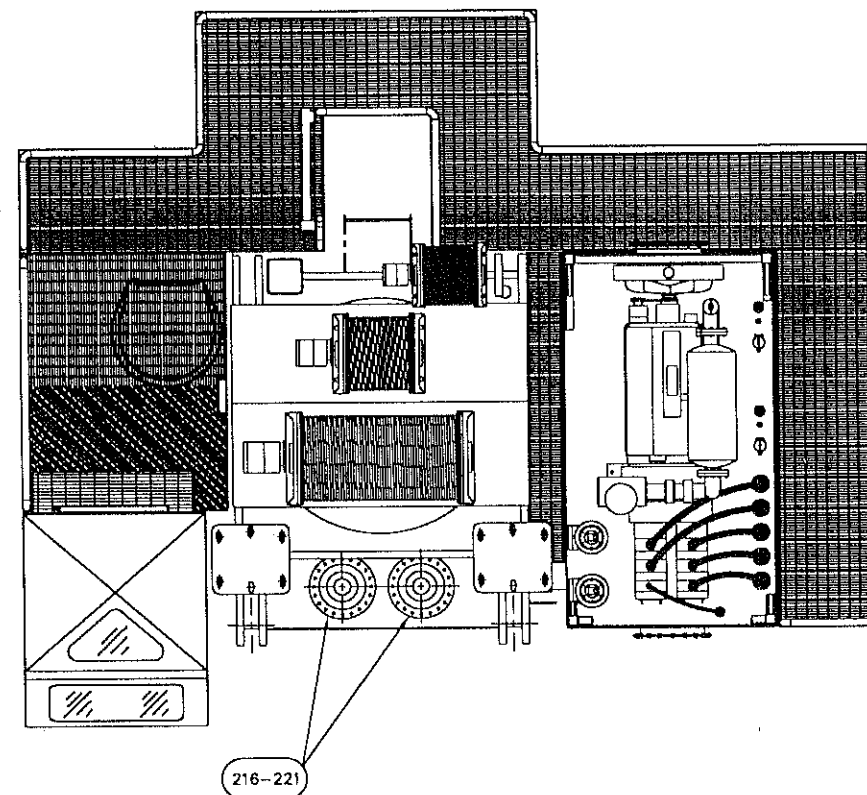
PROCESS PLATFORM CRANE #2  
AHSI WORK ORDER #: 059801  
LOCATION: OFFSHORE BAY OF CAMPECHE  
FACILITY NAME: PEMEX CANTARELL EPC-1  
TAG #: AC9-PA-8997-B  
BUYER'S PURCHASE ORDER #: 031-DW80-PME005

										APPLIED HYDRAULIC SYSTEMS, INC.			
										Manufacturer of <b>NAUTILUS</b> Marine Cranes			
										Sales & Service (504) 851-5600 Fax No. (504) 851-0754		Manufacturing Plant 204 Industrial Ave. C Houma, LA 70363	
										DESCRIPTION		GENERAL ARRANGEMENT MODEL 340LA-140 PEMEX	
										REVISIONS		DWG. NO. M98SK4-099	
This drawing, including all novel and patented or patentable subject matters embodies confidential information of Applied Hydraulic Systems, Inc. and is loaned with the understanding that it will not be reproduced nor be used for any purpose except that for which loaned unless written permission is granted by Applied Hydraulic Systems, Inc. and it shall be returned on demand.										SCALE: 1/4" = 1'-0"		DRAWN BY: <i>DANNY</i>	
										DATE: 5/24/98		APP'D BY: <i>AS</i>	
												SHT. 1 OF 2	





FRONT ELEVATION  
(BOOM NOT SHOWN FOR CLARITY)



PLAN VIEW  
(GANTRY & BOOM NOT SHOWN FOR CLARITY)  
SCALE: 1/2"=1'-0"

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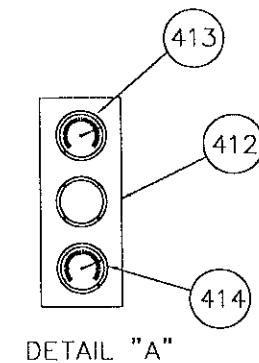
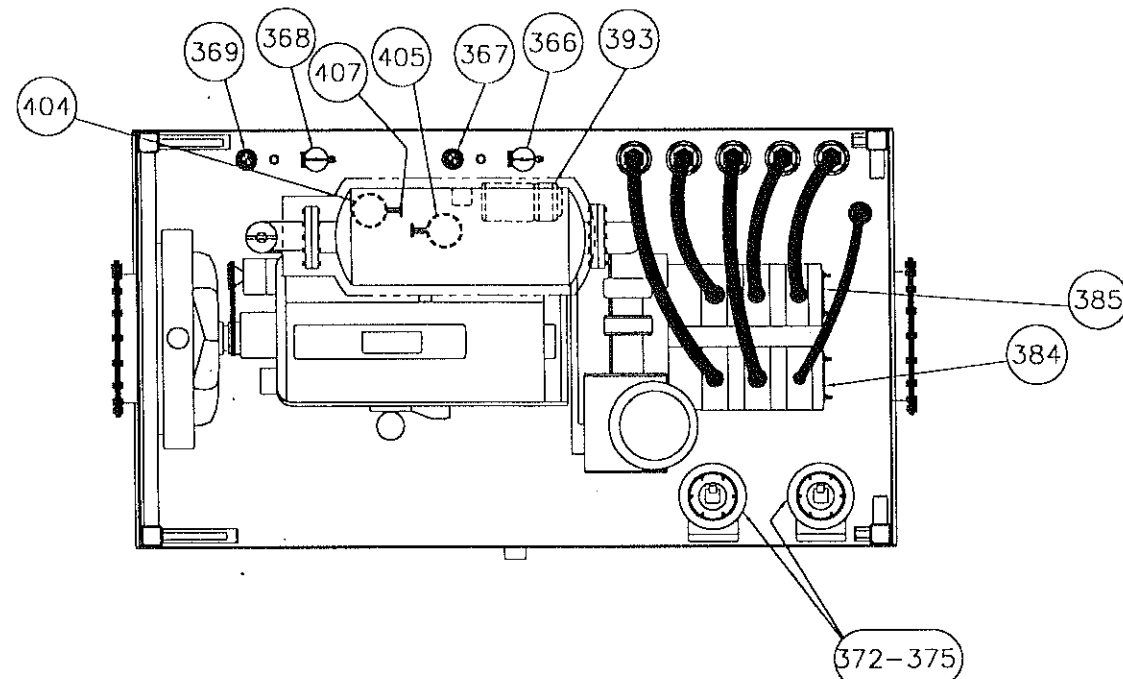
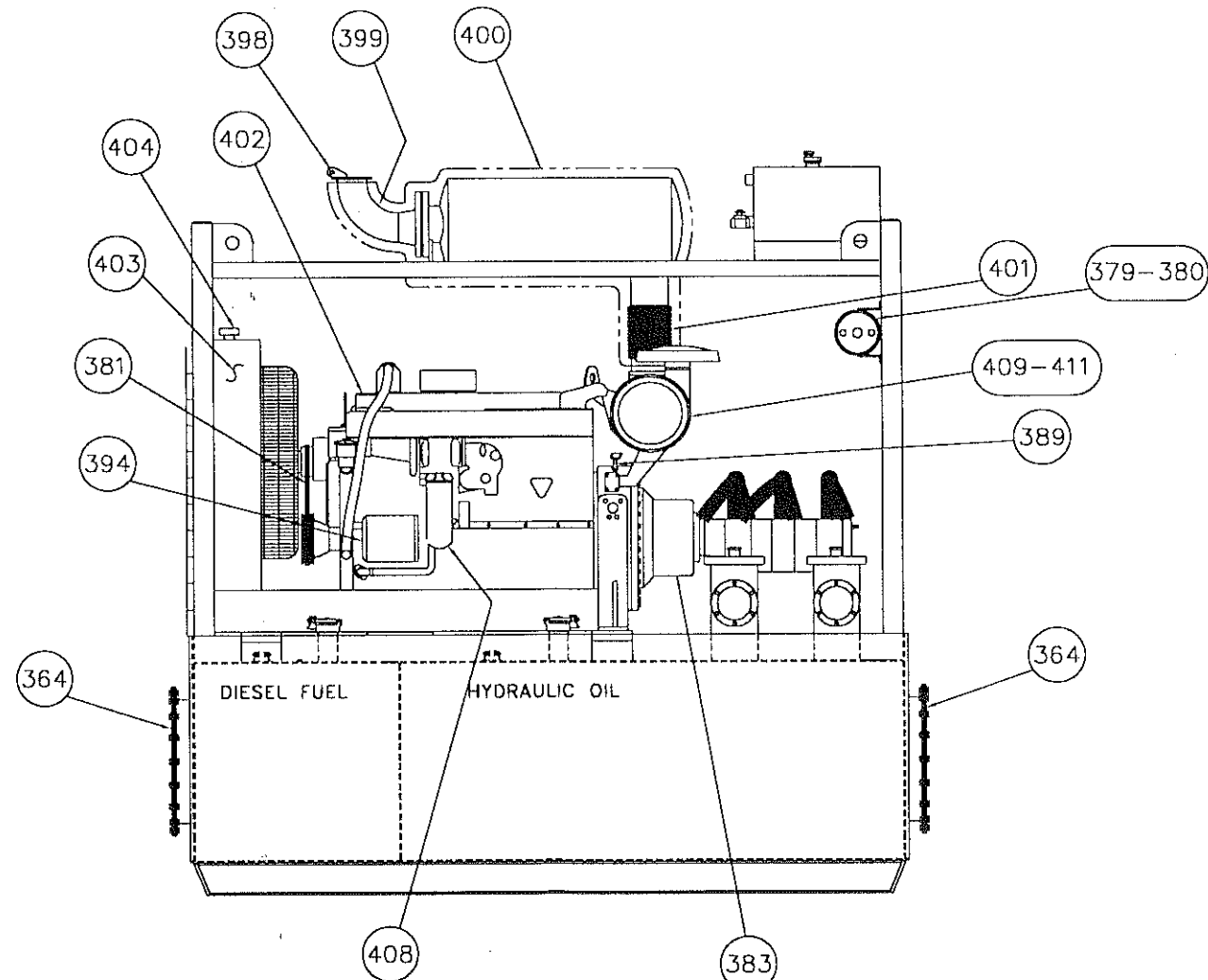
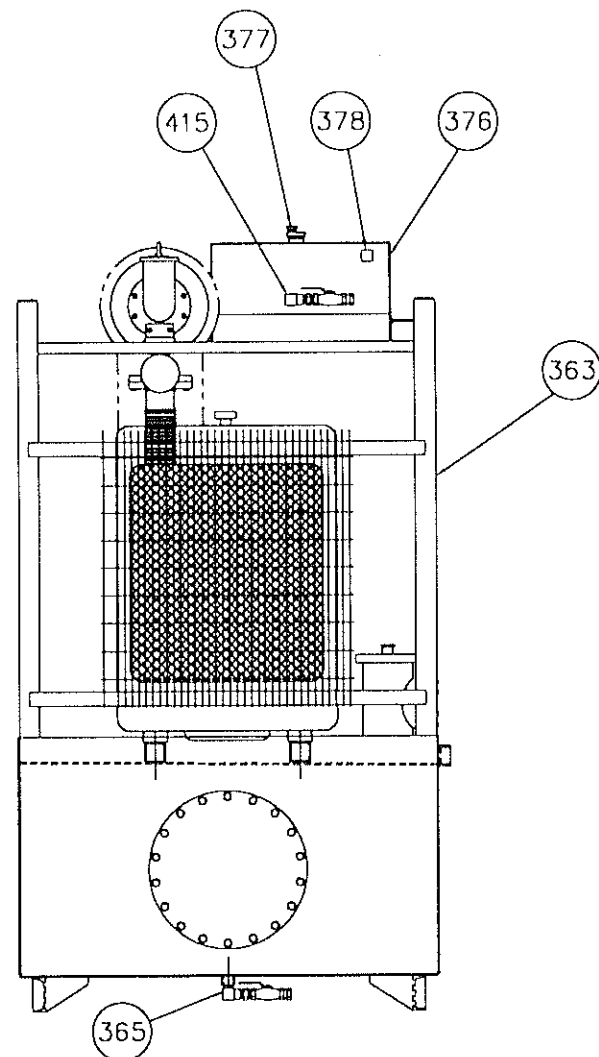
SEPT. 9, 1999

P.O. No.: PMS005 Description: CRANE & DIESEL PEDESTAL  
Tag No(s): AG9-PA-B997-B  
SDRL#: Q1

APPLIED HYDRAULIC SYSTEMS, INC.											
<p>Manufacturer of <b>NAUTILUS</b> Marine Cranes</p> <p>Sales &amp; Service (504) 851-0600 Manufacturing Plant 204 Industrial Ave. C Houma, LA 70363 Fax No. (504) 851-0754</p>											
GENERAL ARRANGEMENT MODEL 340LA-140 PEMEX											
DWR NO. M9BSK4-099											
SCALE: 3/8"=1'-0" DRAWN BY: DANNY											
DATE: 6/24/98 APP'D BY: AS SHIT 2 OF 2											

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# **POWER UNIT ARRANGEMENT DRAWING**



P.O. No.: PME005 Description: CRANE & DIESEL PEDESTAL  
 Tag No(s): AC9-PA-8997-B  
 SDRL #: 01

PROCESS PLATFORM CRANE #2  
 AHSI WORK ORDER #: 059801  
 LOCATION: OFFSHORE BAY OF CAMPECHE  
 FACILITY NAME: PEMEX CANTARELL EPC-1  
 TAG #: AC9-PA-8997-B  
 BUYER'S PURCHASE ORDER #: 031-DW80-PME005

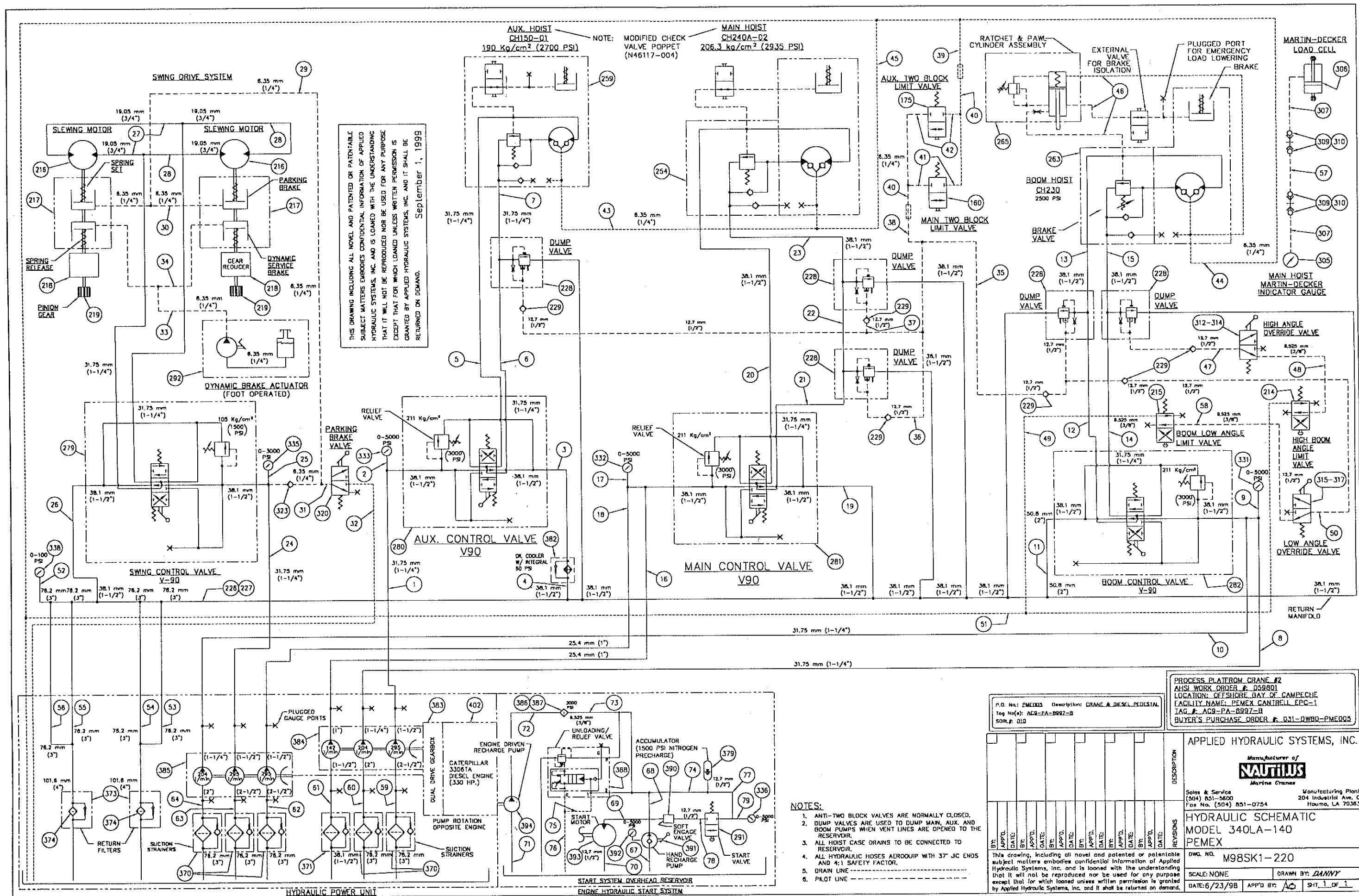
APPLIED HYDRAULIC SYSTEMS, INC.											
<p style="text-align: center;"> <i>Manufacturer of</i>  <b>NAUTILUS</b>  <i>Marine Cranes</i> </p>											
Sales & Service (504) 851-5800 Fax No. (504) 851-0754						Manufacturing Plant 204 Industrial Ave. C Houma, LA 70363					
GENERAL ARRANGEMENT CATERPILLAR 3306TA PEMEX											
DWG. NO. M98SK4-100											
SCALE: 1"=1'-0" <span style="float: right;">DRAWN BY: <i>DANNY</i></span>											
DATE: 6/24/98						APP'D BY: <i>AS</i>			SHT 1 OF 1		

DESCRIPTION												REVISIONS											
BY:	APP'D:	DATE:	BY:	APP'D:	DATE:	BY:	APP'D:	DATE:	BY:	APP'D:	DATE:	BY:	APP'D:	DATE:	BY:	APP'D:	DATE:	BY:	APP'D:	DATE:	BY:		

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**HYDRAULIC SCHEMATIC  
AND  
HOSE DIAGRAM**



P.O. No: PM003 Description: CRANE & DIESEL PEDESTAL  
Tag No(s): AC9-PA-0892-B  
SOM: P. 010

PROCESS PLATFORM CRANE #2  
AHSI WORK ORDER # 059801  
LOCATION: OFFSHORE BAY OF CAMPECHE  
FACILITY NAME: PEMEX CANTRELL EPC-1  
TAG # AC9-PA-0892-B  
BUYER'S PURCHASE ORDER # 031-DWB0-PM003

APPLIED HYDRAULIC SYSTEMS, INC.

Manufacturer of  
**NAUTILUS**  
Marine Cranes

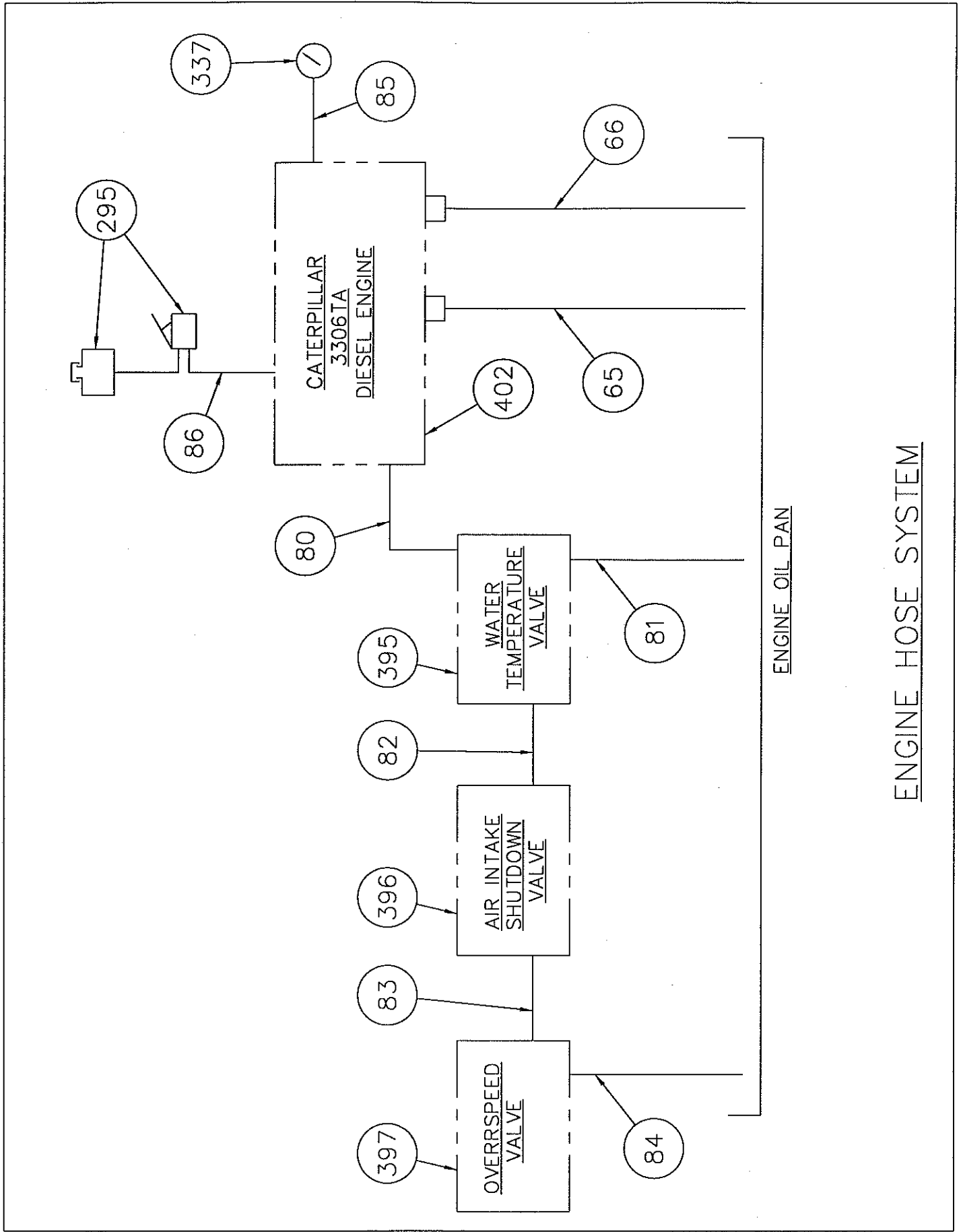
Sales & Service  
(504) 851-5600  
Fax No. (504) 851-0754

Manufacturing Plant  
204 Industrial Ave. C  
Houma, LA 70363

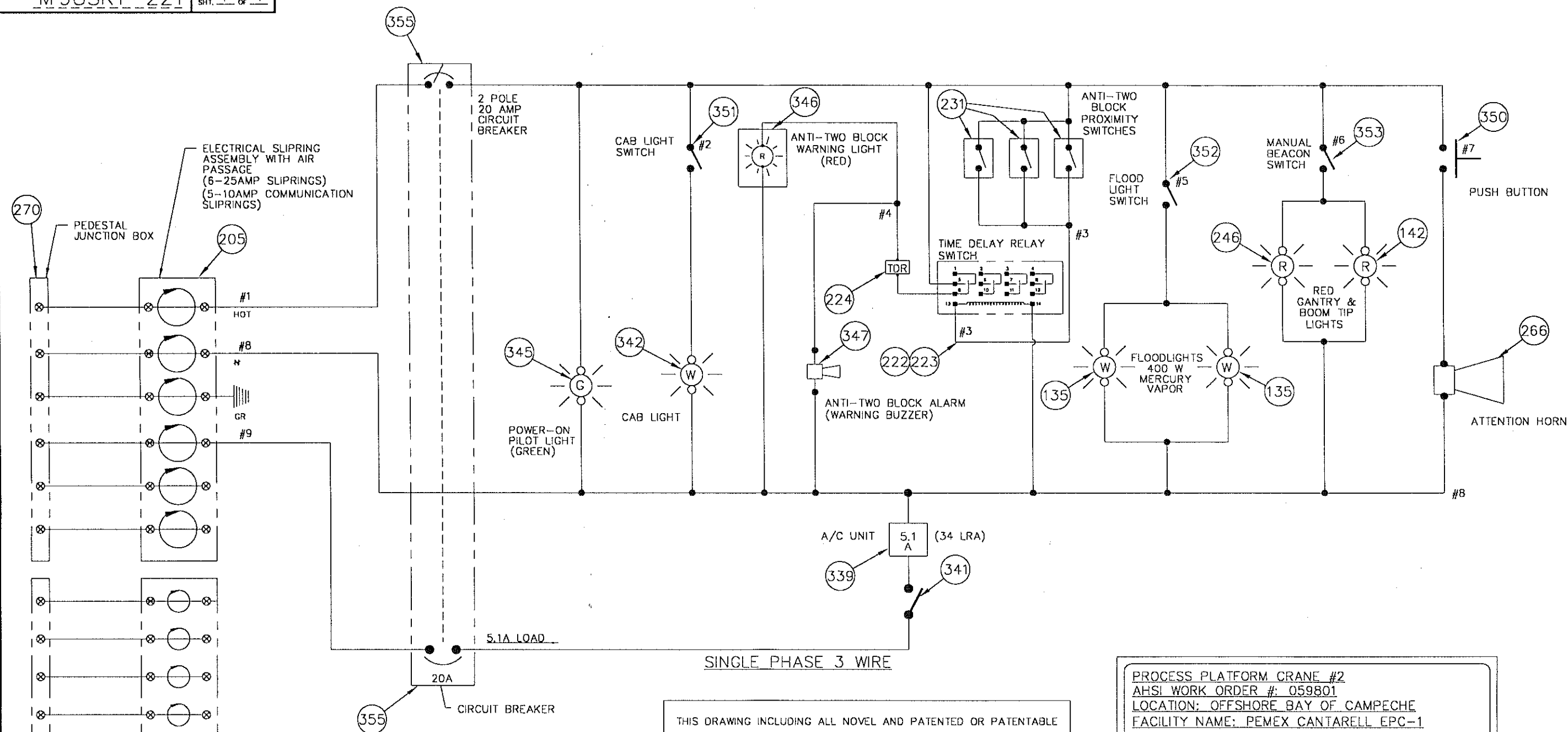
HYDRAULIC SCHEMATIC  
MODEL 340LA-140  
PEMEX

DWG. NO. M98SK1-220

SCALE: NONE  
DATE: 6/23/98  
DRAWN BY: DANNY  
APP'D BY: AG  
SHT. 1 OF 1



# **ELECTRICAL SCHEMATIC**



**NOTE:**

1. ALL ITEMS RATED FOR 120V, 60Hz, SINGLE PHASE POWER SUPPLY.
2. CLASS 1, DIVISION 2, GROUP D AREA CLASSIFICATION.
3. ALL CABLE SHALL BE ARMORED SHIPBOARD CABLE WITH A PVC JACKET.
4. SLIPRINGS RATED FOR 600V.

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SEPT 09,1999

P.O. No.: **PME005** Description: **CRANE & DIESEL PEDESTAL**  
 Tag No(s): **AC9-PA-8997-B**  
 SDRL#: **D16**

**PROCESS PLATFORM CRANE #2**  
**AHSI WORK ORDER #: 059801**  
**LOCATION: OFFSHORE BAY OF CAMPECHE**  
**FACILITY NAME: PEMEX CANTARELL EPC-1**  
**TAG #: AC9-PA-8997-B**  
**BUYER'S PURCHASE ORDER #: 031-DW80-PME005**

												APPLIED HYDRAULIC SYSTEMS, INC.											
												Manufacturer of <b>NAUTILUS</b> Marine Cranes											
												Sales & Service (504) 851-5600 Fax No. (504) 851-0754											
												Manufacturing Plant 204 Industrial Ave. C Houma, LA 70363											
												ELECTRICAL SCHEMATIC MODEL 340LA-140 PEMEX											
												DWG. NO. M98SK1-221											
												SCALE: NONE											
												OWN BY: DANNY											
												DATE: 6/23/88											
												APP'D BY: AO											
												SHT. 1 OF 1											



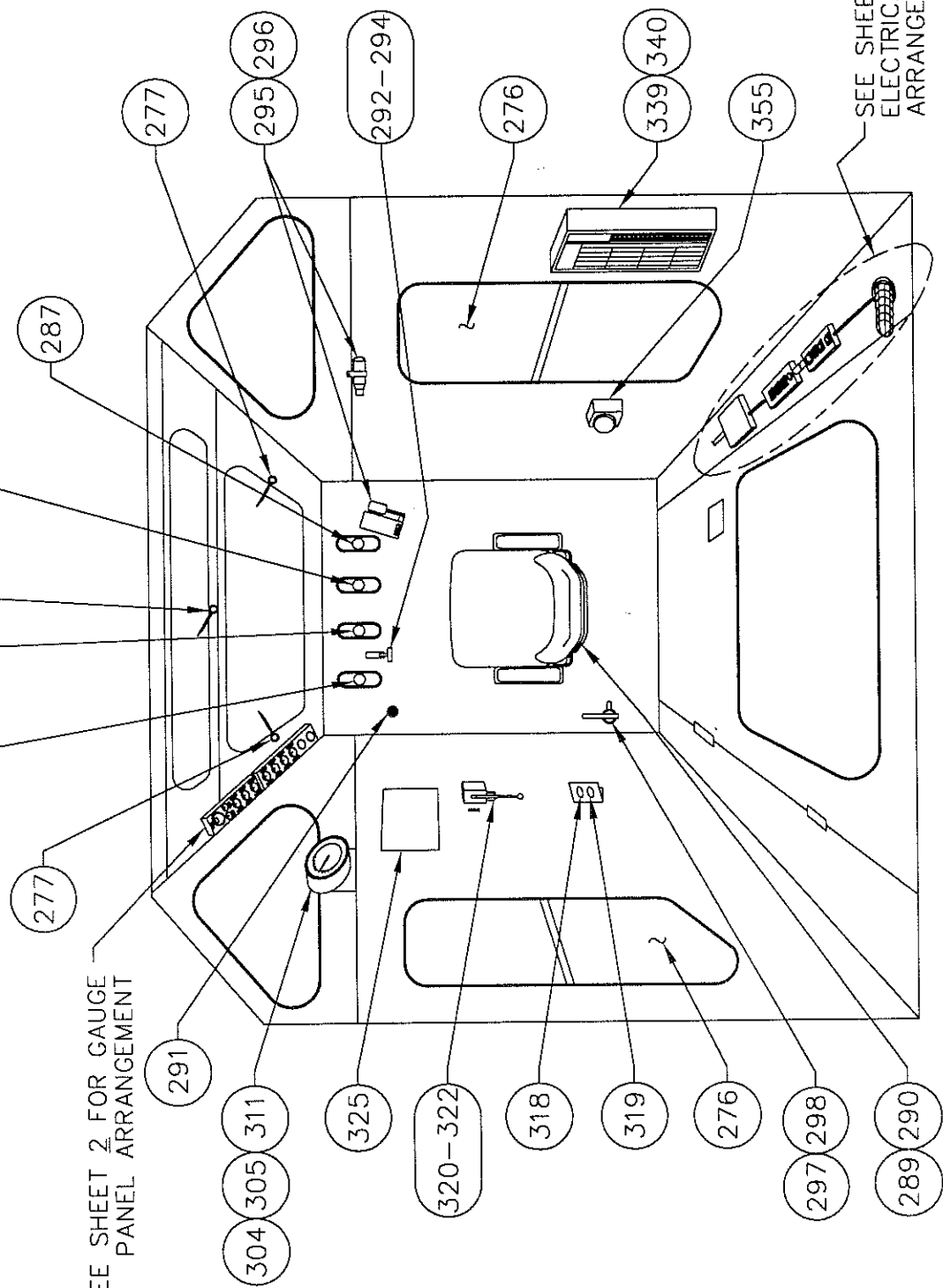
# **ELECTRICAL WIRING DIAGRAM**

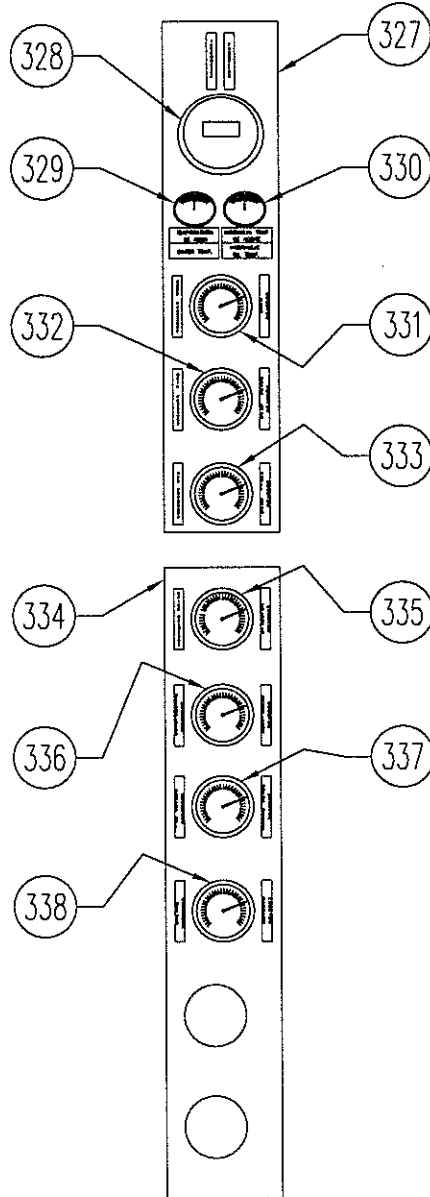


# **PARTS DRAWINGS**

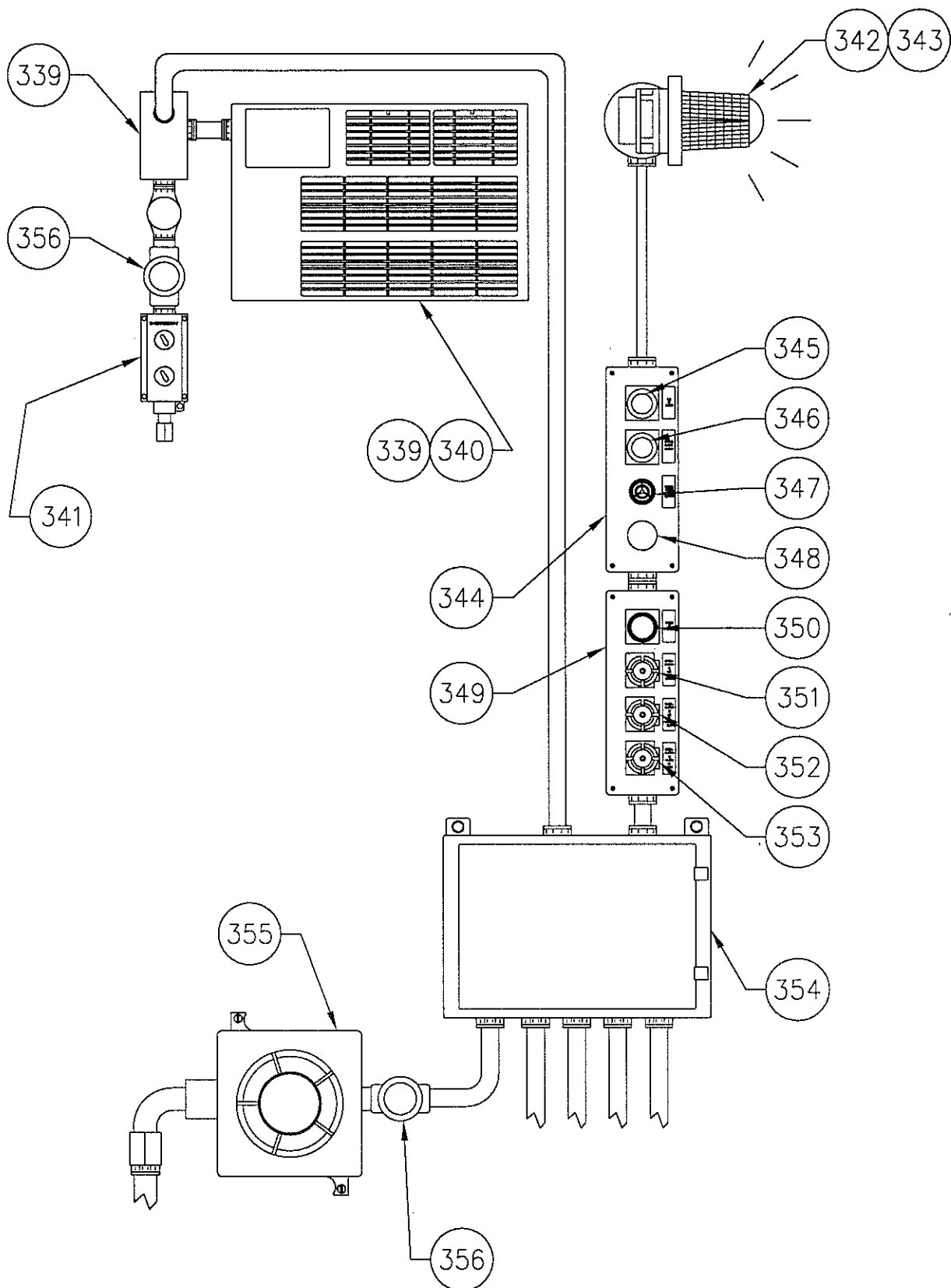
"BIRDS EYE" VIEW  
OF CRANE CAB  
ARRANGEMENT

CAB  
INSTRUMENT  
ARRANGEMENT  
SHEET 1

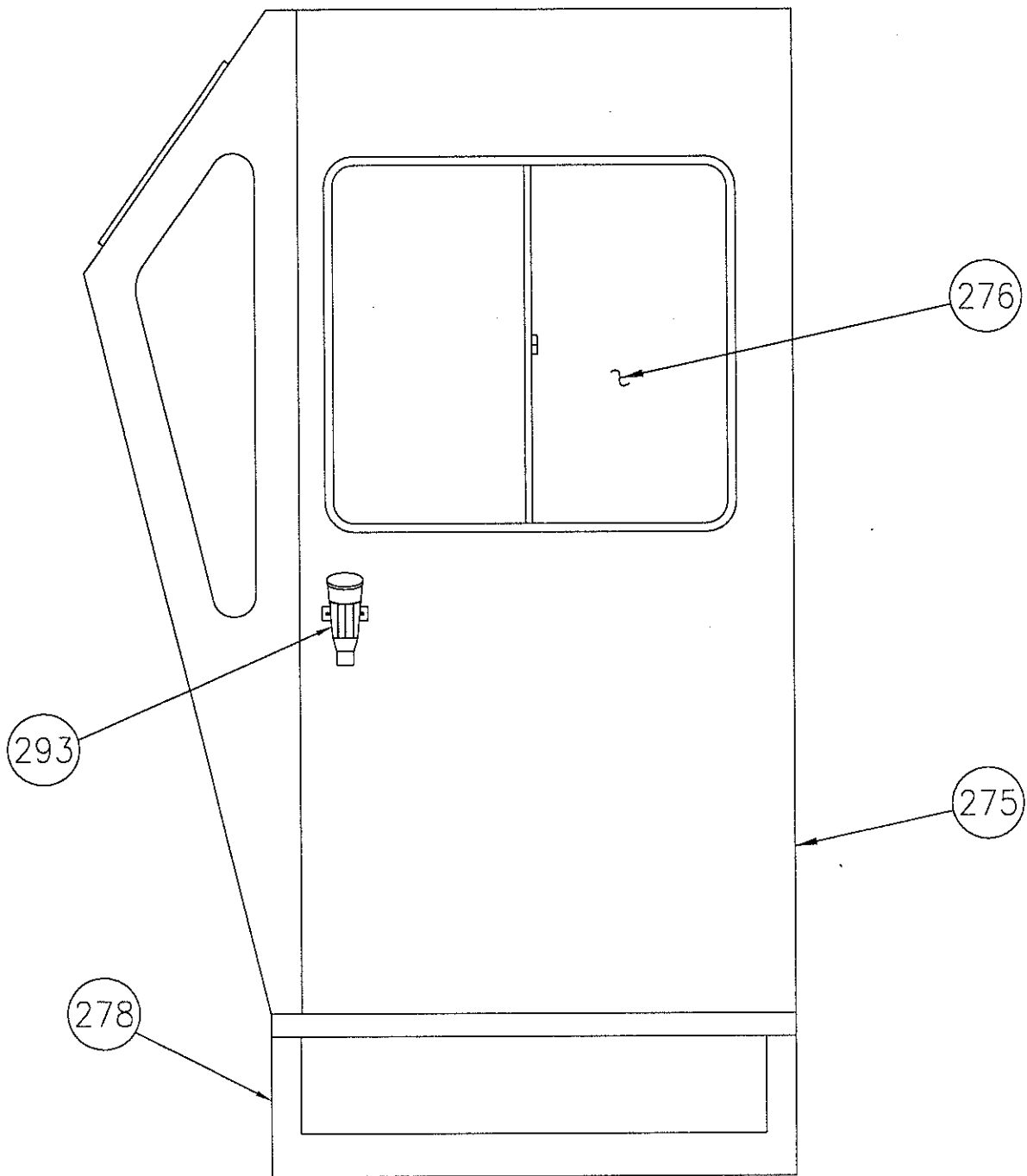




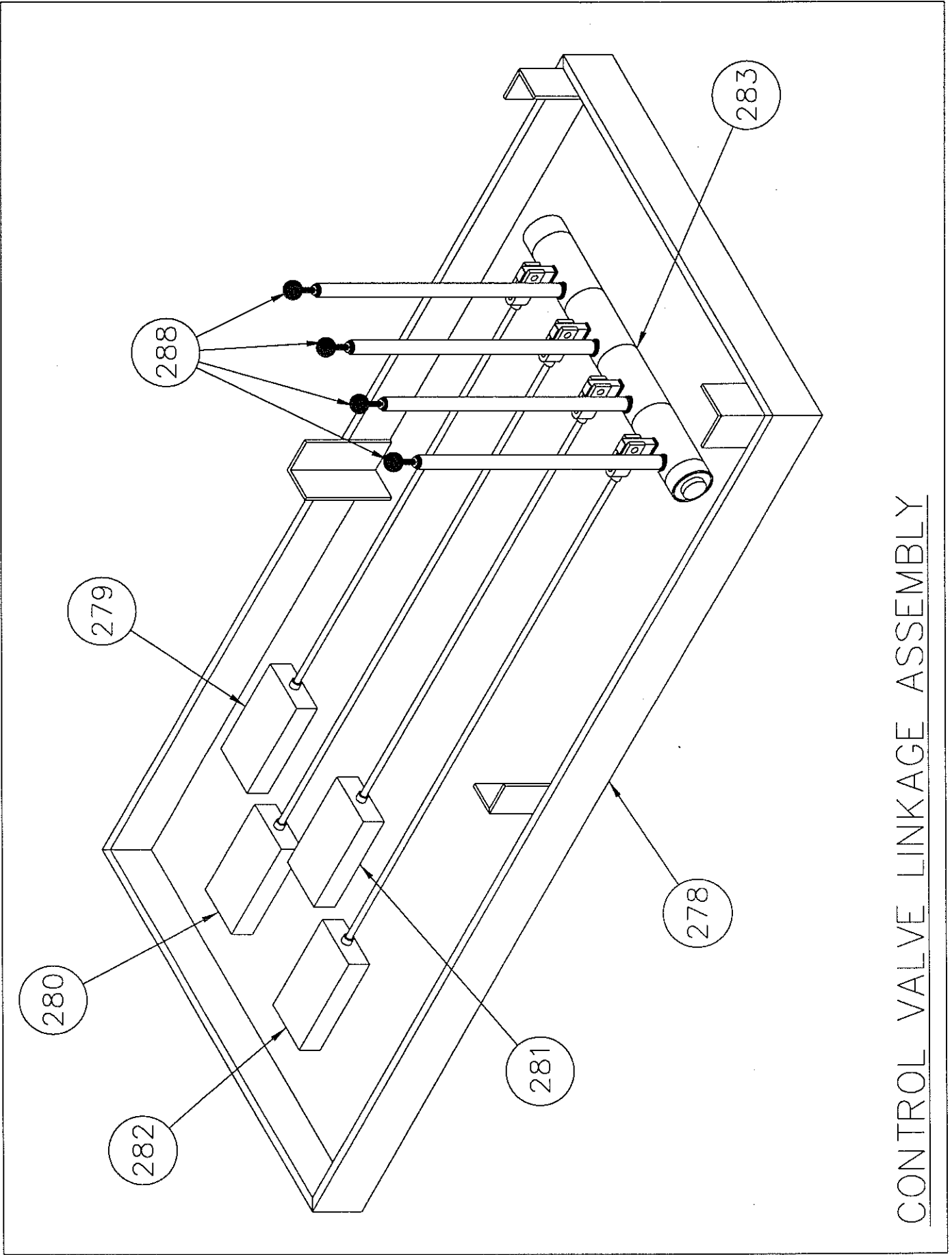
CAB GAUGE PANEL ARRANGEMENTS  
SHEET 2



ELECTRICAL ARRANGEMENTS  
SHEET 3

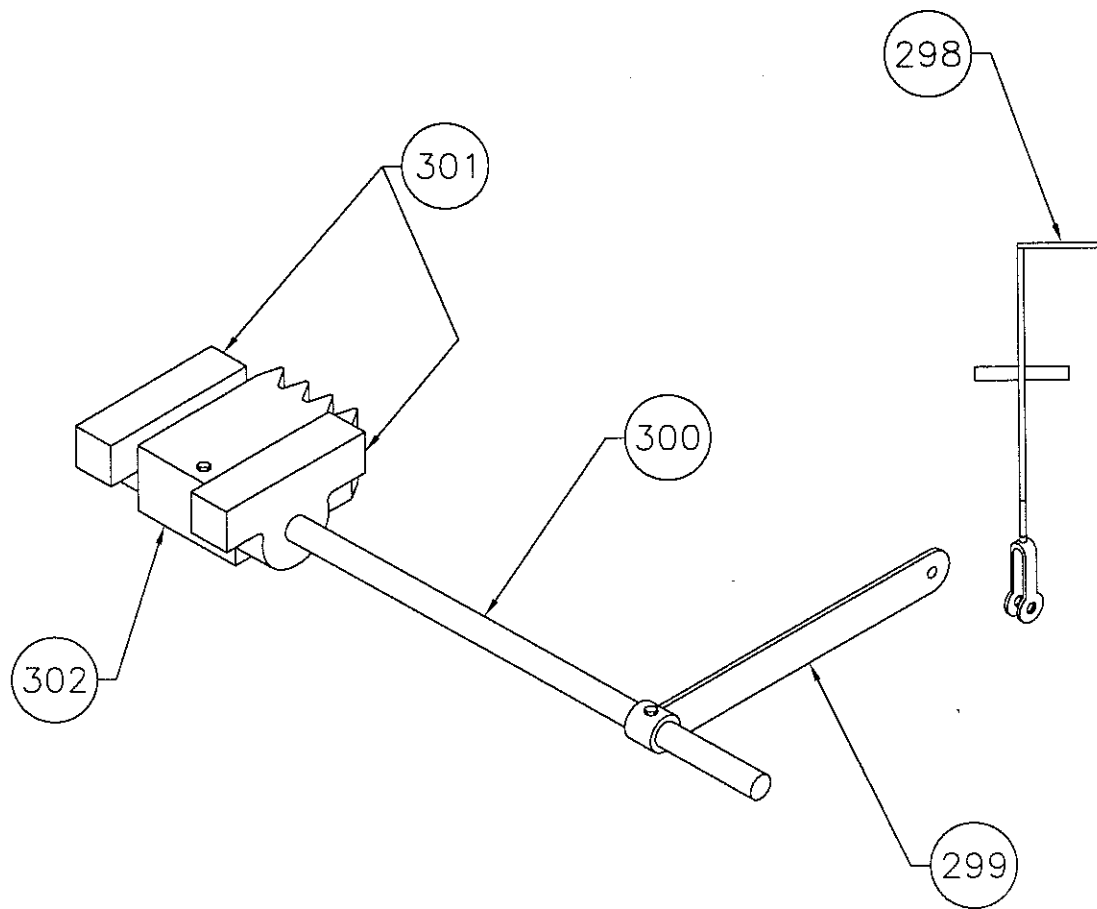


LEFT SIDE OF CAB

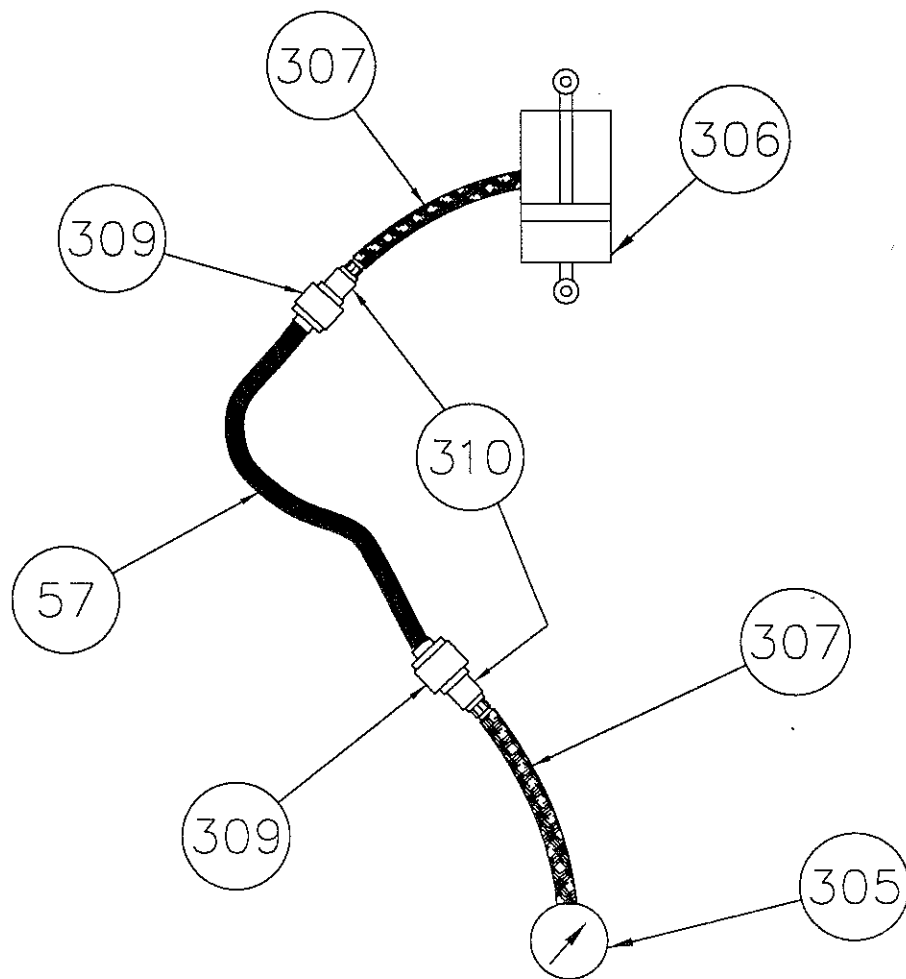


CONTROL VALVE LINKAGE ASSEMBLY

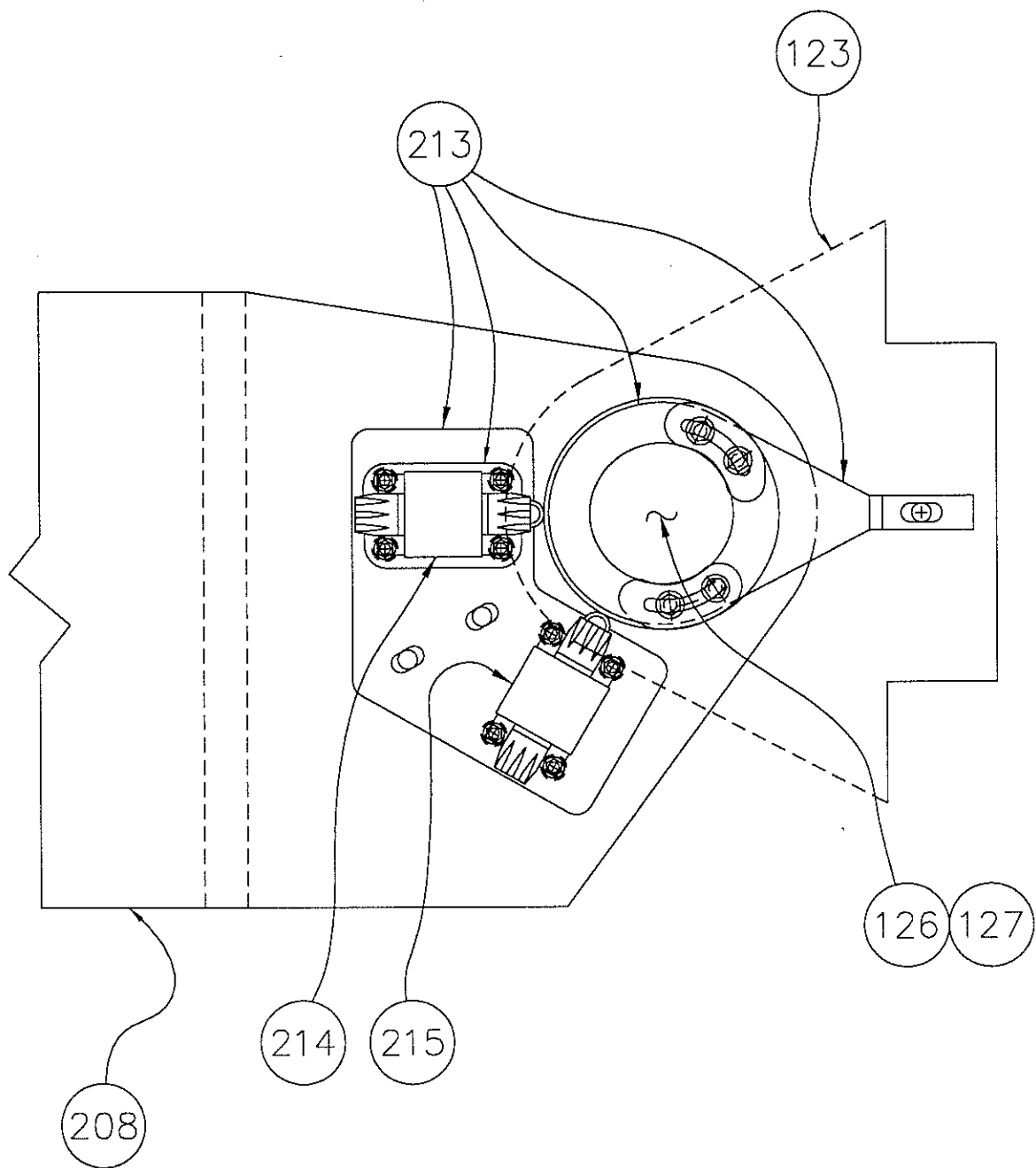




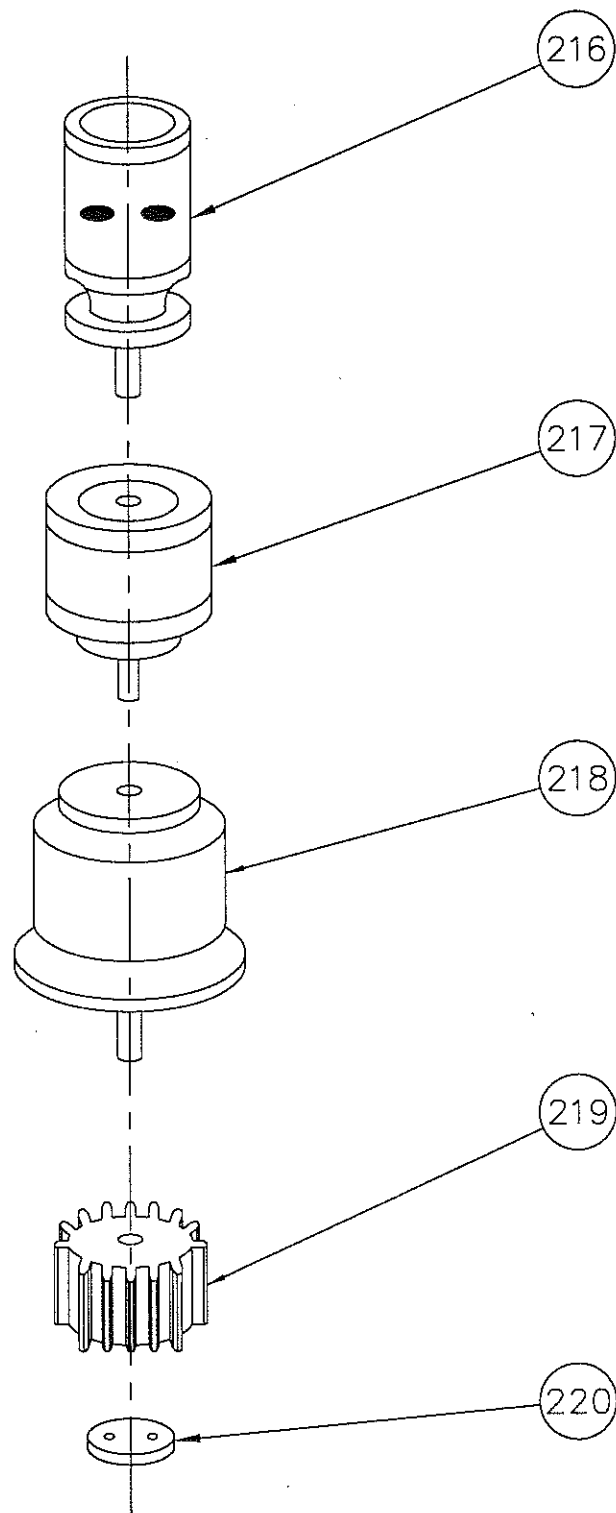
SWING LOCK ASSEMBLY



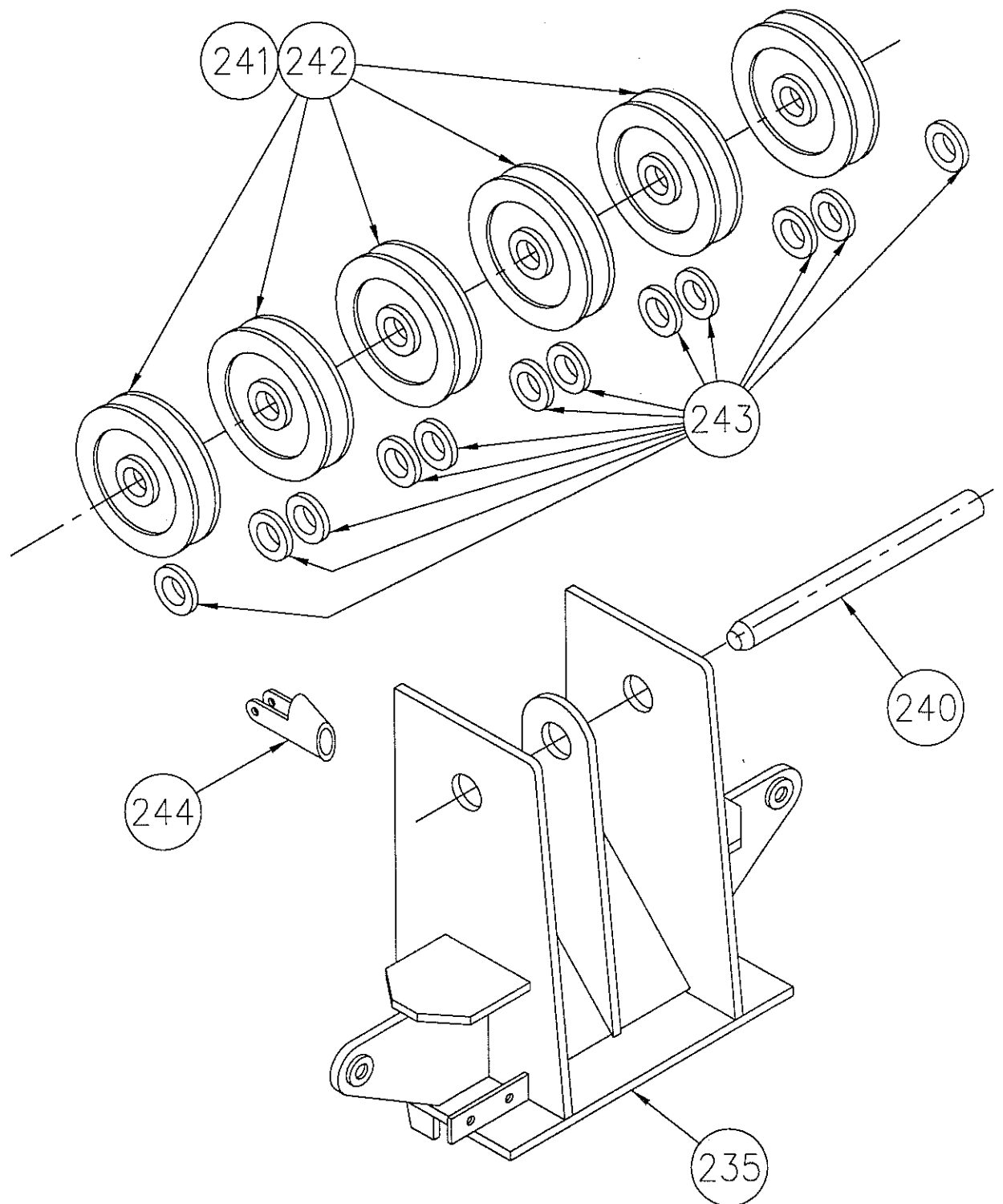
LOAD INDICATOR SYSTEM



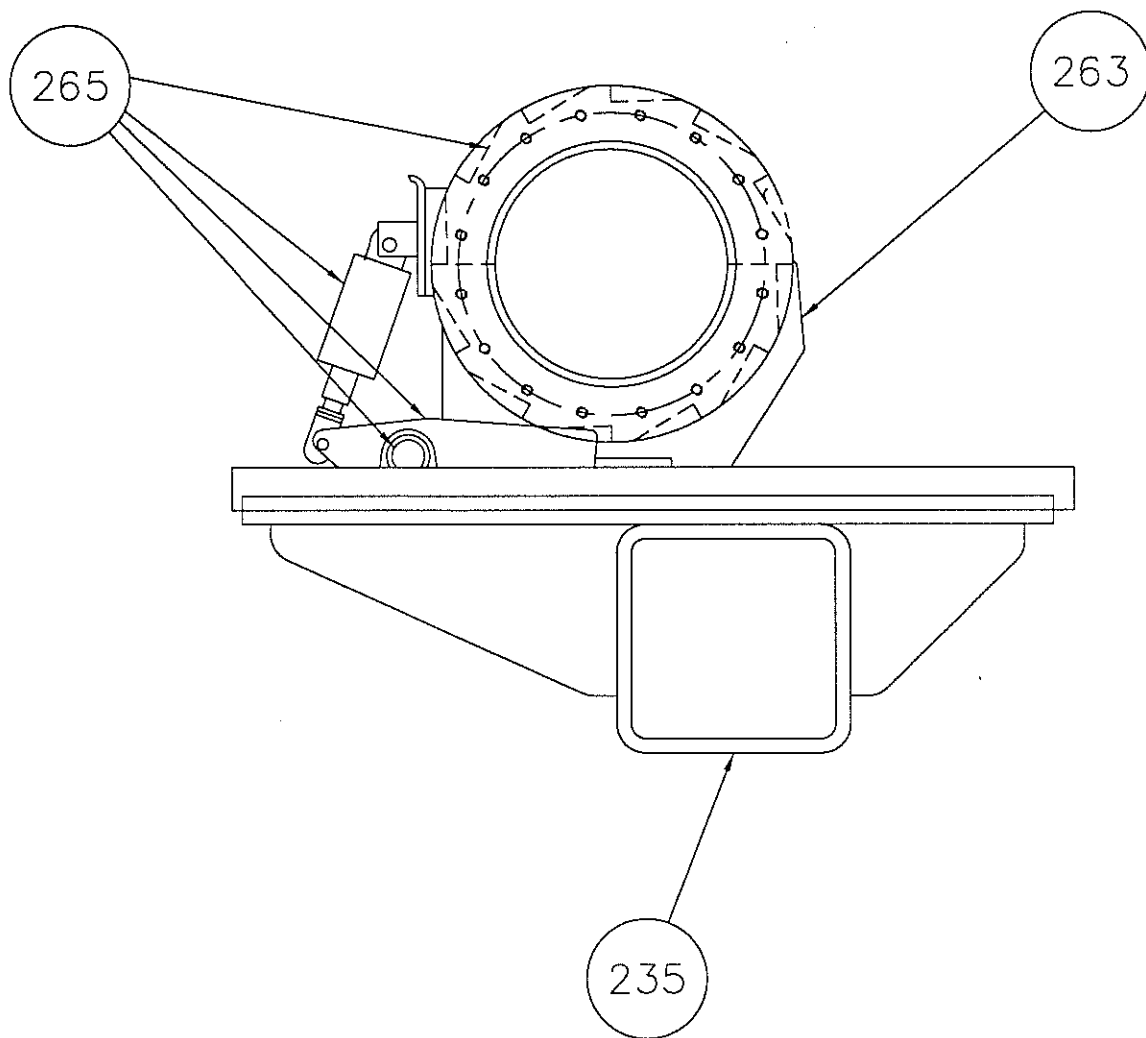
BOOM HIGH/LOW ANGLE KICKOUT ASSEMBLY



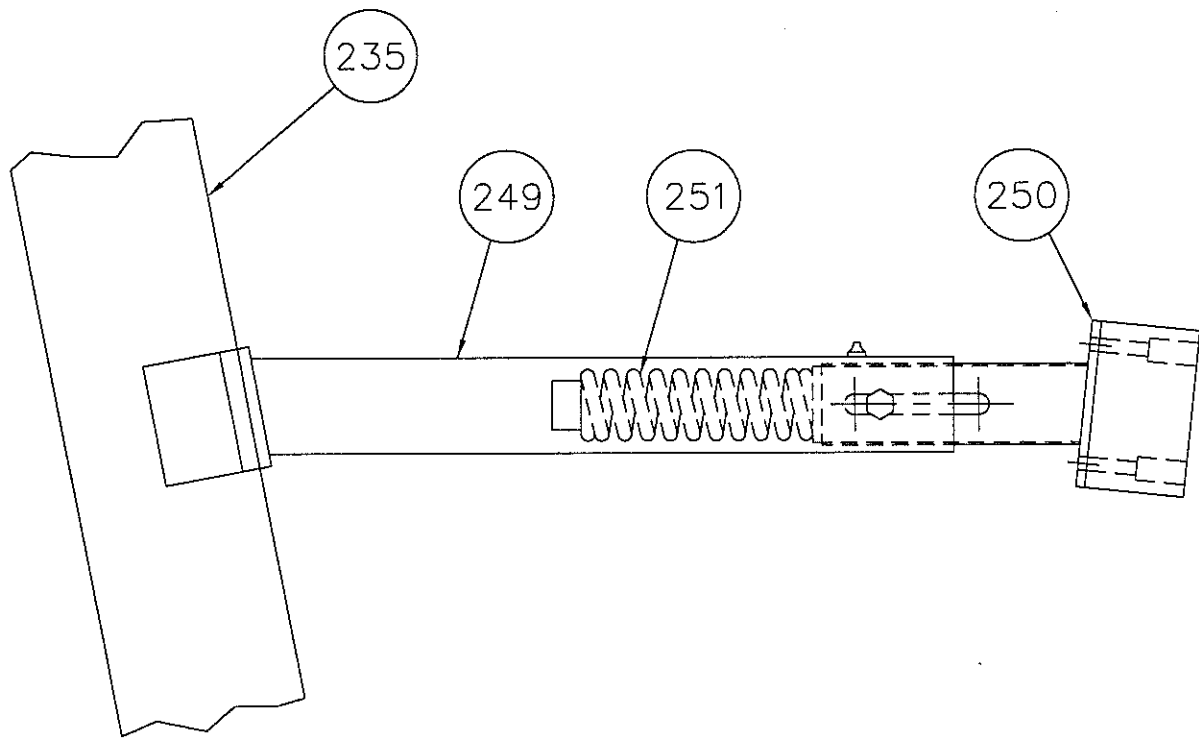
SWING DRIVE ASSEMBLY



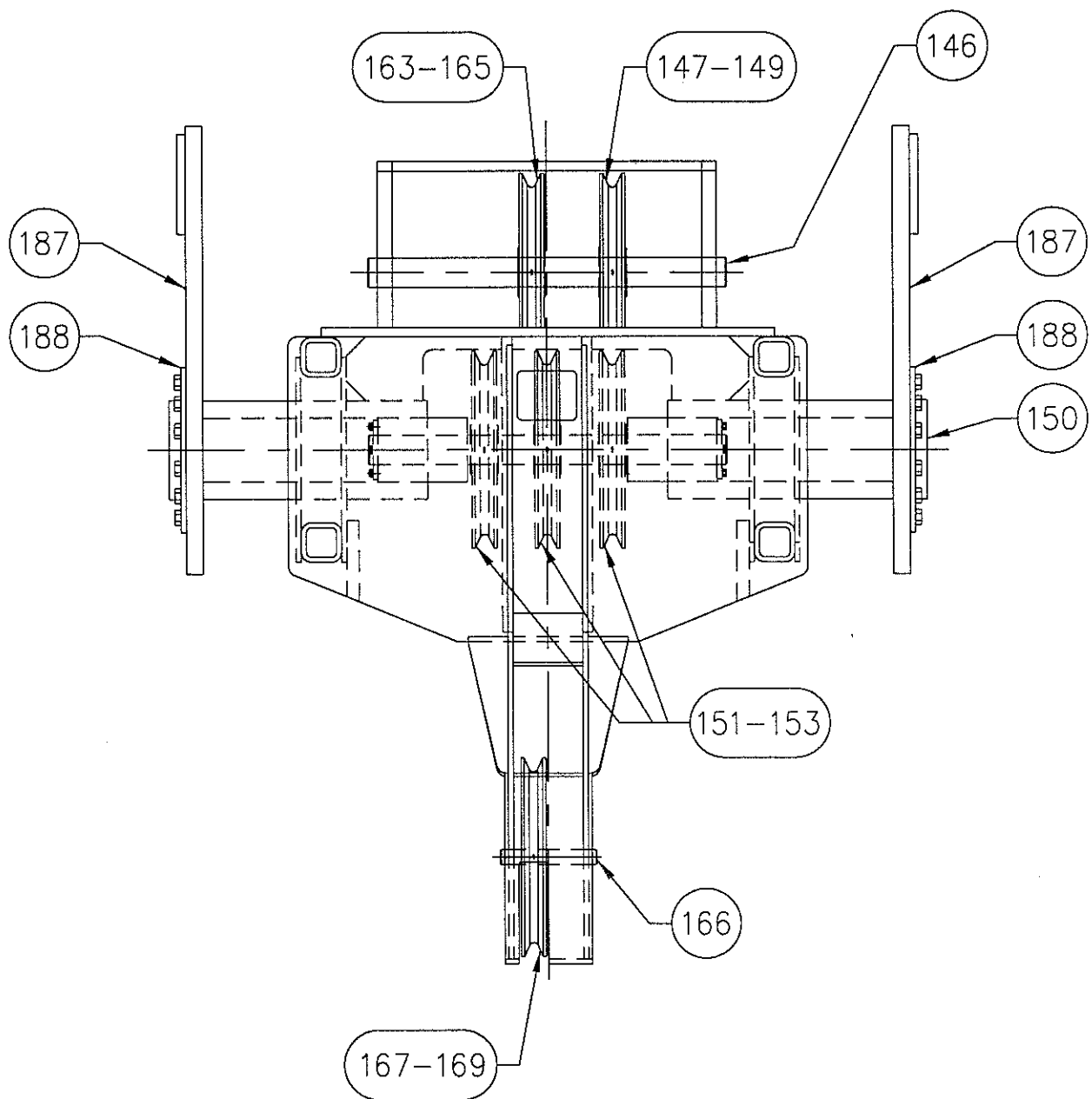
GANTRY SHEAVE CASE ASSEMBLY



BOOM HOIST RATCHET & PAWL ASSEMBLY

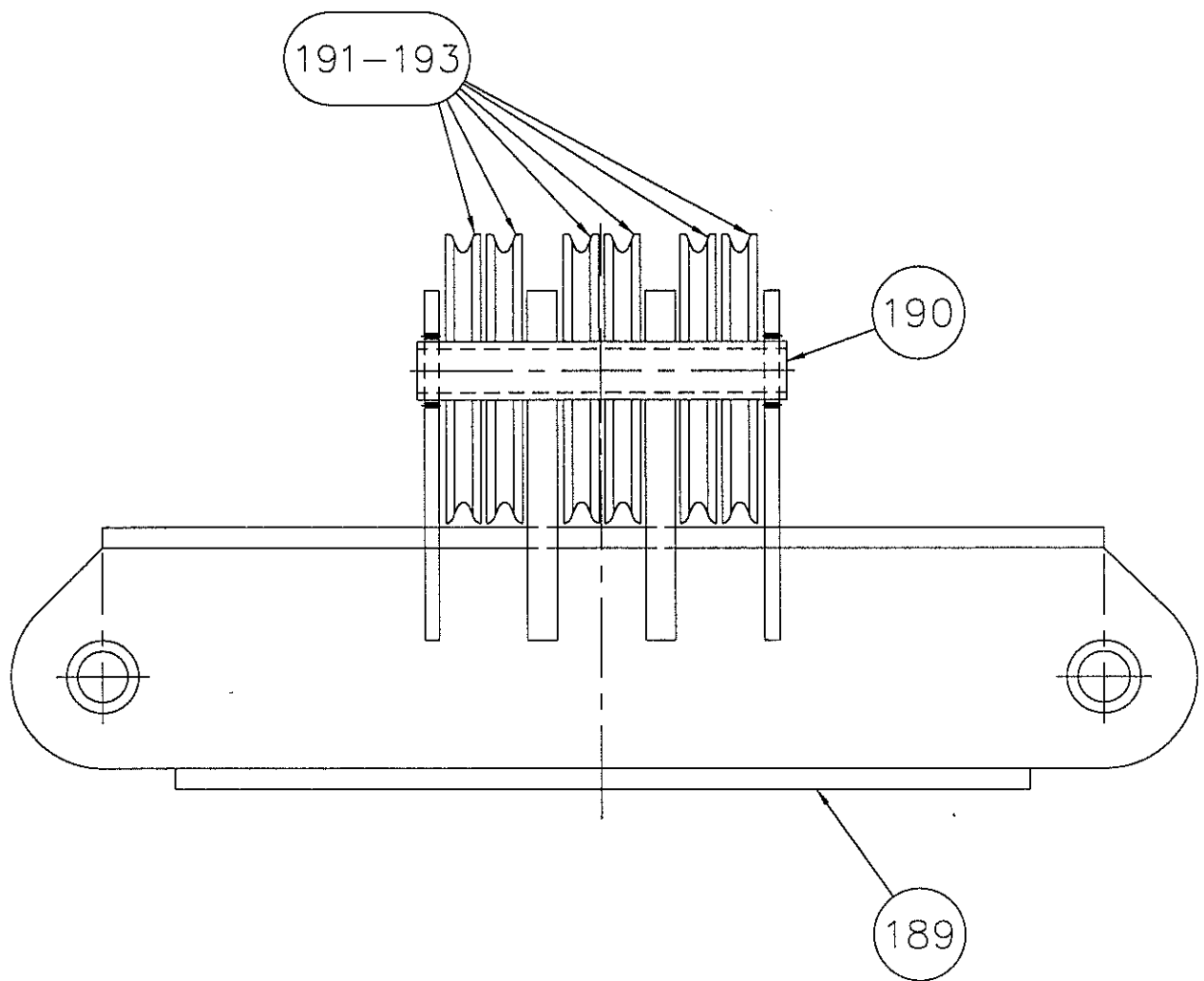


BOOM STOP ASSEMBLY

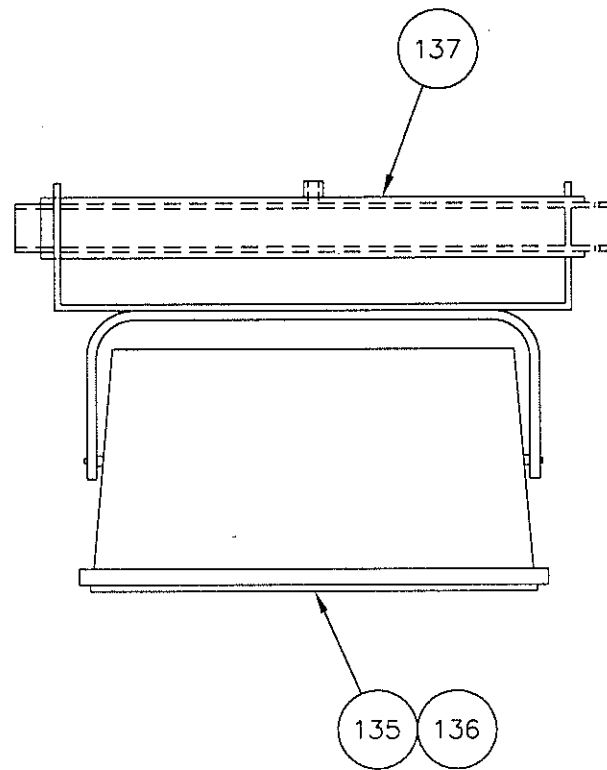


PENDANT/BOOM POINT DETAIL

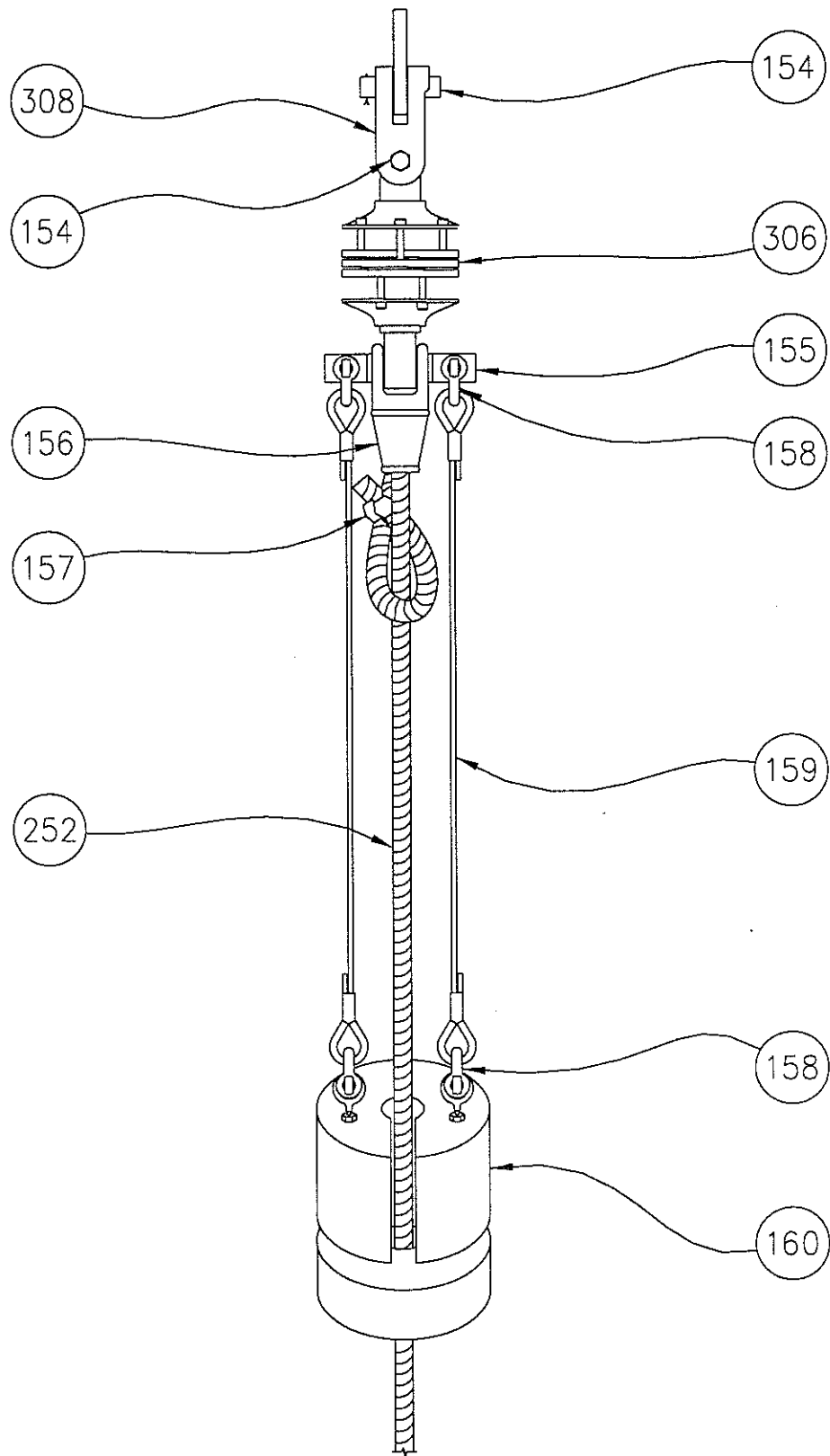




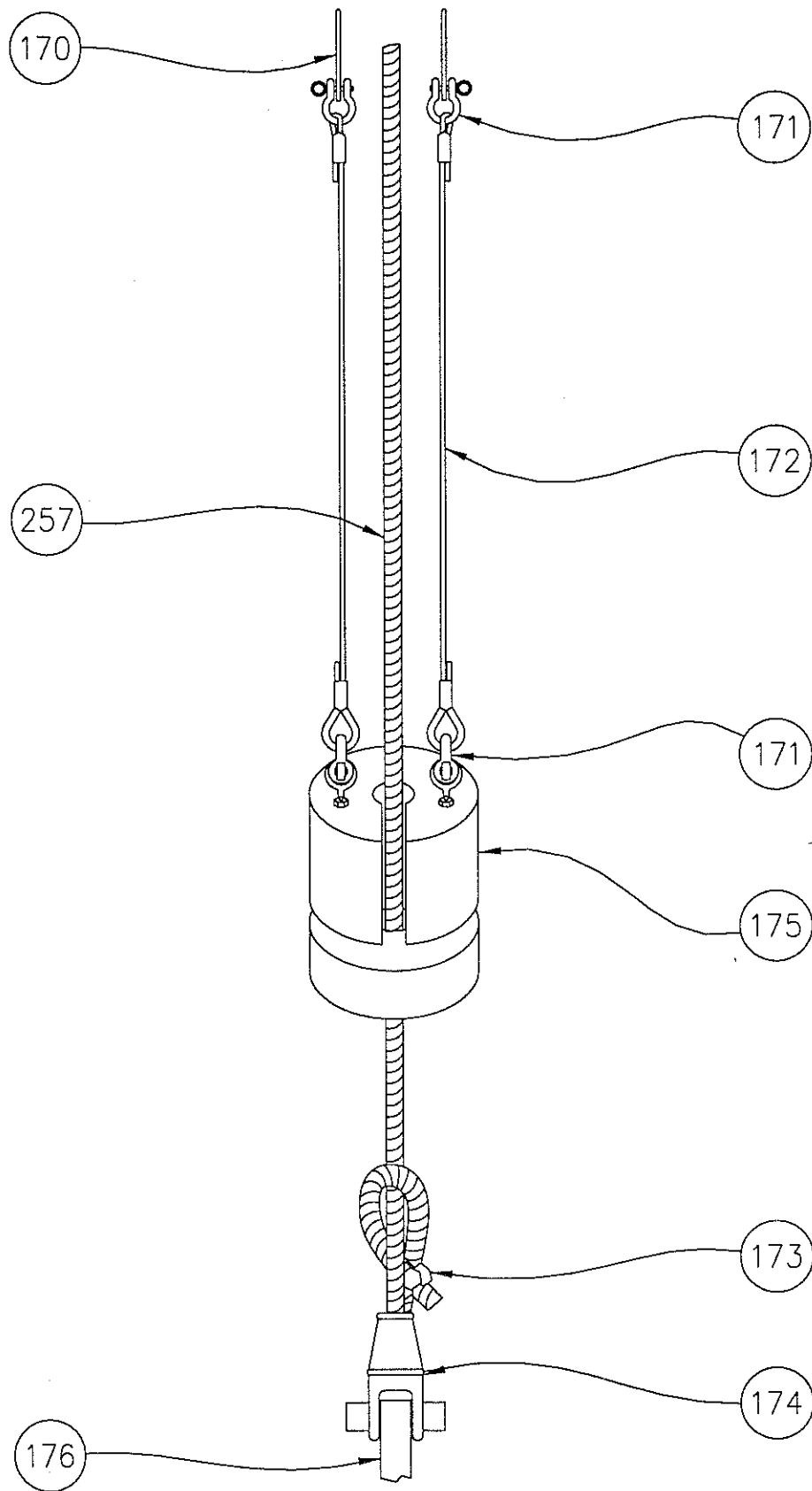
BRIDLE ASSEMBLY



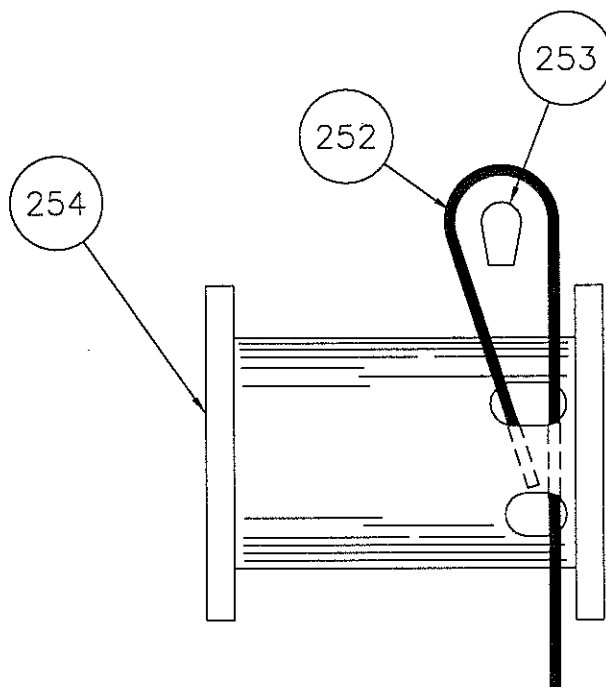
FLOODLIGHT & BRACKET



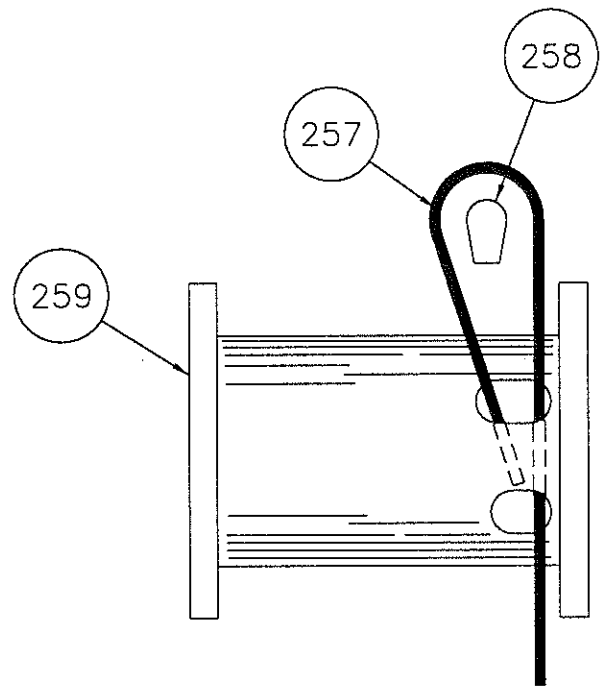
MAIN ANTI-TWO BLOCK ASSEMBLY



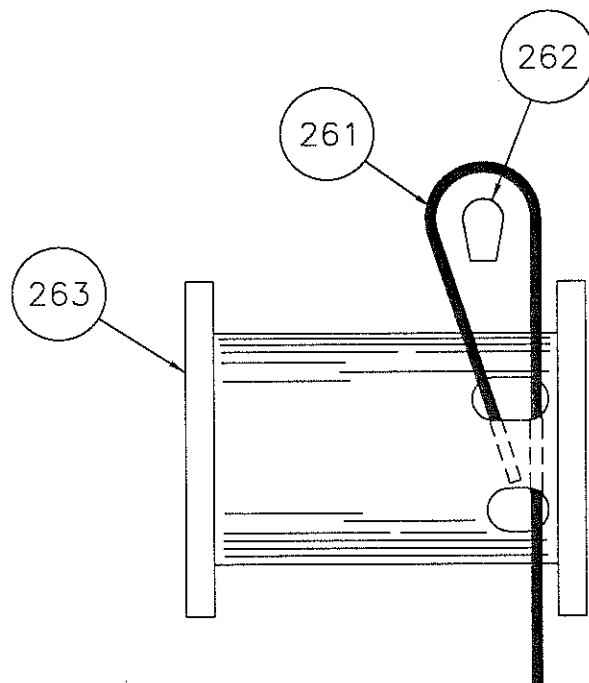
AUXILIARY ANTI-TWO BLOCK ASSEMBLY



MAIN HOIST

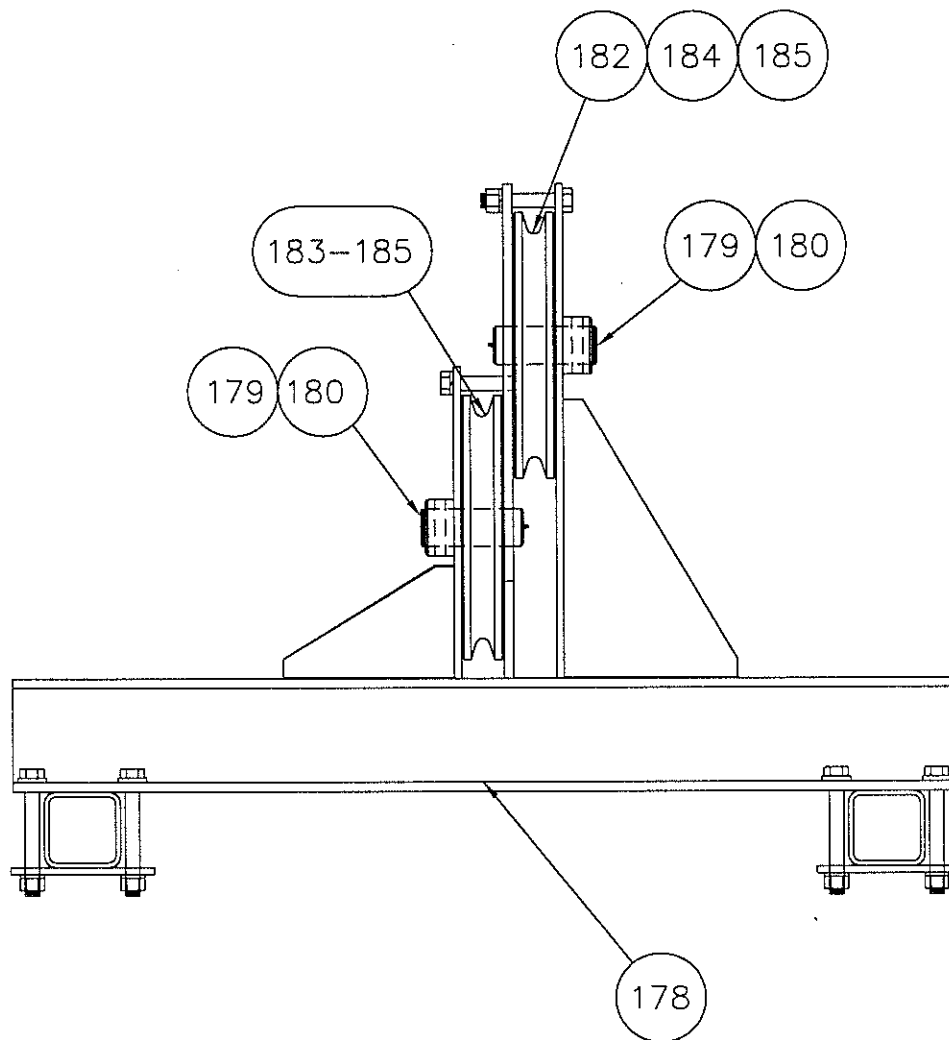


AUXILIARY HOIST

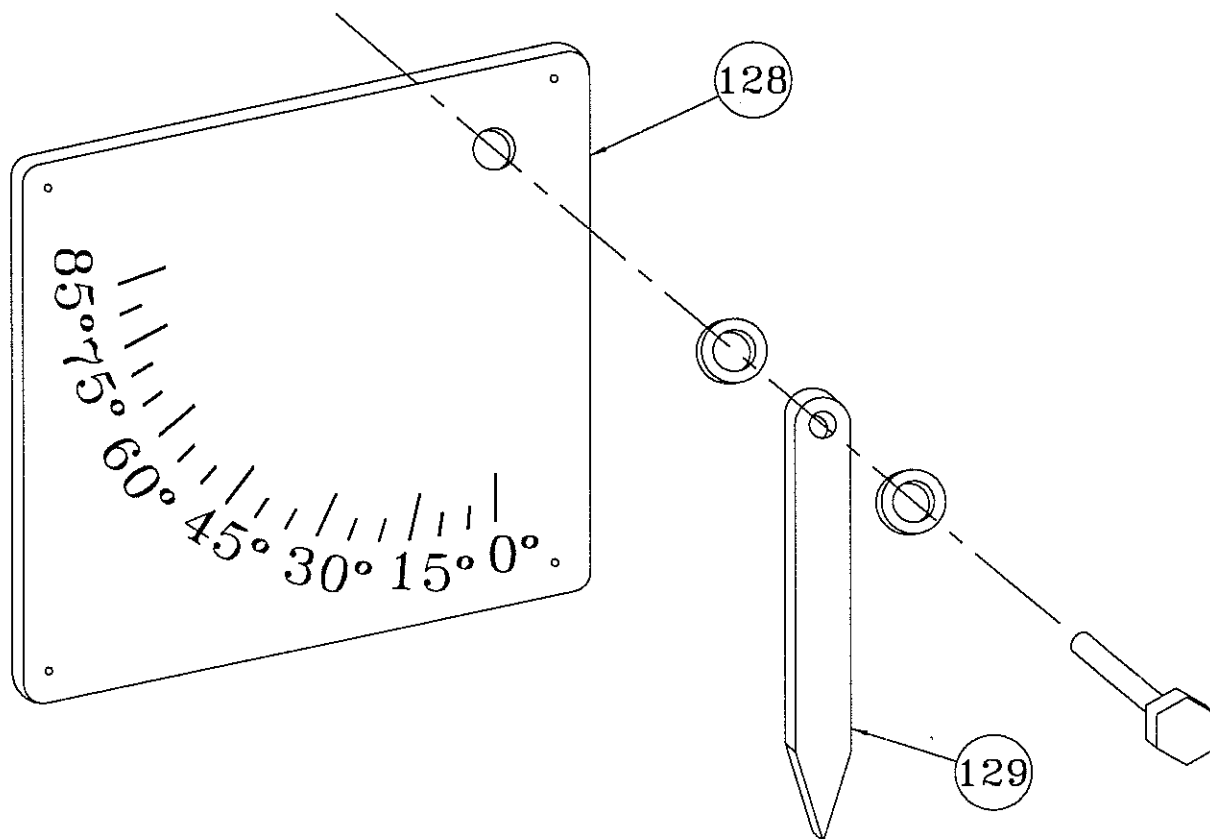


BOOM HOIST

HOIST WIRE ROPE ANCHORS

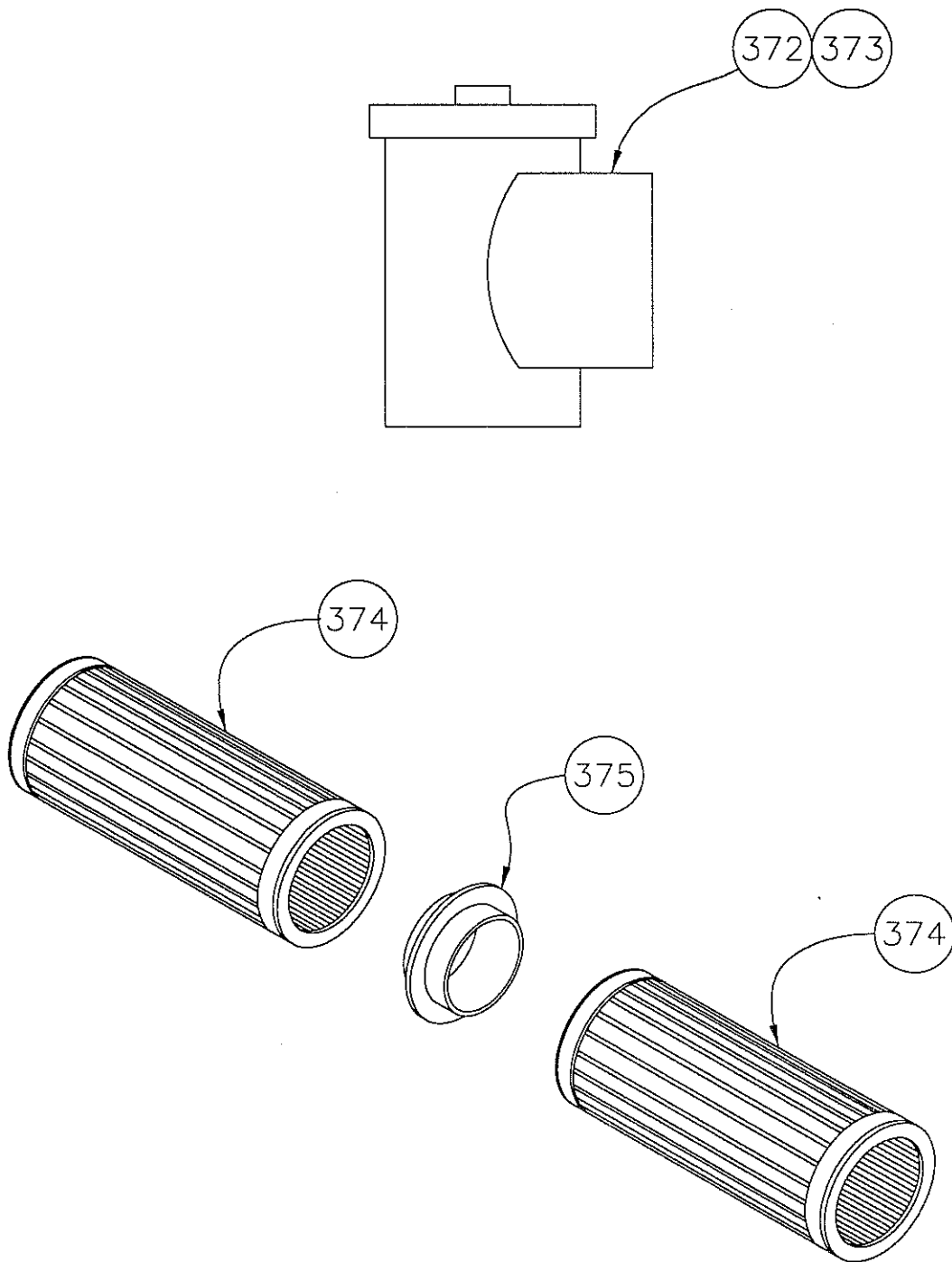


BOOM IDLER ASSEMBLY



RIGHT HAND

BOOM ANGLE INDICATOR ASSEMBLY



RETURN FILTER ASSEMBLY



# **PIN CERTIFICATE SHEET**

# Lattice Boom Style

## PIN CERTIFICATE SHEET

DATE: 10-20-98      REV.: A      WORK ORDER NO.: 059801C

CUSTOMER: Pemex/ Brown & Root      MODEL NO.: 340LA-140

MATERIAL: SS = Stainless Steel with 100,000 PSI Minimum Yield				4140 = 4140 with 100,000 PSI Minimum Yield			
COATING: U = Uncoated				F = Fluorocarbon Coated			
				S = Special			
COMPONENTS	PART NUMBER/REV.	PIN NO.*	HEAT NO.	MATERIAL		COATING (4140 Only)	
				SS	4140	U	F
BOOM FOOT PIN	N61595-001 (2) Rev. A	P1 P2	H5649	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GANRTY/UPPERSTRUCTURE	N61596-001 (2) Rev. A	P3 P4	H5649	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN/IDLER	N61604-001 (2) Rev. A	P5 P6	H6269	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LOWER AUX./EXTENSION	N61605-001 (1) Rev. B	P7	H6269	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BOOM CONNECTIONS	N60986-004 (16) Rev. A	P8-P23	6082H	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BRIDLE/GANTRY	N61603-001 (2) Rev. A	P24 P25	H6269	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXTENDED WEDGE SOCKET PIN/MAIN	N60645-001 (1) Rev. -	P26	3419H	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LOAD CELL PINS	N60646-004 (2) Rev. A	P27 P28	3419H	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BOOM IDLER	N95SK1-104 (2) Rev. F	P29 P30	5768H	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

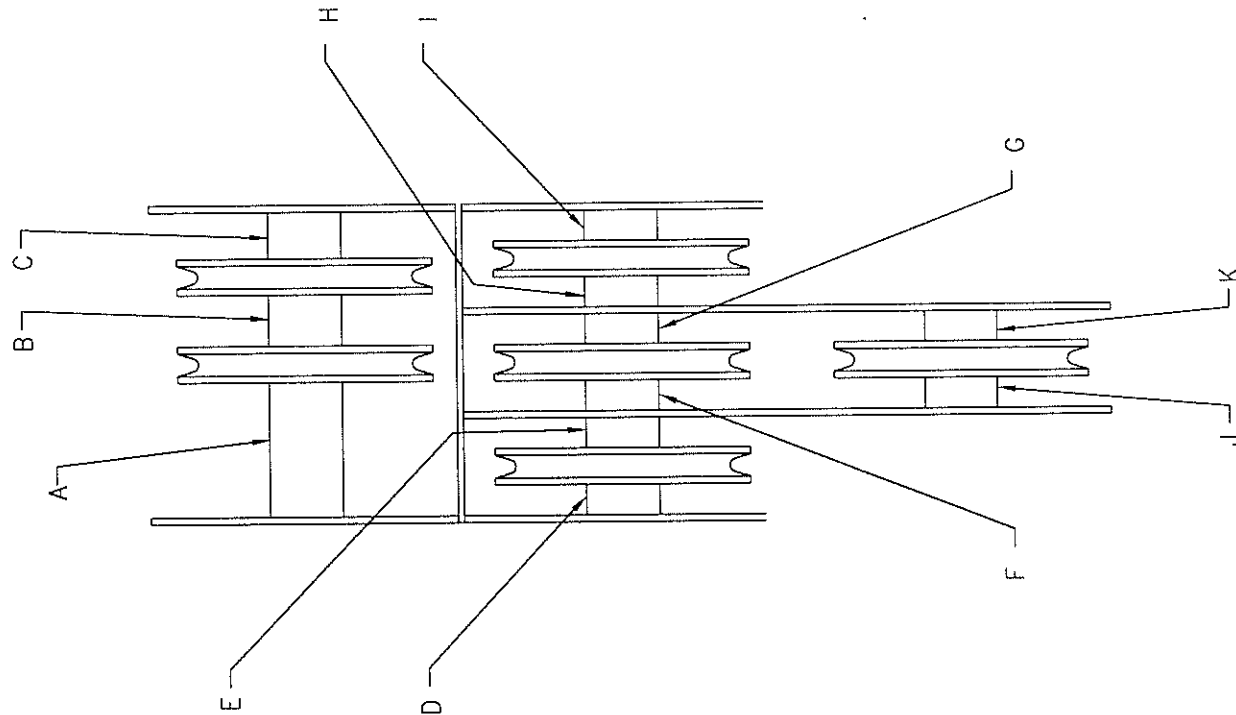
NOTES:      \* Pin number to be stamped on end of pin by machinist.  
              \*\* Heat Number to be recorded by machinist when material is pulled from inventory.

SPECIAL COATING REQUIREMENTS:

# **SPACER KIT**

SERIAL NUMBER: 059801  
 CUSTOMER: BROWN & ROOT/PEMEX  
 CRANE MODEL: 340LA-140

# SPACER KIT



BEARING RETAINERS			
QTY	THICKNESS	O.D.	I.D.
12	1/4"	4-1/2"	3"
			NYLATRON

SPACER	THICKNESS	O.D.	I.D.	MATERIAL
A	12-13/16"	5"	3"	NYLATRON
B	5-7/16"	5"	3"	NYLATRON
C	7-5/8"	5"	3"	NYLATRON
D	1/4"	5"	3"	NYLATRON
E	3-1/8"	5"	3"	NYLATRON
F	3/16"	5"	3"	NYLATRON
G	3-3/16"	5"	3"	NYLATRON
H	3/16"	5"	3"	NYLATRON
I	3-1/8"	5"	3"	NYLATRON
J	5/8"	5"	3"	NYLATRON
K	3-5/8"	5"	3"	NYLATRON

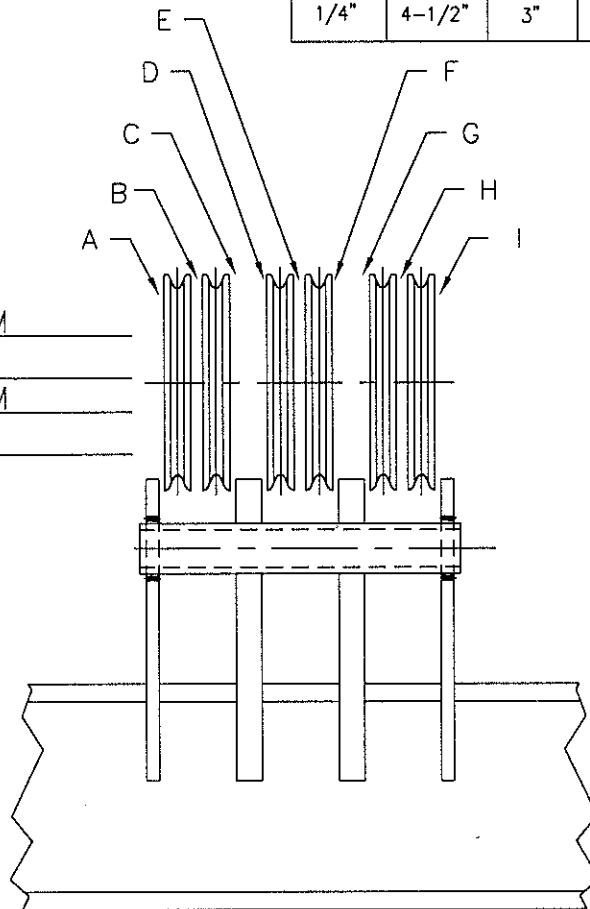
ISSUED BY: KEVIN SAHM  
 DATE ISSUED: 12-16-98  
 COMPLETE BY: KEVIN SAHM  
 DATE COMPLETED: 12-19-98

CUSTOMER: BROWN & ROOT/PEMEX

W/O# : 059801

MODEL : 340LA-140

BEARING RETAINERS				
WIDTH	O.D.	I.D.	MATERIAL	QTY
1/4"	4-1/2"	3"	NYLATRON	24



ISSUED BY : KEVIN SAHM  
 DATE ISSUED : 12-16-98  
 COMPLETED BY : KEVIN SAHM  
 DATE COMPLETED : 12-19-98

## BRIDLE/GANTRY ASSEMBLY

### GANTRY SHEAVE CASE

SPACER	THICKNESS	O.D.	I.D.	MATERIAL
A	1/8"	5"	3"	NYLATRON
B	7/16"	5"	3"	NYLATRON
C	3/16"	5"	3"	NYLATRON
D	3/16"	5"	3"	NYLATRON
E	7/16"	5"	3"	NYLATRON
F	3/16"	5"	3"	NYLATRON
G	1/8"	5"	3"	NYLATRON
H	1/2"	5"	3"	NYLATRON
I	3/16"	5"	3"	NYLATRON

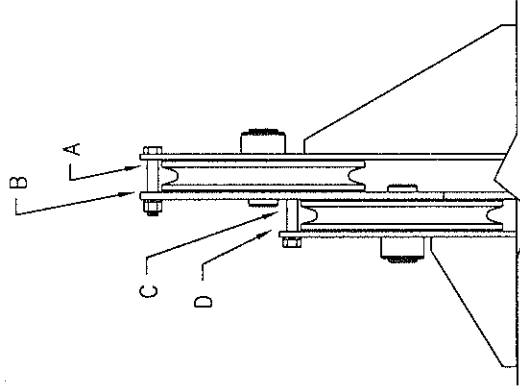
### BRIDLE

SPACER	THICKNESS	O.D.	I.D.	MATERIAL
A	1/8"	5"	3"	NYLATRON
B	1/2"	5"	3"	NYLATRON
C	1/4"	5"	3"	NYLATRON
D	1/8"	5"	3"	NYLATRON
E	7/16"	5"	3"	NYLATRON
F	1/4"	5"	3"	NYLATRON
G	1/8"	5"	3"	NYLATRON
H	7/16"	5"	3"	NYLATRON
I	1/4"	5"	3"	NYLATRON

SERIAL NUMBER: 059801  
 CUSTOMER: BROWN & ROOT/PEMEX  
 CRANE MODEL: 3401A-140

## SPACER KIT

BOOM MID-SECTION IDLER  
 VIEW FROM BOOM TIP



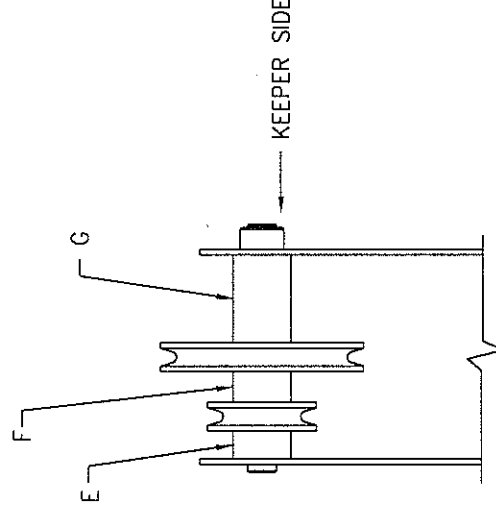
BEARING RETAINERS

WIDTH	O.D.	I.D.	MATERIAL	QTY.
1/8"	3-3/4"	2-1/2"	NYLATRON	4

SPACER	THICKNESS	O.D.	I.D.	MATERIAL
A	N/A	N/A	N/A	N/A
B	1/16"	4-1/2"	2-1/2"	NYLATRON
C	1/8"	4-1/2"	2-1/2"	NYLATRON
D	N/A	N/A	N/A	N/A

ISSUED BY: KEVIN SAHB  
 DATE ISSUED: 12/16/98  
 COMPLETED BY: KEVIN SAHB  
 DATE COMPLETED: 12/19/98

BOOM TIP IDLER  
 VIEW FROM BOOM TIP



BEARING RETAINERS

WIDTH	O.D.	I.D.	MATERIAL	QTY.
N/A	N/A	N/A	N/A	N/A

SPACER	THICKNESS	O.D.	I.D.	MATERIAL
E	N/A	N/A	N/A	N/A
F	N/A	N/A	N/A	N/A
G	N/A	N/A	N/A	N/A

# HYDRAULIC SYSTEM



SEE MAINTENANCE PRECAUTIONS PRIOR  
TO PERFORMING ANY WORK.

## HYDRAULIC SYSTEM -PART REPAIR OR REPLACEMENT-

Any repair of hydraulic parts, particularly pumps, motors, and cylinders, requiring complete disassembly of the unit is not recommended to be performed in the field.

Major repairs should only be attempted by experienced, qualified, and properly equipped personnel. Only minor repairs and adjustments as described in the manual should be performed in the field.

As always, the prime consideration when working on the hydraulic system is to insure that no contamination is introduced into the system. When replacing a hydraulic part, the following basic outline should be used:

1. Remove damaged part and install new part.
2. If any debris are present in the hoses or tubing, the lines should be flushed clean with a suitable solvent and blown-dry before reconnecting.
3. If the hydraulic part is a pump or motor, hand-fill ports with clean hydraulic oil ( Provides lubrication for initial start-up ).
4. Reconnect all tubing and hoses.
5. If debris from damaged parts are in the system ( such as motor which has "gone to pieces" ), replace the return line filter element and check the suction strainers.
6. Check all mounting bolts, nuts, and/or pins.
7. Start prime mover and allow it to run at low idle ( 1,000 rpm ).
8. Operate system at least a few minutes at zero pressure.
9. Operate repaired system without a load on the hook, observing operating pressure and general operational characteristics.
10. Operate system with a load, observing operating pressures and general operational characteristics.
11. Inspect the system for hydraulic leaks and correct any abnormalities.



# **LOAD INDICATOR SYSTEM**

**Part Number TW517**

# **MD Totco™**

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**A Varco Company**

**INSTALLATION, OPERATION, AND MAINTENANCE**

## **CRANE LOAD INDICATING SYSTEMS**

### **SC Series**

**Manufacturers of Precision Instruments**

# IMPORTANT SAFETY NOTICE

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Proper service and repair is important to the safe, reliable operation of all **M/D TOTCO** equipment. The service procedures recommended by **M/D TOTCO** and described in the technical manuals are recommended methods of performing service operations. When these service operations require the use of tools specially designed for the purpose, those special tools should be used as recommended. Warnings against the use of specific service methods that can damage equipment or render it unsafe are stated in the manuals. These warnings are not exclusive, as **M/D TOTCO** could not possibly know, evaluate and advise service people of all conceivable ways in which service might be done or of all possible associated hazardous consequences. Accordingly, anyone who uses service procedures or tools which are not recommended by **M/D TOTCO** must first satisfy themselves thoroughly that neither personnel safety nor equipment safety will be jeopardized by the method selected.

# **LIMITED PRODUCT WARRANTY**

---

THE FOLLOWING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING, BUT NOT BY WAY OF LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Martin-Decker TOTCO ("Company") warrants to Buyer ("Purchaser") of new products manufactured or supplied by the Company that such products are, at the time of delivery to the Purchaser, free of material and workmanship defects, subject to the following exceptions:

- A. Any product which has been repaired or altered in such a way, in the Company's judgement, as to affect the product adversely, including any repairs, rebuilding, welding or heat treating outside of Company authorized facility.
- B. Any product which has, in the Company's judgement, been subject to negligence, accident, or improper storage.
- C. Any product which has not been installed, operated and maintained in accordance with normal practice and within the recommendations of the Company.
- D. For all items of special order by Buyer which are not manufactured by Company, Buyer should submit warranty claims directly to the manufacturer thereof.

The Company's obligation under this warranty is limited to repairing, or at its option, replacing any products which in its judgement proved not to be as warranted within the applicable warranty period. All costs of transportation of products claimed not to be as warranted to authorized Company service facility shall be borne by Buyer. Costs of return transportation to Buyer of products accepted for repair or replacement by Company under the warranty provisions of the Sales Agreement shall be borne by the Company. Company may, at its sole option elect to refund the purchase price of the products, and Company shall have no further obligation under the Sales Agreement.

The cost of labor for installing a repaired or replacement part shall be borne by Buyer. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period of the product upon which installed to the same extent as if such parts were original components thereof.

The warranty periods for various products are:

- A. Hydraulic, Mechanical, Electronic Equipment: one (1) year from date of installation or fifteen (15) months from date of shipment from Company, whichever occurs first.
- B. All Elastomer Diaphragms: six (6) months from date of shipment from Company.

No deviations from the Company's standard warranty terms or period as stated herein will be honored unless agreed to in writing by an authorized Company representative prior to acceptance of the order.

**EXCLUSIVITY OF REMEDY AND LIMITATION OF LIABILITY.** THE REMEDIES PROVIDED FOR IN THIS WARRANTY SHALL CONSTITUTE THE SOLE RECOURSE OF BUYER AGAINST COMPANY FOR BREACH OF ANY OF COMPANY'S OBLIGATIONS UNDER THE SALES AGREEMENT WITH BUYER, WHETHER THE CLAIM IS MADE IN TORT OR IN CONTRACT, INCLUDING CLAIMS BASED ON WARRANTY, NEGLIGENCE, OR OTHERWISE.

IN NO EVENT SHALL COMPANY BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, STRICT LIABILITY OR IN TORT (INCLUDING NEGLIGENCE), NOR FOR LOST PROFITS.

## 1.00 INTRODUCTION

1.01 This manual provides installation, operation and maintenance instructions for the SC Series Crane Load Indicator Systems manufactured by MARTIN-DECKER, Santa Ana, California. Included in this manual is information concerning the effects of various crane configuration and load weights on an installed system, as well as important safety information.

1.02 The SC Series Crane Load Indicator System, when installed and operated in accordance with the instructions herein, can keep the operator informed when he is approaching crane load limits or otherwise exceeding the provisions of the load rating chart.

## 1.03 SYSTEM DESCRIPTION

### 1.04 CRANE LOAD INDICATING SYSTEMS.

The systems are hydraulically operated, require no external power source and are fully assembled and loaded with MARTIN-DECKER W15 fluid prior to shipment (Figure 1-1). They are designed to operate within the ambient temperature range of -20° and +120°F (-29° and +48.9°C). Accuracy of the load indicator system when shipped from the factory is  $\pm 1/2$  percent of full scale capacity.

1.05 The SC series systems are designed to individual crane requirements. The basic system consists of one sensater load cell (usually installed in the crane's main fall rigging) and indicator. One or two additional subsystems may be added to accommodate load indication requirements for an auxiliary fall and/or a whip fall. Two fall systems are designated SC28 while three fall systems are designated SC38.

1.06 SYSTEM COMPONENTS. The system consists of the following basic components and attaching hardware:

- a. Indicator
- b. Sensater Load Cell (hereinafter referred to as "load cell")
- c. Hose
- d. Tubing (optional)
- e. Disconnect Coupling(s)

1.07 INDICATOR. The indicator for each system has a scale calibrated in pounds, tons or kilograms for load indication as specified. Each indicator has a damper to smooth indicator sensitivity and to adjust indicator response time according to operator preference. Also, included on each indicator is a dial adjust gear, which rotates the dial to make necessary tare adjustments.

\* SEE NOTE ON PAGES 2 & 17

1.08 LOAD CELL. The load cell transmits a no-lag, linear load indication signal to the indicator by transforming the applied load to a hydraulic signal. This is accomplished by a Sensater diaphragm sensing element held in place by the load cell housing. Refer to Table 1-1 for typical load cell capacities.

1.09 HOSE. The hydraulic hose is used to connect the indicator to the load cell. It is double wire braid, rubber covered, hydraulic hose and is supplied in lengths to satisfy individual system requirements. Hose lengths greater than 50 feet are coupled with J103 collars or J900 series disconnects.

1.10 TUBING. Copper tubing is normally used to supplement hydraulic hose for fixed boom application where such boom lengths exceed 100 feet. Its PVC covering makes it resistant to chafing. For two and three cell applications tubing bundles are used for rigidity and transmission line protection.

\* 1.11 J900-42 DISCONNECTS. The systems with 8-1/2 and 12 inch indicators are usually supplied with a J900-02 female half disconnect installed on one end of the hose and a J900-40 male half disconnect installed at the indicator damping chamber to facilitate connection. When mated, these components constitute a J900-42 disconnect assembly. If required, the J900-42 disconnect may also be supplied with the 6 inch indicator.

1.12 ATTACHING AND SUPPORT HARDWARE. The systems are furnished with all necessary attaching and support hardware to facilitate installation and maintenance:

- a. Check Valve - Usually installed on the damper and used to replenish or reduce the hydraulic fluid in the system. May be located elsewhere in system.
- b. Indicator Bracket - Used for mounting the indicator inside the cab.
- c. Hydraulic Fluid - Supplied in quart (W15) and/or gallon (W16) containers and is used, in conjunction with the YA2 hand pump, in the event it becomes necessary to charge the system in the field.
- d. YA2 Hand Pump - Used for field loading the system with hydraulic fluid. The YA2 hand pump connects to the check valve usually located on the indicator damper.
- e. C71 Tie Straps - Used for fastening the weight hose and tubing to the boom. Normally supplied on the order of one for every 10 feet of hose and tubing.
- f. J103 Collars and/or J900-22 Disconnects - Used for connecting lengths of hose. They are supplied as required or as specified by customer request.

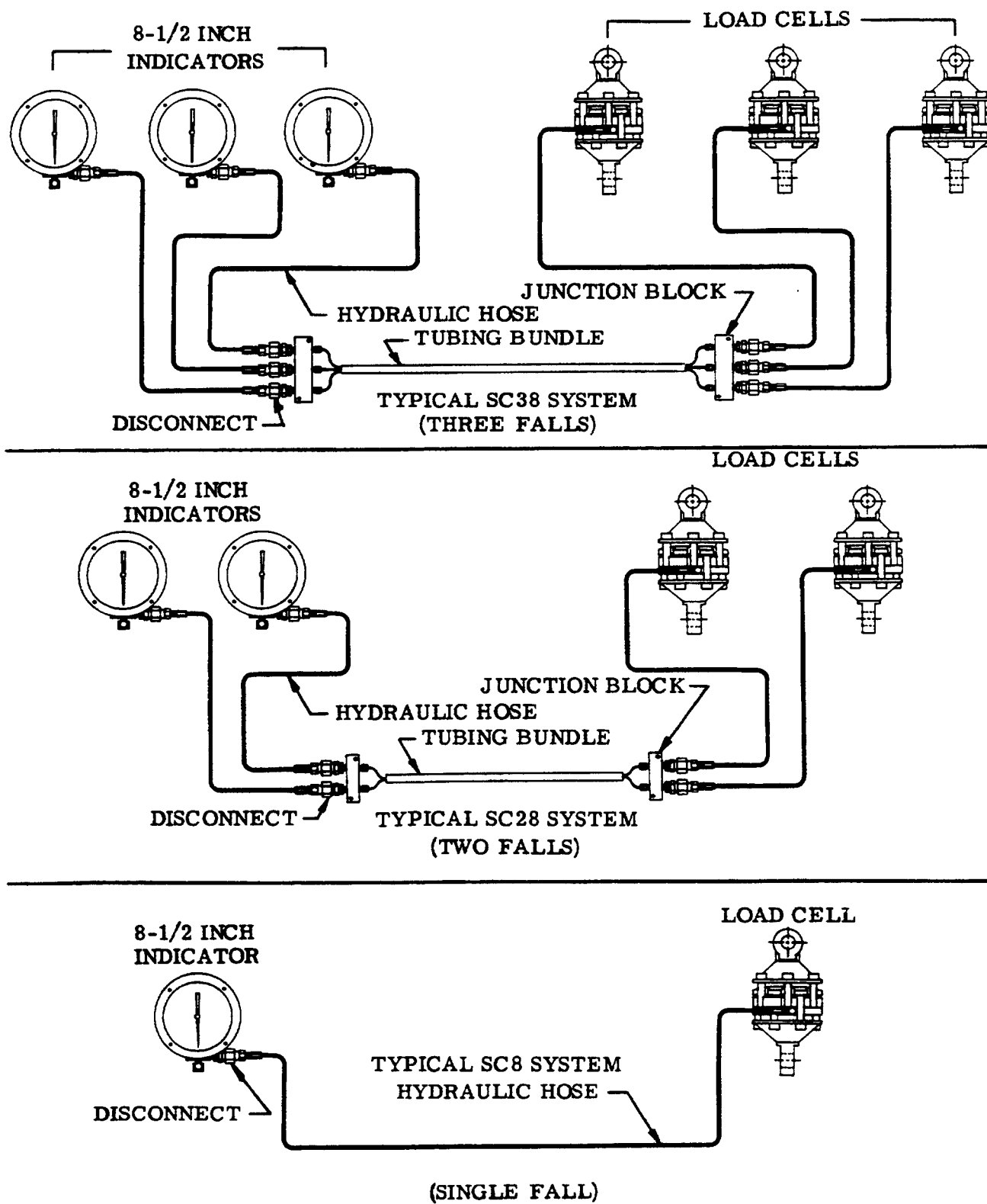


Figure 1-1. Basic SC Systems

Table 1-1. Load Cell Capacities

LOAD CELL CAPACITY	LOAD CELL PART NO.	PIN SIZE (INCHES)	SYSTEM NO.	INDICATOR SIZE (IN.)
5,000 TO 25,000	E235-4A2	1-3/8	SC7	6
	E235-4B1			
	E235-4C2	1-1/2	SC8	8-1/2
	E235-4D1		SC22	12
5,000 TO 30,000 LB	E235-5E2	1-1/2		
	E235-5F1			
	E235-5G2	1-5/8		
	E235-5H1			
	E235-5S2	1-3/4		
	E235-5K1			
	E235-5L2	2		
	E235-5M1			
30,000 TO 40,000 LB	E288N-111	2	SC9	8-1/2
	E288N-112	2	SC11	6
30,000 TO 60,000 LB			SC24	12
	E288N-251	2-1/4		
	E288N-252	2-1/4		
	E288N-231	2-3/4		
	E288N-232	2-3/4		
	E288N-241	3-1/4		
60,000 TO 100,000 LB	E293N-111	2-3/4	SC13	6
	E293N-112	2-3/4	SC15	8-1/2
60,000 TO 150,000 LB			SC25	12
	E293N-221	3-1/4		
	E293N-222	3-1/4		
	E293N-231	3-1/4		
	E293N-232	3-1/4		
	E293N-241	4-1/4		
	E293N-242	4-1/4		

## 2.00 PRE-INSTALLATION

2.01 The pre-installation procedure consists primarily of verification that the load indicating system is the correct system for the crane on which it is to be installed. Items to check:

- a. Indicator dial calibrated in the units of measurement (pounds, tons, kilograms, etc) compatible with the capacity of the crane as dictated by its configuration.
- b. Indicator dial marked with parts of line to be used with crane configuration. If more than one reeving is to be used there should be a separate scale on the dial (or a separate dial) for each of the reefings. See Figure 2-1 for information on how to count parts line.
- c. Load cell capacity suitable for full crane capacity (Table 1-1). To determine load cell capacity use either methods 1 or 2 following:

1. For even parts line dead ended at boom or equivalent, divide system capacity by parts of line to determine cell load.

Example: 100,000 lb ÷ 6 parts line = 16,667 lb single line load.

2. For odd parts line with suspended upper load block and line dead ended at lower block (hook). Multiply capacity by ratio of parts line at upper block over parts line at hook.

Example: 100,000 lb X 4 parts line at upper block / 5 parts line at hook = 80,000 lb at upper block hanger.

- d. Load cell location on the boom requires that the load cell be able to hang and swing freely to get an accurate indication of weight being hoisted. Select method of installing load cell (Figure 2-2 or 2-3) taking into account any obstructions and crane configuration.
- e. Load hose and tubing should be checked for adequate length for routing from the indicator location to the load cell, including extensions to be used when operating the crane with additional boom sections. Also, to be checked are the size and condition of all hose disconnects and collars to insure that when mated they will not leak hydraulic fluid.

## 2.02 SYSTEM INSTALLATION

### CAUTION

Systems are shipped pre-charged. Do not open system at any point except at disconnects. Opening system at points other than disconnects will cause loss of system fluid, introduce air into system and adversely affect operation.

2.03 LOAD CELL INSTALLATION. Install the load cell at the dead end or cable end per Figure 2-2 or 2-3.

### CAUTION

To ensure proper load cell operation, verify that the load cell hangs free and completely CLEAR OF ALL OBSTRUCTIONS AT ALL BOOM OPERATION ANGLES.

2.04 INDICATOR INSTALLATION. Select a location for the indicator that provides a convenient visual access to the operator, seated at the controls in operating position. Installation may be either inside or outside the cab.

- a. Locate indicator mounting bracket. Figures 2-4 and 2-5 give overall dimensions for indicator brackets for 6, 8-1/2 and 12 inch indicators.
- b. After locating bracket refer to Figure 2-4 or 2-5 for bracket mounting hole layout. Drill four 5/16-inch diameter mounting holes for bracket.
- c. Install bracket on back of indicator.
- d. Install indicator/bracket using screws and washers supplied with indicator.

2.05 HYDRAULIC HOSE AND TUBING INSTALLATION.

### CAUTION

During hydraulic hose and tubing layout installation allow for sufficient slack in the hose to avoid pulling hose taut during crane operation. Excessive tension could cause connector failure.

- a. Select layout to best protect hose and tubing from chafing or other damage during crane operation and route hydraulic hose and tubing from load cell to indicator. Allow sufficient slack to prevent hydraulic hose from being pulled taut.



**CAUTION**

If disconnects are being used for connections exercise care during mating to preclude damaging the O ring in the female half of the connector. A damaged O ring could result in hydraulic fluid leaking during operation.

- b. Connect J900 series disconnects, in accordance with the following procedures:

**NOTE**

If the O ring becomes damaged during mating replace it per paragraph 4. 03.

1. Carefully align male and female coupling halves before mating.
2. Push the two halves together firmly.
3. Thread nut onto male half of coupling and tighten.
- c. Use C71 straps to securely fasten hydraulic hose and tubing to boom to prevent chafing, cutting, crushing or other damage during crane operation.

**NOTE**

If system contains tubing and junction blocks, ensure that junction blocks are firmly secured to boom and/or other support structure.

**2.06 POST-INSTALLATION CHECKOUT**

**2.07** After system installation (paragraph 2.02) check to ensure that it is operating properly.

- a. Exercise the system thru several cycles; hoist a known weight of at least 25 percent of full capacity approximately one foot off the ground, then lower to remove weight from the rigging. Repeat several times to flex the diaphragm in the load cell.
- b. On completion of step a, remove weight from hoist. Turn tare adjust knob (knurled knob on back of indicator) to rotate dial to zero.
- c. Hoist boom thru all angles of operation. Check load cell to ensure it is hanging free of all encumbrances. Modify installation if required to achieve load cell freedom of movement.
- d. Lower boom, check all fittings and connections for leaks. Tighten as necessary to preserve integrity of the weight indicator system.
- e. Check all mounting hardware for secure installation.

**2.08 SYSTEM OPERATION**

**2.09** The load indicating system is automatic in operation once the tare and damping adjustments have been made.

**WARNING**

Before proceeding with the pre-operation adjustments the following rules must be observed to avoid damage to equipment or serious injury to personnel.

- a. Parts line shown on the indicator dial corresponds with the load rating chart located in the crane cab.

**2.10 LOAD POINTER ZERO SET (TARE)**

**ADJUSTMENT.** Due to the hydrostatic head (the effect of fluid pressure within the load cell), tare setting should be made each time boom angle or load radius is changed prior to hoisting. The load pointer tare adjustment is made with the system installed and hoisting block and rigging in operating position.

- a. Position the hook at the radius (boom at the angle) at which the lift will be made.
- b. Turn the dial zero adjust knob (knurled knob on back of indicator case) to rotate dial for tare setting of pointer.

**NOTE**

When reading the indicator, maintain a direct and perpendicular line of sight between the eye and the pointer in order to eliminate the possibility of parallax error.

- c. Apply any load less than the safe pick value but not less than 25 percent of safe pick.
- d. Remove load.
- e. Turn dial tare adjust knob to rotate dial for tare setting of pointer.

**2.11 POINTER DAMPING ADJUSTMENT.**

The damper is located on the top or bottom of the indicator case and has a tee handle in one end.

- a. If pointer is too sensitive, push damper tee handle in and turn clockwise to slow pointer action.
- b. If pointer is sluggish, turn tee handle counterclockwise to increase pointer sensitivity.

**2.12 SYSTEM ACCURACY**

**2.13** The operating accuracy of the MARTIN-DECKER load indicator system is such that the indicated load does not differ from the actual hook load by more than  $\pm 1\frac{1}{2}$  percent of the load indicator system capacity. For example, assume the crane has been equipped with a load indicator system having a maximum capacity of 100,000 pounds.

Then:

- a. When lifting an actual load of 80,000 pounds, the indicated load will be within the range of 78,500 pounds and 81,500 pounds, or  $\pm 1\frac{1}{2}$  percent of the maximum load indicator system capacity of 100,000 pounds.
- b. When lifting an actual load of 50,000 pounds the indicated load will be within the range of 48,500 pounds and 51,500 pounds, or  $\pm 1\frac{1}{2}$  percent of the maximum load indicator system capacity of 100,000 pounds.
- c. When lifting an actual load of 20,000 pounds, the indicated load will be within the range of 18,500 pounds and 21,500 pounds, or  $\pm 1\frac{1}{2}$  percent of the maximum load indicator system capacity of 100,000 pounds.

#### 2.14 DETERMINING ACTUAL HOOK LOAD.

Factors affecting accuracy of a dead end load cell application include the number of lines reeved between the boom point sheaves and the hook block, the boom length and boom angle. While hoisting, the friction of the sheaves causes the crane weight indicator to indicate that a load is lighter than it actually is. This friction can range from  $\frac{1}{4}$  to  $1\frac{1}{2}$  percent for each sheave in wire rope service and also causes the indicator to read high during lowering operations. To get an accurate indication of load weight, take the average of the indication obtained during hoisting and lowering operations. For example:

- a. Crane rigged with 4 parts line, load indication system capacity is 80,000 pounds.
- b. Load to be lifted is 65,000 pounds.
- c. Load cell at dead end.
- d. Sheave friction equals  $\frac{3}{4}$  percent per sheave.

2.15 When load is raised the load indicator reads 63,000 pounds, when load is lowered the load indicator reads 67,000 pounds. Mean, or average, value of the two readings is 65,000 pounds.

2.16 Raising and lowering the boom will cause the indicator to show an increase, then a decrease in the indicated weight. This apparent discrepancy is caused by hydrostatic pressure and may be ignored once the weight of the load has been determined. The indication change due to the change in the hydrostatic head can be used as a quick test. Once during each operating day cycle the boom from full stop to full stop and back again, noting the load indicator movement; it should rise and fall with the boom action. If the indication does not change, perform the weight test (paragraph 2.20).

2.17 COMPUTING PERCENT OF ERROR. To compute the percent of error, use the following formula:

Error (percent difference) =

$$\frac{\text{Actual Load minus Indicated Load}}{\text{Load Indicator System Maximum Capacity}} \times 100$$

#### 2.18 SYSTEM WEIGHT TEST

2.19 To ensure accuracy of the crane load indicator system installed on the crane, a weight of load test should be performed at 6 month intervals, and as specified below:

- a. Initial test at system installation.
- b. Subsequent test at crane certification.

A sample load test data worksheet is provided in Figure 2-6 and the weight test procedure is contained in paragraph 2.20.

#### 2.20 WEIGHT TEST. (See Figure 2-6)

- a. Assemble necessary equipment to perform test:
  - (1) Test weights, on the order 15, 35 and 75 percent of total system capacity. Known weights must be accurate to  $\pm 1$  percent.
  - (2) Rigging required to hoist test weights. If weight of rigging is to be included in test, its weight must also be known to  $\pm 1$  percent.

#### NOTE

Steps b thru e provide the average reading of raising and lowering the test load (paragraph 2.15).

- b. Hoist the test weights and write the indicator reading while hoisting, in the space provided on the worksheet.
- c. Lower the test weights and write the indicator reading while lowering, in the space provided on the worksheet.
- d. Add the readings obtained in steps b and c. Enter answer on worksheet.
- e. Divide the sum obtained in step d by 2 to get average. Enter answer on worksheet.

#### NOTE

Repeat steps b thru e for 2nd, 3rd and 4th hoists.

- f. Compute PERCENT OF ERROR on worksheet for each test weight used in the test. Refer to paragraph 2.18 for the formula used on the worksheet.
- g. If the computations of step f are within tolerance sign the worksheet. If they are not within tolerance, perform maintenance per Section 3.00 and repeat test.

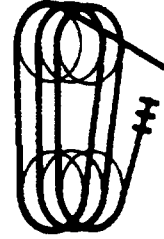
HOW TO COUNT PARTS OF LINE WHEN SHEAVES ARE LOCATED  
IN BOOM POINT AND TRAVELING LOAD BLOCK.



2 PARTS



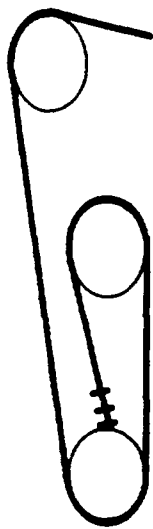
4 PARTS



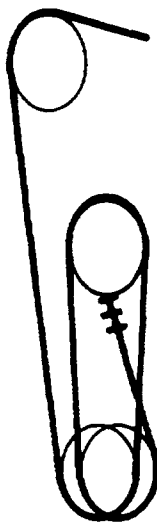
6 PARTS

MARTIN-DECKER LOAD CELL IS INSTALLED @ DEAD END.

HOW TO COUNT PARTS OF LINE WHEN UPPER BLOCK IS SUSPENDED  
AND WITH TRAVELING LOAD BLOCK.



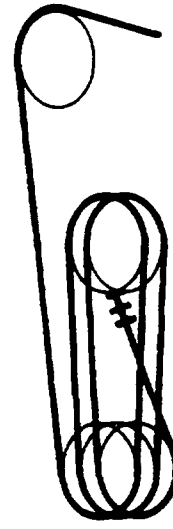
\*3 PARTS



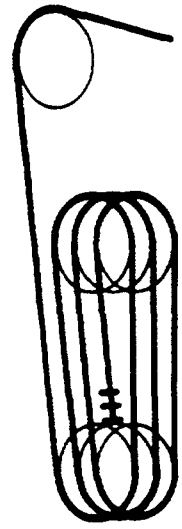
\*\*4 PARTS



\*5 PARTS



\*\*6 PARTS



\*7 PARTS

\* MARTIN-DECKER LOAD CELL IS INSTALLED ABOVE UPPER BLOCK.

\*\* MARTIN-DECKER LOAD CELL IS INSTALLED BELOW UPPER BLOCK  
@ DEAD END.

Figure 2-1. Counting Parts of Line

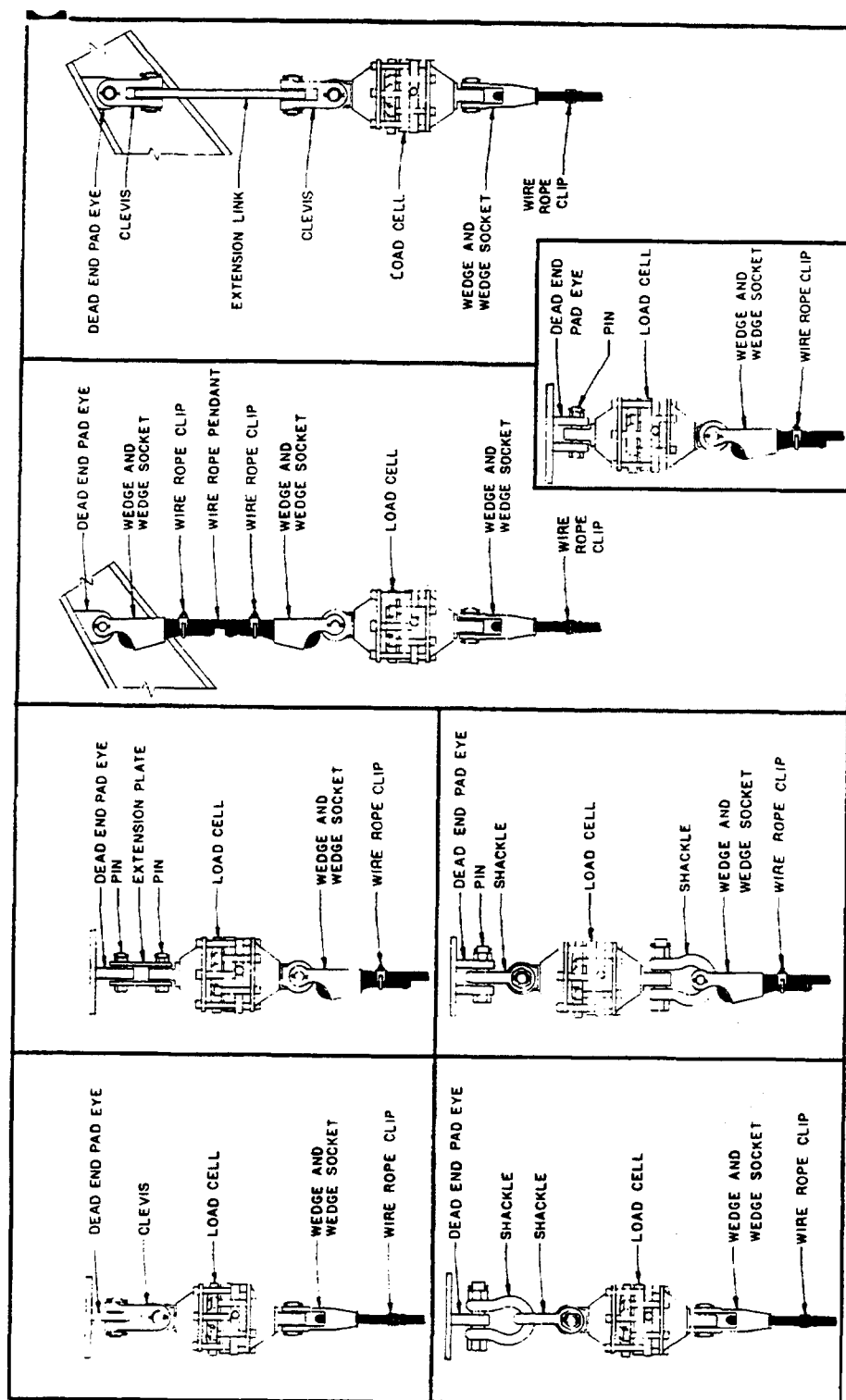


Figure 2-2. Typical Load Cell Installations

Drawing DD149

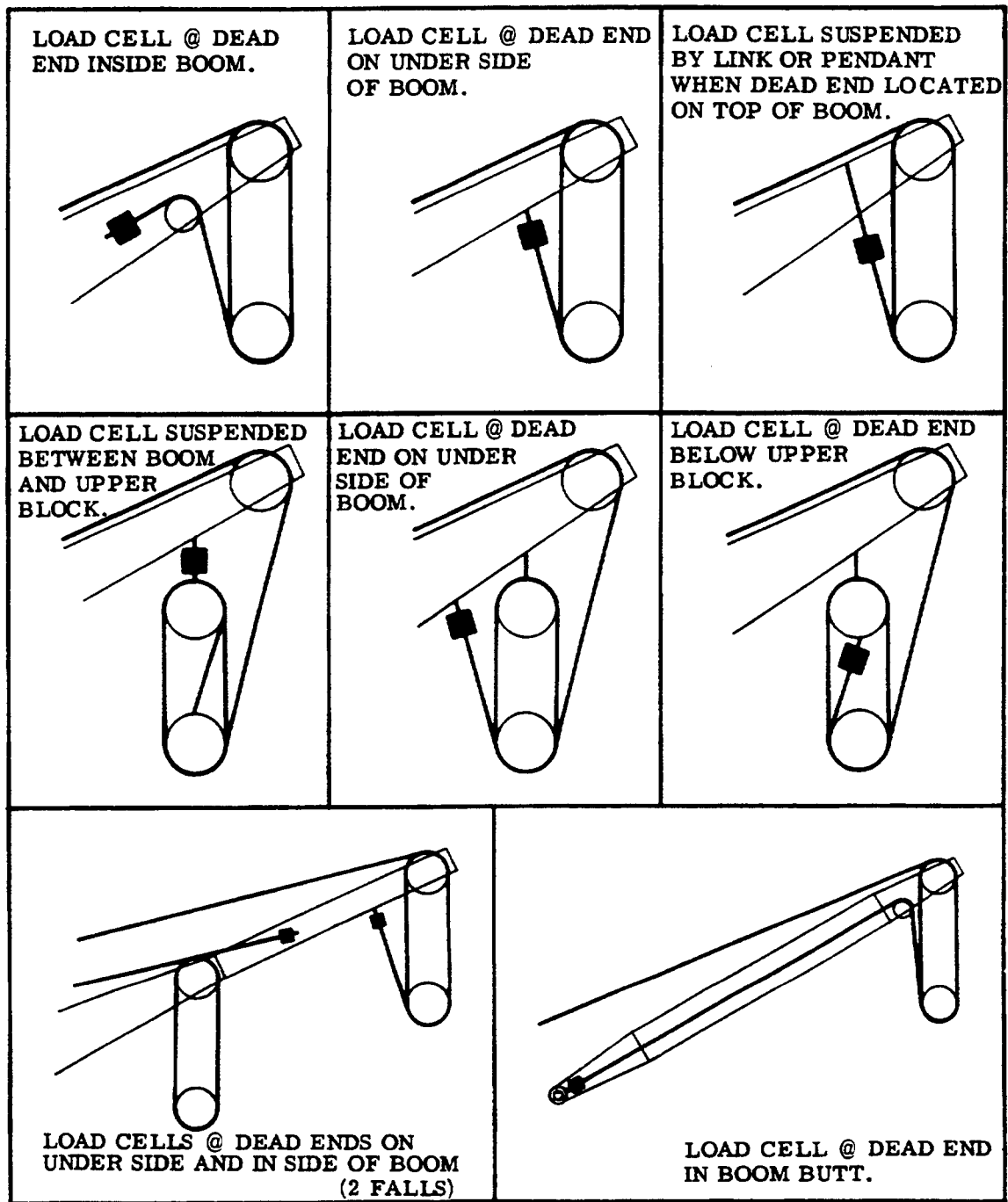


Figure 2-3. Typical Load Cell Installations

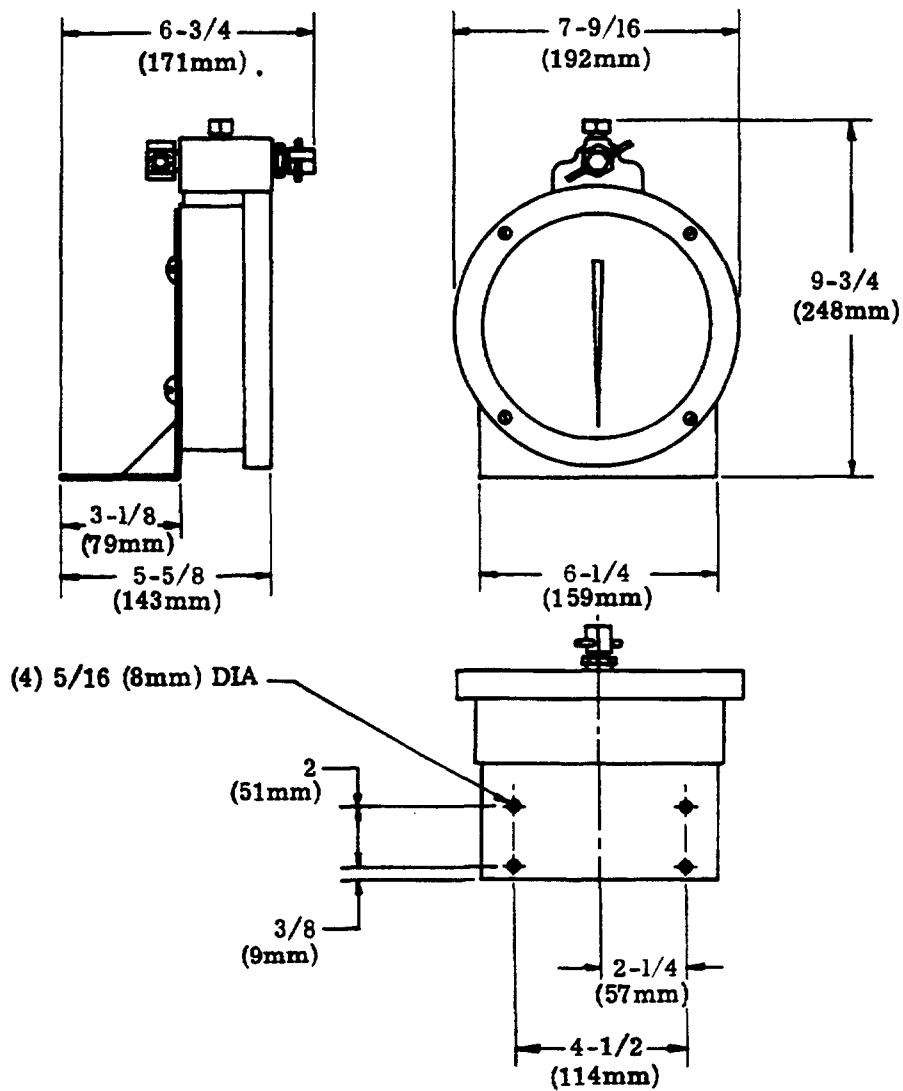


Figure 2-4. Overall Dimensions for 6 Inch Indicator and Bracket Installation

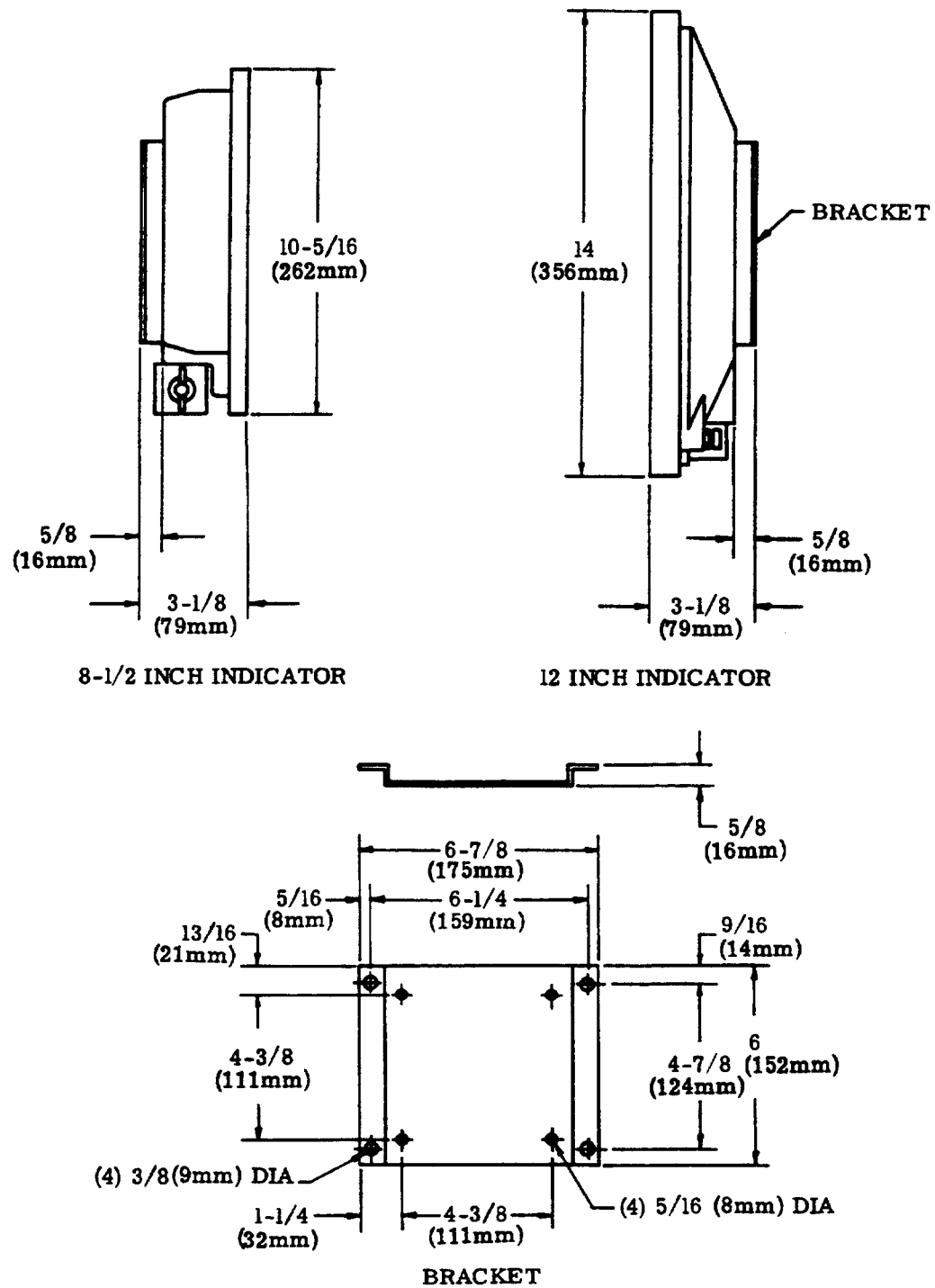


Figure 2-5. Overall Dimensions for 8-1/2 and 12 Inch Indicator and Bracket Installation

OWNER					DATE	
CRANE MFR.			MODEL		SERIAL	
DEVICE MFR. MARTIN-DECKER SANTA ANA, CALIF.			MODEL		SERIAL	
			SYSTEM CAPACITY			
CRANE CONFIGURATION AT TIME OF TEST						
LOCATION OF LOAD SENSOR						
TEST LOAD DATA: PERCENT OF TOTAL SYSTEM CAPACITY (APPROXIMATE). WEIGHT OF TEST LOAD TO INCLUDE ALL RIGGING (ACCURATE TO $\pm 1\%$ ).						
15%		35%			75%	
		1st HOIST 15%	2nd HOIST 35%	3rd HOIST 75%	4th HOIST 35%	
HOIST (INDICATOR READING)						
DOWNHAUL (IND READING)						
SUM OF TWO READINGS						
DIVIDED BY 2						
PERCENT OF ERROR COMPUTATIONS						
1st HOIST						
ACTUAL LOAD	MINUS	INDICATED LOAD	DIVIDED BY	SYSTEM CAPACITY		ERROR * (% DIFFERENCE)
	-		÷		X 100	
2nd HOIST						
ACTUAL LOAD	MINUS	INDICATED LOAD	DIVIDED BY	SYSTEM CAPACITY		ERROR * (% DIFFERENCE)
	-		÷		X 100	
3rd HOIST						
ACTUAL LOAD	MINUS	INDICATED LOAD	DIVIDED BY	SYSTEM CAPACITY		ERROR * (% DIFFERENCE)
	-		÷		X 100	
4th HOIST (REPEATABILITY PROOF TEST): 4th HOIST COMPUTATION SHOULD EQUAL 2nd HOIST COMPUTATION $\pm 1\%$ ; 2nd HOIST: 4thHOIST:						
CONDITION OF LOAD INDICATING DEVICE:						
INSPECTOR		ORGANIZATION			DATE	
* A plus error denotes an indicated load greater than actual load. A minus error denotes an indicated load less than actual load.						

Figure 2-6. Sample Load Data Test Worksheet



**3.00 MAINTENANCE**

**3.01 GENERAL.** The systems described in this manual require no maintenance. However, general operating practices should include:

- a. Cleaning indicator glass on an "as necessary" basis. This can be accomplished using any commercially available glass cleaning solution and a clean, soft, lint-free cloth.
- b. Visual inspection of the system prior to use, paying particular attention to the integrity of fittings and connections (no leakage) and that the load cell is free of any obstructions. Should any leakage and/or other malfunction be observed, refer to paragraph 3.03.

**3.02** The maintenance/repair procedures contained in this section and Section 4.00 are the only procedures that should be performed in the field. In situations involving a faulty component which cannot be removed and replaced, the faulty component should be returned to MARTIN-DECKER, Santa Ana, California, or authorized service facility for repair and recalibration.

**3.03 TROUBLESHOOTING**

**3.04** If, during operation, indication of system malfunction is observed (no load indication and/or sluggish, erratic or erroneous indication), refer to Table 3-1 for tabulation of probable causes and their corrective actions.

**TABLE 3-1. MALFUNCTION ISOLATION**

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
No Indication on Indicator	Damper closed	Open damper (para 2-13)
	Leaking disconnect assembly (in-line or at indicator)	Replace O ring in female half of disconnect (para 4-4)
	Loose and leaking hose connection	Tighten hose connection
	Obstruction in hose or tubing	Replace (para 2-7) or clean hose or tubing
Load Indication Too High	Improper zero (tare) setting	Adjust zero-set (tare) (para 2-12)
	System charge overload	Reduce (bleed) system hydraulic charge (para 4-7)
Load Indications Too Low	Improper zero (tare) setting	Adjust zero-set(tare)(para 2-12)
	Insufficient system charge	Charge system(para 4-6)
Erratic or Sluggish Load Indications	Incorrect damper setting	Correct damper setting (para 2-13)
	Insufficient system charge	Charge system (para 4-6)

#### 4.00 SYSTEM REPAIR

4.01 System repair is limited to removing a faulty component and replacing it with one in serviceable condition. This section of the manual covers repairs that may be readily performed in the field and does not include detailed disassembly/assembly procedures of the indicator and load cell. Field repairs consist of charging or bleeding the hydraulic system, removing and replacing the indicator, load cell and hydraulic hose.

#### 4.02 COMPONENT REPAIR

##### 4.03 DISCONNECT O RING REPLACEMENT.

If the O ring in the female half of the disconnect becomes damaged during mating, or other cause, it must be replaced to preserve the integrity of the system (Figure 4-1).

- a. Remove damaged O ring from female half of disconnect.
- b. Thoroughly clean O ring groove.
- c. Lubricate (using silicon lubricant, or equivalent) and install new O ring (Part No. B651-11A).
- d. Disconnect is ready to be returned to service. When reconnecting disconnect halves, refer to paragraph 2.05 step b, to preclude damaging O ring.

#### 4.04 CHARGING AND BLEEDING SYSTEM

4.05 HYDRAULIC FLUID ADDITION. The system must be kept full of hydraulic fluid at all times to accurately indicate hoisted weight. A quick check for adequate fluid in system is the gap between the load cell load plate and retainer ring. (Refer to Figure 4-2 for gap location and size).

- a. Remove all weight from load cell.
- b. Ensure that weight hose is free of kinks and sharp bends.
- c. Remove cap from F350-1 check valve on indicator damper.
- d. Close damper.
- e. Attach YA2 hand pump to check valve. Do not tighten.

- f. Fill hand pump reservoir with W15/W16 hydraulic fluid.

#### NOTE

Keep hand pump reservoir at least half full at all times to avoid introduction of air into system.

- g. Operate hand pump plunger slowly to bleed air from pump at check valve.
- h. When air bubbles cease (step g), tighten hand pump to check valve connection.
- i. Raise load cell to a position slightly higher than indicator.
- j. Loosen load cell plug (Figure 4-2).
- k. Pump fluid into system and bleed at load cell plug until air bubbles cease to appear.
- l. Tighten load cell plug.
- m. Pump enough fluid into system to achieve gap in load cell (Figure 4-2).
- n. Disengage hand pump from check valve.
- o. Replace and tighten check valve cap.
- p. Adjust damper as necessary (paragraph 2.11).

##### 4.06 HYDRAULIC FLUID REDUCTION.

Occasionally it may be necessary to reduce the quantity of hydraulic fluid in the system to achieve accuracy.

- a. Remove all weight from load cell.

#### NOTE

Use rags or a container to trap escaping fluid.

- b. Using a 5/8-inch wrench, loosen F350-1 check valve on indicator damper until fluid begins to escape from fitting.
- c. Check load cell for proper gap (See Figure 4-2).
- d. When load cell gap is correct, securely tighten F350-1 check valve.

**NOTE:** On or about 1 April 1981, J900-40 and J900-02 Series Disconnects were discontinued. All new assemblies now include J10900A-20 and J10900A-02 Series Disconnects. If in doubt order J996, J10900A-20 and J10900A-02 Series to ensure compatiability.

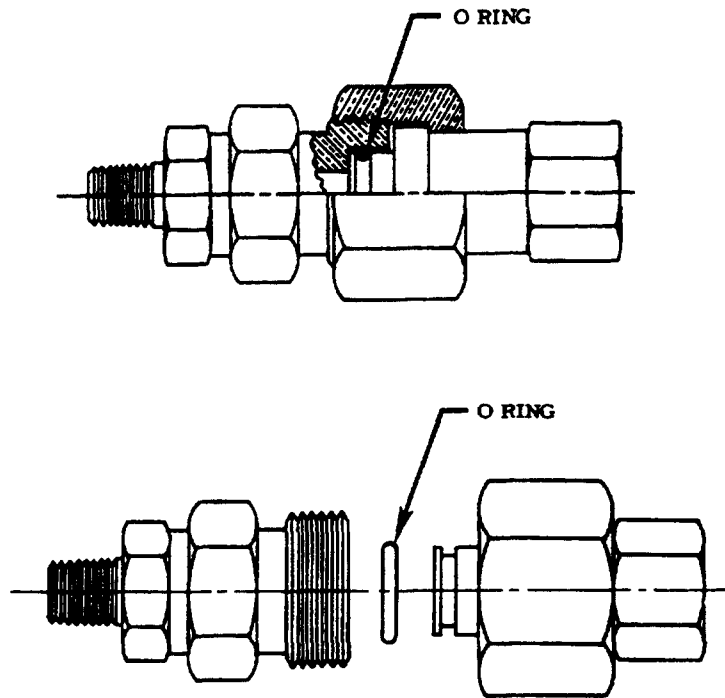


Figure 4-1. O Ring Replacement

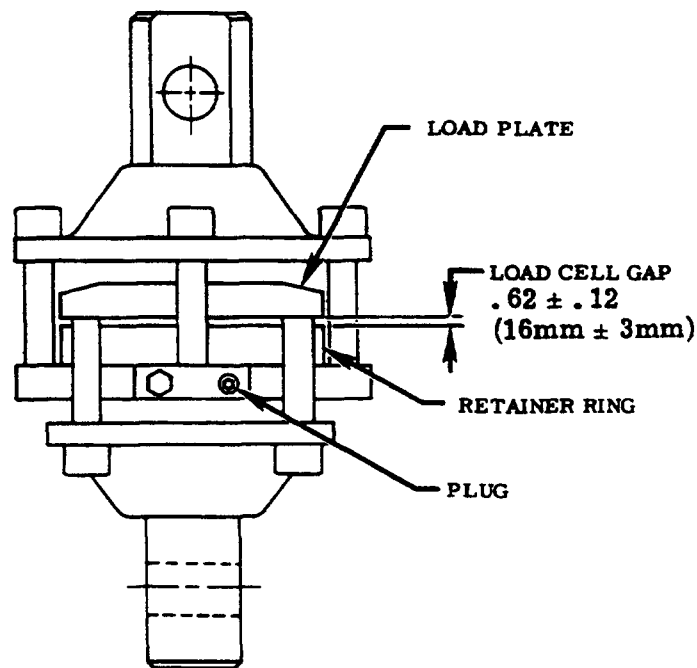


Figure 4-2. Load Cell Gap and Plug

# **ELECTRIC SWIVEL MAINTENANCE MANUAL**

## Maintenance Manual - S-100 Revolving Unit

Ex-Code: Eexd IIB T4 IP56  
25A 600V

Equipped With: (6) Cond 25 Amp Plus (5) Cond 10 Amp Silver Plated Rings

Applied Hydraulics P.O. Number: 40328

## MAINTENANCE MANUAL S-100.

### 1. GENERAL DESCRIPTION:

The Collector Column is a NEMKO approved EExd IIB T4 unit. It means that the Collector Column satisfy the demands to be used in Zone 1 area, where explosive gas can occur.

Brief description of the EExd IIB T4 code.

If an explosive gas occur in the same room as the Collector Column, we can expect the same gas is present inside the enclosure of the Collector Column. There is all reason to believe that eventual sparks from the brushes will ignite the gas inside the Collector Column. The following explosion inside the Collector Column will not ignite the outside room, because all gaps between flanges, bearings, etc. are constructed flame proof.

The Collector Column is tested with pressurised gas inside the Column and ignited. During ignition of the explosive gas in the Column the surrounding room is also filled with gas, which must not be ignited under the test. This is an absolute criteria for the NEMKO approval.

### 2. INSTALLATION OF COLLECTOR COLUMN.

NOTE! Also consult NEMKO test report and certification letter in addition to this manual.

The body of Collector Column is provided with a installation flange against platform side.

The part of the Collector Column which is rotating with the crane have a torque arm to carry the torque to rotate the slip ring unit.

Normal torque to rotate the Collector Column is near zero (only friction from rings/brushes and internal ball bearing).

**IMPORTANT:** There must be some flexibility between the stationary and rotating part of the Collector Column, because some misalignment may occur during the mounting in the crane.

The provided in/out cables and EExd cable gland are a part of EExd sealing, and must not be removed or replaced (Not applicable for the supplier in this case).

The Collector Column is equipped with an identification plate which gives the NEMKO classification.

*THIS IDENTIFICATION PLATE IS NOT TO BE REMOVED OR COVERED.*

### 3. GENERAL DEMANDS CONCERNING MAINTENANCE:

The enclosure ability to resist an internal explosion is tested and approved by NEMKO.

NEMKO demands the utmost carefulness during dis- and reassembling. The flameproof joints must not under any circumstances be damaged.

Ex authorised personnel must be used for maintenance work on this unit. All replaced part must be identical to the original supplied parts.

### 4. MAINTENANCE ROUTINES:

a) Daily inspection:

This inspection includes visual control of surface corrosion, mechanical damage, the state of cable entries and temperature.

b) Periodic inspection, recommended each year.

NOTE! Any disassembling and reassembling of the Collector Column chamber not executed by the manufacturer, excludes the manufacturer for any further responsibility. The frequency of this maintenance is dependent upon the intensity of use. Periodic inspection demands disassembling of the Exd-enclosure.

The periodic inspection should cover:

- I. General condition inside the Collector Column.
- II. Brush wear.
- III. Slip ring wear.
- IV. Cable shoes and screws secured.
- V. Surface on all insulation. (Must be clean and dry).
- VI. The shape of the flange joints. These flanges shall be treated with grease (not painted). Scratches in the flame proof joints are not accepted.
- VII. Internal vacuum-cleaning.

5. DISASSEMBLING:

Uncovering the main slip ring unit in the Exd chamber:

Disconnect all power.

Remove the 8 pcs. M8 screws and lift of the EExd enclosure.

Rings/brushes are now free for inspection.

NOTE!

Use great care to prevent marks/scratches in the flanges, because these are a part of the flameproof joints.

Wipe the enclosure flanges clean and regrease the flanges before assembling.



**TILLEGG TIL  
KONFORMITETSSERTIFIKAT**

**SUPPLEMENT TO  
CERTIFICATE OF CONFORMITY**

NEMKO Nr. Ex 92C400

Tillegg 1

Sertifikatet er utvidet til  
å omfatte alternativ  
utførelse med typebetegnelse:

S-100

Med Ex-kode:

EEx d IIB T4

Beskrivende dokument:

8683-A1-1993-10-26

Data:

100A 660V

Routine test:

Hver enkelt kapsling skal  
gjennom en rutinestrykktest  
på 12,45 bar iht. punkt 15.1  
CENELEC EN 50018

Prøverapport:

M 70695

Oslo, 1994-01-13

NEMKO

*Rolf Hoel*

Rolf Hoel  
Leder for seksjon for Ex-utstyr  
Head of Section for Ex-equipment

Supplement 1

The certificate is extended to include  
alternative design, with the following type  
designation:

With Ex-code:

Descriptive document:

Data:

Routine test:

Every single enclosure shall be submitted  
to a routine pressure test of 12,45 bar  
according to clause 15 of CENELEC EN 50018

Test Report:

*Bjørn Spongsveen*  
B. Spongsveen

# **AIR CONDITIONER INSTALLATION INSTRUCTIONS MANUAL**



**SCIENTIFIC  
SYSTEMS  
CORPORATION**

*A Member of Marduk Holding Corp.*

**9020 So. Choctaw Drive    Baton Rouge LA 70815    Ph (225) 926-6950    FAX (225) 926-6973**

## **Certificate of Conformance**

### **Explosion Proof Air Conditioning and Refrigeration Equipment**

This is to certify that to the best of our knowledge and belief equipment manufactured for and shipped to:

Applied Hydraulics

under customer Purchase Order Number 40609 and Scientific Systems Job Number 4699 conforms to the requirements of the United States of America National Electric Code Class I, Group C/D, Division 2 for equipment to be operated in hazardous areas. Where equipment has been modified such modification voids UL or other ratings granted prior to approval.

SERIAL NO.                      JGES-04459  
MODEL NO.                      WACX-0503-RC

John S. Forrester, Ph.D.,  
General Manager

Attested this 9 day of November, 1998

***Excellence in Products and Services for Industry***



# SCIENTIFIC SYSTEMS CORPORATION

*A Member of Marduk Holding Corp.*

9020 So. Choctaw Drive    Baton Rouge LA 70815    Ph (225) 926-6950    FAX (225) 926-6973

## *SafetyCool* AIR CONDITIONER INSTALLATION INSTRUCTIONS

### ELECTRICAL REQUIREMENTS

**IMPORTANT:** Before beginning the actual installation of the air conditioner, check local electrical codes and the information below.

The air conditioning unit must be connected to a power supply with the same A.C. voltage and hertz as marked on the data plate located on the outside on the cabinet. Only alternating current (A.C.) can be used.

**CIRCUIT PROTECTION** - If the air conditioner is connected to a circuit protected by a fuse, use a "TIME-DELAY" fuse due to momentary high current demand when the air conditioner is started.

Refer to the electrical data plate located on the outside of the cabinet to determine the correct fuse or circuit breaker amperage.

These instructions are for the 5600 BTUH *SafetyCool* air conditioners. The following table lists the cabinet size.

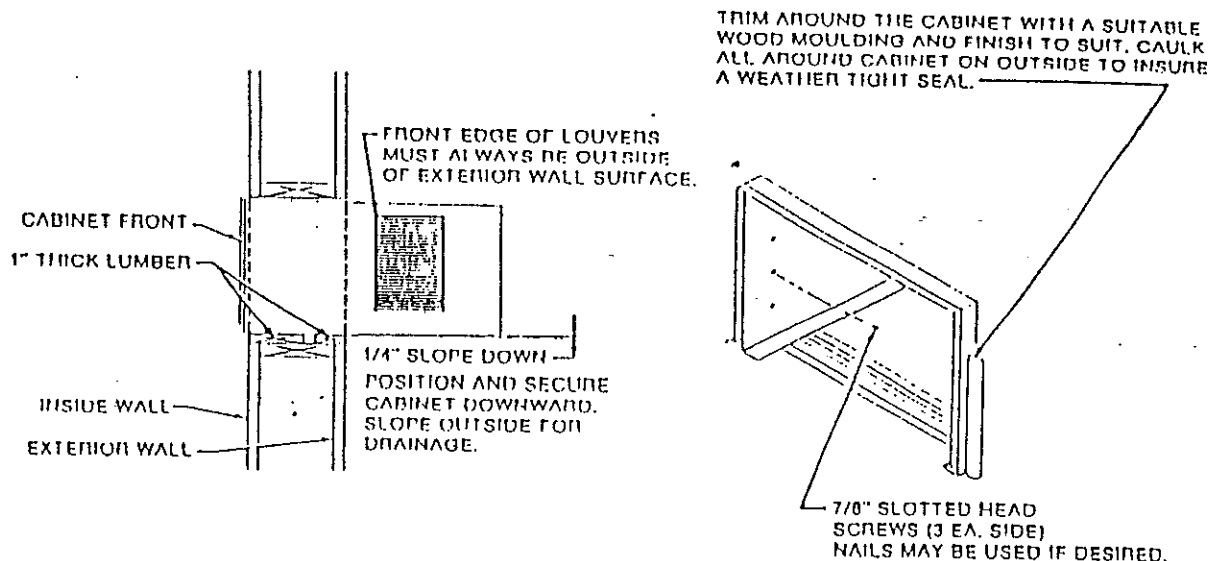
MODEL NO.	CABINET SIZE *
WACX-0503	14-0/0" High x 19-3/4" Wide x 21-3/8" Deep

### INSTALLATION

- STEP 1.** Remove decorative plastic front and accessory pack to a safe area away from unit.
- STEP 2.** Some Models have a shipping bolt fastened through the bottom of the base pan. Place the unit on its left side and remove the bolt if one is there.
- STEP 3.** Grasp the handpulls and while an assistant holds the cabinet stationary, pull the chassis out of the cabinet. As you slide the unit out, notice a foam gasket between the chassis and the cabinet. Save this gasket and reinstall per step 12.

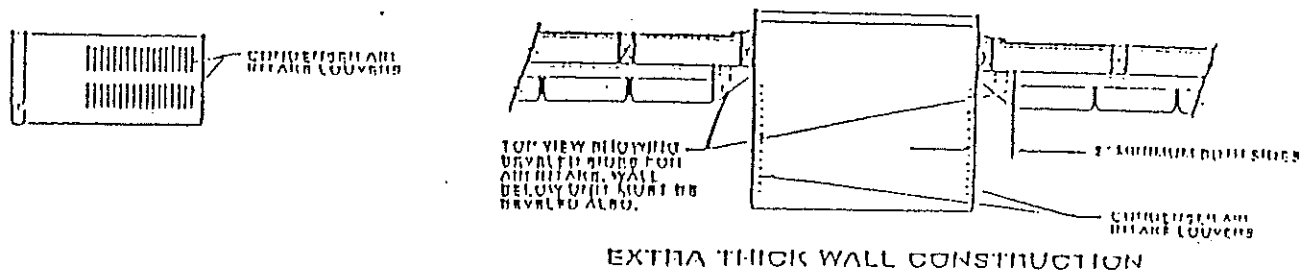
STEP 4. WALL PREPARATION: The maximum wall thickness permissible without special construction is 6-1/4". THE CONDENSER-AIR-INTAKE LOUVERS MUST NOT BE BLOCKED BY EXTENDING INSIDE THE WALL AREA. (See Figure A, page 2.)

FIGURE A.



SPECIAL INSTRUCTIONS FOR EXTRA THICK WALLS: For installation in walls exceeding the maximum said thickness the following construction may apply. (See Figure B.)

FIGURE B.



STEP 5. CHECKING WIRING AND PLUMBING: Check all wiring and plumbing inside and outside of wall to be sure none will be broken where hole is to be cut.

STEP 6. HOLE CONSTRUCTION: Depending upon size of unit to be installed, layout hole dimensions per chart below. Cut and frame in hole to finished dimensions. Use 2" x 4" material for framing and follow the suggested typical installations (See Figure C, Page 4).

NOTE: IF THE WALL CONSTRUCTION IS TYPICAL FRAME OR 2" X 4" STUDDING WITH BRICK OR STONE VENEERS, LOCATE THE HOLE NEXT TO ONE OF THE STUDS. FOR MASONRY, CONCRETE OR CINDER BLOCK WALLS, LOCATE HOLE FOR CONVENIENCE.

FINISHED CUT-OUT DIMENSION	
HEIGHT	14-3/4"
WIDTH	20-0/0"
NOTE: THESE DIMENSIONS ARE FOR FINISHED CUT-OUT SIZE	

STEP 7. Slide the cabinet into the hole far enough to allow the sill channel to contact the inside wall surface. (See Figure D, page 4.)

STEP 8. Drill three (3) 5/32" dia. pilot holes through holes in sill-channel and install three (3) #12A x 2" long screws.

STEP 9. Attach the (optional) outside support frame (See Engineering Data Sheet).

NOTE: MOLLY, TOGGLE, OR EXPANSION ANCHOR BOLTS MAY BE USED AS AN ALTERNATE FASTENER FOR SECURING THE SILL-PLATE IN THE WALL AND THE SUPPORT FRAME TO THE OUTSIDE WALL (NOT FURNISHED WITH UNIT BUT AVAILABLE AT LOCAL HARDWARE STORE).

FIGURE C.

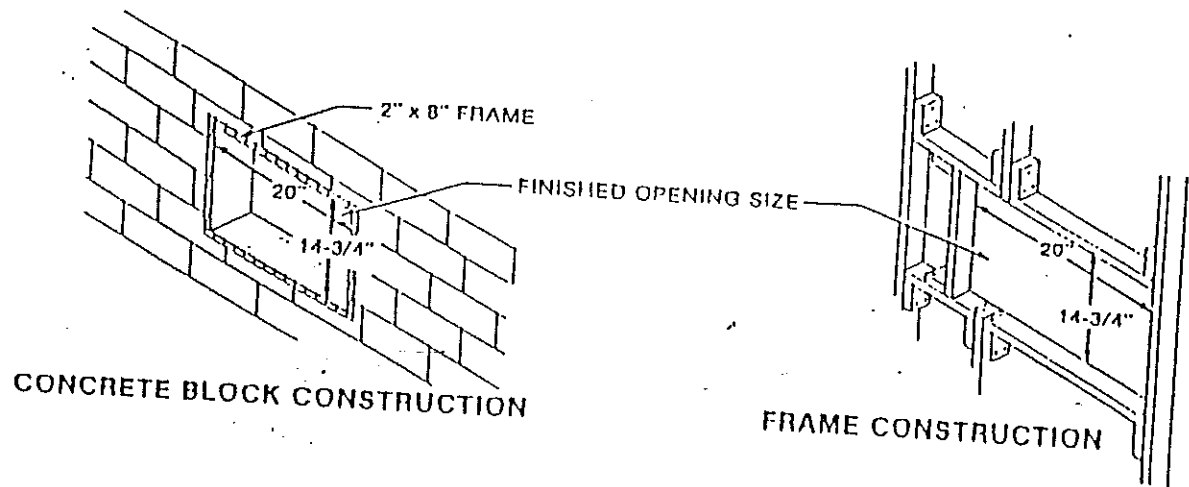
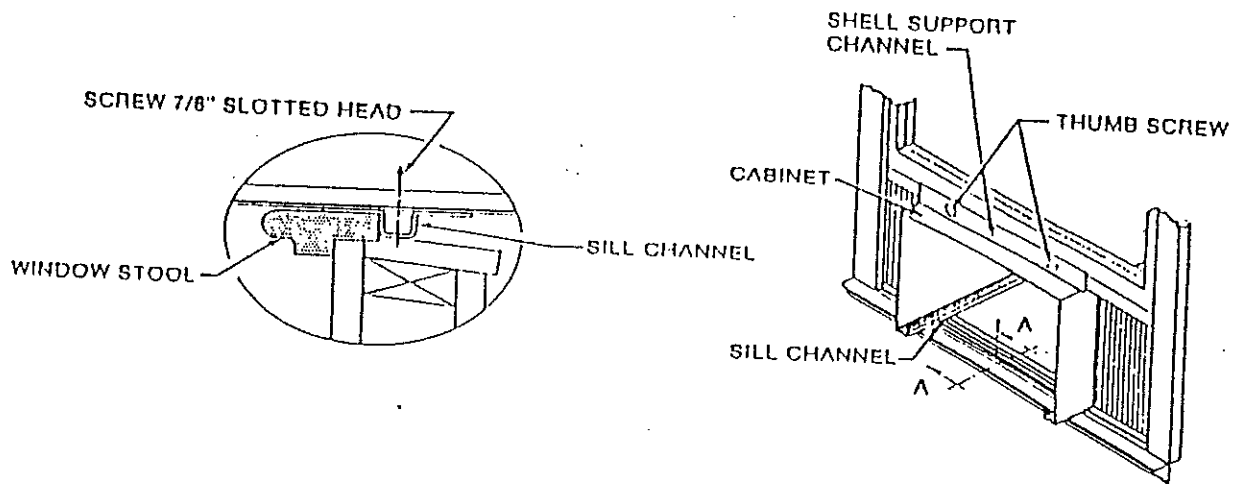
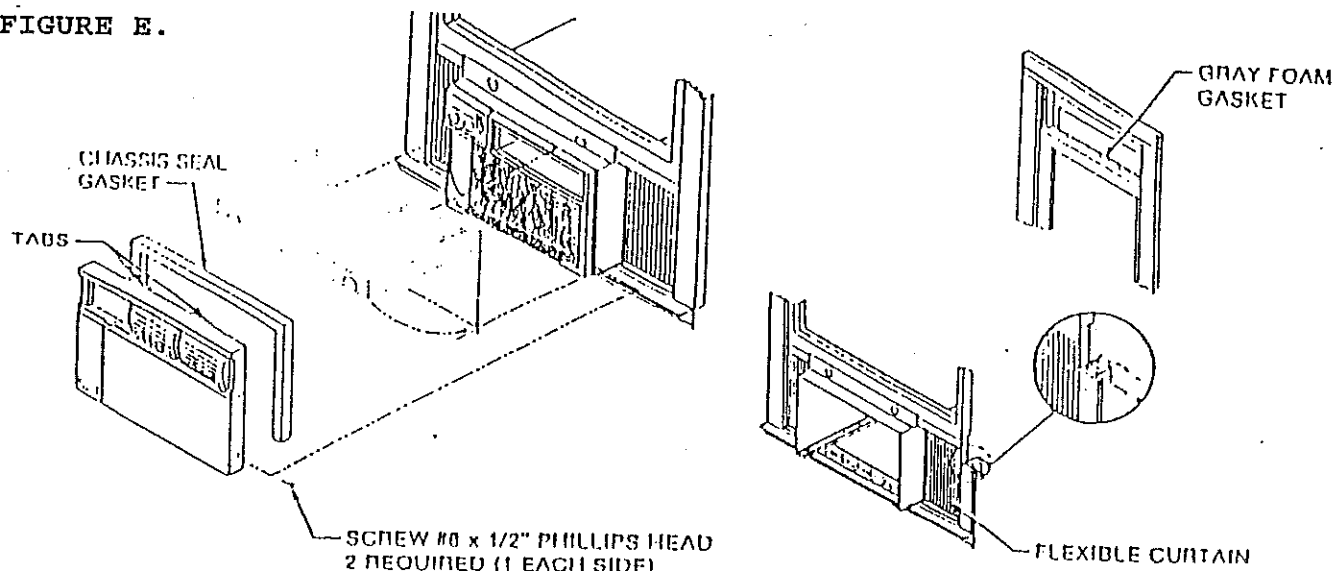


FIGURE D.



- STEP 10. If desired, trim around the cabinet on the room side with a suitable frame molding furnished by the installer (See Figure A, page 2).
- STEP 11. **INSTALL CHASSIS:** Lift chassis by the base pan and slide into cabinet full depth.
- STEP 12. Reinstall **CHASSIS SEAL GASKET**, CAREFULLY 'STUFF' gasket between chassis and cabinet starting at either bottom corner and go up the side, across top and down opposite side. It is **IMPORTANT** that this gasket be properly installed as it prevents air leakage around chassis.
- STEP 13. **INSTALL DECORATIVE FRONT:** Hold the decorative front as shown in Figure E. Insert the two tabs into the slots in the top of the cabinet and lower the bottom of the decorative front to the bottom of the cabinet. (Allow the power cord to extend from the unit through one of the openings in the bottom of the decorative front.) Attach the front to the cabinet with two #8 x 1/2" Phillips Head screws.
- STEP 14. Be sure filter is in place. After front frame assembly is in place, replace the intake grille by inserting tabs into front frame assembly and snap intake grille closed.

FIGURE E.



**HARDWARE INCLUDED FOR INSTALLATION**

- 10 - No. 8 x 7/8" Slotted Head Screws
- 8 - No. 8 x 3/8" Slotted Head Screws
- 2 - No. 8 x 1/2" Phillips Head Screws
- 1 - Window Seal Gasket

\*10 Screws required for thru-the-wall installation. Only 1 required for Sash Windows.

INSTALL A SUITABLE BLOCK OF WOOD ON DOWEL PIN ABOVE THE WINDOW SASI TO PREVENT ACCIDENTAL OPENING. INSTALL GRAY FOAM GASKET AS SHOWN



Complete and return the Warranty Registration Card today so we can activate your warranty and keep you advised on new equipment or any safety related updates.

You are now ready to operate! If any additional information or assistance is needed, call TOLL FREE (800) 654-3857.

## *SafetyCool*

WINDOW or THRU-the-WALL AIR CONDITIONER

MASTER PARTS LIST

MODEL NO. WACX-0503

DATE 06/05/97

\*\* DESIGNATES RECOMMENDED SPARE PART

REF		PART NAME	DESCRIPTION	QTY/UNIT
01		CONTROL BOX ASSEMBLY	SSC, WACX-074500003	1 ea.
01C	**	THERMOSTAT	SSC, WACX-26004	1 ea.
01D	**	ROTARY SWITCH	SSC, WACX-48050	1 ea.
01E		OPERATOR	SSC, WACX-XPOS	1 ea.
01F		NAME TAG	SSC, WACX-074500010	1 ea.
13		WINDOW UNIT	SSC, WACX-SQ05H10	1 ea.
14		COMPRESSOR (MODIFIED)	SSC, WACX-61562510	1 ea.
15		FAN MOTOR (MODIFIED)	SSC, WACX-61071457	1 ea.
16		FRONT GRILLE	SSC, WACX-61637702	1 ea.
17		UNIT SHELL (MODIFIED)	SSC, WACX-61623000	1 ea.
18		CONDENSER COIL	SSC, WACX-61600336	1 ea.
19		EVAPORATOR COIL	SSC, WACX-61600244	1 ea.
20	**	MOTOR CAPACITOR	SSC, WACX-61580301	1 ea.
21		FAN BLADE	SSC, WACX-61634000	1 ea.
22		BLOWER WHEEL	SSC, WACX-60610604	1 ea.

## Troubleshooting Guide

### READ BEFORE ATTEMPTING TO SERVICE

This equipment conforms to ANSI, NFPA 70, Article 500 of the National Electrical Code Class I Group C/D Division 2. No other claims are made or implied. Person or persons placing this equipment into service assume full and total responsibility that the equipment and the installation meet the safety requirements for the hazardous area.

The service or replacement of motors and/or any electrical or mechanical components must be made by qualified personnel, without any modification of the existing wiring; parts used must meet the above code requirements.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Compressor does not run.	Low Voltage	Check for voltage at compressor. Units will operate at 10% voltage variance.
	Thermostat not set cold enough or inoperative	Set thermostat to coldest position. Test thermostat and replace if inoperative.
	Compressor hums but cuts off on compressor overload.	Hard start compressor. Direct test compressor. If compressor starts, add optional hard start kit.
	Open or shorted compressor windings.	Check for continuity and resistance.
	Open capacitor.	Test capacitor and replace if inoperative.
	Inoperative system switch.	Test for continuity in all positions. Replace if inoperative.
	Broken, loose or incorrect wiring.	Refer to wiring diagram to check wiring.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Fan motor does not run.	Inoperative system switch.	Test switch and replace if inoperative.
	Broken, loose or incorrect wiring.	Refer to wiring diagram to check wiring.
	Open capacitor.	Test capacitor and replace if inoperative.
	Fan speed switch open.	Test switch and replace if inoperative.
	Inoperative fan motor.	Test fan motor and replace if inoperative (be sure internal overload has had time to reset.)

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Does not cool, or cools only slightly.	Thermostat open or inoperative.	Set to coldest position. Test thermostat and replace if necessary.
	Dirty filter.	Clean with warm soapy water and air dry.
	Dirty or plugged condenser or evaporator coil.	Use cold water stream or air to clean. DO NOT USE STEAM OR HOT WATER.
	Poor air circulation in area being cooled.	Adjust air louvers. Use high fan speed.
	Fresh air or exhaust air door open on applicable models.	Close doors. Instruct customer on use of this feature.
	Low capacity - undercharge.	Check for leak and make repair.
	Compressor not pumping properly.	Check amperage draw against nameplate. If not conclusive, make pressure test.
	Hot Gas bypass valve inoperative or not adjusted correct.	Adjust valve to maintain a 55# suction pressure with evaporator blocked.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Unit does not run.	Fuse blown or circuit tripped.	Replace fuse, reset breaker. If repeats, check fuse or breaker size. Check for shorts in unit wiring and components.
	Power cord not plugged in.	
	System switch in "OFF" position.	Set switch correctly.
	Inoperative system switch.	Test for continuity in each switch position.
	Loose or disconnected wiring at switch or other components.	Check wiring and connections. Reconnect per wiring diagram.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Evaporator coil freezes up.	Dirty filter.	Clean with warm soapy water and air dry.
	Restricted air flow.	Check for dirty or obstructed coil - clean as required.
	Inoperative thermostat.	Test for shorted thermostat or stuck contacts.
	Short of refrigerant.	De-ice coil and check for leak.
	Inoperative fan motor.	Test fan motor and replace if inoperative.
	Partially restricted capillary.	De-ice coil. Check temperature differential across coil. Touch test coil return bends for same temperature. Test for low running current.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Compressor runs continually. Does not cycle off.	Excessive heat load.	Unit undersized. Test cooling performance of unit. Replace with larger unit.
	Restriction in line.	Check for partially iced coil. Check temperature split across coil.
	Low refrigerant charge.	Check for leak and make repair. Recharge with proper amount of refrigerant.
	Thermostat contacts stuck.	Check operation of thermostat. Replace if contacts remain closed.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Thermostat does not turn unit off.	Thermostat set at coldest point.	Turn thermostat to higher temperature setting to see if unit cycles off.
	Thermostat contacts stuck.	Check operation of thermostat. Replace if contacts remain closed.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Compressor attempts to start, or runs for short periods only. Cycles on overload.	Compressor attempts to start before system pressures are equalized.	Allow a minimum of 2 minutes for pressure to equalize before attempting to restart.
	Low or fluctuating voltage.	Check voltage with unit operating. Air conditioner should be on separate circuit for proper voltage and fused separate.
	Shorted or incorrect capacitor.	Check by substituting a known good capacitor of correct rating.
	Restricted or low air flow through condenser coil.	Check for proper fan speed or blocked condenser.
	Compressor running abnormally hot.	Checked for kinked discharge line or restricted condenser. Check amperage.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Thermostat does not turn unit on.	Loss of charge in the thermostat bulb.	Place jumper across thermostat terminals to check if unit operates. If unit operates replace thermostat.
	Lose or broken parts in thermostat.	Check as above.

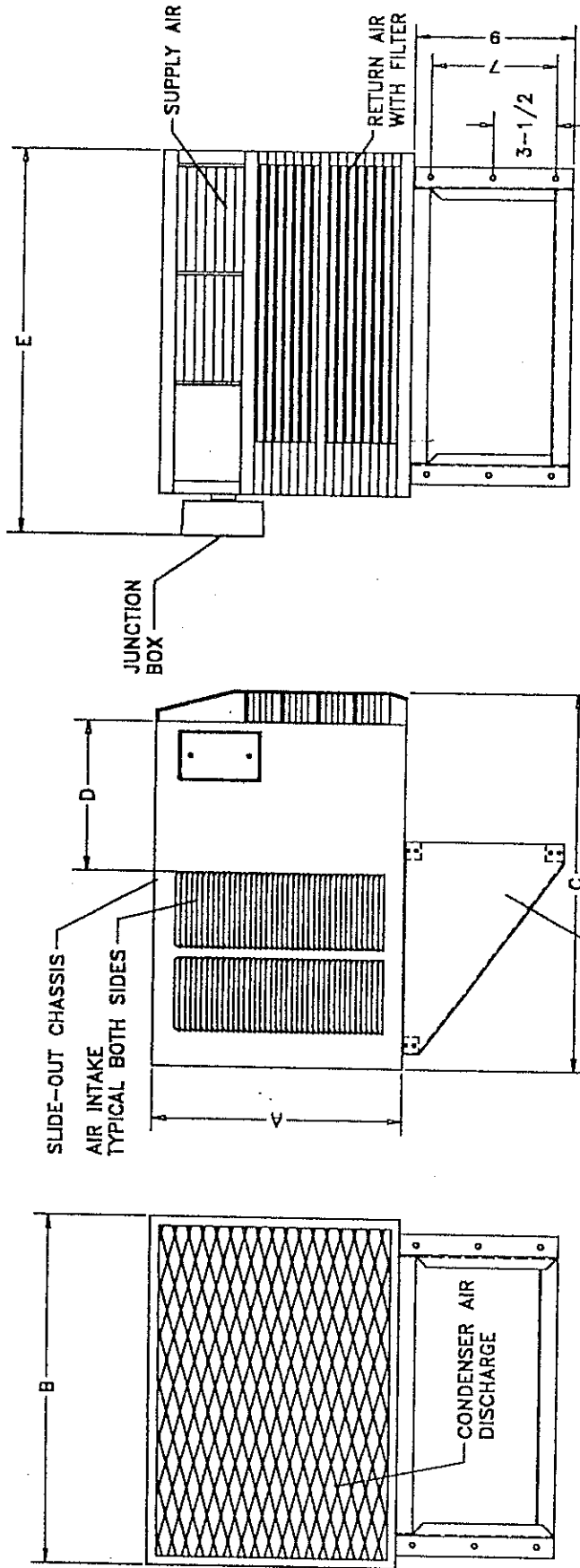
PROBLEM	POSSIBLE CAUSE	TO CORRECT
Noisy operation.	Poorly installed unit.	Refer to installation Instructions for proper installation.
	Fan blade striking chassis.	Reposition - adjust motor mount.
	Compressor vibrating.	Check that compressor grommets have not deteriorated. Check that compressor mounting parts are not missing.
	Improperly mounted or loose cabinet parts.	Check assembly and parts for looseness rubbing and rattling.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Water leaks into room.	Evaporator drain pan overflowing.	Clean obstructed drain trough.
	Condensation forming on base pan.	Evaporator drain pan broken or cracked. Reseal or replace.
	Poor installation resulting in rain entering the room.	Check installation instructions. Reseal as required.
	Condensation on discharge grilles.	Dirty evaporator coil - clean. Very high humidity level.

# REAR VIEW

# LEFT SIDE

# FRONT VIEW

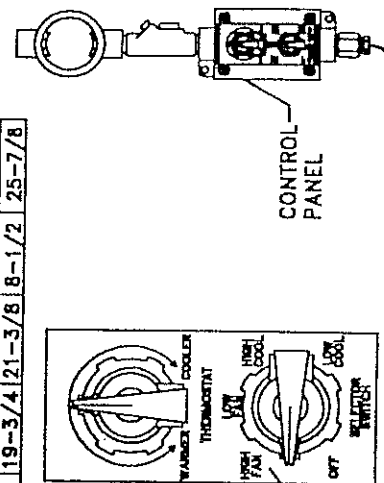


16 GA. SUPPORT FRAME  
(OPTIONAL)

CUT OUT DIMENSIONS (IN.)		
WIDTH	HEIGHT	
20	14-3/4	

MODEL NO.	CAPACITY BTU/HR	VOLTAGE 60 Hz	FUSE SIZE AMPS	UNIT AMPS	COMPRESSOR F.L.A.	COMPRESSOR L.R.A.	FAN F.L.A.	AIR FLOW CFM	R-22 OZ	CHARGE	NET WEIGHT LBS	A INCHES	B INCHES	C INCHES	D INCHES	E INCHES
WACX-0503-RC	5,600	115	15	5.4	4.71	30.1	0.69	265	16		81	14	19-3/4	21-3/8	18-1/2	25-7/8

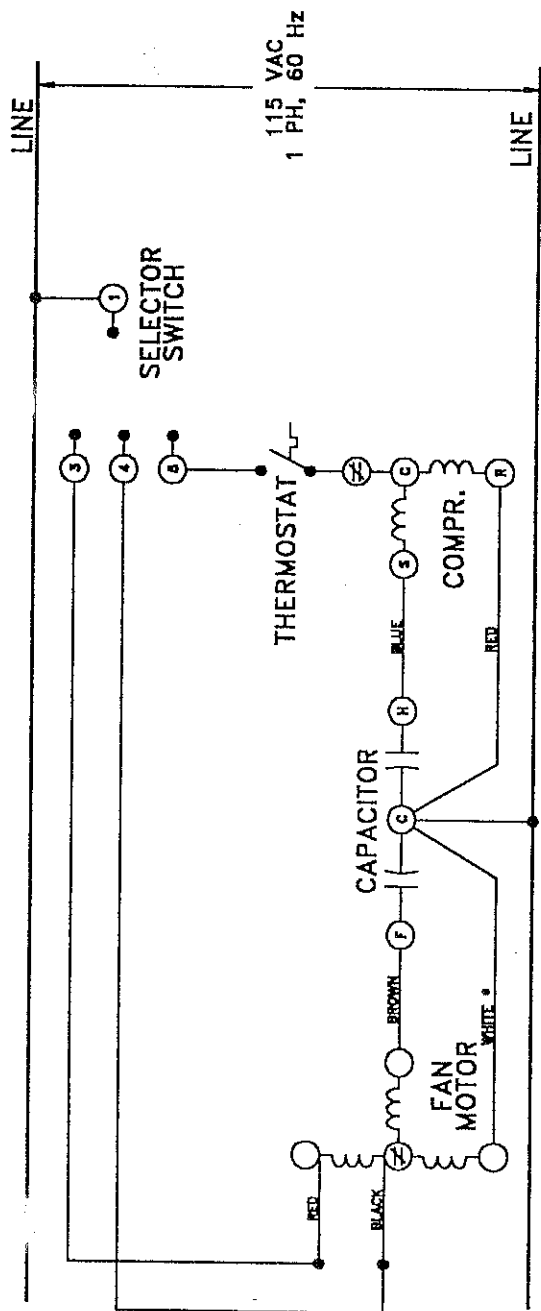
- ☒ (STANDARD) CARBON STEEL HOUSING WITH BAKED ENAMEL FINISH
- ☐ (OPTIONAL) CARBON STEEL HOUSING AND INTERNAL METAL PARTS EPOXY FINISHED
- ☐ (STANDARD) EVAPORATOR AND CONDENSER COILS COPPER TUBES WITH ALUMINUM FINS
- ☐ (OPTIONAL) EVAPORATOR AND CONDENSER COILS SERVOCOIL 101 COATED
- ☐ (OPTIONAL) ALL EXPOSED COPPER TUBING EPOXY PAINTED
- ☒ (STANDARD) REMOTE CONTROLS (THERMOSTAT & SELECTOR SWITCH CLASS 1 GROUP C/D DIVISION 2)
- ☐ (OPTIONAL) REMOTE CONTROLS (THERMOSTAT & SELECTOR SWITCH CLASS 1 GROUP B,C,D DIVISION 2)
- ☐ (OPTIONAL) GALVANIZED SUPPORT FRAME
- ☐ (OPTIONAL) TYPE 316 STAINLESS STEEL SUPPORT FRAME
- ☐ (OPTIONAL) LOW AMBIENT CONTROL, FOR OPERATING WHEN OUTDOOR AMBIENTS ARE BELOW 55°F
- ☒ (STANDARD) ELECTRICAL CLASSIFICATION N.E.C. CLASS I GROUP C/D DIVISION 2
- ☐ (OPTIONAL) ELECTRICAL CLASSIFICATION N.E.C. CLASS I GROUP B,C,D DIVISION 2
- ☐ (OPTIONAL) ELECTRICAL CLASSIFICATION N.E.C. CLASS II GROUP E,F,G DIVISION 2



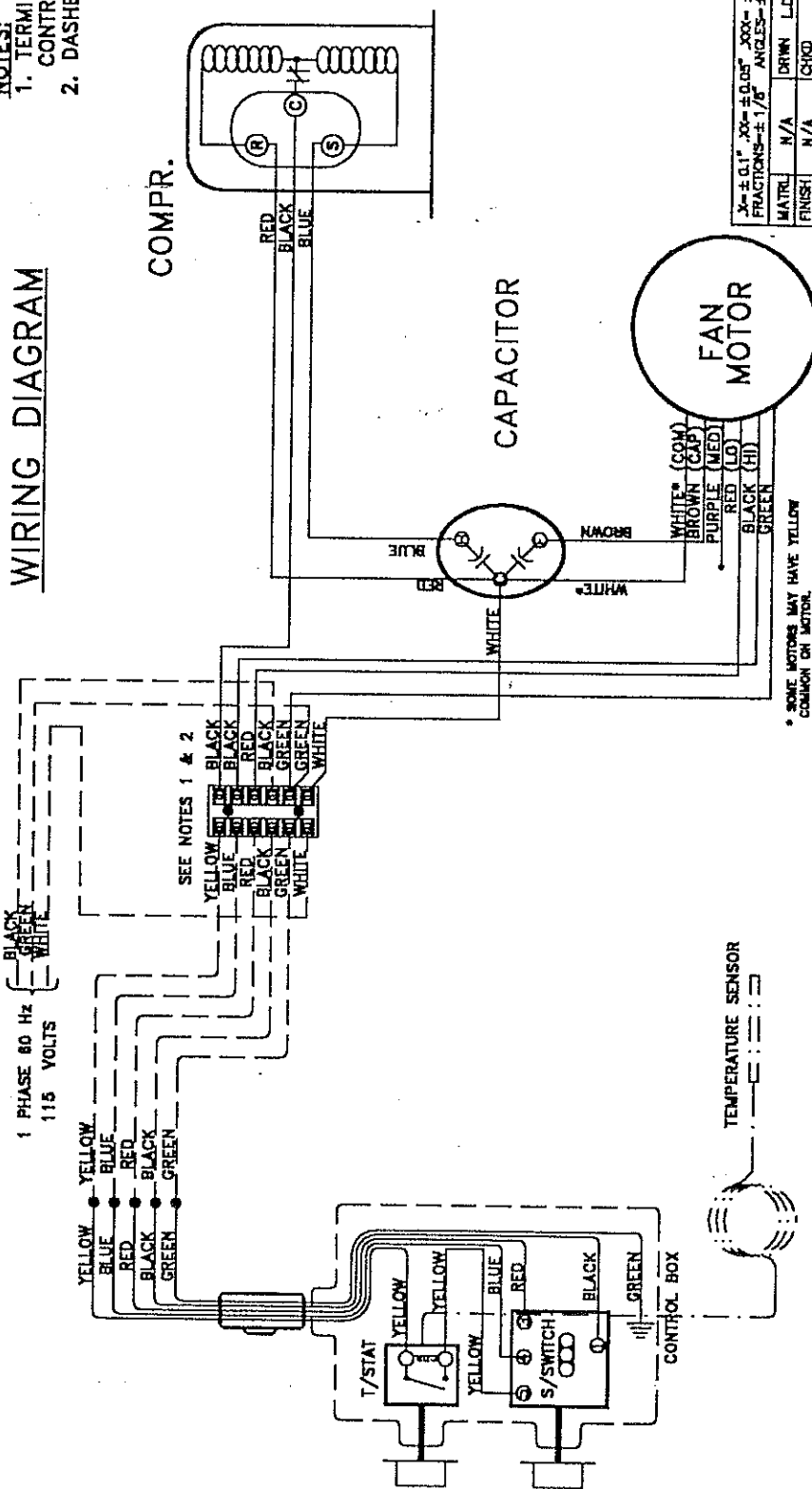
CONTROL PANEL DETAIL

X=±0.1" X0=±0.05" .XXX=±0.01" FRACTIONS=±1/8" ANGLES=±1.0°		SCIENTIFIC SYSTEMS CORP.	
MATL	DRWN	L.D.T.	80 THE SERIES REMOTE
FINISH	CHKD		ENGINEERING DATA SHEET
ACAD	50740013	APVD	DWG. # 074-50-0013
		DATE	11/88
		REV	
		BY	
		DATE	11/88
		BY	
		DATE	11/88
		BY	

**END**



## WIRING DIAGRAM

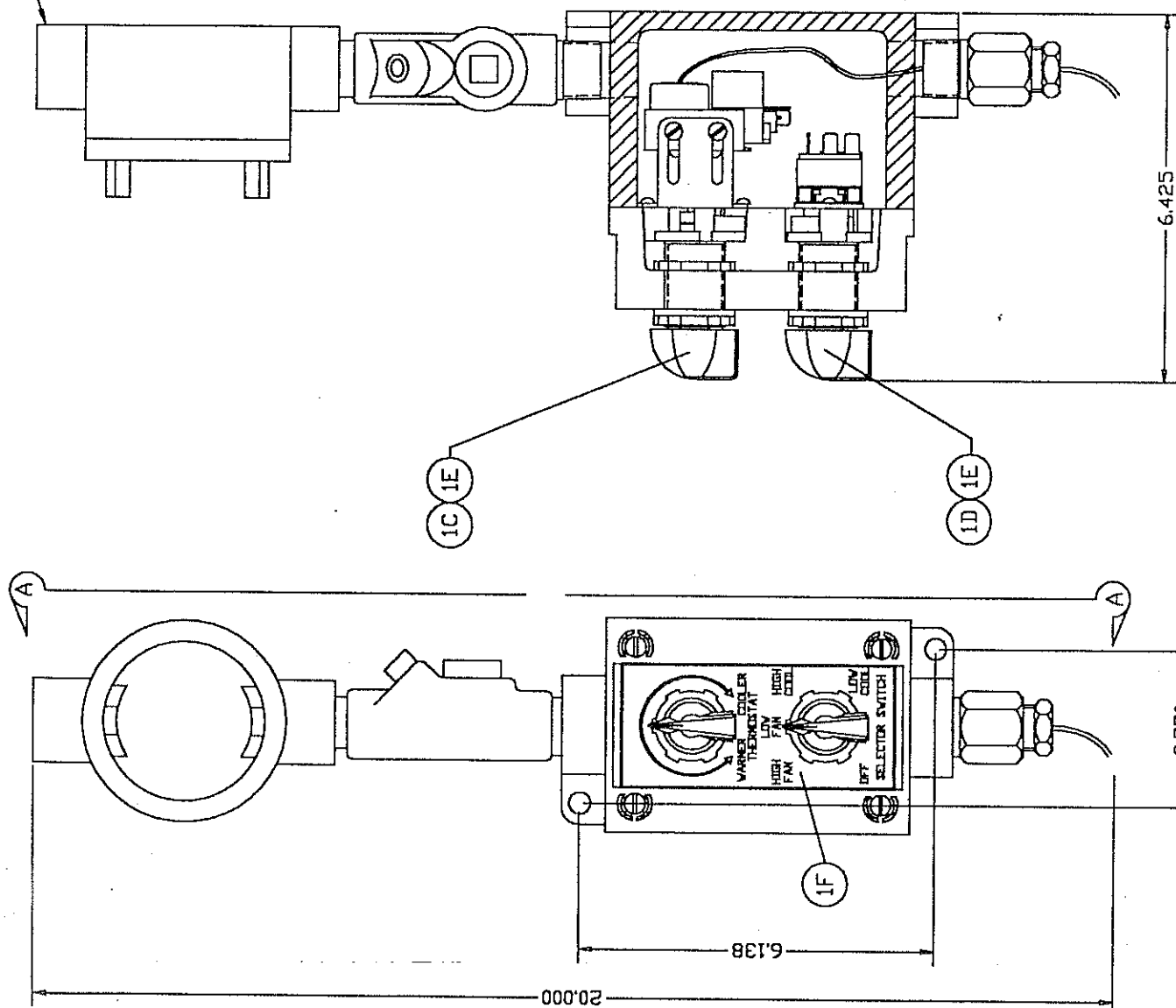


\* SOME MOTORS MAY HAVE YELLOW  
COMMON ON MOTOR.

[illegible]



3/4" NPT



XX - REF. NUMBER ON MASTER PARTS LIST.

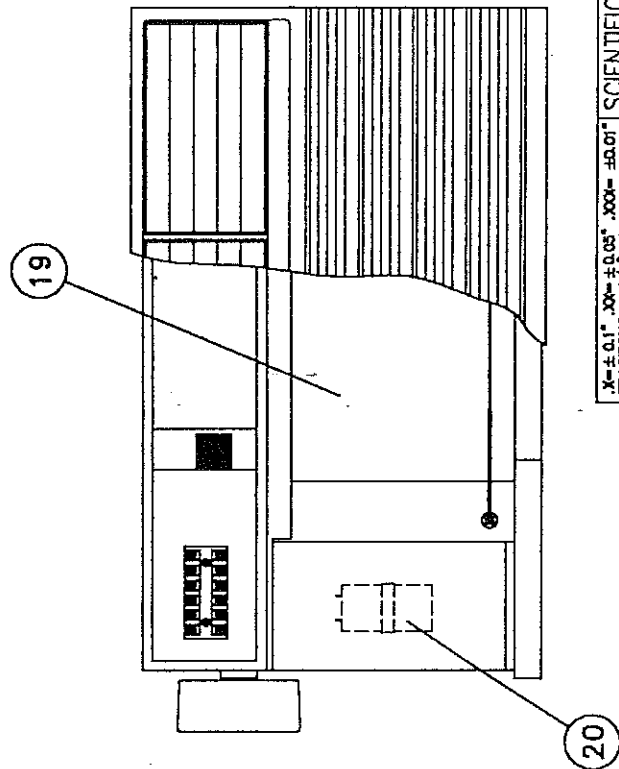
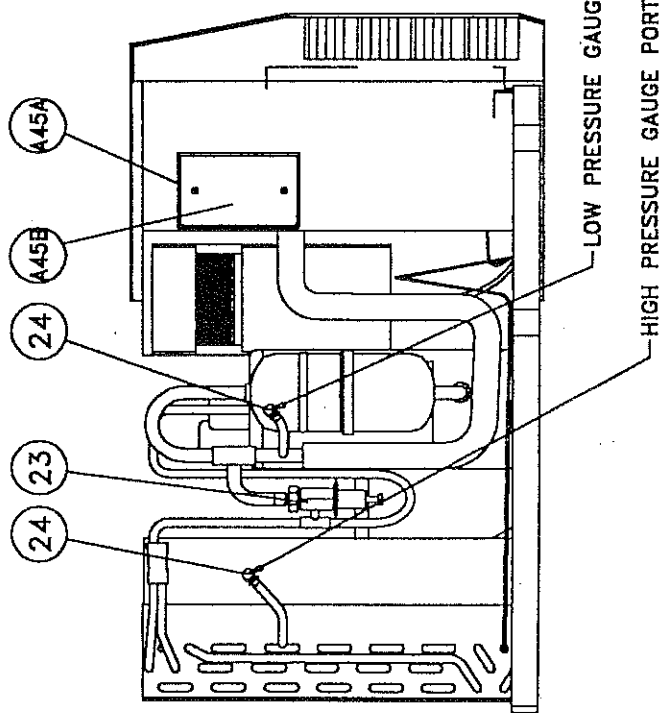
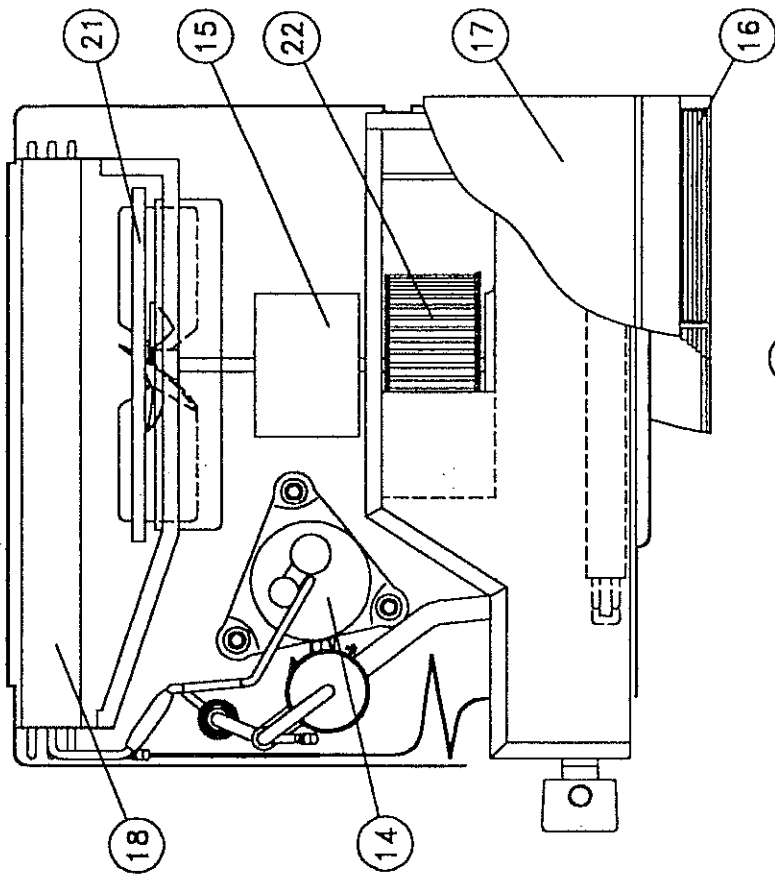
SECTION "A" - "A"

FRONT VIEW

X = ± 0.1" XX = ± 0.005" XXX = ± 0.01" FRACTIONS = 1/8" ANGLES = ± 1.0°		SCIENTIFIC SYSTEMS CORP.	
MATL	DRWN L.D.T.	CLASS 1 GROUP C/D DIV. 2	JOB#
FINISH	CPD	REMOTE CONTROL ASSEMBLY	DATE 11/98
ACD# 30740015	APD	DWG# 074-30-0015	REV

**NOTES:**

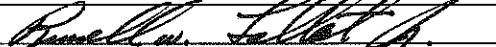
1. (XX) - DENOTES REFERENCE PART NUMBER ON MASTER PARTS LIST.
2. ITEM 23 AND 24 ARE FOR OPTIONAL HOT-GAS BYPASS.



X=±0.1° XX=±0.05° XXX=±0.01° SCIENTIFIC SYSTEMS CORP.					
FRACTIONS=±1/8	ANGLES=±1.0°	DRWN L.D.T.	CHKD	REV	DATE 11/88
MASTR	BACK-000-00	MAIN ASSEMBLY DRAWING	DWG.#	50740018	APVD
FINISH	50740018	APVD	SCALE	1/1"	BYT

## **MATERIAL CERTIFICATES**

## Material Traceability Log

CRANE WO. NO.:	059801
CUSTOMER:	PEMEX / B & R
WELDMENT PART NO.:	N98SK1-212
REV. LEVEL:	C
WELDMENT S/N:	98286-02
DESCRIPTION:	Pedestal Weldment
MODEL:	340LA-140
CHECKED BY:	
DATE:	1-14-88

[illegible]



# TEST CERTIFICATE

PAGE NO. 0 IF 02  
FILE NO: 0234-01-11  
DATE: 05/30/98  
MILL ORDER NO: 10622-003

SOLD TO:		SEND TO:	
AMERICAN ALLOY STEEL, INC P. O. BOX 40469		AMERICAN ALLOY STEEL, INC P. O. BOX 40469 ATTN: HOMER GARZA	
HOUSTON		HOUSTON	
TX 77240-0469		TX 77240-0469	
API 2H-7TH-EDITION GR 50 YR 93		S1 S3 S4	
ASTM A633 GR C YR 95		ASME SA537 CL 1 MOD.	
SUPPL. PARA. S5 APPLIES.		MATERIAL MEETS DIN 50049 3.1.8/EN 10204 3.1.8	

CHEMICAL ANALYSIS																PRACTICES	
MELT/SLAB	C	MN	P	S	CU	SI	NI	CR	MO	V	TI	B	AL	CB	N		
D7149	0.13	1.44	0.007	0.003	0.10	0.29	0.08	0.10	0.03	0.001	0.003	0.0004	0.031	0.031	0.0074	C.E. = 0.410 VIP	
D7149																GS 7-8 FINELINE	
									</								

TENSILES				CHARPY V IMPACTS				FULL		OTHER TESTS PERFORMED							
TYPE	YLD (PSI X 100)	% ELONG 8"	% R.A.	TEMP	FT	LBS	FT	LBS	MILS LATERAL EXPANSION	% SHEAR	HEAT TREAT CYCLES - MATL OR TESTS - DEG FAHR.						
BZ			52.9	-40F	263	263	263	263			MATL TEST	NOM TEMP	HOLD MINS.				
TZ			52.9								X	X	1650	0031	AC	COOL METHOD	END TEMP
BX	565	763	28.0														

WEIGHT PER PIECE = 16335 LBS. 7425 KG.  
A.B.S. Q.A. CERTIFICATE 98-QA1255-X.  
MATERIAL HAS BEEN VACUUM DEGASSED AND CALCIUM TREATED FOR SULFIDE SHAPE CONTROL.  
ALL STEEL HAS BEEN MELTED AND MANUFACTURED IN U.S.A.  
FINE LINE MOD FOR SULPHUR  
LUKENS FINE LINE STEELS ARE CALCIUM ARGON TREATED FOR SULFIDE SHAPE CONTROL.  
B/L 214252 TTPX 80279  
MATERIAL PRODUCED UNDER A CERTIFIED QUALITY MANAGEMENT SYSTEM  
COMPLYING WITH ISO 9002 ABS-QE CERTIFICATE NO. 30130

TEST REPORT APPROVED DATE 10-27-97  
AMERICAN ALLOY STEEL BY [Signature]

AMERICAN BUREAU OF SHIPPING  
PHILADELPHIA

INFORMATION												HEAT TREAT CYCLES - TESTS ONLY - DEG FAHR.			
QUALITY ASSURANCE DEPT.												START TEMP	NOM TEMP	MIN TEMP	MAX TEMP
												END TEMP	NOM TEMP	MIN TEMP	MAX TEMP
												HEAT RATE	NOM RATE	MIN RATE	MAX RATE
												COOL METHOD	NOM METHOD	MIN METHOD	MAX METHOD

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT:  
FORM NO.2231T (R 5/96)

Quality Assurance Laboratory  
Coatesville, PA 19320

[Signature]  
SUPERVISOR - TEST REPORTING.



# TEST CERTIFICATE

PAGE NO. 02 OF 02  
FILE NO. 01-01-11  
DATE: 05/30/98  
MILL ORDER NO: 10622-003

CUSTOMER P.O.: 36616  
DESCRIPTION:

1 - RECTANGLE 1 - X - 120 - X - 430

SEND TO: 03-C SHIP TO:

AMERICAN ALLOY STEEL, INC  
P. O. BOX 40469

AMERICAN ALLOY STEEL, INC  
P. O. BOX 40469  
ATTN: HOMER GARZA

AMERICAN ALLOY STEEL, INC.  
C/O STORAGE & PROCESSORS, INC.  
8500 CLINTON DR./TRACK 23-430  
DELIV CARRIER-PORT TERMINAL RR

HOUSTON

TX 77240-0469

TX 77240-0469

HOUSTON

TX 77240

THIS MATERIAL HAS BEEN MANUFACTURED AND TESTED IN ACCORDANCE WITH PURCHASE ORDER REQUIREMENTS AND SPECIFICATIONS:

WITH LUKENS BEING THE APPROVED TEST AGENCY.

ABS PT.2 SEC.1 YR. 94 GR. DH36 & GR. EH35

MATERIAL PRODUCED UNDER A CERTIFIED QUALITY MGMT SYSTEM COMPLYING WITH ISO 9002 ABS-QE CERT. NO. 30130

MELT/SLAB		CHEMICAL ANALYSIS												PRACTICES	
		C	MN	P	S	CU	SI	NI	CR	MO	V	TI	B		
D7149	/13														

TENSILES				CHARPY V IMPACTS		OTHER TESTS PERFORMED			
YLD	TENS	% ELONG	% R.A.	TYPE	TEMP	MILS LATERAL EXPANSION	% SHEAR	TEST REPORT APPROVED DATE	TEST REPORT APPROVED BY
								9/11/98	Paul Hays

AMERICAN ALLOY STEEL BY  
QUALITY ASSURANCE DEPT.

Certified a true copy of the  
original, retained in our file.  
AMERICAN ALLOY STEEL, INC.

## INFORMATION

HEAT TREAT CYCLES - MATL. OR TESTS - DEG													
MATL	TEST	NOM	TEMP	MIN	TEMP	MAX	TEMP	HOLD	MINS.	COOL	METHOD	END	TEMP

HEAT TREAT CYCLES - TESTS ONLY - DEG													
START	END	NOM	TEMP	MIN	TEMP	MAX	TEMP	HOLD	MINS.	HEAT	RATE	COOL	RATE

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT:  
FORM NO.2221T (R 5/96)

Quality Assurance Laboratory  
Coatesville, PA 19320

Supervisor: Test Reporting  
SUPERVISOR - TEST REPORTING

Q.A. -- INSPECTION DEPARTMENT

CUSTOMER		AM ALLOY STL-TX		MILL ORDER NO.		0284-10622		SPECIFICATION/PROCEDURE		SA578-L2-S1		DATE		5-6-98	
CUSTOMER NO.		36616		QUALITY		API-2H-7TH.		NO. PCS.		1		GAUGE		1,000	
INSPECTOR'S NAME		LEVEL 1 SNT-TC-1A-MIL-STD-2132		WITNESSED BY		Peggy Baker		MELT & SLAB		07149-13		MARK NO.		PC-#1	
UTR		EQUIPMENT USED		MTD		EQUIPMENT USED		PTD		EQUIPMENT USED		METHOD			
S800 ABO		# 137		DUE		7-4-98									
TRANSDUCER		AEROTECH		TYPES OF PRODS.											
SIZE & FREQ.		1" DIA. 2 1/4 MHZ		SPACING											
COUPLANT		SOAP & WATER		GRID REF.											
METHOD		CONTACT		AMP. REF.											
AMPLITUDE		75%		METHOD											
FREQ. REF.		10090		TYPE OF SURFACE		AS-ROLLED		TPVD						TYPE OF SURFACE	

[illegible]

I HEREBY CERTIFY THAT THE ABOVE MATERIAL MEETS THE NON-DESTRUCTIVE TEST REQUIREMENTS FOR THE ABOVE SPECIFICATION, KNOWINGLY OR WILLINGLY RECORDING FALSE FICTITIOUS OR FRAUDULENT STATEMENTS ON ENTRIES ON THIS DOCUMENT MAY BE PUNISHED AS A FELONY UNDER FEDERAL STATUTES INCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47

<input checked="" type="checkbox"/>	UT	— MEETS SPECIFICATION REQUIREMENTS
<input type="checkbox"/>	MT	
<input type="checkbox"/>	PT	

INSPECTION SUPERVISOR (LEVEL 1) SNT-TC-1A/ML-STD-2132



Metallurgical Chemistry and Testing Laboratory

3204 BROADWAY (77017)  
P.O. BOX 262265  
HOUSTON, TEXAS 77207-2265  
PHONE: (713) 844-7501  
FAX: (713) 844-1400

October 30, 1998

Page 1 of 1

American Alloy Steel, Inc.  
ATTN: Q. A. Department  
P. O. Box 40469  
Houston TX 77240

P. O. No. 38778  
Report No. 98-2927

IDENTIFICATION: 1" x 6" x 7", PLT #8015456, HT #D7149, SL #13  
MATERIAL: API-2H-50, Mfg. Lukens  
REFERENCE: S/O 155593

DROPWEIGHT TEST

<u>Type of Specimen</u>	<u>Energy</u>	<u>Temperature</u>	<u>Results</u>
P-3	250 Ft/Lbs.	-30°F	No Break
P-3	250 Ft/Lbs.	-30°F	No Break

  
Donald Derrick  
Mechanical Testing Supervisor

tp/R1155



# Rotek

A member of the Hoechst Group

## CERTIFICATION OF TEST

CERTIFICATION NO. **A100084**

CUSTOMER ORDER NO.	ROTEK ORDER NO.	SPECIFICATION	DATE
35509	F92030	ASTM A694-F50-95C <i>Will Be in to pick up</i>	5-8-07/98

S O L D	APPLIED HYDRAULIC SYSTEMS STATION 1, BOX 10155 HOUMA LA 70363	S H I P
------------------	---	------------------

PART NO.	PCS.	ROTEK HEAT CODE
MACHINED RING B1230785 90.000 76.000 X 3.000	150896	X289
HEAT NO. Y5369	MATERIAL VENDOR FIRSTMISS STEEL INC	

### CHEMICAL ANALYSIS

C	MN	P	S	SI	NI	CR	MO	CU	V	CB
.150	1.340	.006	.014	.220	.060	.080	.018	.150	.104	.000

### MECHANICAL PROPERTIES OF TEST RING

BHN	TENSILE STRENGTH PSI	YIELD STRENGTH PSI	ELONG. %	% RED. OF AREA	GRAIN SIZE
000	78,500	58,500	32	72	

### CLEANLINESS RATING PER E-45

A	B	C	D
T H T H T H T H			

### CHARPY IMPACT TEST RESULTS (FT. LBS.)

TEMP. ° F.	#1	#2	#3
.0	98.0	99.0	119.0

ULTRASONIC INSPECTED

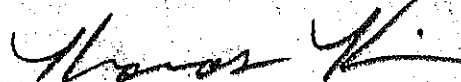
UT OK PER ASTM A388 ST.BEAM ACCEPT ASTM A578-1

HEAT TREATMENT

NORMALIZED

NOTES:

WE HEREBY CERTIFY THE ABOVE RESULTS ARE CORRECT AS REPORTED AND CONTAINED WITHIN COMPANY RECORDS.



AUTHORIZED SIGNATURE

METALLURGICAL MANAGER

TITLE

67-1920-01

## Gulf States Steel, Inc.

GADSDEN, AL 35904-1935

 GSS ORDER NO.  
 DIST NUMBER ITEM MFG  
 50812 03 742  
 PURCHASE ORDER NO.

 PURCHASE ORDER DATE  
 06 10 97

 CERTIFICATE  
 OF TESTS

 ACCOUNT NUMBER  
 71390006  
 PAGE NO.  
 1  
 INVOICE NUMBER  
 742-69769  
 DATE SHIPPED  
 06 30 97  
 ROUTE/VEHICLE IDENTIFICATION  
 MS 101100

NEW 61187

 SHIPPED FROM  
 ALA CITY

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.

 C.F. BEARDEN, JR.  
 MGR. TECHNOLOGY AND  
 QUALITY - PLATE PRODUCTS

("SHIP TO" SAME AS "SOLD TO" UNLESS OTHERWISE INDICATED)

 KLOCKNER NANASCO CORP  
 SOUTHWEST DIVISION  
 P O DRAWER 450469

HOUSTON

TX 77245-0469

 KLOCKNER NANASCO CORP  
 SOUTHWEST DIV  
 4501 N MIRO STREET

NEW ORLEANS

LA 70117

## MATERIAL DESCRIPTION

 PLATE CARBON ASTM A-36-94 ASME SA-36 BID 07/01/95 SUPP 6-91 KILLED FINE GRAIN  
 PRACTICE IMPACT TEST HEAT QUAL HEATED & MFG IN USA

QUANTITY SHIPPED

 1.0000 X 96.0000 SHEARED EDGE X 240.0000 IN  
 HT 7454137 2 PCS  
 HT 7160472 1 PCS  
 HT 7460569 20 PCS

130282

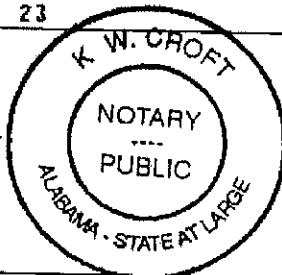
 CH C 25MX MM 80/1.20 P 040MX S 050MX SI 15/40 CU RPT NI RPT CR RPT MO RPT CB RPT V RPT AL  
 020MIN

 MR YLD 36000 MIN TEN 58/80000 XELONG MIN 2 IN 23 OR 8 IN 20 IMP HT QUAL LT AR 15 FT LBS AVG 10  
 FT LBS MIN AT PLUS 10 DEG F

 II 3 NOTR TR CA  
 TOTAL WT. 150,282# PCS 23

 STATE OF ALABAMA COUNTY OF ETOWAH  
 SWORN AND SUBSCRIBED TO BEFORE ME  
 THIS 01 DAY OF JULY 1997

Notary Public



ANALYSIS

HEAT NUMBER	GRAIN	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E.
7454137		.17	0.82	.013	.013	.225	0.02	0.00	0.03	.02	.002	.000	.033					
7160472		.17	0.90	.007	.008	.252	0.05	0.02	0.03	.02	.003	.001	.051					
7460569		.17	0.85	.009	.015	.267	0.03	0.01	0.02	.02	.002	.001	.058					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7160472	S250401	56.0	72.0		25			AR	.77									
7454137	S250301	47.0	74.0		26			AR	.63									
7460569	S328101	53.0	68.0		24			AR	.77									
7460569	S328102	54.0	71.0		28			AR	.76									

NOTES: V NOTCH

CHARP

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	
7160472	S250401	AR	FUL	LT	10	92	108	101	100									
7454137	S250301	AR	FUL	LT	10	81	67	78	75									
7460569	S328101	AR	FUL	LT	10	91	100	95	95									

TEST PAGE

070301121531

LAST PAGE

970701121531

# OREGON STEEL MILLS

P.O. BOX 2760, Portland, Oregon 97208 • (503) 286-9651 Fax (503) 240-5268



**SOLD TO**  
KLOCKNER NAMASCO CORPORATION  
ATTN: MELANIE ELLIOTT  
5775-C GLENRIDGE DRIVE  
SUITE 110  
ATLANTA, GA 30328

NAMASCO-SOUTHWEST  
4501 N MIRO STREET  
NEW ORLEANS, LA 70117-4439

## REPORT OF CHEMICAL/PHYSICAL TESTS

CERTIFICATE NO. 497904P	DATE Sep 14, 1998	PAGE 3
MILL ORDER NO. 101244	DATE	
CUSTOMER ORDER NO. NEW-90274		
JOB REQ. NO.		
SHIPPING NO. 497904	DATE 09/11/1998	
CARRIER UNION PACIFIC		
CARTRUCK NO. MP651064		

THIS MATERIAL HAS BEEN MANUFACTURED, TESTED AND FOUND TO MEET THE SPECIFICATIONS AND PURCHASE ORDER REQUIREMENTS  
OSM CARBON STRUCTURAL QUALITY PLATE ASTM A36-96/ASME SA36 1995. FINE GRAIN  
PRACTICE. LCVN 15 FT/LBS AVG @ +10 F (H).

### PHYSICAL PROPERTIES

OSM ITEM NO.	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8" 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
2	0.7500 X 96.000M X 240.000	+	392873					LCVN @ 10		DEG F 10.0mm 299 299 299/299 egy
	1 PC 4901 LBS	+	392954	505	640	29		LCVN @ 10		DEG F 10.0mm 299 299 299/299 egy
3	1.0000 X 96.000M X 240.000	+	394081	437 493	675 690	25 22		LCVN @ 10 LCVN @ 10		DEG F 10.0mm 60 70 59 /63 egy DEG F 10.0mm 42 57 53 /51 egy
	8 PCS 52272 LBS									
	34 PCS 150286 LBS TOTALS									

### CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cr	Mo	Ti	B	N <sub>2</sub>	Ca	CE	REMARKS
+392873	.05	.96	.007	.003	.26	.21	.08	<.008	.025	.024	.03					
+392954	.06	.96	.006	.004	.24	.22	.11	<.008	.025	.022	.06					
+394081	.15	.90	.006	.011	.27	.24	.11	<.008	.035	.08	.03					
ALL HEATS INDICATED WITH (+) WERE MELTED AND MANUFACTURED IN THE USA.																
END OF REPORT																

I certify the above to be correct as contained in the records of OREGON STEEL MILLS By

*Angie McDaniel*  
ANGIE MCCASLAND  
Q.C. RECORDS  
ADMINISTRATOR



# Metallurgical Test Report

REV. 3/97



GENEVA STEEL COMPANY CERTIFIES ALL SMELTING, MELTING AND MANUFACTURING PROCESSES OCCURRED IN THE U.S.A.

REQ., JOB, CONTRACT NO.		P.O. DATE		PURCHASE ORDER NO.	
V E N D O R		03/30/98		NEW-79892/61-9210	
GENEVA STEEL		SHIPPERS NO.		MILL ORDER NO.	
P.O. BOX 2500		GP45050A		09-18-98	
PROVO, UTAH 84603		VEHICLE IDENTITY		SC09677	
S O L D T O		NAMESMANN PIPE&STEEL CORP		NAMESMANN PIPE&STEEL CORP	
ATTN: KARIN ST. ANDRE		4501 N MIRO STREET		4501 N MIRO STREET	
1990 POST OAK BLVD SUITE 1800		NEW ORLEANS LA 70117		NEW ORLEANS LA 70117	
HOUSTON TX 77056-3811		T O		T O	

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS REQUIREMENTS IN SUCH RESPECTS.

*Larry D. Clinger*  
DIVISION MANAGER, QUALITY  
DATE 09-18-98

SPEC. PLATE ASTM A36-96 AND ASME SA-36 1995 EDITION 1996 ADDENDA  
INSPECTION WITH REST SPEC .80/1.20 MN KILLED FINE GRAIN AND DIN 50049-3.1B

75 PSI CERTIFIED T/R

ITEM NO.	MATERIAL DESCRIPTION				QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEND					
	THICKNESS OR SECTION	WIDTH DIA. OR FT. WT.	LENGTH	IN 8"							IN 2"								
03	.3750"	96.0000"	240.0000"	16	89200#	102009	.3750" .5000" .3750" .5000" ***END OF DATA***	62.7 53.5 62.6 54.8 DATA***	74.4 70.9 78.9 71.1	18.0 29.0 29.0 20.0	29.0								
HEAT NO.	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	CA
102009	HEAT 19	87	006	006	017	01	01	01	02	004	025	004	004	004	004	004	003		
'GENEVA STEEL COMPANY CERTIFIES ALL SMELTING, MELTING AND MANUFACTURING PROCESSES OCCURRED IN THE U.S.A.'																			
***END OF DATA***																			


**AMERISTEEL™**
**CHEMICAL AND PHYSICAL TEST REPORT**  
 MADE IN U.S.A.

 TENNESSEE STEEL MILL DIVISION  
 METALLURGICAL DEPARTMENT

P.O. BOX 3670 JACKSON, TENN. 38301

PRODUCING MILL IS KNOWN BY HEAT ID NUMBER PREFIX:

C = CHARLOTTE, J = JACKSONVILLE, K = KNOXVILLE, T = TAMPA, V = WEST TENNESSEE

KLOCKNER NAMASCO CORP 4501 N MIRO (& POLLAND) 504-947-4215 NEW ORLEANS		LA 70177		KLOCKNER NAMASCO CORP (T.FL) NAMASCO-***ACCTS PAYABLE** 5775 C GLENRIDGE DR ATLANTA GA 30328		SHIP DATE 09-01-98		SHIP NUMBER 8582-407704			
HEAT ID NO.		SIZE		GRADE		SPECIFICATION		S.O. NO.		CUST. P.O. NUMBER	
A 3 X 3 X 1/4		A36		ASTM-A36-96		9002865		N83119		CE	
V9-1359 .13		.73 .01 .03		.21		46530		32.5		.35	
A 3 X 3 X 1/4		A36		ASTM-A36-96		9002865		N83119		.35	
V9-1359 .13		.73 .01 .03		.21		47050		31.5		.35	
A 3 X 3 X 3/8		A36		ASTM-A36-96		9002865		N83119		.37	
V9-1392 .13		.69 .02 .03		.22		46580		31.8		.37	
A 3 X 3 X 3/8		A36		ASTM-A36-96		9002865		N83119		.37	
V9-1392 .13		.69 .02 .03		.22		47540		30.6		.37	
A 3 X 3 X 3/8		A36		ASTM-A36-96		9002865		N83119		.35	
V9-1393 .14		.68 .01 .03		.18		46250		32.0		.35	
A 3 X 3 X 3/8		A36		ASTM-A36-96		9002865		N83119		.35	
V9-1393 .14		.68 .01 .03		.18		45560		33.6		.35	

 THIS MATERIAL, INCLUDING THE BILLETS,  
 WAS PRODUCED AND MANUFACTURED IN THE  
 UNITED STATES OF AMERICA.

 A. J. TURNER  
 QUALITY ASSURANCE MGR.  
 MILL GROUP

 WE HEREBY CERTIFY THAT THE ABOVE FIGURES ARE CORRECT  
 AS CONTAINED IN THE RECORDS OF THE COMPANY



U.S. STEEL GROUP  
A division of USX Corporation  
010000772 (REV. 8/91)

# Metallurgical Test Report

USX  
are trademarks of USX Corp

37086

REQ. JOB, CONTRACT NO.	PO. DATE	PURCHASE ORDER NO.	
		NEW-76549	
VENDOR	SHIPPER NO.	INVOICE NO.	
GARY WORKS	H02048	154-005522	
GARY, INDIANA 46402	06 16 98	UB56016	
** MELTED AND MANUFACTURED IN THE USA **	VEHICLE IDENTITY		
KLOCKNER NAMASCO CORP	EJE 006228	H2048	
SOUTHWEST DIVISION			
4501 N MIRO ST			
NEW ORLEANS LA 70117-4439			

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MFGD., SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS REQUIREMENTS IN SUCH RESPECT.

PREPARED BY THE OFFICE OF:  
S.C. PAPE GEN. MGR., O.A.

DATE: 6-22-98

SPEC. INSP. PLATE CARBON ASTM A36-\*96 FINE GRAIN NORMALIZE CHARPY V-NOTCH  
LONGITUDINAL HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

INSP:01 WILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION		QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD ST. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEND
	THICKNESS OR SECTION	WIDTH DIA. OR FT. WT.							IN 8"	IN 2"		
06	2.0000	96.0000	02	26136	M65937	57W 1	45.0	75.0	33.0	32.0		
	STEEL-TYPE = CAST	REDUCTION RATIO = 6.0 TO 1					47.0	76.0				
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F											
	-12 DEG C AVERAGE IMPACT STRENGTH +79 FT LBS											
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F											
	-12 DEG C AVERAGE IMPACT STRENGTH +80 FT LBS											
	PRODUCT & TEST SPECIMENS WERE NORMALIZED AT 1660 DEG.F. FOR 0112 MINUTES. COOLING COMPLETED IN STILL AIR.											
	***END OF DATA***											

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION.

HEAT NO.	TYPE	C	AN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M65937	HEAT 21	1.00	021	013	02	02	02	02	05	01	026	001	001	001	001	001	001	001	
	***END OF DATA***																		

FINE GRAIN

ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA

HATRIX DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.

980616 HV21 1014 701131020 061598 0125788001 01 SAM CBA 0 0 3 PAGE 1



# GLOBAL X-RAY & TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861

Post Office Box 1536  
Morgan City, Louisiana 70381

Bus: 504-631-2426  
Fax: 504-631-0093

## DAILY NDE WORK REPORT TERMS AND ABBREVIATIONS

BT - BURN THROUGH      LC - LOW CROWN      OU - OUTSIDE UNDERCUT  
BTA - BURN THROUGH AREA      LP - LACK OF PENETRATION      P - POROSITY  
C - CRACK      NF - NON FUSION      SI - SLAG INCLUSIONS  
IU - INTERNAL UNDERCUT      NW - NARROW WELD      SL - SLAG LINES

499946

418604

Customer APPLIED HYDRAULIC SYS. Contractor SAME  
Address \_\_\_\_\_ Location of Job Houma  
Job No. \_\_\_\_\_ W.O. 059801 AFE \_\_\_\_\_ Other REUS D1.1  
Job Specifications GAMMA RAY INSP. OF CRANE PED.

	WELD NO.	PIPE SIZE	RECOMMENDATIONS				WELD NO.	PIPE SIZE	RECOMMENDATIONS		
			✓ x	ACCEPT REJECT	REMARKS				✓ x	ACCEPT REJECT	REMARKS
1	LS-1	80"x1"				41					
2	0-1					42					
3	1-2					43					
4	2-3					44					
5						45					
6	LS-2					46					
7	0-1					47					
8	1-2					48					
9	2-3					49					
10						50					
11						51					
12						52					
13						53					
14						54					
15						55					
16						56					
17						57					
18						58					
19						59					
20						60					
21						61					
22						62					
23						63					
24						64					
25						65					
26						66					
27						67					
28						68					
29						69					
30						70					
31						71					
32						72					
33						73					
34						74					
35						75					
36						76					
37						77					
38						78					
39						79					
40						80					

Check Type Inspection:

X-Ray \_\_\_\_\_ Ultrasonic \_\_\_\_\_ Other GAMMA Customer Representative [Signature]  
Magnetic Particle \_\_\_\_\_ Dye Penetrant \_\_\_\_\_ Date 1-6-99  
No. of Welds Checked: 2 Technician: R. BERGERON  
Linear Ft. Film 6115 (4 1/2 x 17) Type D-7 Assistant: K. TOUPS  
Hours Worked: 2 Assistant: \_\_\_\_\_  
Stand-By Time: \_\_\_\_\_ Travel Time: \_\_\_\_\_ Mileage: \_\_\_\_\_ Unit No. \_\_\_\_\_  
Substance (check if applicable) \_\_\_\_\_

## GLOBAL X-RAY &amp; TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861

Post Office Box 1536  
Morgan City, Louisiana 70381

Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

13377

P.O.# 42131

CLIENT Applied Hydraulics DATE 1-28-99  
CONTRACTOR Sams JOB LOCATION Houma, La. 1-26-99  
JOB NO. W-059801 CLIENT REPRESENTATIVE Paula Sams  
MT TECH. Jack Mck REMARKS MT & UT Insp.

WELD NO.	WALL THICKNESS	RECOMMENDATIONS		WELD NO.	WALL THICKNESS	RECOMMENDATIONS	
		✓ ACCEPT	✗ REJECT			REMARKS	✓ ACCEPT
1	100% INT			51			
2				52			
3	Jacking Pads, Manway,			53			
4				54			
5	Couplings, Brackets, Spill			55			
6				56			
7	Containment & Padeyes			57			
8				58			
9	On Pedestal Welds			59			
10				60			
11	Acceptable			61			
12				62			
13				63			
14				64			
15				65			
16	100% UT Insp. of 80"			66			
17				67			
18	X1" Cracks Weld On Ped.			68			
19				69			
20	Weld Acceptable			70			
21				71			
22				72			
23	100% UT Insp. of 3"			73			
24				74			
25	Pcd. Flange For Lam.			75			
26				76			
27	Flange Acceptable			77			
28				78			
29				79			
30				80			
31							
32	UT- USK 7						
33	2.26 x 1/4 x 1"						
34	0° 70°						
35	AWS D11.5 SCL						
36	ASTM A57F LUT						
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							

## SURFACE CONDITION

GOOD ( ) FAIR ( ) PAINTED ( ) WELD ( )

## EQUIPMENT

MAKE Parker MODEL B302 S/N 2304

## CONTRACTS

PROD SPACING 3' 4.5" CONTINUOUS ( )

AC ( ) DC ( ) HALF WAVE ( ) FULL WAVE ( )

AMPS 5.75

## MEDIA

7C-BLACK WET ( ) 8A-DRY ( ) WHITE HIGHLIGHTER ( )

## CALIBRATION

10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )

CALIBRATION DATE: \_\_\_\_\_

## ACCEPTANCE CRITERIA

ASME SEC 8TOTAL TIME HRS. 1



# Material Traceability Log

CRANE WO. NO.:	059801
CUSTOMER:	PEMEX / B & R
WELDMENT PART NO.:	N61584-001
REV. LEVEL:	M
WELDMENT S/N:	98253-01
DESCRIPTION:	Upperstructure Weldment
MODEL:	340LA-140
CHECKED BY:	<i>Dan Sosa</i>
DATE:	12-30-88

[illegible]



# TEST CERTIFICATE

PAGE NO. 01 OF 02  
FILE NO: 02 -01-11  
DATE: 03/17/98  
MILL ORDER NO: 62813-003

CUSTOMER P.O.: 36187-2  
DESCRIPTION: 1 - RECTANGLE 3 -X- 120 -X- 360

SEND TO:

AMERICAN ALLOY STEEL, INC  
P. O. BOX 40469

AMERICAN ALLOY STEEL, INC  
P. O. BOX 40469  
ATTN: HOMER GARZA

03-C SHIP TO:

AMERICAN ALLOY STEEL, INC.  
C/O STORAGE & PROCESSORS, INC.  
8500 CLINTON DR./TRACK 23-430  
DELIV CARRIER-PORT TERMINAL RR

HOUSTON

TX 77240-0469

HOUSTON

TX 77240-0469

HOUSTON

TX 77240

THIS MATERIAL HAS BEEN MANUFACTURED AND TESTED IN ACCORDANCE WITH PURCHASE ORDER REQUIREMENTS AND SPECIFICATION(S):

API 2H-7TH-EDITION GR 50 YR 93  
ASTM A633 GR C YR 95 PVQ  
SUPPL. PARA. 55 APPLIES.

S1 S3 S4  
ASME SA537 CL 1 YR 95A MOD.  
ABS PART 2 SECT.1 YR. 94 GR. DH 36

## CHEMICAL ANALYSIS

## PRACTICES

D5884	/3	C	MN	P	S	CU	SI	NI	CR	MO	V	TI	B	AL	CB	N	C.E. = 0.440 VIP GS 7-8 FINELINE
D5884		16	1.43	0.09	0.003	0.03	0.29	0.08	0.13	0.02	0.01	0.003	0.0002	0.032	0.028	0.0072	
OTHER TESTS PERFORMED																	
TENSILES																	
YLD (PSI	TENS X 100)	% ELONG	% R.A.	CHARPY V IMPACTS			FULL			OTHER TESTS PERFORMED							
TYPE				TYPE	TEMP	FT LBS		MILS LATERAL EXPANSION		% SHEAR							
BZ			70.0	BL	-4F	199	211	218									
TZ			65.0	BX	-40F	262	262	262									
BX	556	804	27.0														

COPIED FROM COPY OF THE  
ORIGINAL REPORT TO CUSTOMER  
AMERICAN ALLOY STEEL, INC.

## INFORMATION

HEAT TREAT CYCLES - MATL OR TESTS - DEG										FAHR.			
MATL	TEST	NOM TEMP	MIN TEMP	MAX TEMP	HOLD MINS.	COOL METHOD	END TEMP						
X	X	1650			3101	AC							
HEAT TREAT CYCLES - TESTS ONLY - DEG										FAHR.			
START END TEMP	NOM TEMP	MIN TEMP	MAX TEMP	HOLD MINS.	HEAT RATE MAX	COOL RATE MAX							

WEIGHT PER PIECE = 36755 LBS. 16707 KG.  
A-B-S. Q.A. CERTIFICATE 98-QA1255-X.  
MATERIAL HAS BEEN VACUUM DEGASSSED AND CALCIUM TREATED FOR SULFIDE SHAPE CONTROL.  
ALL STEEL HAS BEEN MELTED AND MANUFACTURED IN U.S.A.  
FINELINE MOD FOR SULPHUR  
LUKENS FINELINE STEELS ARE CALCIUM ARGON TREATED FOR SULFIDE SHAPE CONTROL.  
B/L #04793 TTPX 81663  
MATERIAL PRODUCED UNDER A CERTIFIED QUALITY MANAGEMENT SYSTEM  
COMPLYING WITH ISO 9002 ABS-QE CERTIFICATE NO. 30130

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT:

Quality Assurance Laboratory  
Coatesville, PA 19320

*Elaine Jackson*  
SUPERVISOR - TEST REPORTING

FORM NO.2221T (R 5/95)



TEST CERTIFICATE

PAGE NO. 02 OF 02  
FILE NO: 02-01-11  
DATE: 03/17/98  
MILL ORDER NO: 62813-003

CUSTOMER P.O.: 36187-2  
DESCRIPTION: 1 - RECTANGLE 3 -X- 120 -X- 360

SEND TO: AMERICAN ALLOY STEEL, INC  
P. O. BOX 40469  
ATTN: HOMER GARZA

SHIP TO: AMERICAN ALLOY STEEL, INC.  
C/O STORAGE & PROCESSORS, INC.  
8500 CLINTON DR./TRACK 23-430  
DELIV CARRIER-PORT TERMINAL RR

SOLD TO:

AMERICAN ALLOY STEEL, INC  
P. O. BOX 40469

HOUSTON

TX 77240-0469

HOUSTON

TX 77240-0469

TX 77240

THIS MATERIAL HAS BEEN MANUFACTURED AND TESTED IN ACCORDANCE WITH PURCHASE ORDER REQUIREMENTS AND SPECIFICATIONS:

ABS PART 2 SECT.1 YR. 94 GR. ED 36  
WITH LUKENS BEING THE APPROVED TEST AGENCY.  
MATERIAL PRODUCED UNDER A CERTIFIED QUALITY MGMT SYSTEM COMPLYING WITH ISO 9002 ABS-QE CERT. NO. 30130

CHEMICAL ANALYSIS

PRACTICES

MELT/SLAB	C	MN	P	S	CU	SI	NI	CR	MO	V	TI	B
D5884 /3												

TENSILES

CHARPY V IMPACTS

OTHER TESTS PERFORMED

YLD	TENS	% ELONG	% R.A.	TYPE	TEMP	MILS LATERAL EXPANSION	% SHEAR

Certified a true copy of the original, retained in our file, AMERICAN ALLOY STEEL, INC.

INFORMATION

HEAT TREAT CYCLES - MATL OR TESTS - DEG

MATL	TEST	NOM TEMP	MIN TEMP	MAX TEMP	HOLD MINS.	COOL METHOD	END TEMP

HEAT TREAT CYCLES - TESTS ONLY - DEG

START END TEMP	NOM TEMP	MIN TEMP	MAX TEMP	HOLD MINS.	HEAT RATE MAX	COOL RATE MAX

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT:  
FORM NO.2221Y (R 5/96)

Quality Assurance Laboratory  
Coatesville, PA 19320

*Elmore*  
SUPERVISOR - TEST REPORTING



U. S. STEEL GROUP  
A division of USX Corporation  
010000772 (REV. 8/91)

# Metallurgical Test Report

USX<sup>TM</sup>  
are trademarks of USX Corp.

REQ. JOE CONTRACT NO.

P.O. DATE

PURCHASE ORDER NO.  
NEW-76549

VENDOR

GARY WORKS

GARY, INDIANA 46402

\*\* MELTED AND MANUFACTURED IN THE USA \*\*

KLOCKNER NAMASCO CORP

SOUTHWEST DIVISION

4501 N MIRO ST

NEW ORLEANS LA 70117-4439

SHIP TO

KLOCKNER NAMASCO CORP

SOUTHWEST DIVISION

4501 N MIRO ST AT INDL CANAL

NEW ORLEANS LA 70117-4439

INVOICE NO.

154-010873

INSTR. ORDER NO.

UB56016

SHIP TO

KLOCKNER NAMASCO CORP

SOUTHWEST DIVISION

4501 N MIRO ST AT INDL CANAL

NEW ORLEANS LA 70117-4439

THIS IS TO CERTIFY THAT THE  
PRODUCT DESCRIBED HEREIN WAS  
MFGD., SAMPLED, TESTED AND/OR  
INSPECTED IN ACCORDANCE WITH  
THE SPECIFICATION AND FUL-  
FILLS REQUIREMENTS IN SUCH  
RESPECT.

PREPARED BY THE OFFICE OF:  
S.C. PAPE GEN. MGR., O.A.

DATE

7-18-98

SPEC. & INSP. PLATE CARBON ASTM A36-\*96 FINE GRAIN NORMALIZE CHARPY V-NOTCH  
LONGITUDINAL HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

INSP: 01 MILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N  
MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION		QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD ST. KSI	ELONGATION %		% RED. OF AREA	BEND
	THICKNESS OR SECTION	WIDTH DIA OR FT. WT.						N 8"	N 2"		
06	STEEL-TYPE = CAST	2.0000	96.0000	240"	01	13068	M66254	55W 3			
				REDUCTION RATIO							
	LONG. FL SZ CHARPY IMP T V-NOTCH +010			DEG F							
	-12 DEG C AVERAGE IMPACT STRENGTH			+93							
	LONG. FL SZ CHARPY IMP T V-NOTCH +010			DEG F							
	-12 DEG C AVERAGE IMPACT STRENGTH			+73							
	PRODUCT & TEST SPECIMENS WERE NORMALIZED AT 1660 DEG.F. FOR 0064 MINUTES. COOLING COMPLETED IN STILL AIR. ***END OF DATA***										

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION.

HEAT NO.	TYPE	C	AN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	FINE GRAIN
M56254	HEAT 22	096	012	008	22	03	02	03	01	024	001	001	001	001	001	001	001	001	
***END OF DATA***																			
ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA																			

MATRIX DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.

980711 MV21 1235 701131020 071198

0125788001 01 SAM

CRA 0 0 0

PAGE 2 OF 2



# Metallurgical Test Report

REV. 397



35648

GENEVA STEEL COMPANY CERTIFIES ALL SMELTING, MELTING AND MANUFACTURING PROCESSES OCCURRED IN THE U.S.A.

REQ. JOB, CONTRACT NO.

P.O. DATE

PURCHASE ORDER NO.

SHIP NO.

MILL ORDER NO.

TALLY NO.

GENEVA STEEL

P.O. BOX 2500

PROVO, UTAH 84603

MANNESSMANN PIPE&STEEL CORP

1990 POST OAK BLVD SUITE 1800

HOUSTON TX 77056-3811

NAMASCO

C/O NEW ORLEANS PUBLIC BELT RR

DELIVERY WAREHOUSE #1

NEW ORLEANS, LA

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS REQUIREMENTS IN SUCH RESPECTS.

*Larry D. Cluser*  
DIVISION MANAGER, QUALITY

DATE 03-10-98

SPEC. PLATE ASTM A36-96 AND ASME SA-36 1995 EDITION 1996 ADDENDA  
INS. KILLED FINE GRAIN AND DIN 50049-3.18

01 MILL RA/SN CERTIFIED T/R

ITEM NO.	MATERIAL DESCRIPTION				QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	REMARKS
	THICKNESS OR SECTION	WIDTH DIA. OR FT. WT.	LENGTH								IN 8"	IN 2"		
01	2.0000"	96.0000"	240.0000"		4	52272#	100787	2.0000"	44.8	75.0	27.0			
02	3.0000"	96.0000"	240.0000"		1	19602#	100690	2.0000"	44.3	75.9	27.0			
	3.0000"	96.0000"	240.0000"		2	39204#	100788	3.0000"	46.7	73.1	20.0			
	3.0000"	96.0000"	240.0000"		1	19602#	100790	3.0000"	42.1	72.4	23.0			
	3.0000"	96.0000"	240.0000"					3.0000"	44.5	73.6	20.0			
								3.0000"	47.6	73.4	20.0			
								3.0000"	47.1	74.1	18.0			
								3.0000"	48.3	75.2	20.0			
	***END OF DATA***													

HEAT NO.	TYPE	C	AN	P	S	SI	CU	N	CR	MO	SN	AL	N	V	B	TI	CB	CO	CA
1D0690	HEAT	23	104	012	014	20	01	01	02	004		041		004			003		
1D0787	HEAT	24	101	010	021	18	01	01	02	004		042		004			003		
1D0788	HEAT	23	103	009	012	19	01	01	01	004		040		004			003		
1D0790	HEAT	23	100	010	017	18	05	02	02	004		042		004			003		
GENEVA STEEL COMPANY CERTIFIES ALL SMELTING, MELTING AND MANUFACTURING PROCESSES OCCURRED IN THE U.S.A.																			
***END OF DATA***																			

019308

DECIMAL POSITIONS FOR A1 ENDS ARE INDICATED BY THE LEFT MARGINAL VERTICAL DOTTED LINE OR DECIMAL POINT 01

# OREGON STEEL MILLS

P.O. BOX 2760, Portland, Oregon 97208 • (503) 286-9651 Fax (503) 240-5268

THE FIRST

ISO9002

REGISTERED  
U.S. PATENT PENDING

**SOLD TO**  
KLOCKNER NAMASCO CORPORATION  
ATTN: MELANIE ELLIOTT  
5775-C GLENRIDGE DRIVE  
SUITE 110  
ATLANTA, GA 30328

NAMASCO-SOUTHWEST  
4501 N MIRO STREET  
NEW ORLEANS, LA 70117-4439

## REPORT OF CHEMICAL/PHYSICAL TESTS

CERTIFICATE NO. 492321P	DATE Aug 09, 1998	PAGE 1
MILL ORDER NO. 80808	DATE	
CUSTOMER ORDER NO. NEW-84815		
JOB REQ. NO.		
SHIPPING NO. 492321	DATE 08/09/1998	
CARRIER UNION PACIFIC		
CARTRUCK NO. CW5003		

THIS MATERIAL HAS BEEN MANUFACTURED, TESTED AND FOUND TO MEET THE SPECIFICATIONS AND PURCHASE ORDER REQUIREMENTS  
OSM CARBON STRUCTURAL QUALITY PLATE ASTM A36-96/ASME SA36 1995. SI. KILLED FINE  
GRAIN PRACTICE. LCVN 15 FT/LBS AVG @ +10 F (H).

## PHYSICAL PROPERTIES

ITEM	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8" 2"	% RA	HARDNESS BEND BHN TEST	IMPACTS
1	10.5000 X 96.000M X 240.000 1 PC 3267 LBS	+	392730	465 461	680 675	28 28			
2	1.0000 X 96.000M X 240.000 2 PCS 13068 LBS	+	393200	453 481	665 695	26 28	LCVN @ 10	DEG F 10.0mm 55 105 95 /85	egy
	2 PCS 13068 LBS	+	393285	476 478	705 700	27 26	LCVN @ 10	DEG F 10.0mm 99 119 91 /103	egy
							LCVN @ 10	DEG F 10.0mm 84 44 106/78	egy

## CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cr	Al	Mo	Ti	B	Ni	Ca	CE	McQuaid Bn Grain Size
+392730	.15	.77	.005	.003	.22	.25	.10	<.008	.031	.05	.04						
+393200	.14	.92	.006	.010	.17	.26	.11	<.008	.024	.05	.03						
+393285	.14	.91	.006	.007	.22	.25	.11	<.008	.029	.06	.04						
ALL HEATS INDICATED WITH (+) WERE MELTED AND MANUFACTURED IN THE USA.																	

*Colleen Shamrell*  
COLLEEN SHAMRELL  
Q.C. RECORDS  
ADMINISTRATOR

32-9122-01

# Gulf States Steel, Inc.

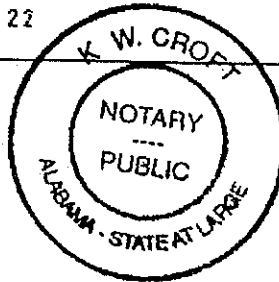
GADSDEN, AL 35904-1835

GSS ORDER NO. ST NUMBER ITEM MFG 6 53762 03 142		PURCHASE ORDER DATE 11 18 97		CERTIFICATE OF TESTS	ACCOUNT NUMBER 71390086	PAGE NO. 1	INVOICE NUMBER 742-01701
PURCHASE ORDER NO. NEW 72984		SHIPPED FROM ALA CITY			DATE SHIPPED 01 29 98	ROUTE/VEHICLE IDENTIFICATION SOU 152139	
I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.					C F BEARDEN, JR. MGR, TECHNOLOGY AND QUALITY - PLATE PRODUCTS		
					(SHIP TO SAME AS "SOLD TO" UNLESS OTHERWISE INDICATED)		

S T O C K 35129	KLOCKNER HANASCO CORP SOUTHWEST DIVISION P O DRAWER 450469 HOUSTON TX 77245-0469	KLOCKNER HANASCO CORP SOUTHWEST DIV 4501 N MIRO STREET NEW ORLEANS LA 70117	S H I P T O

MATERIAL DESCRIPTION		QUANTITY SHIPPED
PLATE CARBON ASTM A-36-96 ASME SA-36 DTD 07/01/95 SUPP S-91 KILLED FINE GRAIN PRACTICE IMPACT TEST HEAT QUAL METED A APL IN 304 1.0000 X 96.0000 SHEARED EDGE X 240.0000 IN HT 7456440 22 PCS CH C 25HX MN 80/1 20 P 040HX S 050HX SI 15/40 CU RPT NI RPT CR RPT MO RPT CB RPT V RPT AL 020MIN NR VLD 36000 MIN TEN 58/80000 XELONG MIN 2 IN 23 OR 8 IN 20 IMP HT QUAL LT HR 15 FT LBS AUG 10 FT LBS MIN AT PLUS 10 DEG F TI 3 NOTR TR CA TOTAL WT. 143,748# PCS 22		143748

STATE OF ALABAMA COUNTY OF ETOWAH  
 SWORN AND SUBSCRIBED TO BEFORE ME  
 THIS 29 DAY OF JANUARY 1998  
*[Signature]*  
 Notary Public



ANALYSIS

HEAT NUMBER	GRAIN	C	Mn	P	S	SI	Cu	NI	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E
7456440		.15	0.87	.015	.015	270	0.02	0.01	0.02	.01	.001	.001	.036					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7456440	H282701	53.0	68 0		27			AR	.77									
7456440	H282702	50.0	67 0		26			AR	.74									

NOTES

CHARPY M

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	
7456440	H282701	AR	FUL	LT	10	54	57	60	57									
7456440	H282702	AR	FUL	LT	10	72	83	84	79									

LAST PAGE

890139141645

LAST PAGE

080129141645



# GLOBAL X-RAY & TESTING CORPORATION

Post Office Box 1536  
Morgan City, Louisiana 70381

JOEL MOREAU, President  
Residence: 504-446-6861

Bus: 504-631-2426  
Fax: 504-631-0093

## UT WORK REPORT

### TERMS AND ABBREVIATIONS

BT—BURN THROUGH  
BTA—BURN THROUGH AREA  
C—CRACK  
IU—INTERNAL UNDERCUT

LC—LOW CROWN  
LP—LACK OF PENETRATION  
NF—NON FUSION  
NW—NARROW WELD

OU—OUTSIDE UNDERCUT  
P—POROSITY  
SI—SLAG INCLUSIONS  
SL—SLAG LINES

155760

40965

CLIENT Applied Hydraulics

DATE 10-29-98

CONTRACTOR Same

JOB LOCATION Houma, La. 11-2-98

JOB NO. 20# 059801

CLIENT'S REPRESENTATIVE Russell L. Talbot

UT TECH. Mike Mit

REMARKS UT Tngl

WELD NO.	WALL THICKNESS	RECOMMENDATION		REMARKS	WELD NO.	WALL THICKNESS	RECOMMENDATION		REMARKS
		✓	✗				✓	✗	
1					51				
2					52				
3					53				
4					54				
5					55				
6					56				
7					57				
8					58				
9					59				
10					60				
11					61				
12					62				
13					63				
14					64				
15					65				
16					66				
17					67				
18					68				
19					69				
20					70				
21					71				
22					72				
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25					75				
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### EQUIPMENT

KRAUT KRAMER 615K.7

TRANSDUCER (M H Z) 2.25 x 1"

ANGLE USED 0°

REFERENCE STANDARD ASTM A578

### CALIBRATION

db Gain                      Sweep Delay                     

Zero Delay                      Reference Level                     

SUBSTANCES                     

AUTO TRANSPORTATION MILES                     

WATER TRAVEL TIME HRS.                     

LAND TRAVEL TIME HRS.                     

WORK TIME HRS.                     

STANDBY TIME HRS.                     

TOTAL TIME HRS.



## GLOBAL X-RAY &amp; TESTING CORPORATION

Post Office Box 1536  
Morgan City, Louisiana 70381JOEL MOREAU, President  
Residence: 504-446-6861Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

8015

41262

CLIENT Applied HydraulicsDATE 11-18-98CONTRACTOR SameJOB LOCATION Houma, La. 11-898JOB NO. 40# 059801CLIENT REPRESENTATIVE Renald A. J. [Signature]MT TECH. Glade M. [Signature]REMARKS MT Insp.

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS			WELD NO.	WALL THICKNESS	RECOMMENDATIONS	
			✓ X	ACCEPT REJECT				✓ X	ACCEPT REJECT
1					REMARKS	51			
2						52			
3						53			
4						54			
5						55			
6						56			
7						57			
8						58			
9						59			
10						60			
11						61			
12						62			
13						63			
14						64			
15						65			
16						66			
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18						68			
19						69			
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22						72			
23						73			
24						74			
25						75			
26						76			
27						77			
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## SURFACE CONDITION

GOOD ( ☒ ) FAIR ( ) PAINTED ( ) WELD ( ☒ )

## EQUIPMENT

MAKE Parker MODEL B-300 S/N CG93

## CONTRACTS

PROD SPACING 3' 20" CONTINUOUS ( )AC ( ☒ ) BC ( ) HALF WAVE ( ) FULL WAVE ( )AMPS 6.75

## MEDIA

7C-BLACK WET ( ☒ ) 8A-DRY ( ) WHITE HIGHLIGHTER ( )

## CALIBRATION

10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )

CALIBRATION DATE: \_\_\_\_\_

## ACCEPTANCE CRITERIA

ASME B31.1 Sec 6TOTAL TIME HRS. 2

# GLOBAL X-RAY & TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861

Post Office Box 1536  
Morgan City, Louisiana 70381

Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

24376

41125

CLIENT Applied Hydraulics

DATE 11-9-98

CONTRACTOR Same

JOB LOCATION Bourma, La. 11-10-98

JOB NO. 120th 059801

CLIENT REPRESENTATIVE [Signature]

MT TECH. Lack Mike

REMARKS MT Insp.

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS				WELD NO.	WALL THICKNESS	RECOMMENDATIONS		
			✓	ACCEPT	REMARKS				✓	ACCEPT	REMARKS
1					100% MT Inspection	51					
2						52					
3					MT Coating Welds	53					
4						54					
5					Acceptable	55					
6						56					
7						57					
8						58					
9						59					
10						60					
11						61					
12						62					
13						63					
14						64					
15						65					
16						66					
17						67					
18						68					
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### SURFACE CONDITION

GOOD ( ) FAIR ( ) PAINTED ( ) WELD ( )

### EQUIPMENT

MAKE Parker MODEL B-300 S/N 6693

### CONTRACTS

PROD SPACING 3" 60" CONTINUOUS ( )  
AC ( ) DC ( ) HALF WAVE ( ) FULL WAVE ( )  
AMPS 5.75

### MEDIA

7C-BLACK WET ( ) SA-DRY ( ) WHITE HIGHLIGHTER ( )

### CALIBRATION

10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )  
CALIBRATION DATE:

### ACCEPTANCE CRITERIA

FLS 8.11 5x6

TOTAL TIME HRS

1

# Material Traceability Log

CRANE WO. NO.: 059801  
 CUSTOMER: PEMEX / B & R  
 WELDMENT PART NO.: N61583-001  
 REV. LEVEL: P  
 WELDMENT S/N: 98253-02  
 DESCRIPTION: Gantry Weldment  
 MODEL: 340LA-140  
 CHECKED BY: *D. J. S.*  
 DATE: 12-30-98

ITEM NO.	QTY.	MATERIAL DESCRIPTION	HEAT NUMBER
1	2	1" Plate, A-36 Fine Grain	393285
2	2	2" Plate, A-36 Fine Grain	1D0787
3	1	20" Sch-80 Pipe, A-106 Gr B	B67635
4	2	1" Plate, A-36 Fine Grain	393285
5	2	2" Plate, A-36 Fine Grain	M66254
6	2	10" x 14" x 5/8" Rect. Tbg., A-500 Gr B	D60168
7	2	10" x 1/2" Sq. Tbg., A-500 Gr B	X62556
8	1	8" x 1/2" Sq. Tbg., A-500 Gr B	C47449
9	1	8" x 1/2" Sq. Tbg., A-500 Gr B	X62764
10	2	8" x 1/2" Sq. Tbg., A-500 Gr B	X62764
11	1	8" x 1/2" Sq. Tbg., A-500 Gr B	X62764
12	2	8" x 1/2" Sq. Tbg., A-500 Gr B	X62764
13	1	8" x 1/2" Sq. Tbg., A-500 Gr B	X62764
14	2	8" x 1/2" Sq. Tbg., A-500 Gr B	X62764
15	2	4" Plate, A-36	M66395
16	2	3/4" Plate, A-36 Fine Grain	M66115
17	2	2" Plate, A-36 Fine Grain	1D0787
18	2	3" Sch-40 Pipe, A-106 Gr B	A44433
19	2	8" x 1/2" Sq. Tbg., A-500 Gr B	X62764
20	2	1/2" Plate, A-36 Fine Grain	Y67605
21	2	3/4" Plate, A-36 Fine Grain	M66115
22	2	3/4" Plate, A-36 Fine Grain	M66115
23	1	1" Plate, A-36 Fine Grain	393285
24	1	3/8" x 1 1/2" Flat Bar, ABS GR A	371-0505
25	4	1/2" Plate, A-36 Fine Grain	Y67605
26	1	1/2" Plate, A-36 Fine Grain	389843
27	4	1/2" Plate, A-36 Fine Grain	M66073

# OREGON STEEL MILLS

P.O. BOX 2760, Portland, Oregon 97208 • (503) 286-9651 Fax (503) 240-5268

THE FIRST

ISO9002

REGISTERED  
U.S. PLATE FABRICATOR

KLOCKNER NAMASCO CORPORATION  
ATTN: MELANIE ELLIOTT  
5775-C GLENRIDGE DRIVE  
SUITE 110  
ATLANTA, GA 30328

S O L D T O

## REPORT OF CHEMICAL/PHYSICAL TESTS

CERTIFICATE NO. 492321P	DATE Aug 09, 1998	PAGE 1
MILL ORDER NO. 80808	DATE	
CUSTOMER ORDER NO. NEW-84815		
JOB REQ. NO.		
SHIPPING NO. 492321	DATE 08/09/1998	
CARRIER UNION PACIFIC		
CART/TRUCK NO. CW5003		

NAMASCO-SOUTHWEST  
4501 N MIRO STREET  
NEW ORLEANS, LA 70117-4439

THIS MATERIAL HAS BEEN MANUFACTURED, TESTED AND FOUND TO MEET THE SPECIFICATIONS AND PURCHASE ORDER REQUIREMENTS  
OSM CARBON STRUCTURAL QUALITY PLATE ASTM A36-96/ASME SA36 1995. SI. KILLED FINE  
GRAIN PRACTICE. LCVN 15 FT/LBS AVG @ +10 F (H).

## PHYSICAL PROPERTIES

CSM (ITEM NO)	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8" 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
1	0.5000 X 96.000M X 240.000 1 PC 3267 LBS	392730		465 461	680 675	28 28				
							LCVN @ 10			DEG F 10.0mm 55 105 95 /85 egv
2	1.0000 X 96.000M X 240.000 2 PCS 13068 LBS	393200		453 481	665 695	26 28				
							LCVN @ 10			DEG F 10.0mm 99 119 91 /103 egv
							LCVN @ 10			DEG F 10.0mm 84 44 106/78 egv

## CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cr	Al	Mo	Ti	B	N	Ca	CE	McQand Brn Grain Size
+392730	.15	.77	.005	.003	.22	.25	.10	<.008	.031	.05	.04						
+393200	.14	.92	.006	.010	.17	.26	.11	<.008	.024	.05	.03						
+393285	.14	.91	.006	.007	.22	.25	.11	<.008	.029	.06	.04						
ALL HEATS INDICATED WITH (+) WERE MELTED AND MANUFACTURED IN THE USA.																	

*Colleen Shamrell*  
COLLEEN SHAMRELL  
Q.C. RECORDS  
ADMINISTRATOR



# Metallurgical Test Report



REV. 3/87

35648

GENEVA STEEL COMPANY CERTIFIES ALL SMELTING, MELTING AND MANUFACTURING PROCESSES OCCURRED IN THE U.S.A.

REQ. JO# CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
	12/11/97	NEW-74269/61-8085
V E N D O R	GENEVA STEEL	
	P.O. BOX 2500	SHIPERS NO.
	PROVO, UTAH 84603	GP42423B 03-10-98
		MILL ORDER NO.
		EA48880
		TTPX 81643
		TALLY NO.
		GP42423B
S O L D T O	MANASCO C/O NEW ORLEANS PUBLIC BELT RR DELIVERY WAREHOUSE #1 NEW ORLEANS, LA	

SPEC. PLATE ASTM A36-96 AND ASME SA-36 1995 EDITION 1996 ADDENDA  
 INSP. KILLED FINE GRAIN AND DIN 50049-3.18

01 MILL RA/SN CERTIFIED T/R

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS REQUIREMENTS IN SUCH RESPECTS.

*Larry D. Clinger*  
 DIVISION MANAGER, QUALITY  
 DATE 03-10-98

ITEM NO.	MATERIAL DESCRIPTION					QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEN			
	THICKNESS OR SECTION	WIDTH DIA. OR FL. WT.	LENGTH		IN 8"							IN 2"						
01	2.0000"	96.0000"	240.0000"		4	52272#	100787	2.0000"	44.8	75.0	27.0							
02	3.0000"	96.0000"	240.0000"		1	19602#	100690	2.0000"	44.3	75.9	27.0							
	3.0000"	96.0000"	240.0000"		2	39204#	100788	3.0000"	46.7	73.1	20.0							
	3.0000"	96.0000"	240.0000"		1	19602#	100790	3.0000"	42.1	72.4	23.0							
								3.0000"	44.5	73.6	20.0							
								3.0000"	47.6	73.4	20.0							
								3.0000"	47.1	74.1	18.0							
								3.0000"	48.3	75.2	20.0							
								***END OF DATA***										
HEATNO.	TYPE	C	AN	P	S	SI	CU	N	CR	MO	SN	AL	V	B	PI	CB	CO	CA
100690	HEAT	23	104	012	014	20	01	01	02	004		041	004			003		
100787	HEAT	24	101	010	021	18	01	01	02	004		042	004			003		
100788	HEAT	23	103	009	012	19	01	01	01	004		040	004			003		
100790	HEAT	23	100	010	017	18	05	02	02	004		042	004			003		
'GENEVA STEEL COMPANY CERTIFIES ALL SMELTING, MELTING AND MANUFACTURING PROCESSES OCCURRED IN THE U.S.A.'																		
***END OF DATA***																		

530

667635

US

20.1.031

P

DATE: 07/22/98  
TIME: 12:39:48  
USS, USX are trademarks of USX Corporation

**TUBULAR PRODUCTS  
CERTIFIED TEST REPORT**  
(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049)

U.S. STEEL GROUP  
A DIVISION OF USX CORPORATION

MILL ORDER/ITEM NO. DR34695 02	SHEPERS NO.	P.O. NUMBER 10-30092	VEHICLE ID.
SOLD TO ADDRESS MARION KEYSTONE CORP P O BOX 791 BUTLER PA 16003-0791		MAIL TO ADDRESS	
VENDOR USS TUBULAR PRODUCTS 1807 EAST 28TH ST. LORAIN, OH 44055			

**SPECIFICATION AND GRADE**

PIPE CARBON SMLS STD PIPE API 5L-X41ST EDITION DTD 4/1/95 ASTM A53-X97 ASTM A106-X97A GRADE B TRIPLE STENCIL ASME SA53-X1995 EDITION 1996 ADDENDUM ASME SA106-X1995 EDITION 1996 ADDENDUM GRADE B BLK REG MILL COAT PE SC MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75

AS ROLLED										OD: 20.000 (508.000)										WALL: 1.031 (26.187)										in (mm)		in (mm)	
PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD		EXT %	TENSILE		Y/T	ELONG % (IN 2")		HARDNESS		MIN HYDRO PSI	DWEIL (SEC)																		
				MIN:	MAX:		MIN:	MAX:		MIN:	MAX:	MIN:	MAX:			MIN:	MAX:																
B67635	STRIP/T/B	AR	1.500	MIN:	48500	.50	MIN:	60000		MAX:	29.5	MIN:	100.0	2170	5																		
		***	END OF DATA THIS SHEET	MAX:	76800	0.63	MAX:			46.0	MAX:	B 86.7	2170	5																			
LEGEND:		L - LONGITUDINAL U - UPSET		T - TRANSVERSE N - NORMALIZED		QT - QUENCHED & TEMPERED SR - STRESS RELIEVED					AR - AS ROLLED					B - BODY					W - WELD												
PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	N	CR	MO	AL	N	V	B	TI	CB	CO	CE *															
B67635	HEAT	24	39	006	006	26	01	02	03	01	031		003			001																	
B67635	PROD	24	38	007	006	24	01	02	03	01	029		000			000																	
B67635	PROD	24	38	007	006	24	01	02	03	01	028		000			001																	
			***	END OF DATA THIS SHEET: ***																													
																			Q. C. REVIEWED		DATE		INITIAL										
																					7/22/98		dl										
*C.E. IS BASED ON THE FOLLOWING EQUATION(S):																																	

Q. C. REVIEWED  
DATE 7/22/98  
INITIAL BT

U.S. STEEL GROUP  
A DIVISION OF USX CORPORATION

TUBULAR PRODUCTS  
CERTIFIED TEST REPORT  
(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN5049)

DATE: 07/22/98  
TIME: 12:39:48  
USX™  
USS, USX, USX are trademarks of USX Corporation

MILL ORDER/ITEM NO. DR34695 02		SHIPPER'S NO.		P.O. NUMBER 10-30092		O.D.: 20.000(508.000)		I.D.: 1.031 (26.187)		WALL: 1.031 (26.187)		IN (mm)	
MATERIAL COND: AS ROLLED		FLAT		BEND		GRAIN SIZE		MIN COLLAPSE		DIR		TEST LOC.	
PRODUCT IDENTIFICATION		OK				END OF DATA		THIS SHEET		XX			
LEGEND:		L - LONGITUDINAL		T - TRANSVERSE		B - BODY		W - WELD		HAZ - HEAT AFFECTED ZONE			
TEST / INSPECTION		YES		RESULTS / COMMENTS									
FULL LENGTH VISUAL		X											
FULL LENGTH EMI													
FULL LENGTH MPI		X											
FULL LENGTH UT													
END AREA INSPECTION (PLAIN END)													
SPECIAL END AREA (SEA) INSP.													
FULL LENGTH DRIFT													
DRIFT MANDREL SIZE:													
ADDITIONAL NOTES/COMMENTS													
ALL MELTING AND MANUFACTURING TOOK PLACE IN THE USA. 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.													

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: F.J. MIKULSKI MGR. MET. &  
Q.A. USS TUBULAR PRODUCTS  
DATE: 07/22/98

37434

**Metallurgical  
Test Report**

REQ. FOR CONTRACT NO.		PURCHASE ORDER NO.	
		NEW-76549	
NO. DATE		INVOICE NO.	
SHEET NO.		154-010873	
H02314 07 11 98		H2314	
GARY WORKS GARY, INDIANA 46402		H2314	
** MELTED AND MANUFACTURED IN THE USA **			
KLOCKNER NAMASCO CORP SOUTHWEST DIVISION 4501 N MIRO ST NEW ORLEANS LA 70117-4439		SHIP TO	

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MFGD., SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS REQUIREMENTS IN SUCH RESPECT.

PREPARED BY THE OFFICE OF:  
S.C. PAPE GEN. MGR., O.A.

DATE: 7-15-98

ITEM NO.	MATERIAL DESCRIPTION				QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PECE DENSITY	YIELD ST. KSI	TENSILE ST. KSI	ELONGATION %		% RED. OF AREA	REMARKS
	THICKNESS OR SECTION	WIDTH OR DIA.	LENGTH	REDUCTION RATIO							N 8"	N 2"		
06	2.0000	96.0000	240"		01	13068	M66254	55W 3	46.0	76.0				
	STEEL-TYPE = CAST					4.6 TO 1			52.0	74.0	32.0	22.3	0.0	
	LONG. FL SZ CHARPY IMPACT V-WTCH +010					DEG F								
	-12 DEG C AVERAGE IMPACT STRENGTH					+93								
	LONG. FL SZ CHARPY IMPACT V-WTCH +010					DEG F								
	-12 DEG C AVERAGE IMPACT STRENGTH					+73								
	PRODUCT & TEST SPECIMENS WERE NORMALIZED AT 1660 DEG.F. FOR 0064 MINUTES. COOLING COMPLETED IN STILL AIR. ***END OF DATA***													

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION.

HEAT NO.	TYPE	C	MIN	P	S	SI	CU	N	CR	MO	SN	AL	N	V	B	TI	CS	CO
M66254	HEAT 22	096	012	008	22	03	02	01	01	01	01	024	001	001	001	001	001	001
	***END OF DATA***																	

FINE GRAIN



**BULL MOOSE TUBE - ELKHART FACILITY  
CERTIFICATION OF TESTS**

**BILL TO: MARMON-TARRANT**

**SHIP TO: MARMON KEYSTONE**

**0 CPU - CALL JOHNNY SIMMONS**

205-520-1000

AL

35210000

000000000000

**BMT BOL # 50039244**

**SHIP VIA: CPU TRUCK**

10.00 X 14.00 RECT.

.625 NOM 30'

MO# 778329-101

254MM X 356MM

15.88 MM

9.14M

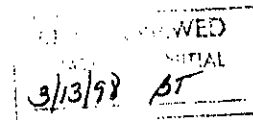
PO# 10M51746

A500-93 GR-B

MILL TEST REPORTS

PN# 1014WM

C	MN	P	S	AL	SI	YLD psi	TEN psi	ELN%
						YLD N/mm2	TEN N/mm2	ELN%
HEAT#/CAST#: D60168						63099	76000	35%
.070	0.830	.008	.007	.052	.018	435	524	35



THIS WELDED STEEL TUBING IS MANUFACTURED IN THE UNITED STATES OF AMERICA AND HAS BEEN PRODUCED IN ACCORDANCE WITH THE STATED SPECIFICATION. LADLE CHEMISTRIES ARE REPORTED FROM DOCUMENTS PROVIDED BY THE SUPPLYING STEEL MILL. ANY PHYSICAL AND MECHANICAL TESTING RESULTS SHOWN ON THIS CERTIFICATION ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

APPROVED BY DALE DONAT

CUSTOMER COPY

Certform: DC-1

Quality Control Department Date 3/11/98

R 10.14.6.95 AM D60168 377

# COPPERWELD

## BIRMINGHAM DIVISION

1500 North 50th Street  
Birmingham, AL 35212-1058  
TEL. 205-599-0600

Customer Order No.

10-051745

Copperweld Order No. 199914

Invoice No. 728126

Date 04/17/98

## TEST REPORT

### Customer:

MARMON KEYSTONE CORPORATION  
2505 FIRST AVENUE SOUTH  
TEST REPORTS DEPT.  
IRONDALE, AL 35210

### Specification:

10 IN, SQ, 1/2  
30 Ft  
ASTM A500 GRB 93  
PART # 10.10..5

### HEAT NO.

### CHEMICAL ANALYSIS, %

HEAT NO.	C	Mn	P	S	SI	AL					
X62556	.20	.78	.007	.013	.01	.046					

### MECHANICAL PROPERTIES

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
X62556	CB006937	57800	68100	28	80

YIELD STRENGTH IS 0.2% OFFSET - ELONGATION IN 2 INCHES

### Other Tests

MELTED & MANUFACTURED IN THE U.S.A. (D)

Copperweld certifies that the material purchased on this order meets all chemical and physical requirements in accordance with the latest applicable ASTM standards.

Q. C. REVIEWED

DATE INITIAL

4/21/98

BT

*Paul J Anthony*  
PAUL J ANTHONY, METALLURGIST

5 10.10.5  
X62556  
375

# COPPERWELD

Customer Order No.

10-M-51491

**BIRMINGHAM DIVISION**

1500 North 50th Street

Birmingham, AL 35212-1058

TEL. 205-599-0600

Copperweld Order No. **171236**Invoice No. **723473**Date **09/24/97**

## TEST REPORT

**Customer:**

MARMON KEYSTONE CORPORATION  
2505 FIRST AVENUE SOUTH  
TEST REPORTS DEPT.  
IRONDALE, AL 35210

**Specification:**

8 IN, SQ, 1/2  
40 Ft  
ASTM A500 GRB 93

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL		V	CU	NI	CR
C47448	.22	.80	.009	.012	.01	.034		.00	.020	.010	.030
C47449	.21	.82	.009	.011	.01	.035		.00	.020	.010	.030

**MECHANICAL PROPERTIES**

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
C47448 C47449	CB006376 CB006377	70300 52900	85500 66600	32 34	80 82

Q. C. REVIEWED  
DATE 9/25/97 INITIAL BT

YIELD STRENGTH IS 0.2% OFFSET - ELONGATION IN 2 INCHES

**Other Tests**

MELTED &amp; MANUFACTURED IN THE U.S.A. (D)

Copperweld certifies that the material purchased on this order meets  
all chemical and physical requirements in accordance with the latest  
applicable ASTM standards.

*Paul J Anthony*  
PAUL J ANTHONY, METALLURGIST

5 8.8.5 RE  
C47448  
C47449  
374

# **COPPERWELD**

Customer Order No.

10-051774**BIRMINGHAM DIVISION**

1500 North 50th Street  
Birmingham, AL 35212-1058  
TEL. 205-599-0600

Copperweld Order No. 204100Invoice No. 729239

## **TEST REPORT**

Date 06/06/98**Customer:**

MARMON KEYSTONE CORPORATION  
2505 FIRST AVENUE SOUTH  
TEST REPORTS DEPT.  
IRONDALE, AL 35210

**Specification:**

8 IN, SQ, 1/2  
30 Ft  
ASTM A500 GRB 93  
PART # 8.8..5

HEAT NO.	CHEMICAL ANALYSIS, %									
	C	Mn	P	S	SI	AL				
X62764	.20	.79	.009	.008	.01	.032				

**MECHANICAL PROPERTIES**

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
X62764	CB008037	60200	73400	31	81

YIELD STRENGTH IS 0.2% OFFSET - ELONGATION IN 2 INCHES

**Other Tests**

MELTED &amp; MANUFACTURED IN THE U.S.A. (D)

Copperweld certifies that the material purchased on this order meets  
all chemical and physical requirements in accordance with the latest  
applicable ASTM standards.

Q. C. REVIEWED

DATE INITIAL

6/8/98 ST

*Paul J Anthony*  
PAUL J ANTHONY, METALLURGIST



U STEEL GROUP  
A Division of USX Corporation  
80000272 (REV 8/91)

**Metallurgical  
Test Report**

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are trademarks  
of USX Corp.

USX<sup>TM</sup>

CONTRACT NO.

PO DATE \* PURCHASE ORDER NO.

SHIPERS NO. TOB017	INVOICE NO. 154-005895
QUANTITY 00	32231
GARY WORKS GARY, INDIANA 46402	
** MELTED AND MANUFACTURED IN THE USA **	
TAYLOR MACHINE WORKS INC HIGHWAY 15 LOUISVILLE MS 39339-9737	

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MFGD., SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS REQUIREMENTS IN SUCH RESPECT.

*Neo*

PREPARED BY THE OFFICE OF:  
S.C. PAPE GEN. MGR, Q.A.

PART NO: PT#501-100--  
PLATE CARBON ASTM A36--x96

NSP:01 WILL CERTIFIED I/R 3 T/R'S TO SOLD TO ATTN K COLLINS

DATE  
*6-29-98*

ITEM NO.	MATERIAL DESCRIPTION		QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PL KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEN
	THICKNESS OR SECTION	WIDTH HA. OR FL. WT.							N 8"	N 2"		
01	4.0000	63.0030	02	34304	H66395		37.0	74.0		32.0		
	STEEL-TYPE - CAST	REDUCTION RATIO	= 3.0 TO 1									
	***END OF DATA***											

*01486A SN*

HIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION.

HEAT NO.	HEAT 20	093	013	008	02	04	01	001	001	001	001	001
***END OF DATA***												

RECEIVED OCT 0 9 1998

TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.

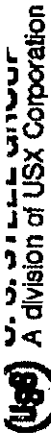
50617 MY21 2003 701454030 061796 8635225001 01 GMS CAA 0 0 3 PAGE 1 OF 1



USIS, USISL, USIX are trademarks of USIX Corporation.

MATERIAL ORDER/ITEM NO.		SHIPPER'S NO.		P.O. NUMBER		VEHICLE ID		VENDOR	
SOLD TO ADDRESS		SOLD TO ADDRESS		MAIL TO ADDRESS		MAIL TO ADDRESS		MAIL TO ADDRESS	
DR19130 05		DR19130 05		97-1569B		97-1569B		USS TUBULAR PRODUCTS 1807 EAST 28TH ST. LORAIN, OH 44055	
PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77228-3237		PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77228-3237		PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77228-3237		PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77228-3237		PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77228-3237	
SPECIFICATION AND GRADE									
PIPE CARBON SMLS STD PIPE API 5L-X41ST EDITION DTD 4/1/95 GRADE B AND GRADE X42 ASTM A53-X96 ASTM A106-X95 GRADE B QUAD STENCIL ASME SA53-X1995 EDITION 1996 ADDENDUM ASME SA106-X1995 EDITION 1996 ADDENDUM GRADE B CARBON EQUIVALENT ON HEAT ANALYSIS .40 MAX BASED ON C-MN OVER 6 + (CR+MO+V) OVER 5 + (CU+NI) OVER 15 BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75									
MATERIAL COND:		AS ROLLED		OD: 3.500 ( 88.900 )		ID: 0.216 ( 5.486 )		h (mm)	
PRODUCT IDENTIFICATION		TENSILE		YIELD		TENSILE		HARDNESS	
TEST TYPE/ ORIENTATION		TEST COND.		GAUGE WIDTH		EXT %		SCALE	
MIN		MAX		MIN		MAX		MIN	
A44433		AR		0.750		.50		21.5	
B49704		AR		0.750		.50		33.0	
		XX END OF DATA THIS SHEET				XX		35.0	
LEGEND		T - TRANSVERSE		QT - QUENCHED & TEMPERED		AR - AS ROLLED		B - BODY	
L - LONGITUDINAL		N - NORMALIZED		SR - STRESS RELIEVED				W - WELD	
U - UPSET									
PRODUCT IDENTIFICATION		TYPE		C		MN		P	
				S		SI		CU	
				M		DR		MO	
				AL		N		V	
				B		Ti		CB	
				CO					
				CE*					
A44433		HEAT		.18		.106		.010	
A44433		PROD		.18		.105		.008	
A44433		PROD		.18		.102		.008	
B49704		HEAT		.18		.102		.010	
B49704		PROD		.18		.099		.008	
B49704		PROD		.19		.101		.008	
				XX END OF DATA THIS SHEET		XX			

\*CE IS BASED ON THE FOLLOWING EQUATION(S):



A Division of USS Corporation

# CERTIFIED TEST REPORT

(TYPE B - IN ACCORDANCE WITH ISO 10474/EN1204/DIN50049)

USS, USSX, USSX are trademarks of USS Corporation

MILL ORDER/ITEM NO. DR19130 05	SHIPPER'S NO.	P.O. NUMBER 97-15698	Q.D. 3.500 ( 88.900 )		In (mm) WALL 0.216 ( 5.485 )		In (mm)	
MATERIAL COND: AS ROLLED	MIN COLLAPSE		GRAIN SIZE	BEND	FLAT	PRODUCT IDENTIFICATION		
A44433 B49704	OK OK	** END OF DATA THIS SHEET **						
LEGEND: L - LONGITUDINAL		T - TRANSVERSE		B - BODY		W - WELD		HAZ - HEAT AFFECTED ZONE
TESTING / INSPECTION INFORMATION								
TEST / INSPECTION		YES		RESULTS / COMMENTS				
FULL LENGTH VISUAL		X						
FULL LENGTH EMI				OD _____ L _____ L/T _____				
FULL LENGTH MPI				OD _____ L _____ L/T _____				
FULL LENGTH UT				MPI _____ UT _____				
END AREA INSPECTION (PLAIN END)				MPI _____ UT _____				
SPECIAL END AREA (SEA) INSP.				DRIFT MANDREL SIZE: _____				
FULL LENGTH DRIFT								
ADDITIONAL NOTES/COMMENTS								

ALL MELTING AND MANUFACTURING TOOK PLACE IN THE USA. 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.

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: F.J. MIKULSKI MGR. MET. &  
Q.A. USS TUBULAR PRODUCTS

DATE 01/20/98





U. S. STEEL GROUP  
A division of USX Corporation  
010000772 (REV. 8/71)

# Metallurgical Test Report

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are trademarks of USX Corp.

USX™

37422

REQ. FOR CONTRACT NO.	PO. DATE	PURCHASE ORDER NO.	THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MFGD., SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FUL- FILLS REQUIREMENTS IN SUCH RESPECT.	
Y E N D O R	SHIPERS NO. H02314 07 11 98 JUNE EJE 006016	MAIL ORDER NO. UB56015	INVOICE NO. 154-010872	PREPARED BY THE OFFICE OF S. C. PAPE GEN MGR. Q. A DATE 7-16-98
S O L D T O	GARY WORKS GARY, INDIANA 46402 ** MELTED AND MANUFACTURED IN THE USA ** KLOCKNER NAMASCO CORP SOUTHWEST DIVISION 4501 N MIRO ST NEW ORLEANS LA 70117-4439			

SPEC. & INSP. PLATE CARBON ASTM A36-896 FINE GRAIN CHARPY V-NOTCH LONGITUDINAL  
HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

INSP 01 MILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N  
MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION			QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD ST. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEND
	THICKNESS OR SECTION	WDR, DIA. OR FL WT.	LENGTH							IN 8"	IN 2"		
01	1/2 " STEEL-TYPE	96.0000 = CAST	240" REDUCTION RATIO = 18.2 TO 1	09	29403	M66073							
								44.0	67.0	28.0	50.0		
								43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMP T V-N TCH +010 DEG F -12 DEG C	AVERAGE IMPACT STRENGTH +154 FT LBS				128-167-168							
01	1/2 " STEEL-TYPE	96.0000 = CAST	240" REDUCTION RATIO = 18.2 TO 1	05	16335	Y67605							
								46.0	68.0	29.0	50.0		
								44.0	64.0	31.0	50.0		
	LONG FL SZ CHARPY IMP T V-N TCH +010 DEG F -12 DEG C	AVERAGE IMPACT STRENGTH +118 FT LBS				105-129-121							
***END OF DATA***													
THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION													

HEAT NO.	TYPE	C	AN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	FINE GRAIN
M66073	HEAT 14	098	014	006	21	02	02	02	03	01		027		001			001		FINE GRAIN
Y67605	HEAT 14	095	014	008	20	02	02	02	05	01		031		001			001		FINE GRAIN
	***END OF DATA***																		

ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA  
MATRIX DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.  
C80715 MU21 1137 701130010 071698 R 0125788001 01 SAM CBA 0 0 3 PAGE 1

31945  
Date 4/28/97

NUCOR STEEL  
A Division of NUCOR Corporation  
JENETT, TEXAS 75846 PH (903) 626-4461

B/L# 50438

CERTIFIED MILL TEST REPORT

18001

Sold To: MANASCO  
4501 NORTH MIRO STREET  
NEW ORLEANS LA 70117-4439

Ship To: MANASCO  
4501 N. MIRO & INDUSTRIAL CANAL  
NEW ORLEANS LA

8 INCH  
SCALE

SIZE GRADE	HEAT NUMBER	CUSTOMER PO NUMBER	TENSILE PSI	YIELD PSI	ELONG %	C	Mn	Si	S	P	V	Nb	Ca	Cr	Ni	Mo	Test
1/4 X 1 ABS A	372-0996	NEW-56587	68800	53200	23	.150	.700	.250	.025	.006	.000	.000	.310	.090	.090	.020	
1/4 X 2 ABS A	371-0953	NEW-56587	76600	55400	25	.170	.810	.280	.033	.012	.000	.000	.440	.120	.140	.028	
3/8 X 1 1/2 ABS A	371-0505	NEW-56587	69400	50100	23	.150	.620	.210	.028	.006	.000	.000	.430	.130	.130	.033	
3/8 X 2 ABS A	372-0960	NEW-56587	69700	52000	28	.140	.710	.240	.033	.010	.000	.000	.380	.100	.110	.026	
3/8 X 2 1/2 ABS A	371-0945	NEW-56587	67300	48000	28	.140	.660	.240	.028	.006	.000	.000	.480	.100	.130	.028	
1/2 X 2 ABS A	371-0945	NEW-56587	64500	45800	26	.140	.660	.230	.030	.006	.000	.000	.400	.000	.130	.033	
3/4 X 2 1/2 ABS A	371-0480	NEW-56587	74400	50700	24	.180	.850	.360	.028	.010	.000	.000	.400	.150	.130	.026	
1 X 2 ABS A	371-0970	NEW-56587	69400	47900	23	.140	.750	.290	.028	.007	.000	.000	.390	.090	.140	.027	

*Debbie Wood*  
DEBBIE WOOD  
Notary Public, State of Texas  
My Commission Expires 10-19-02

*Ben R Corp*

MELTED AND MANUFACTURED IN U.S.A.

ALL MATERIAL STRAND CAST

CHIEF METALLURGIST

# OREGON STEEL MILLS

P.O. BOX 2760, Portland, Oregon 97208 • (503) 286-9651 Fax (503) 240-5268



**S O L D T O**

KLOCKNER NAVASCO CORPORATION  
ATTN: MELANIE ELLIOTT  
5775-C GLENRIDGE DRIVE  
SUITE 110  
ATLANTA, GA 30328

NAVASCO-SOUTHWEST  
4501 N MIRO STREET  
NEW ORLEANS, LA 70117-4439

## REPORT OF CHEMICAL/PHYSICAL TESTS

CERTIFICATE NO.	DATE	PAGE
497904P	Sep 14, 1998	1
MILL ORDER NO.	DATE	
101244		
CUSTOMER ORDER NO.		
NEW-90274		
JOB/REQ. NO.		
SHIPPING NO.	DATE	
497904	09/11/1998	
CARRIER		
UNION PACIFIC		
CAR/TRUCK NO.		
MP651064		

THIS MATERIAL HAS BEEN MANUFACTURED, TESTED AND FOUND TO MEET THE SPECIFICATIONS AND PURCHASE ORDER REQUIREMENTS  
OSM CARBON STRUCTURAL QUALITY PLATE ASTM A36-96/ASME SA36 1995. FINE GRAIN  
PRACTICE. LCVN 15 FT/LBS AVG @ +10 F (H).

### PHYSICAL PROPERTIES

Q&A ITEM	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8" 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
1	0.5000 X 96.000M X 240.000 5 PCS 16335 LBS	386601	+	535	655	26				
	5 PCS 16335 LBS	389843	+	486 465	665 665	28 27				
	5 PCS 16335 LBS	393054	+	535	665	28				
	3 PCS 9801 LBS	393066	+	555	675	26				

### CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cr	Mo	Ti	B	N <sub>2</sub>	Ca	CE	McQuaid Bn Chem Size
+386601	.05	.96	.007	.003	.28	.24	.10	<.008	.025	.022	.05	.03				
+389843	.14	.49	.004	.009	.21	.28	.14	<.008	<.008	.029	.04	.05				
+393054	.06	.97	.005	.002	.26	.17	.10	<.008	.021	.024	.04	.03				
+393066	.05	.97	.006	.002	.29	.26	.12	<.008	.024	.022	.08	.03				
ALL HEATS INDICATED WITH (+) WERE MELTED AND MANUFACTURED IN THE USA.																

I certify the above to be correct as contained in the records of OREGON STEEL MILLS By

*Angie McQuaid*  
ANGIE MCQUAID  
Q.C. RECORDS  
ADMINISTRATOR

381325-381333

# Material Traceability Log

CRANE WO. NO.:	059801
CUSTOMER:	PEMEX / B & R
WELDMENT PART NO.:	N61586-001
REV. LEVEL:	E
WELDMENT S/N:	98253-03
DESCRIPTION:	Boom Base Weldment
MODEL:	340LA-140
CHECKED BY:	<i>D. S.</i>
DATE:	<i>12-30-98</i>

[illegible]

**COPPERWELD**

Customer Order No.

7006

Copperweld Order No. 226812

Invoice No. 854685

Date 08/24/98

CHICAGO DIVISION  
7401 South Linder Avenue  
Chicago, IL 60638-9930  
TEL. 708-496-2200

**TEST REPORT**

Customer: TUBULAR STEEL INC 1031 EXECUTIVE PARKWAY DRIVE ATTN: CHERYL HARTMANN TEST REPORTS ST. LOUIS, MO 63141-6351						Specification: 4 IN. SQ, 1/2 ASTM A500 GRB 96						
HEAT NO.	CHEMICAL ANALYSIS, %											
	C	Mn	P	S	SI	AL	CB	V	CU	NI	CR	
K30538	.20	.76	.013	.001	.02	.031	.001		.026	.010		
J42474	.20	.75	.010	.006	.02	.046	.001	.00	.021	.010	.020	
MECHANICAL PROPERTIES												
HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb							
K30538	90822	67000	73700	26	64							
J42474	90818	66300	73800	28	83							
YIELD STRENGTH IS 0.2% OFFSET - ELONGATION IN 2 INCHES												
Other Tests MELTED & MANUFACTURED IN THE U.S.A. (D)												
<p>Copperweld certifies that the material purchased on this order meets all chemical and physical requirements in accordance with the latest applicable ASTM standards.</p> <p><i>Paul J. Anthony</i> PAUL J. ANTHONY, METALLURGIST</p>												

AUG 25 '98 11:58

H0811

PAGE 002

\*\* TOTAL PAGE 003 \*\*

\*\* TOTAL PAGE 002 \*\*

NUMBER	CUSTOMER ORDER NUMBER	DATE	OFC	COM	DI	WI	NET SLS	GR SLS	ACCOUNT NUMBER	US	PAW	PAGE
92423	98-15948	03/23/98	22	00	16	20	01	00471003PDR	BP	PAW	1	

PIPE DISTRIBUTORS INC  
P O BOX 23237

HOUSTON

TX

77028

PIPE DISTRIBUTORS, INC  
GRAND CALLIOU & INDL BLVD.  
HOUMA LA 70360

SN 4  
TR 4  
INV 3

OUTING  
COL-CUST. TRK-TR W/SHPT

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 3-31-98
SEAMLESS	SPECIFICATION		CMST	DESCRIPTION	PROMISE
	ASTM/ASME A/SA 106 B 94			HF CARBON PIPE	04/10/98

## SPECIAL INSTRUCTIONS:

PLAIN ENDS. U.V.C. COATED. ACCEPTABLE PER NACE MRO 175 TABLE 3.  
CERTIFIED TO DIN 50049 3.1B. PERMISSIBLE OVERAGES ACCEPTABLE  
BUT CONTACT SALES WITH ALL OVERAGES. AIM 21' MIN. LENGTHS.

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,900'	1.900		.145	RAND 17'	2.718	10,600	Comp.
		1-1/2"	SCH 40	AVG	24'			185 pcs.
								4,362'
SHIPPING NOTE: PPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.								

ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
231024	.18	.75	.007	.013	.21	.08	.07	.02	.23		V .002
	.18	.73	.006	.013	.21	.08	.07	.02	.21		V .002

FLATTEN	FLARE	FLANGE	REV. FLATTEN	HYDRO TEST	BEND	EDDY CURRENT
				2500 psi OK	OK	

PROPERTIES

HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS	HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS
231024	74200	49000	48.0						

I CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED  
IN ACCORDANCE WITH THE ORDERED SPECIFICATION AND THAT THIS TEST  
INFORMATION IS CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Dwayne Allen*  
TECHNICAL ANALYST

DWAYNE ALLEN

(R.F) REV.0

EFFECTIVE 7/1/97

SWORN TO AND SUBSCRIBED BEFORE ME THIS

DAY OF 19

NOTARY PUBLIC



# MILL TEST REPORT

## WELDED TUBE COMPANY OF AMERICA

1855 EAST 12ND STREET CHICAGO, ILLINOIS 60633  
PHONE: 773-648-4500

MANUFACTURERS OF ELECTRIC WELDED CARBON/ALLOY STEEL TUBING



TEST REPORT NO. 1997/D5C963  
RE: FUSION  
08/19/1997  
Shipped: 08/19/1997

17886

ACCOUNT NO. SOLD TO

840

NAMASCO SOUTHEAST  
5775-C GLENWYDSE DR., SUITE 110

ACCOUNT NO. SHIP TO

3

NAMASCO SOUTHEAST  
3775 INDUSTRIAL CANAL

ATLANTA GA 30320

SUNABER GA 30174

HEAT NUMBER	DESCRIPTION	Yield (0.2%) KSI/MPa	Tensile KSI/MPa	Elong. % in 2"	HEAT ANALYSIS - CHEMICAL COMPOSITION, %									
					C	Mn	P	S	Si	Al	Ni	Cr	Mo	Cu
622391	10.00x10.00x.250 BARE ASTM A500-93 GRADE B PO: ATL-65306, ALSO MEETS GRADE C	61.1 421	75.7 522	35.0	.203	.76	.01	.013	.005	.044	.00	.00	.00	.00
D42624	10.00x10.00x.312 BARE ASTM A500-93 GRADE B PO: ATL-65306, Melted and Manufactured in USA ALSO MEETS GRADE C	63.6 439	76.7 529	35.0	.21	.42	.016	.02	.013	.048	.00	.00	.00	.00
644623	6.00x4.00 x .250 BARE ASTM A500-93 GRADE B PO: ATL-65306, Melted and Manufactured in USA ALSO MEETS GRADE C	55.6 383	72.8 502	36.0	.19	.72	.014	.01	.012	.045	.00	.00	.00	.00
M45603	8.00x4.00 x .188 BARE ASTM A500-93 GRADE B PO: ATL-65306, Melted and Manufactured in USA ALSO MEETS GRADE C	54.7 377	70.7 487	32.0	.20	.74	.013	.013	.012	.049	.00	.00	.00	.00
M45766	10.00x10.00x.250 BARE ASTM A500-93 GRADE B	57.6 397	72.6 501	33.0	.20	.74	.012	.013	.011	.049	.00	.00	.00	.00

WE HEREBY CERTIFY THAT THE CHEMICAL ANALYSIS CONFORMS WITH REPORTS PROVIDED TO US BY THE SUPPLYING STEEL MILL. THE PHYSICAL AND MECHANICAL TEST RESULTS SHOWN ON THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF OUR COMPANY.



# WELD TEST REPORT

## WELDED TUBE COMPANY OF AMERICA

1855 EAST 122ND STREET CHICAGO, ILLINOIS 60633  
PHONE: 773-646-4500

MANUFACTURERS OF ELECTRIC WELDED CARBON-ALLOY STEEL TUBING



TEST REPORT NO. 1997/DSC64J  
JUNIOR  
08/11/1997  
Shipped: 08/11/1997

ACCOUNT NO. SOLD TO  
345

NAMASCO SOUTHCENTRAL  
5773 C GLENRIDGE DR, SUITE 110

ATLANTA GA 30328

ACCOUNT NO. SHIP TO  
6

NAMASCO SOUTHCENTRAL  
4501 N. MIRO STREET  
(SOUTH CENTRAL)

NEW ORLEANS LA 70117

HEAT NUMBER	DESCRIPTION	Yield (0.2%) KSI/MPa	Tensile KSI/MPa	Elong. % in 2"	HEAT ANALYSIS - CHEMICAL COMPOSITION, %									
					C	Mn	P	S	Si	Al	Ni	Cr	Mo	Sb
E44623	ALSO MEETS GRADE C  6.00x4.00 x .250 BARS ASTM A500-93 GRADE B FOR NEW-65771: Welded and Manufactured in USA ALSO MEETS GRADE C	55.6	72.6	36.0	.19	.72	.014	.01	.012	.045	.00	.00	.00	.00
		383	502		.00	.02	.00	.000	.00	.311	.00	.00	.00	.00

WE HEREBY CERTIFY THAT THE CHEMICAL LADLE ANALYSIS CONFORMS WITH REPORTS PROVIDED TO US BY THE SUPPLYING STEEL MILL. THE PHYSICAL AND MECHANICAL TEST RESULTS SHOWN ON THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF OUR COMPANY.

NUMERICAL COPY

Jeffrey D. Hunt, QA Mgr



Metallurgical  
Test Report

U.S. STEEL GROUP  
A Division of USX Corporation  
000.0772 (REV. 8/91)

U.S. STEEL GROUP  
A Division of USX Corporation  
000.0772 (REV. 8/91)

REQ. JOB, CONTRACT NO.  
PO. DATE  
PURCHASE ORDER NO.  
NEW-76549

VENDOR  
GARY WORKS  
GARY, INDIANA 46402

SHIPPER NO.  
H02314 07 11 98  
VEHICLE IDENTITY  
EJE 006016

INVOICE NO.  
154-010872  
H2314

SOLD TO  
KLOCKNER NAMASCO CORP  
SOUTHWEST DIVISION  
4501 N MIRO ST  
NEW ORLEANS LA 70117-4439

THIS IS TO CERTIFY THAT THE  
PRODUCT DESCRIBED HEREIN WAS  
MFGD. SAMPLED, TESTED AND/OR  
INSPECTED IN ACCORDANCE WITH  
THE SPECIFICATION AND FUL-  
FILLS REQUIREMENTS IN SUCH  
RESPECT  
PREPARED BY THE OFFICE OF  
S C PAPE GEN MGR. O A

DATE  
7-16-98

SPEC. & INSP.  
PLATE CARBON ASTM A36-896 FINE GRAIN CHARPY V-NOTCH LONGITUDINAL  
HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

INSP 01 MILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N  
MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION			QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEND
	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH							IN 8"	IN 2"		
01	1/2 "	96.0000	240 "	09	29403	M66073							
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 18	2 TO 1								
	LONG. FL SZ CHARPY IMPT V-NTCH +010 -12 DEG C	AVERAGE IMPACT STRENGTH		DEG F +154	FT LBS	128-167-168		44.0	67.0	28.0	50.0		
01	1/2 "	96.0000	240 "	05	16335	Y67605							
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 18	2 TO 1								
	LONG FL SZ CHARPY IMPT V-NTCH +010 -12 DEG C	AVERAGE IMPACT STRENGTH		DEG F +118	FT LBS	105-129-121		46.0	68.0	29.0	50.0		
***END OF DATA***													
THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION													

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION

HEAT NO. TYPE C MN P S SI CU NI CR MO SN AL N V B TI CB CO

M66073 HEAT 14 098 014 006 21 02 02 03 01 027 001

Y67605 HEAT 14 095 014 008 20 02 02 05 01 031 001

\*\*\*END OF DATA\*\*\*

FINE GRAIN  
FINE GRAIN

ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.

MU21 1127 701130010 071698 R 0125788001 01 SAM CBA 003 PAGE 1

BETHLEHEM STEEL CORPORATION

QUALITY ASSURANCE DEPARTMENT

BURNS HARBOR DIVISION

REPORT OF TESTS AND ANALYSES

SUBMITTER NO.

DATE SHIPPED

CAR OR VEHICLE NO.

803-13536

8-17-96

CR-ESTL-20W-SF

INB 2057

SJE 305274

PAGE 1

SHIP TO

QTY	SERIAL NUMBER	PAT. NO.	HEAT NUMBER	SIZE AND QUANTITY					YIELD POINT PSI	TENSILE STRENGTH PSI	ELONG.		R
				NO. PCS.	THICKNESS INCHES	WIDTH OR DIA. INCHES	LENGTH INCHES	WEIGHT POUNDS			IN	%	
	QUALITY STEEL MELTED & MANUFACTURED IN THE U.S.A.												
	PLATES - ASTM A 36-93A, ASME SA36 1995												
	EDITION --- GAS CUT 4 SIDES												
	MFST - MFST MILL SERIAL# LIFT MAX 10 TON UNLDG												
	OH-SLING												
	CO# 1-65660 GH 845-1684												
	(M55)MFST		801T16270	1	5	96	238	32398	41100	71200	2	28	
			REF# 04										
			821U05720	5	4	96	240	130685	40800	67700	2	29	
	(M55)MFST		REF# 03						40600	67900	2	30	
	PLATES - ASTM A 36-93A, ASME SA36 1995												
	EDITION												
	MFST - LIFT MAX 10 TON UNLDG OH-SLING												
	CO# 1-65650 GH 845-1696												
	(M55)MFST		803U60920	3	3/16	120	480	9189	59100	71400	8	19	
			REF# 1-65650										
	(M55)MFST		803U61750	2	3/16	120	480	6126	64500	74400	8	17	
			REF# 1-65650										
QTY Q—QUENCH TEMPERATURE T—TEMPER TEMPERATURE N—NORMALIZE TEMPERATURE													

Q - QUENCH TEMPERATURE

T - TEMPER TEMPERATURE

N - NORMALIZE TEMPERATURE

SERIAL NUMBER	PAT. NO.	HEAT NUMBER	HARD	BEND	CHARPY IMPACT														
					THICKNESS INCHES	TYPE	SIZE	DIR.	TEST TEMP.	ENERGY FT. LBS.			SHEAR (%)			LAT. EXP.		HIT	
		3,5128			TEXAS PLATE PROCESSORS						1	2	3	1	2	3	1	2	
		CUSTOMER NAME			Applied Hyd.														
		CUSTOMER PO #			35115														
		THK			4"														
		HT & SL			821U05720														
		TPP PO# & PL#																	

HEAT NUMBER	CHEMICAL ANALYSIS															MOL. GRA. SIZ.		
	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	Al	B	Ca	N			
801T16270	.21	.70	.009	.010	.153	.005	.01	.01	.005	.001								
821U05720	.16	1.05	.022	.009	.205	.014	.01	.04	.004	.003				.003				
803U60920	.14	.70	.022	.016	.204	.267	.01	.03	.005	.003				.003				
803U61750	.14	.73	.020	.008	.223	.009	.01	.04	.005	.002				.004				

I CERTIFY THAT THE ABOVE RESULTS ARE A TRUE AND CORRECT COPY OF ACTUAL RESULTS CONTAINED IN RECORDS MAINTAINED BY BETHLEHEM AND ARE IN FULL COMPLIANCE WITH THE REQUIREMENTS OF THE SPECIFICATION CITED ABOVE. THIS TEST REPORT CANNOT BE ALTERED AND MUST BE TRANSMITTED INTACT WITH ANY SUBSEQUENT THIRD PARTY TEST REPORTS, IF REQUIRED.

SUPT. QUALITY ASSURANCE

R. F. HARTMANN

PER LD



U. S. STEEL GROUP  
A division of USX Corporation  
010000772 (REV. 5/71)

# Metallurgical Test Report

USS, USX, USX<sup>TM</sup>  
are trademarks of USX Corp.

USX<sup>TM</sup>

REQ. FOR CONTRACT NO.

PO. DATE

PURCHASE ORDER NO.

THIS IS TO CERTIFY THAT THE  
PRODUCT DESCRIBED HEREIN WAS  
MFGD., SAMPLED, TESTED AND/OR  
INSPECTED IN ACCORDANCE WITH  
THE SPECIFICATION AND FUL-  
FILLS REQUIREMENTS IN SUCH  
RESPECT.

PREPARED BY THE OFFICE OF:  
S.C. PAPE GEN. MGR., O.A.

DATE

7-18-98

Y  
I  
N  
D  
O  
R

GARY WORKS

GARY, INDIANA 46402

\*\* MELTED AND MANUFACTURED IN THE USA \*\*

KLOCKNER NAMASCO CORP

SOUTHWEST DIVISION

4501 N MIRO ST

NEW ORLEANS LA 70117-4439

SHIPERS NO.

H02314

07 11 98

UB56016

154-010873

H2314

INVOICE NO.

154-010873

H2314

INVOICE NO.

154-010873

H2314

KLOCKNER NAMASCO CORP

SOUTHWEST DIVISION

4501 N MIRO ST AT INDL CANAL

NEW ORLEANS LA 70117-4439

SPEC.  
&  
NSP.

PLATE CARBON ASTM A36-\*96 FINE GRAIN NORMALIZE CHARPY V-NOTCH  
LONGITUDINAL HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

INSP:01 MILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N  
MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION				QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PECE IDENTITY	YIELD ST. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	REND
	THICKNESS OR SECTION	WIDTH DIA OR FL WT	LENGTH	REDUCTION RATIO							N 8"	N 2"		
06	2.0000	96.0000	240"	REDUCTION RATIO = 4.6 TO 1	01	13068	M66254	55W 3	46.0 52.0	76.0 74.0	2.3 0.0	32.0		
STEEL-TYPE = CAST														
LONG. FL SZ CHARPY IMPT V-NITCH +010 DEG F FT LBS/ 092-092-096														
-12 DEG C AVERAGE IMPACT STRENGTH +93 FT LBS														
LONG. FL SZ CHARPY IMPT V-NITCH +010 DEG F FT LBS/ 072-069-077														
-12 DEG C AVERAGE IMPACT STRENGTH +73 FT LBS														
PRODUCT & TEST SPECIMENS WERE NORMALIZED AT 1660 DEG.F.														
FOR 0064 MINUTES. COOLING COMPLETED IN STILL AIR.														
***END OF DATA***														

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION.

HEAT NO.	TYPE	C	AN	P	S	SI	CU	N	CR	MO	SN	AL	N	V	B	TI	CB	CO	FINE GRAIN
M66254	HEAT	22	096	012	008	22	03	02	03	01		024		001			001		
***END OF DATA***																			
ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA																			
MATRIX DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.																			


**AMERISTEEL™**
**CHEMICAL AND PHYSICAL TEST REPORT**

MADE IN U.S.A.

 TENNESSEE STEEL MILL DIVISION  
 METALLURGICAL DEPARTMENT

P.O. BOX 3670 JACKSON, TENN. 38301

PRODUCING MILL IS KNOWN BY HEAT ID NUMBER PREFIX:

C = CHARLOTTE, J = JACKSONVILLE, K = KNOXVILLE, T = TAMPA, V = WEST TENNESSEE

KLOCKNER NAMASCO CORP 4501 N MIRO (& POLLAND) 504-947-4215 NEW ORLEANS										KLOCKNER NAMASCO CORP (T. FL) NAMASCO-***ACCTS PAYABLE** 5775 C GLENRIDGE DR ATLANTA GA 30328										SHIP DATE 09-09-98		SHIPMENT NUMBER 8582-408197																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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INST ID NO		C		MN		F		S		V		SI		CR		CU		NI		SN		AL		MO		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS		WEIGHT LBS / PCS	

**SMI****CTR Fax**

Fax Confirmation No:1,704,678,551

Date: 7/9/98

NAMASCO

ShipNumber  
S60367BoI Number  
B93541City  
NEW ORLEANSState  
LACustomerPO  
NEW78716**Heat Tests:**

<u>Heat</u>	<u>Section</u>		<u>Specification</u>	<u>T</u>	<u>Yield</u>	<u>Tensl</u>	<u>Elong</u>	<u>RA%</u>	<u>BendTest</u>	<u>Date</u>
983373	L 5X3X1/4	40	ABS PART 2-97	1	51.0	73.0	35.			

**Chem Tests:**

<u>Heat</u>	<u>C</u>	<u>MN</u>	<u>P</u>	<u>S</u>	<u>SI</u>	<u>CU</u>	<u>CR</u>	<u>NI</u>	<u>MO</u>	<u>CB</u>	<u>V</u>	<u>AL</u>	<u>CE</u>
983373	.16	0.67	.005	.024	.26	.28	0.09	0.10	.025	.002	.0000	.002	.01

**Remarks:**

100% MELTED AND MANUFACTURED IN THE USA AND FREE FROM MERCURY CONTAMINATION IN THE PROCESS

## GLOBAL X-RAY &amp; TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861

Post Office Box 1536  
Morgan City, Louisiana 70381

Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

24362

41077

CLIENT Applied Hydraulics DATE 11-21-98  
CONTRACTOR Same JOB LOCATION Bouma, Ca 11-2-98  
JOB NO. 620 # 059801 CLIENT REPRESENTATIVE Bennett, J. L.  
MT TECH. Wade Mink REMARKS MT Eng

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS				WELD NO.	WALL THICKNESS	RECOMMENDATIONS		
			✓	✗	REMARKS				✓	✗	REMARKS
1	100% MT Inspection					51					
2						52					
3	OF Repairs In Boom					53					
4						54					
5	Base Welds Acceptable					55					
6						56					
7						57					
8						58					
9	100% MT Inspection OF					59					
10						60					
11	Boom Mid #2 General					61					
12						62					
13	Indications Found.					63					
14						64					
15	Repairs Made &					65					
16						66					
17	Reinspected. Welds					67					
18						68					
19	Acceptable					69					
20						70					
21						71					
22						72					
23						73					
24						74					
25						75					
26						76					
27						77					
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50											

SURFACE CONDITION  
GOOD ( ) FAIR ( ) PAINTED ( ) WELD ( )

EQUIPMENT  
MAKE Baker MODEL B-300 S/N 6693

CONTRACTS  
PROD SPACING 3" 20" CONTINUOUS ( )  
AC ( ) DC ( ) HALF WAVE ( ) FULL WAVE ( )  
AMPS 6.75

MEDIA  
7C-BLACK WET ( ) 8A-DRY ( ) WHITE HIGHLIGHTER ( )

CALIBRATION  
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )  
CALIBRATION DATE: \_\_\_\_\_

ACCEPTANCE CRITERIA  
ASNT S-6

TOTAL TIME HRS. 2

# GLOBAL X-RAY & TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861

Post Office Box 1536  
Morgan City, Louisiana 70381

Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

24353

41022

CLIENT Applied Hydraulics

DATE 11-3-98

CONTRACTOR Same

JOB LOCATION Houma, La.

JOB NO. WOT 069801

CLIENT REPRESENTATIVE R. La. Safety

MT TECH. Jade Mub

REMARKS mt ing

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS			WELD NO.	WALL THICKNESS	RECOMMENDATIONS	
			✓	ACCEPT REJECT				✓	ACCEPT REJECT
1						51			
2						52			
3						53			
4						54			
5						55			
6						56			
7						57			
8						58			
9						59			
10						60			
11						61			
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SURFACE CONDITION  
GOOD ( ☒ ) FAIR ( ) PAINTED ( ) WELD ( ☒ )

EQUIPMENT  
MAKE Parker MODEL B300 S/N 6693

CONTRACTS  
PROD SPACING 3/16" CONTINUOUS ( ☒ )  
AC ( ☒ ) DC ( ) HALF WAVE ( ) FULL WAVE ( )  
AMPS 6.75

MEDIA  
7C-BLACK WET ( ☒ ) 8A-DRY ( ) WHITE HIGHLIGHTER ( ☒ )

CALIBRATION  
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )  
CALIBRATION DATE: \_\_\_\_\_

ACCEPTANCE CRITERIA  
AWS A4.1 Se6

TOTAL TIME HRS. 1

# GLOBAL X-RAY & TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861

Post Office Box 1536  
Morgan City, Louisiana 70381

Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

8080

41320

CLIENT Applied Hydraulics

DATE 11-23-98

CONTRACTOR Same

JOB LOCATION Houma, LA.

JOB NO. 059801

CLIENT REPRESENTATIVE Amil J. Mollere

MT TECH. Wade Mike

REMARKS MT inspection

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS			WELD NO.	WALL THICKNESS	RECOMMENDATIONS	
			✓ ACCEPT	REMARKS				✓ ACCEPT	REMARKS
1						51			
2						52			
3						53			
4						54			
5						55			
6						56			
7						57			
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### SURFACE CONDITION

GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

### EQUIPMENT

MAKE Contour MODEL B-300 S/N 9037

### CONTRACTS

PROD SPACING 3-8" CONTINUOUS (✓)  
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )  
AMPS 5.75

### MEDIA

7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLIGHTER (✓)

### CALIBRATION

10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )  
CALIBRATION DATE: 11-23-98

### ACCEPTANCE CRITERIA

AWS D 1.1 Sec 6

TOTAL TIME HRS. 1 hr



## Material Traceability Log

CRANE WO. NO.:	059801
CUSTOMER:	PEMEX / B & R
WELDMENT PART NO.:	N61587-030
REV. LEVEL:	A
WELDMENT S/N:	98253-04
DESCRIPTION:	Boom Mid #1 (30')
MODEL:	340LA-140
CHECKED BY:	<i>DA S</i>
DATE:	<i>12-30-98</i>

[illegible]

Leavitt Tube Company, Inc.  
1717 W. 115th Street  
Chicago, IL 60643



# MATERIAL TEST REPORT

DATE 3/25/98  
PAGE 2 OF 2  
BILL OF LADING 59399

(773) 239 7700 (800) LEAVITT  
FAX (773) 239 1023 (800) 532 8488

## CUSTOMER:

TUBULAR STEEL INC-HAZELWOOD

06020122 1031 EXECUTIVE PKWY 63141  
ST. LOUIS MO  
ATTN: DEBI DERDA

ITEM NO.	PECES	TUBE SIZE & GAUGE	LENGTH	QTY. SHIPPED	CUSTOMER P.O.	MILL ORDER NUMBER	CLUST. PART NUMBER	ASTM SPECIFICATION	GRADE
7- 8	9	4X4-500H80	360.000"	270°	4652	601084		A500-93	8
9	8	8X8-375H80	480.000"	320°	4652	601125		A500-93	8

ITEM NO. 7 8 9

COIL NO. 701104 701006 325856

HEAT NO. 831A06880 841A06880 558

DOMESTIC DOMESTIC

CORRECTED COIL 701106

CARBON	.170	.170	.200
MANGANESE	1.000	1.000	.780
PHOSPHORUS	.016	.016	.007
SULFUR	.003	.003	.007
ALUMINUM	.029	.029	.040
SILICON	.020	.020	.020
WELD TESTING	FLARE	FLARE	FLARE
YIELD STRENGTH (PSI)	55,982	55,982	57,894
TENSILE STRENGTH (PSI)	71,794	71,794	73,684
ELONGATION IN 2"	28.0	28.0	31.0

I HEREBY CERTIFY THAT THE ABOVE IS CORRECT  
AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Robert V. Leavitt*

**MELTED & MANUFACTURED  
IN THE U.S.A.**

Leavitt Tube Company, Inc.  
1717 W. 115th Street  
Chicago, IL 60643



# MATERIAL TEST REPORT

DATE 3/25/98

PAGE 1 OF 2

BILL OF LADING: 59399

(773) 239 7700 (800) LEAVITT  
FAX (773) 239 1023 (800) 532 8488

## CUSTOMER:

TUBULAR STEEL INC-HAZELWOOD

06020122

1031 EXECUTIVE PKWY

ST. LOUIS MO

63141

ATTN: DEBI DERDA

ITEM NO.	PECES	TUBE SIZE & GAUGE	LENGTH	QTY. SHIPPED	CUSTOMER P.O.	MILL ORDER NUMBER	CUST. PART NUMBER	ASTM SPECIFICATION	GRADE
1- 2	36	4X4-250H80	288-000"	864*	4652	601079	330896	A500-93	8
3	24	4X4-250H80	360-000"	720*	4652	601080	A76513	A500-93	8
4- 5	12	4X4-250H80	408-000"	408*	4652	601081	835805	A500-93	8
6	12	4X4-250H80	480-000"	480*	4652	601082	DOMESTIC	A500-93	8

ITEM NO.	1	2	3	4	5	6
COIL NO.	330538	330536	330543	330895	330896	330019
HEAT NO.	A76513	A76513	835807	835805	A76513	842240780
	DOMESTIC	DOMESTIC	DOMESTIC	DOMESTIC	DOMESTIC	DOMESTIC

CARBON	-200	-200	-190	-180	-200	-170
MANGANESE	.830	.830	.860	.870	.820	.970
PHOSPHORUS	.012	.012	.013	.013	.012	.012
SULFUR	.005	.005	.004	.005	.005	.007
ALUMINUM	.028	.028	.035	.038	.028	.037
SILICON	.030	.030	.040	.020	.030	.019
WELD TESTING	FLARE	FLARE	FLARE	FLARE	FLARE	FLARE
YIELD STRENGTH (PSI)	59,649	59,649	56,521	60,176	59,649	59,649
TENSILE STRENGTH (PSI)	78,070	78,070	78,260	77,876	78,070	71,930
ELONGATION IN 2"	27.0	27.0	26.0	30.0	27.0	27.0

I HEREBY CERTIFY THAT THE ABOVE IS CORRECT  
AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Debi Derda*

**MELT & MANUFACTURED  
IN THE U.S.A.**



1 1/2 Sch - 40 MC

ROSENBERG, TEXAS 77471  
(713) 342-5401  
800-231-5984

DIVISION ROSENBERG, TEXAS 77471

ORDER NUMBER	CUSTOMER ORDER NUMBER	DATE	OFC	COM	DI WI	NET SLS	GR SLS	ACCOUNT NUMBER	US	PAW	PAG
092370	98-15942	03/20/98	22	00	16	20	01	00471003PDR	BP	PAW	1

PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77028	PIPE DISTRIBUTORS INC 5400 MESA DRIVE HOUSTON TX 77028	SN TR INV
--	--	-----------------

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 3-31-98
SEAMLESS	ASTM/ASME A/SA 106 B 94	HF CARBON PIPE			03/31/98

SPECIAL INSTRUCTIONS:  
PLAIN ENDS. U.V.C. COATED. ACCEPTABLE PER NACE MRO 175 TABLE 3.  
CERTIFIED TO DIN 50049 3.1B.  
PERMISSIBLE OVERAGES ACCEPTABLE BUT CONTACT SALES WITH ALL  
OVERAGES. AIM 21' MIN. LENGTHS.

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	REMARKS
1	3,900'	1.900	1-1/2"	.145 AVG	RAND 17' 24'	2.718	10,600	Comp. 185 pcs. 4,049'

SHIPPING NOTE: RPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
226544	.17 .17	.69 .69	.001 .002	.015 .016	.26 .26	.08 .08	.05 .05	.02 .02	.23 .23		V .002 V .002

FLATTEN	FLARE	FLANGE	REV. FLATTEN	HYDRO TEST	BEND	EDDY CURRENT
				2500 psi OK	OK	

HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS	HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS
226544	71600	47100	50.0						

I CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED  
IN ACCORDANCE WITH THE ORDERED SPECIFICATION AND THAT THIS TEST  
INFORMATION IS CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Dwayne Allen*  
TECHNICAL ANALYST  
DWAYNE ALLEN

SWORN TO AND SUBSCRIBED BEFORE ME THIS

DAY OF 19





32-9122-01

## Gulf States Steel, Inc.

GADSDEN, AL 35904-1935

GSS ORDER NO. 1ST NUMBER 53762 ITEM 03 MFG 142		PURCHASE ORDER DATE 11 18 97		ACCOUNT NUMBER 71390006		PAGE NO. 1		INVOICE NUMBER 742-01701	
PURCHASE ORDER NO. NEW 72984		SHIPPED FROM ALA CITY		DATE SHIPPED 01 29 98		ROUTE/VEHICLE IDENTIFICATION SOU 152139			
I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.				C F BEARDEN, JR. MGR, TECHNOLOGY AND QUALITY - PLATE PRODUCTS					
				("SHIP TO" SAME AS "SOLD TO" UNLESS OTHERWISE INDICATED)					

KLOCKNER HANASCO CORP  
SOUTHWEST DIVISION  
P O DRAWER 450469

HOUSTON TX 77245-0469

KLOCKNER HANASCO CORP  
SOUTHWEST DIV  
4501 N MIRO STREET

NEW ORLEANS LA 70117

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## MATERIAL DESCRIPTION

PLATE CARBON ASTM A-36-96 ASME SA-36 DTD 07/01/95 SUPP S-91 KILLED FINE GRAIN PRACTICE IMPACT TEST MEAT QUAL METED A MIN IN JIS

QUANTITY SHIPPED

1.0000 X 96.0000 SHEARED EDGE X 240.0000 IN  
HT 7456440 22 PCS

143748

CH C 25HX MN 80/1 20 P 040KR S 050MX SI 15/40 CU RPT NI RPT CR RPT MO RPT CB RPT V RPT AL  
020MIN

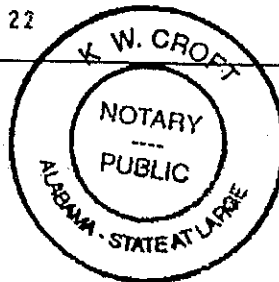
NR VLD 36000 MIN TEN 58/80000 XELONG MIN 2 IN 23 OR 8 IN 20 INP HT QUAL LT NR 15 FT LBS AUG 10  
FT LBS MIN AT PLUS 10 DEG F

TI 3 NOIR TR CA

TOTAL WT. 143,748# PCS 22

STATE OF ALABAMA COUNTY OF ETOWAH  
SWORN AND SUBSCRIBED TO BEFORE ME  
THIS 29 DAY OF JANUARY 1998

Notary Public



ANALYSIS

HEAT NUMBER	GRAN	C	Mn	P	S	SI	Cu	NI	Cr	Mo	Cb	V	Al	N	B	Ca	TI	C.E
7456440		.15	0.87	.015	.015	220	0.02	0.01	0.02	.01	.001	.001	.036					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7456440	N282701	53.0	68 0		27			AR	.77									
7456440	N282702	50.0	67 0		26			AR	.74									

VAUTCH

CHARPY M

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	
7456440	N282701	AR	FUL	LT	10	54	57	60	57									
7456440	N282702	AR	FUL	LT	10	72	83	84	79									

LAST PAGE

980128101645

LAST PAGE

990129141445

# GLOBAL X-RAY & TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861

Post Office Box 1536  
Morgan City, Louisiana 70381

Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

24351  
41021

CLIENT Applied Hydraulics DATE 11-2-98  
CONTRACTOR Same JOB LOCATION Bouma, La 11-4-98  
JOB NO. W01 059801 CLIENT REPRESENTATIVE Samuel A. Lally  
MT TECH. Jack Mib REMARKS MT Insp.

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS			WELD NO.	WALL THICKNESS	RECOMMENDATIONS	
			✓ ACCEPT	✗ REJECT				✓ ACCEPT	✗ REJECT
1					REMARKS	51			
2						52			
3						53			
4						54			
5						55			
6						56			
7						57			
8						58			
9						59			
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### SURFACE CONDITION

GOOD ( ) FAIR ( ) PAINTED ( ) WELD ( )

### EQUIPMENT

MAKE Parker MODEL B-300S/N 6693

### CONTRACTS

PROD SPACING 3' 205' CONTINUOUS ( )

AC ( ) DC ( ) HALF WAVE ( ) FULL WAVE ( )

AMPS 5175

### MEDIA

7C-BLACK WET ( ) 8A-DRY ( ) WHITE HIGHLIGHTER ( )

### CALIBRATION

10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )

CALIBRATION DATE: \_\_\_\_\_

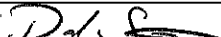
### ACCEPTANCE CRITERIA

ASNT S-6

TOTAL TIME HRS. 1



# Material Traceability Log

CRANE WO. NO.:	059801
CUSTOMER:	PEMEX / B & R
WELDMENT PART NO.:	N61587-030
REV. LEVEL:	A
WELDMENT S/N:	98253-05
DESCRIPTION:	Boom Mid # 2 (30')
MODEL:	340LA-140
CHECKED BY:	
DATE:	12-30-98

[illegible]

Leavitt Tube Company, Inc.  
1717 W. 115th Street  
Chicago, IL 60643



# MATERIAL TEST REPORT

DATE 3/25/98

PAGE 2 OF 2

BILL OF LADING 59399

(773) 239 7700 (800) LEAVITT  
FAX (773) 239 1023 (800) 532 8488

## CUSTOMER:

TUBULAR STEEL INC-HAZELWOOD

06020122

1031 EXECUTIVE PKWY

ST. LOUIS MO

63141

ATTN: DEBI DERDA

ITEM NO.	PECES	TUBE SIZE & GAUGE	LENGTH	QTY. SHIPPED	CUSTOMER P.O.	MILL ORDER NUMBER	CUST. PART NUMBER	ASTM SPECIFICATION	GRADE
7- 8	9	4X4-500H80	360.000"	270	4652	601084		A500-93	8
9	8	8X8-375H80	480.000"	320	4652	601125		A500-93	8

ITEM NO.

7

8

9

COL NO.

701104

701006

325856

HEAT NO.

831A06880

841A06880

558

DOMESTIC

DOMESTIC

CORRECTED COIL

701106

CARBON

.170

.170

.200

MANGANESE

1.000

1.000

.780

PHOSPHORUS

.016

.016

.007

SULFUR

.003

.008

.007

ALUMINUM

.029

.029

.040

SILICON

.020

.020

.020

WELD TESTING

FLARE

FLARE

FLARE

YIELD STRENGTH (PSI)

55,982

55,982

57,894

TENSILE STRENGTH (PSI)

71,794

71,794

73,684

ELONGATION IN %

28.0

28.0

31.0

I HEREBY CERTIFY THAT THE ABOVE IS CORRECT  
AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Richard Helms*

MAILED & MANUFACTURED  
IN THE U.S.A.

Leavitt Tube Company, Inc.  
1717 W. 115th Street  
Chicago, IL 60643



# MATERIAL TEST REPORT

DATE: 3/25/98  
PAGE: 1 OF 2  
BILL OF LADING: 59399

(773) 239 7700 (800) LEAVITT  
FAX (773) 239 1023 (800) 532 8488

## CUSTOMER:

TUBULAR STEEL INC-HAZELWOOD

06020122

1031 EXECUTIVE PKWY

ST. LOUIS MO

63141

ATTN: DEBI DERDA

ITEM NO.	PECES	TUBE SIZE & GAUGE	LENGTH	QTY. SHIPPED	CUSTOMER P.O.	MAIL ORDER NUMBER	CUST. PART NUMBER	ASTM SPECIFICATION	GRADE
1- 2	36	4X4-250H80	288.000"	864	4652	601079		A500-93	8
3	24	4X4-250H80	360.000"	720	4652	601080		A500-93	8
4- 5	12	4X4-250H80	408.000"	408	4652	601081		A500-93	8
6	12	4X4-250H80	480.000"	480	4652	601082		A500-93	8

ITEM NO.	1	2	3	4	5	6
COIL NO.	330538	330536	330543	330895	330896	330019
HEAT NO.	A76513	A76513	B35807	B35805	A76513	842240780
	DOMESTIC	DOMESTIC	DOMESTIC	DOMESTIC	DOMESTIC	DOMESTIC

CARBON	-200	-200	-190	-180	-200	-170
MANGANESE	-830	-830	-860	-870	-820	-970
PHOSPHORUS	-012	-012	-013	-013	-012	-012
SULFUR	-005	-005	-004	-005	-005	-007
ALUMINUM	-028	-028	-035	-038	-028	-037
SILICON	-030	-030	-040	-020	-030	-019
WELD TESTING	FLARE	FLARE	FLARE	FLARE	FLARE	FLARE
YIELD STRENGTH (PSI)	59,649	59,649	56,521	60,176	59,649	59,649
TENSILE STRENGTH (PSI)	78,070	78,070	78,260	77,876	78,070	71,930
ELONGATION IN 2"	27.0	27.0	26.0	30.0	27.0	27.0

I HEREBY CERTIFY THAT THE ABOVE IS CORRECT  
AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Debi Derda*

**MELTED & MANUFACTURED  
IN THE U.S.A.**



1 1/2 Sch-40 MC

ROSENBERG, TEXAS 77471  
(713) 342-5401  
800-231-5984

ORDER NUMBER	CUSTOMER ORDER NUMBER	DATE	OFC	COM	DI	WI	NET SLS	GR SLS	ACCOUNT NUMBER	US	PAW	PAG
092370	98-15942	03/20/98	22	00	16	20	01	00471003PDR	BP	PAW	1	

PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77028						PIPE DISTRIBUTORS INC 5400 MESA DRIVE HOUSTON TX 77028						SN TR INV
--	--	--	--	--	--	--	--	--	--	--	--	-----------------

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 3-31-98
SPECIFICATION		CMST	DESCRIPTION		PROMISE
SEAMLESS ASTM/ASME A/SA 106 B 94			HF CARBON PIPE		03/31/98

SPECIAL INSTRUCTIONS:  
PLAIN ENDS. U.V.C. COATED. ACCEPTABLE PER NACE MRO 175 TABLE 3.  
CERTIFIED TO DIN 50049 3.1B.  
PERMISSIBLE OVERAGES ACCEPTABLE BUT CONTACT SALES WITH ALL  
OVERAGES. AIM 21' MIN. LENGTHS.

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,900'	1.900		.145	RAND 17'	2.718	10,600	Comp.
		1-1/2"	SCH 40	AVG	24'			185 pcs.
								4,049'

SHIPPING NOTE: RPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
226544	.17	.69	.001	.015	.26	.08	.05	.02	.23		V .002
	.17	.69	.002	.016	.26	.08	.05	.02	.23		V .002

FLATTEN	FLARE	FLANGE	REV. FLATTEN	HYDRO TEST 2500 psi OK	BEND OK	EDDY CURRENT
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HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS	HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS
226544	71600	47100	50.0						

I CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED  
IN ACCORDANCE WITH THE ORDERED SPECIFICATION AND THAT THIS TEST  
INFORMATION IS CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Dwayne Allen*  
DWAYNE ALLEN  
TECHNICAL ANALYST

SWORN TO AND SUBSCRIBED BEFORE ME THIS

DAY OF 19

NOTARY PUBLIC



U.S. STEEL GROUP  
A Division of USX Corporation

Metallurgical  
Test Report

U.S. Steel Group  
A Division of USX Corporation

USX

REQ. JOB, CONTRACT

P.O. DATE

PURCHASE ORDER NO.

THIS IS TO CERTIFY THAT THE

VENDOR

GARY WORKS

GARY, INDIANA 46402

KLOCKNER NAMASCO CORP  
SOUTHWEST DIVISION  
4501 N MIRO ST  
NEW ORLEANS LA 70117-4439

\*\* MELTED AND MANUFACTURED IN THE USA \*\*

KLOCKNER NAMASCO CORP  
SOUTHWEST DIVISION  
4501 N MIRO ST AT INDL CANAL  
NEW ORLEANS LA 70117-4439

BB

PREPARED BY THE OFFICE OF  
S C PAPE GEN MGR. O A

SPEC.  
&  
INSP.

PLATE CARBON ASTM A36-896 FINE GRAIN CHARPY V-NOTCH LONGITUDINAL  
HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

DATE

7-16-98

INSP 01 MILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N  
MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION			QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD ST. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEND
	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH							IN 8"	IN 2"		
01	1 1/2 " STEEL-TYPE	96.0000 = CAST	240" REDUCTION RATIO = 18.2 TO 1	09	29403	M68073		44.0	67.0	28.0	50.0		
	LONG. FL. SZ CHARPY IMP T V-NOTCH +010 DEG F AVERAGE IMPACT STRENGTH +154 FT LBS							43.0	65.0	29.0	50.0		
01	1 1/2 " STEEL-TYPE	96.0000 = CAST	240" REDUCTION RATIO = 18.2 TO 1	05	16335	Y67605		46.0	68.0	29.0	50.0		
	LONG. FL. SZ CHARPY IMP T V-NOTCH +010 DEG F AVERAGE IMPACT STRENGTH +118 FT LBS							44.0	64.0	31.0	50.0		

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION

HEAT NO.	TYPE	C	MIN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	FINE GRAIN
M-5072	HEAT 14	098	014	006	21	02	02	02	03	01		027		001					
167605	HEAT 14	095	014	008	20	02	02	02	05	01		031		001					
	**END OF DATA**																		FINE GRAIN
ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA																			
DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.																			
701130010										0125788001 01					SAM				
M121 1137										071698 R					CBA 0002 PAGE 1				

**Metallurgical  
Test Report**

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MFGD., SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS REQUIREMENTS IN SUCH RESPECT.

PREPARED BY THE OFFICE OF:  
S.C. PAPE GEN. MGR., O.A.

DATE: 7-15-98

SHIPERS NO. H02314 07 11 98  
PURCHASE ORDER NO. NEW-76549  
INVOICE NO. 154-010873  
H2314

GARY WORKS  
GARY, INDIANA 46402  
KLOCKNER NAMASCO CORP  
SOUTHWEST DIVISION  
4501 N MIRO ST  
NEW ORLEANS LA 70117-4439

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SPEC. & NSP. PLATE CARBON ASTM A36-\*96 FINE GRAIN NORMALIZE CHARPY V-NOTCH  
LONGITUDINAL HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

INSP:01 WILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION				QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD ST. KSI	TENSILE ST. KSI	ELONGATION %		% RED. OF AREA	BEND
	PROCESS OR SECTION	WTD. DIA. OR FL. WT.	LENGTH	REDUCTION RATIO							N 8"	N 2"		
06	STEEL-TYPE = CAST	96.0000	240"		01	13068	M66254	55W 3	46.0 52.0	76.0 74.0	32.0	12.3 10.0		
	LONG. FL SZ CHARPY IMPT V-NOTCH +010 AVERAGE IMPACT STRENGTH				DEG F	FT LBS	092-092-096							
	-12 DEG C				+93	FT LBS								
	LONG. FL SZ CHARPY IMPT V-NOTCH +010 AVERAGE IMPACT STRENGTH				DEG F	FT LBS	072-069-077							
	-12 DEG C				+73	FT LBS								
	PRODUCT & TEST SPECIMENS WERE NORMALIZED AT 1660 DEG.F. FOR 0064 MINUTES. COOLING COMPLETED IN STILL AIR. ***END OF DATA***													

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION.

HEAT NO.	TYPE	C	AN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO
M66254	HEAT 22	096	012	008	003	002	003	001	001	001	001	001	001	001	001	001	001	001
	***END OF DATA***																	

FINE GRAIN

32-9122-01

## Gulf States Steel, Inc.

GADSDEN, AL 35904-1835

GSS ORDER NO. 1ST NUMBER ITEM MFG 6 53762 03 142				PURCHASE ORDER DATE 11 18 97		ACCOUNT NUMBER 71390006		PAGE NO. 1		INVOICE NUMBER 742-01701	
PURCHASE ORDER NO. NEW 72984				SHIPPED FROM ALA CITY		DATE SHIPPED 01 29 98		ROUTE/VEHICLE IDENTIFICATION SOU 152139			
I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.						C F BEARDEN, JR. NCR, TECHNOLOGY AND QUALITY - PLATE PRODUCTS					

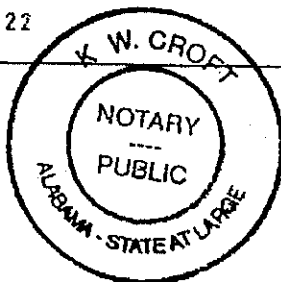
(SHIP TO SAME AS "SOLD TO" UNLESS OTHERWISE INDICATED)

KLOCKNER HANASCO CORP SOUTHWEST DIVISION P O DRAWER 450469 HOUSTON TX 77245-0469		KLOCKNER HANASCO CORP SOUTHWEST DIV 4501 N MIRO STREET NEW ORLEANS LA 70117	
---	--	--	--

MATERIAL DESCRIPTION		QUANTITY SHIPPED
PLATE CARBON ASTM A-36-96 ASMT SA-36 DTG 07/01/95 SUPP S-91 KILLED FINE GRAIN PRACTICE IMPACT TEST HEAT QUAL METED A MIN IN 334 1.0000 X 96.0000 SHEARED EDGE X 240 0000 IN HT 7456440 22 PCS CH C 25MM MN 80/1 20 P 040KA S 050MX SI 15/40 CU RPT NI RPT CR RPT NO RPT CU RPT V RPT AL 020MIN NR VLD 36000 MIN TEN 58/80000 XELONG MIN 2 IN 23 OR 8 IN 20 IMP HT QUAL LT HR 15 FT LBS AUG 10 FT LBS MIN AT PLUS 10 DEG F TI 3 NOTR TR CA TOTAL WT. 143,748# PCS 22		143748

 STATE OF ALABAMA COUNTY OF ETOWHA  
 SWORN AND SUBSCRIBED TO BEFORE ME  
 THIS 29 DAY OF JANUARY 1998

Notary Public



ANALYSIS

HEAT NUMBER	GRAN	C	Mn	P	S	SI	Cu	Ni	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E.
7456440		15	0.87	0.015	0.015	220	0.02	0.01	0.02	01	001	0.001	0.036					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7456440	N282701	53.0	68 0		27			AR	77									
7456440	N282702	50.0	67 0		26			AR	74									

TOUCH CHARTER 84

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	
7456440	N282701	AR	FUL	LT	10	54	57	60	57									
7456440	N282702	AR	FUL	LT	10	72	83	84	79									

LAST PAGE

880139141505

LAST PAGE

990129141645

# Material Traceability Log

CRANE WO. NO.:	059801
CUSTOMER:	PEMEX / B & R
WELDMENT PART NO.:	N61587-040
REV. LEVEL:	B
WELDMENT S/N:	98253-06
DESCRIPTION:	Boom Mid Weldment (40')
MODEL:	340LA-140
CHECKED BY:	<i>Del S</i>
DATE:	12-30-98

[illegible]



**COPPERWELD**

Customer Order No.

7006

CHICAGO DIVISION

7401 South Linder Avenue

Chicago, IL 60638-9930

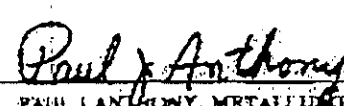
TEL. 708-496-2200

Copperweld Order No. 226812

Invoice No. 854685

**TEST REPORT**

Date 08/24/98

Customer:						Specification:						
TUBULAR STEEL INC 1031 EXECUTIVE PARKWAY DRIVE ATTN: CHERYL HARTMANN TEST REPORTS ST. LOUIS, MO 63141-6351						4 IN, SQ, 1/2  ASTM A500 GRB 96						
HEAT NO.		CHEMICAL ANALYSIS, %										
		C	Mn	P	S	SI	AL	CB	V	CU	NI	CR
K30538		.20	.76	.013	.001	.02	.031	.001		.026	.010	
J42474		.20	.75	.010	.006	.02	.046	.001	.00	.021	.010	.020
MECHANICAL PROPERTIES												
HEAT NO.	LAB NO.	YIELD STRENGTH PSI		TENSILE STRENGTH PSI		ELONGATION %		HARDNESS Rb				
K30538	90822	67000		73700		28		84				
J42474	90818	66300		73800		28		83				
YIELD STRENGTH IS 0.2% OFFSET - ELONGATION IN 2 INCHES												
Other Tests												
MELTED & MANUFACTURED IN THE U.S.A. (D)												
Copperweld certifies that the material purchased on this order meets all chemical and physical requirements in accordance with the latest applicable ASTM standards.						 PAUL J. ANTHONY, METALLURGIST						

AUG. 25 '98 11:58

H0811

PAGE.002

\*\* TOTAL PAGE.003 \*\*

\*\* TOTAL PAGE.002 \*\*

NUMBER	CUSTOMER ORDER NUMBER	DATE	OFC	COM	DI WI	NET SLS	GR SLS	ACCOUNT NUMBER	US	PAW	PAGE
22423	98-15948	03/23/98	22	00	16	20	01	00471003PDR	BP	PAW	1

PIPE DISTRIBUTORS INC  
P O BOX 23237

HOUSTON

TX

77028

PIPE DISTRIBUTORS, INC  
GRAND CALLIOU & INDL BLVD.

HOUMA

LA 70360

SN 4  
TR 4  
INV 3

ROUTING

COL-CUST. TRK-TR W/SHPT

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 3-31-98
	SPECIFICATION	CMST		DESCRIPTION	PROMISE
SEAMLESS	ASTM/ASME A/SA 106 B 94			HF CARBON PIPE	04/10/98

SPECIAL INSTRUCTIONS:

PLAIN ENDS. U.V.C. COATED. ACCEPTABLE PER NACE MRO 175 TABLE 3.  
CERTIFIED TO DIN 50049 3.1B. PERMISSIBLE OVERAGES ACCEPTABLE  
BUT CONTACT SALES WITH ALL OVERAGES. AIM 21' MIN. LENGTHS.

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,900'	1.900		.145	RAND 17'	2.718	10,600	Comp.
		1-1/2"	SCH 40	AVG	24'			185 pcs.
								4,362'
SHIPPING NOTE: PPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.								

ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
231024	.18	.75	.007	.013	.21	.08	.07	.02	.23		V .002
	.18	.73	.006	.013	.21	.08	.07	.02	.21		V .002
FLATTEN		FLARE		FLANGE		REV. FLATTEN		HYDRO TEST		BEND	
						2500 psi OK		OK		EDDY CURRENT	

PROPERTIES

HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS	HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS
231024	74200	49000	48.0						

I CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED  
IN ACCORDANCE WITH THE ORDERED SPECIFICATION AND THAT THIS TEST  
INFORMATION IS CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

TECHNICAL ANALYST

DWAYNE ALLEN

(R.F1 REV.0

EFFECTIVE 7/1/97

SWORN TO AND SUBSCRIBED BEFORE ME THIS

DAY OF 19

NOTARY PUBLIC

# Gulf States Tube

Vision Metals

P.O. BOX 952  
ROSENBERG, TEXAS 77471  
(713) 342-5401  
800-231-5984

DIVISION ROSENBERG, TEXAS 77471

ORDER NUMBER	CUSTOMER ORDER NUMBER	DATE	OFC	COM	DI	WI	NET SLS	GR SLS	ACCOUNT NUMBER	US	PAW	PAGE
090596	97-15827	12/02/97	22	00	16	20	01	00471003PDR	BP	PAW	1	

S	PIPE DISTRIBUTORS INC	SN	4
J	P O BOX 23237	TR	4
T	HOUSTON TX 77028	INV	3
O		LA 70360	

## ROUTING

COL-CUST. TRK-TR W/SHPT.

ANALYSIS	SHAPE	PRODUCT	PC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	SEE BELOW
SPECIFICATION	CMST	DESCRIPTION	PROMISE		
SEAMLESS	ASTM/ASME A/SA 106 B 94	HF CARBON PIPE	12/19/97		

## SPECIAL INSTRUCTIONS:

SCH NOTE: WEEK 12-19-97, AIM SOONER.  
PLAIN ENDS. U.V.C. COATED. ACCEPTABLE PER NACE MRO 175 TABLE 3.  
CERTIFIED TO DIN 50049 3.1B. PERMISSIBLE OVERAGES ACCEPTABLE  
BUT CONTACT SALES WITH ALL OVERAGES. AIM 21' MIN. LENGTHS.

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,900'	1.900		.145 AVG	RAND 17' 24'	2.718	10,600	Comp. 191 pcs. 4,134'
		1-1/2"	SCH 40					

SHIPPING NOTE: RPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
698454	.20	.82	.005	.017	.23	.09	.08	.03	.13		V .037
	.20	.82	.005	.017	.23	.09	.08	.03	.13		V .037
209724	.19	.71	.006	.015	.23	.06	.05	.01	.11		V .001
	.19	.69	.006	.016	.23	.06	.05	.01	.11		V .001

FLATTEN	FLARE	FLANGE	REV. FLATTEN	HYDRO TEST	BEND	EDDY CURRENT
				2500 psi OK	OK	

HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS	HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS
698454	71700	50100	56.0						
209724	74500	48600	52.0						

OTHER TESTS

I CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED  
IN ACCORDANCE WITH THE ORDERED SPECIFICATION AND THAT THIS TEST  
INFORMATION IS CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Dwayne Allen*  
TECHNICAL ANALYST

DWAYNE ALLEN

SWORN TO AND SUBSCRIBED BEFORE ME THIS

DAY OF 19

Metallurgical  
Test Report

THIS IS TO CERTIFY THAT THE  
PRODUCT DESCRIBED HEREIN WAS  
MFGD., SAMPLED, TESTED AND  
INSPECTED IN ACCORDANCE WITH  
THE SPECIFICATION AND FUL-  
FILLS REQUIREMENTS IN SUCH  
RESPECT

PREPARED BY THE OFFICE OF  
S C PAPE GEN MGR, Q A

REQ. JOB, CONTRACT	PO. DATE	PURCHASE ORDER NO.
		NEW-76549
VENDOR	SHIPPER NO.	INVOICE NO.
GARY WORKS	H02314 07 11 98	154-010872
GARY, INDIANA 46402	VEHICLE IDENTITY	H2314
** MELTED AND MANUFACTURED IN THE USA **		
KLOCKNER NAMASCO CORP	KLOCKNER NAMASCO CORP	
SOUTHWEST DIVISION	SOUTHWEST DIVISION	
4501 N MIRO ST	4501 N MIRO ST AT INDL CANAL	
NEW ORLEANS LA 70117-4439	NEW ORLEANS LA 70117-4439	

DATE 7-16-98

SPEC. & INSP.	PLATE CARBON ASTM A36-96 FINE GRAIN CHARPY V-NOTCH LONGITUDINAL
	HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

ITEM NO.	MATERIAL DESCRIPTION		QUAN-TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEND
	THICKNESS OR SECTION	WIDTH DIA OR FT. WT.							IN 8"	IN 2"		
01	1/2 " STEEL-TYPE	96.0000 = CAST	09 REDUCTION RATIO = 18	29403 2 TO 1	MC6073		44.0	67.0	28.0	50.0		
	LONG. FL SZ CHARPY IMP T V-NTCH +010 DEG F -12 DEG C	AVERAGE IMPACT STRENGTH	+154 FT LBS	FT LBS/ 128-167-168			43.0	65.0	29.0	50.0		
01	1/2 " STEEL-TYPE	96.0000 = CAST	05 REDUCTION RATIO = 18	16335 2 TO 1	Y67605		46.0	68.0	29.0	50.0		
	LONG. FL SZ CHARPY IMP T V-NTCH +010 DEG F -12 DEG C	AVERAGE IMPACT STRENGTH	+118 FT LBS	FT LBS/ 105-129-121			44.0	64.0	31.0	50.0		
**END OF DATA**												
THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION												

HEAT NO.	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	FINE GRAIN
MC6073	HEAT 14	098	014	006	21	02	02	03	01	027	001	001	001	001	001	001	001	001	FINE GRAIN
Y67605	HEAT 14	095	014	008	20	02	02	05	01	031	001	001	001	001	001	001	001	001	FINE GRAIN
**END OF DATA**																			

32-9122-01

## Gulf States Steel, Inc.

GADSDEN, AL 35904-1935

GSS ORDER NO.		PURCHASE ORDER DATE	
DIST	NUMBER	ITEM	MFG
6	53762	03	442
PURCHASE ORDER NO.		SHIPPED FROM	
NEW 72984		ALA CITY	

CERTIFICATE  
OF TESTS

ACCOUNT NUMBER	PAGE NO.	INVOICE NUMBER
71390006	1	742-01701
DATE SHIPPED	ROUTE/VEHICLE IDENTIFICATION	
01 29 98	SOU 152139	

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.

C F BEARDEN, JR.  
MGR, TECHNOLOGY AND  
QUALITY - PLATE PRODUCTS

(\*SHIP TO SAME AS "SOLD TO" UNLESS OTHERWISE INDICATED)

KLOCKNER MANASCO CORP  
SOUTHWEST DIVISION  
P O DRAWER 450469

HOUSTON TX 77245-0469

KLOCKNER MANASCO CORP  
SOUTHWEST DIV  
4501 N MIRO STREET

NEW ORLEANS LA 70117

## MATERIAL DESCRIPTION

PLATE CARBON ASTM A-36-96 ASME SA-36 DTD 07/01/95 SUPP S-91 KILLED FINE GRAIN  
PRACTICE IMPACT TEST MEAT QUAL MEETED A MIN IN 304

QUANTITY SHIPPED

1.0000 X 96.0000 SHEARED EDGE X 240.0000 IN  
HT 7456440 22 PCS

143748

CH C 25MM MN 80/1 20 P 040KA S 050MX SI 15/40 CU RPT NI RPT CR RPT MO RPT CB RPT V RPT AL  
020HIN

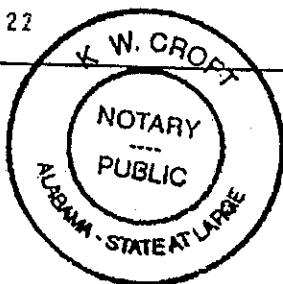
MR VLD 36000 MIN TEN 58/80000 XELONG MIN 2 IN 23 OR 8 IN 20 IMP HT QUAL LT MR 15 FT LBS AUG 10  
FT LBS MIN AT PLUS 10 DEG F

TI 3 HOUR TR CA

TOTAL WT. 143,748# PCS 22

STATE OF ALABAMA COUNTY OF ETOWAH  
SWORN AND SUBSCRIBED TO BEFORE ME  
THIS 29 DAY OF JANUARY 1998

Notary Public



ANALYSIS

HEAT NUMBER	GRAN	C	Mn	P	S	SI	Cu	NI	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E
7456440		.15	0.87	.015	.015	270	0.02	0.01	0.02	.01	.001	.001	.036					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7456440	M282701	53.0	68.0		27			AR	.77									
7456440	M282702	50.0	67.0		26			AR	.74									

MECHANICAL

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	
7456440	M282701	AR	FUL	LT	10	54	57	60	57									
7456440	M282702	AR	FUL	LT	10	72	83	84	79									

CHARACTERISTICS

LAST PAGE

990129141645

LAST PAGE

32-9122-01



U. S. STEEL GROUP  
A division of USX Corporation  
010000772 (REV. 8/79)

**Metallurgical  
Test Report**

USX  
are trademarks of USX Corp.

37434

REQ. FOR CONTRACT NO.	PO. DATE	PURCHASE ORDER NO.	THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MFGD., SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FUL- FILLS REQUIREMENTS IN SUCH RESPECT.	
Y E N D O R	SHEET NO. H02314	NEW-76549	INVOICE NO. 154-010873	PREPARED BY THE OFFICE OF: S.C. PAPE GEN. MGR., O.A.  DATE 7-18-98
S O L D	GARY WORKS GARY, INDIANA 45402	07 11 98	UB56016	
T O	** MELTED AND MANUFACTURED IN THE USA **	006016	H2314	
	KLOCKNER NAMASCO CORP SOUTHWEST DIVISION			
	4501 N MIRO ST NEW ORLEANS LA 70117-4439			

SPEC. & NSP. PLATE CARBON ASTM A36-\*96 FINE GRAIN NORMALIZE CHARPY V-WOTCH  
LONGITUDINAL HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

INSP:01 WILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N  
MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION		QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PECE IDENTITY	YELD PL KSI	TENSILE STR KSI	ELONGATION %		% RED OF AREA	RECD
	PROCESS OR SECTION	WORK P/L OR FT WT							N#	N2		
06	STEEL-TYPE = CAST	2.0000	96.0000	240"	REDUCTION RATIO = 4.6 TO 1	01	13068	M66254	55W 3			
	LONG. FL SZ CHARPY IMPT V-WTCH +010 DEG F											
	-12 DEG C AVERAGE IMPACT STRENGTH +93 FT LBS											
	LONG. FL SZ CHARPY IMPT V-WTCH +010 DEG F											
	-12 DEG C AVERAGE IMPACT STRENGTH +73 FT LBS											
	PRODUCT & TEST SPECIMENS WERE NORMALIZED AT 1660 DEG.F. FOR 0064 MINUTES. COOLING COMPLETED IN STILL AIR. ***END OF DATA***											

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION.											
HEAT NO.	TYPE	C	AN	P	S	SI	CU	N	CR	MO	SN
M66254	HEAT 22	096	012	008	22	03	02	03	01	024	001
***END OF DATA***											
FINE GRAIN											

ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA

MATRIX DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.

980711 MV21 1235 701131010 071198 0125788001 01 SAM

PAGE 2 OF 2

## GLOBAL X-RAY &amp; TESTING CORPORATION

Post Office Box 1536  
Morgan City, Louisiana 70381JOEL MOREAU, President  
Residence: 504-446-6861Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

24345

40965

CLIENT Applied Hydraulics DATE 10-20-98  
CONTRACTOR Same JOB LOCATION Idouma La  
JOB NO. WD# 059801 CLIENT REPRESENTATIVE Ronald H. Tilly  
MT TECH Jack Mike REMARKS MT Taps

WELD NO.	WALL THICKNESS	RECOMMENDATIONS		WELD NO.	WALL THICKNESS	RECOMMENDATIONS	
		✓ X	ACCEPT REJECT			REMARKS	✓ X
1	100%			51			
2				52			
3	OF 40' Boom Mid.			53			
4				54			
5	Welds Acceptable			55			
6				56			
7				57			
8				58			
9				59			
10				60			
11				61			
12				62			
13				63			
14				64			
15				65			
16				66			
17				67			
18				68			
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49							
50							

**SURFACE CONDITION**  
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

**EQUIPMENT**  
MAKE Parker MODEL B-300 S/N 6693

**CONTRACTS**  
PROD SPACING 3.25" CONTINUOUS (✓)  
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )  
AMPS 5.75

**MEDIA**  
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLIGHTER ( )

**CALIBRATION**  
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )  
CALIBRATION DATE: \_\_\_\_\_

**ACCEPTANCE CRITERIA**  
AWS D11.1 S.6

TOTAL TIME HRS. 7/2

# Material Traceability Log

CRANE WO. NO.: 059801  
 CUSTOMER: PEMEX / B & R  
 WELDMENT PART NO.: N61588-001  
 REV. LEVEL: K  
 WELDMENT S/N: 98253-07  
 DESCRIPTION: Boom Point Weldment  
 MODEL: 340LA-140  
 CHECKED BY: *Dal S*  
 DATE: 12-30-98

ITEM NO.	QTY.	MATERIAL DESCRIPTION	HEAT NUMBER
1	87 lf.	4" x 4" x ½" Sq. Tbg., A-500 Gr B	J42474
2	58 lf.	3" x 3" x ¼" Sq. Tbg., A-500 Gr B	B8R5826 / A6972
3	78 lf.	1½" Sch-40 Pipe, A-106 Gr B	231024
4	1	1" Plate, A-36 Fine Grain	393285
5	1	1" Plate, A-36 Fine Grain	393285
6	2	½" Plate, A-36 Fine Grain	Y67605
7	2	1" Plate, A-36 Fine Grain	393285
8	2	½" Plate, A-36 Fine Grain	M66073
9	1	½" Plate, A-36 Fine Grain	M66073
10	4	¾" Plate, A-36 Fine Grain	M66115
11	2	½" Plate, A-36 Fine Grain	M66073
12	1	½" Plate, A-36 Fine Grain	M66073
13	4	½" Plate, A-36 Fine Grain	M66073
14	8	1" Plate, A-36 Fine Grain	7456440
15	4	½" Plate, A-36 Fine Grain	M66073
16	2	10" OD. MT., 1026	J0078
17	2	6½" OD. MT., 1026	J2215
18	2	1½" Plate, A-36 Fine Grain	D62424
19	1	½" Plate, A-36 Fine Grain	M66073
20	2	1¼" Plate, A-36 Fine Grain	7456306
21	2	1½" Plate, A-36 Fine Grain	D62424
22	2	1½" Plate, A-36 Fine Grain	D62424
23	2	6½" OD. MT., 1026	J2215
24	1	1" Plate, A-36 Fine Grain	394081
25	1	½" Plate, A-36 Fine Grain	Y67605
26	1	1½" Plate, A-36 Fine Grain	D62424
27	2	½" Plate, A-36 Fine Grain	Y67605



**CHICAGO DIVISION**

7401 South Linder Avenue

Chicago, IL 60638-9930

TEL. 708-496-2200

Copperweld Order No. **223375**Invoice No. **853650**Date **07/29/9****TEST REPORT****Customer:**

TUBULAR STEEL INC  
1031 EXECUTIVE PARKWAY DRIVE  
ATTN: CHERYL HARTMANN  
TEST REPORTS  
ST. LOUIS, MO 63141-6351

**Specification:**

4 IN. SQ, 1/2

ASTM A500 GRB 96

**HEAT NO.****CHEMICAL ANALYSIS, %**

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL	CB	V	CU	NI	CI
J42474	.20	.75	.010	.006	.02	.046	.001	.00	.021	.010	.021

**MECHANICAL PROPERTIES**

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
J42474	90818	66200	73800	28	83

YIELD STRENGTH IS 0.2% OFFSET - ELONGATION IN 2 INCHES

**Other Tests**

MELTED &amp; MANUFACTURED IN THE U.S.A. (D)

Copperweld certifies that the material purchased on this order meets  
all chemical and physical requirements in accordance with the latest  
applicable ASTM standards.

*Paul J Anthony*  
PAUL J ANTHONY, METALLURGIST

# HANNA

Certification

732048

8/04/98

Shipped Hanna Steel Corporation  
From: Tuscaloosa Division  
1701 Boone Blvd.  
P O Box 428  
Northport AL 35476

Cust P.O. # 10-51893  
Date Shipped: 8/04/98  
Load Tally 5-28184  
Invoice # 000000

Send Marmon/Keystone Corp.  
To: 105 Goodrich Drive

Ship Marmon/Keystone Corp.  
To:

105 Goodrich Drive

Tarrant AL 35217

Tarrant AL 00000

No	Item	Heat #	ASTM Grade	Description	Yield	Tensile	Elong	Rockwell
01	4450412		3 SQ 1/4	HRA500	20.000FT			
2163452	BBR5826		A500 B		63,000	67,000	27.1	BB1
2163454	BBR5826		A500 B		63,000	67,000	27.1	BB1
2163455	BBR5826		A500 B		63,000	67,000	27.1	BB1

Total Weight 11,088

Heat #	C	Mn	P	S	Si	Al	Co	Cr	Cu	Mo	Ni	V
BBR5826	.060	.620	.011	.004	.030	.022	.002	.030	.130	.007	.060	.015

02	4450412		3 SQ 1/4	HRA500	40.000FT							
2164499	BBQ5655		A500 B		63,500	65,000	24.6					
2164521	ABQ3903		A500 B		66,500	69,000	24.7					
2164521	782866		A500 B		60,000	63,000	27.0					
2164522	ABQ3903		A500 B		66,500	69,000	24.7					

Total Weight 15,640

Heat #	C	Mn	P	S	Si	Al	Co	Cr	Cu	Mo	Ni	V
BBQ5655	.070	.590	.008	.007	.040	.024	.009	.090	.140	.016	.070	.015
ABQ3903	.050	.590	.008	.004	.050	.025	.002	.090	.140	.015	.070	.016
782866	.070	.480	.005	.001	.060							

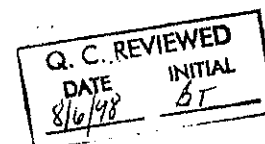
N 11.0030 B

06	7450712		3X4 RECT 3/16	HRA500	40.000FT							
2139281	ABQ3888		A500 B		56,000	62,000	33.3					
2168201	6805457		A500 B		76,000	88,500	28.0					
2168202	6805457		A500 B		76,000	88,500	28.0					

Total Weight 10,770

Hanna Steel Corporation  
3812 Commerce Avenue  
P.O. Box 558  
Fairfield, Alabama 35084  
(205) 780-1111  
DUNS No. 00-402-9294

SUBJECT TO TERMS AND CONDITIONS ON BACK





MILL TEST REPORT

WELDED TUBE COMPANY OF AMERICA

1855 EAST 122ND STREET CHICAGO, ILLINOIS 60633  
PHONE: 773-646-4500

MANUFACTURERS OF ELECTRIC WELDED CARBON-ALLOY STEEL TUBING



TEST REPORT NO. 1998/D5D423  
RE: TUSCO  
09/02/1998  
Shipped: 09/02/1998  
Checksum: 60392

ACCOUNT NO. SOLD TO  
040

NAMASCO SOUTHEAST  
5775-C GLENRIDGE DR., SUITE 110

ACCOUNT NO. SHIP TO  
4

NAMASCO SOUTHEAST  
1300 EXCHANGE AVENUE

ATLANTA GA 30328

CHARLOTTE NC 28213

HEAT NUMBER	DESCRIPTION	Yield (0.2%) KSI/MPa	Tensile KSI/MPa	Elong. % in 2"	HEAT ANALYSIS - CHEMICAL COMPOSITION, %									
					C	Mn	P	S	Si	Al	Ni	N	Cr	Sn
821263	1.00x4.00 x .250 BARE ASTM A500-93 GRADE B PO: CLT-91910; ALSO MEETS GRADE C	66.2 456	81.6 563	26.0	.189	.77	.017	.01	.008	.042				
A6972	3.00x3.00 x .250 BARE ASTM A500-93 GRADE B PO: CLT-91910; Melted and Manufactured in USA ALSO MEETS GRADE C	66.9 461	75.2 518	24.7	.05	1.28	.011	.02	.007	.037	.06		.03	
D62908	4.00x4.00 x .188 BARE ASTM A500-93 GRADE B PO: CLT-91910; Melted and Manufactured in USA ALSO MEETS GRADE C	57.3 395	75.7 522	33.9	.21	.76	.016	.018	.009	.041	.02		.04	
-562950	5.563 x .250 BARE ASTM A500-93 GRADE B PO: CLT-91910; Melted and Manufactured in USA ALSO MEETS GRADE C	65.4 451	81.7 563	26.5	.19	.04	.016	.015	.01	.055	.00		.00	

WE HEREBY CERTIFY THAT THE CHEMICAL LADLE ANALYSIS CONFORMS WITH REPORTS PROVIDED TO US BY THE SUPPLYING STEEL MILL. THE PHYSICAL AND MECHANICAL TEST RESULTS SHOWN ON THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF OUR COMPANY.

09/03/98 08:33 FAX 773 646 6305

WELDED TUBE CO

NAMASCO

002/008

# Vision Metals

IVISION ROSENBERG, TEXAS 77471

ROSENBERG, TEXAS 77471  
(713) 342-5401  
800-231-5984

NUMBER	CUSTOMER ORDER NUMBER	DATE	OFC	COM		DI WI	NET SLS	GR SLS	ACCOUNT NUMBER	US	PAW	PAGE
22423	98-15948	03/23/98	22	00		16	20	01	00471003PDR	BP	PAW	1

PIPE DISTRIBUTORS INC  
P O BOX 23237

HOUSTON

TX

77028

PIPE DISTRIBUTORS, INC  
GRAND CALLIOU & INDL BLVD.

HOUMA

LA 70360

SN 4  
TR 4  
INV 3

ROUTING

COL-CUST. TRK-TR W/SHPT

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 3-31-98
SEAMLESS	SPECIFICATION		CMST	DESCRIPTION	PROMISE
	ASTM/ASME A/SA 106 B 94			HF CARBON PIPE	04/10/98

SPECIAL INSTRUCTIONS:

PLAIN ENDS. U.V.C. COATED. ACCEPTABLE PER NACE MRO 175 TABLE 3.  
CERTIFIED TO DIN 50049 3.1B. PERMISSIBLE OVERAGES ACCEPTABLE  
BUT CONTACT SALES WITH ALL OVERAGES. AIM 21' MIN. LENGTHS.

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,900'	1.900		.145	RAND 17'	2.718	10,600	Comp.
		1-1/2"	SCH 40	AVG	24'			185 pcs.
								4,362'

SHIPPING NOTE: PPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
231024	.18	.75	.007	.013	.21	.08	.07	.02	.23		V .002
	.18	.73	.006	.013	.21	.08	.07	.02	.21		V .002

FLATTEN	FLARE	FLANGE	REV. FLATTEN	HYDRO TEST	BEND	EDDY CURRENT
				2500 psi OK	OK	

HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS	HEAT NO.	ULT. STR. PSI	YIELD PSI	ELONG 2"	HARDNESS
231024	74200	49000	48.0						

I CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED  
IN ACCORDANCE WITH THE ORDERED SPECIFICATION AND THAT THIS TEST  
INFORMATION IS CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

*Dwayne Allen*  
TECHNICAL ANALYST

DWAYNE ALLEN

(R.F) REV.0

EFFECTIVE 7/1/97

SWORN TO AND SUBSCRIBED BEFORE ME THIS

DAY OF 19

NOTARY PUBLIC

# OREGON STEEL MILLS

P.O. BOX 2760, Portland, Oregon 97208 • (503) 286-9651 Fax (503) 240-5268

## REPORT OF CHEMICAL/PHYSICAL TESTS

CERTIFICATE NO.	DATE	PAGE
492321P	Aug 09, 1998	1
MILL ORDER NO.	DATE	
80808		
CUSTOMER ORDER NO.		
NEW 84815		
JOB/REQ. NO.		
SHIPPING NO.	DATE	
492321	08/09/1998	
CARRIER		
UNION PACIFIC		
CAR/TRUCK NO.		
CW5003		



**SOLD TO**  
 KLOCKNER NAVASCO CORPORATION  
 ATTN: MELANIE ELLIOTT  
 5775-C GLENRIDGE DRIVE  
 SUITE 110  
 ATLANTA, GA 30328

NAVASCO-SOUTHWEST  
 4501 N MIRO STREET  
 NEW ORLEANS, LA 70117-4439

THIS MATERIAL HAS BEEN MANUFACTURED, TESTED AND FOUND TO MEET THE SPECIFICATIONS AND PURCHASE ORDER REQUIREMENTS  
 OSM CARBON STRUCTURAL QUALITY PLATE ASTM A36-96/ASME SA36 1995. SI. KILLED FINE  
 GRAIN PRACTICE. LCVN 15 FT/LBS AVG @ +10 F (H).

### PHYSICAL PROPERTIES

ITEM NO.	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8" 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
1	0.5000 X 96.000M X 240.000 1 PC 3267 LBS	+	392730	465 461	680 675	28 28				
2	1.0000 X 96.000M X 240.000 2 PCS 13068 LBS	+	393200	453 481	665 695	26 28				
	2 PCS 13068 LBS	+	393285	476 478	705 700	27 26				
							LCVN @ 10	DEG F 10.0mm	55	105 95 /85 egy
							LCVN @ 10	DEG F 10.0mm	99	119 91 /103 egy
							LCVN @ 10	DEG F 10.0mm	84	44 106/78 egy

### CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cr	Al	Mo	Ti	B	Nb	Ca	CE
+392730	.15	.77	.005	.003	.22	.25	.10	<.008	<.008	.031	.05	.04				
+393200	.14	.92	.006	.010	.17	.26	.11	<.008	<.008	.024	.05	.03				
+393285	.14	.91	.006	.007	.22	.25	.11	<.008	<.008	.029	.06	.04				
ALL HEATS INDICATED WITH (+) WERE MELTED AND MANUFACTURED IN THE USA.																

I certify the above to be correct as contained in the records of OREGON STEEL MILLS By

*Colleen Shanell*  
 COLLEEN SHANELL  
 O.C. RECORDS  
 ADMINISTRATOR

37245



U. S. STEEL GROUP  
A division of USX Corporation  
010000772 (REV. 8/91)

# Metallurgical Test Report

USX<sup>TM</sup>  
USX, USX<sup>TM</sup> and  
are trademarks of USX Corp.

REQ. FOR CONTRACT NO.

P.O. DATE

PURCHASE ORDER NO.

THIS IS TO CERTIFY THAT THE  
PRODUCT DESCRIBED HEREIN WAS  
MFGD., SAMPLED, TESTED AND/OR  
INSPECTED IN ACCORDANCE WITH  
THE SPECIFICATION AND FUL-  
FILLS REQUIREMENTS IN SUCH  
RESPECT.

VENDOR

GARY WORKS  
GARY, INDIANA 46402

SHIPPER NO.  
H02314 07 11 98  
VERNO EJE 006016

INVOICE NO.  
154-010872  
H2314

IN THE USA \*\*  
KLOCKNER NAMASCO CORP  
SOUTHWEST DIVISION  
4501 N MIRO ST AT INDL CANAL  
NEW ORLEANS LA 70117-4439

PREPARED BY THE OFFICE OF  
S. C. PAPE GEN MGR. Q. A

DATE  
7-16-98

SPEC.  
INSP.

PLATE CARBON ASTM A36-896 FINE GRAIN CHARPY V-NOTCH LONGITUDINAL  
HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

INSP 01 MILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N  
MIRO ST AT INDL CANAL NEW ORLEANS LA 70117.

ITEM NO.	MATERIAL DESCRIPTION		QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE DENSITY	YIELD ST. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BEND
	PROCESS OR SECTION	WIDTH IN. OR PL. WT.							IN 8"	IN 2"		
01	1/2 " STEEL-TYPE = CAST	96.0000	09	29403	M66073		44.0	67.0	28.0	50.0		
	REDUCTION RATIO =	240"	18	2 TO 1			43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NOTCH +010 DEG F			FT LBS/	128-167-168							
01	-12 DEG C AVERAGE IMPACT STRENGTH		+154	FT LBS								
	1/2 " STEEL-TYPE = CAST	96.0000	05	16335	Y67605		46.0	68.0	29.0	50.0		
	REDUCTION RATIO =	240"	18	2 TO 1			44.0	64.0	31.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NOTCH +010 DEG F			FT LBS/	105-129-121							
	-12 DEG C AVERAGE IMPACT STRENGTH		+118	FT LBS								
	***END OF DATA***											

THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION

HEAT NO.	TYPE	C	AN	P	S	SI	CU	NI	CR	MO	SN	AL	V	B	TI	CB	CO	FINE GRAIN
M66073	HEAT 14	098	014	006	21	02	02	02	03	01		027	001			001		FINE GRAIN
Y67605	HEAT 14	095	014	008	20	02	02	02	05	01		031	001			001		FINE GRAIN
	***END OF DATA***																	

ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA

MATRIX DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.  
980715 MU21 1137 701130010 071698 R 0125788001 01 SAM CBA 0 0 3 PAGE 1



32-9122-01

## Gulf States Steel, Inc.

GADSDEN, AL 35904-1935

GSS ORDER NO.		PURCHASE ORDER DATE		CERTIFICATE OF TESTS	ACCOUNT NUMBER	PAGE NO.	INVOICE NUMBER
1ST	NUMBER	ITEM	MFG		71390006	1	742-01701
6	53762	03	142		DATE SHIPPED	ROUTE/VEHICLE IDENTIFICATION	
PURCHASE ORDER NO.				SHIPPED FROM	01 29 98	SOU 152139	
NEW 72984				ALA CITY			

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.

C F BEARDEN, JR.  
HCR, TECHNOLOGY AND  
QUALITY - PLATE PRODUCTS

(SHIP TO" SAME AS "SOLD TO" UNLESS OTHERWISE INDICATED)

O-T D-T O-G  
35/29KLOCKNER HANASCO CORP  
SOUTHWEST DIVISION  
P O DRAWER 450469

HOUSTON TX 77245-0469

KLOCKNER HANASCO CORP  
SOUTHWEST DIV  
4501 N MIRO STREET

NEW ORLEANS LA 70117

S  
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P  
T  
O

## MATERIAL DESCRIPTION

- PLATE CARBON ASTM A-36-96 ASME SA-36 DTD 07/01/95 SUPP S-91 KILLED FINE GRAIN  
PRACTICE IMPACT TEST HEAT QUAL METERS A MET IN 32"

QUANTITY SHIPPED

- 1.0000 X 96.0000 SHEARED EDGE X 240 0000 IN  
HT 7456440 22 PCS

143748

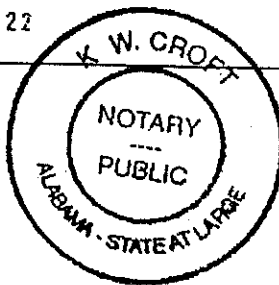
CH C 25MM MN 80/1 20 P 040KA S 050MM SI 15/40 CU RPT NI RPT CR RPT NO RPT (U RPT U RPT AL  
020MINMR VLD 36000 MIN TEN 58/80000 XELONG MIN 2 IN 23 OR 8 IN 20 IMP HT QUAL LT HR 15 FT LBS AVG 10  
FT LBS MIN AT PLUS 10 DEG F

TI 3 NOYR TR CA

TOTAL WT. 143,748# PCS 22

STATE OF ALABAMA COUNTY OF ETOWHA  
SWORN AND SUBSCRIBED TO BEFORE ME  
THIS THE 29 DAY OF JANUARY 1998

Notary Public



ANALYSIS

HEAT NUMBER	GRAN	C	Mn	P	S	SI	Cu	NI	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E
7456440		15	0.87	.015	.015	270	0.02	0.01	0.02	.01	.001	.001	.036					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT YEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7456440	H282701	53.0	68 0		27			AR	.77									
7456440	H282702	50.0	67 0		26			AR	.74									

WATCH

CHART N°

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	
7456440	H282701	AR	FUL	LT	80	54	57	60	57									
7456440	H282702	AR	FUL	LT	80	72	83	84	79									

LAST PAGE

880129101505

LAST PAGE

990129141645



TEEL OPERATIONS

TI

## CERTIFICATE OF TEST

835 DUEBER AVE. S.W.

CANTON, OHIO 44706

**TIMKEN**

WORLDWIDE LEADER IN BEARINGS AND STEEL

T 10 X 1.750 130

JANUARY 26, 1998

SOLD TO: MARMON/KEYSTONE CORPORATION  
 BOX 7447  
 CHARLOTTE NC 28217 USA

SHIP TO: MARMON/KEYSTONE CORPORATION  
 11522 TEXLAND BLVD  
 CHARLOTTE NC 28273 USA

DESCRIPTION 1026 - HOT ROLLED - SCALE FREE  
 OF MATERIAL: SPEC: ASTM-A519-94

TIMKEN ORDER 43505 RELEASE 1 CUSTOMER ORDER 70-023930-001 1QD  
 SIZE OD 10.000" WALL 1.750"

HEAT	C	MN	P	CHEMICAL ANALYSIS						PIECE NO.	CV NO.
				S	SI	CR	NI	MO	CU		
J0078 LADLE	.25	.80	.015	.022	.26	.14	.13	.03	.23		

## LONGITUDINAL TENSILE TEST

HEAT	PIECE NO.	YIELD TENSILE		ELONG		TEMP C	SPECIMEN
		STRENGTH P.S.I.	STRENGTH P.S.I.	IN	%		
J0078		51,205	82,723	2.0	28.6	62.7	.505" ROUND

THE MECHANICAL PROPERTY RESULT REPRESENTS ONE SAMPLE  
 (PER HEAT) AND IS NOT A MINIMUM, MAXIMUM OR AVERAGE FOR THE  
 ORDER/HEAT.

WHEN SHIPPING NOTICE IS ATTACHED IT BECOMES PART OF THIS CERTIFICATION

WE CERTIFY THE ABOVE MATERIALS HAVE BEEN INSPECTED AND TESTED  
 IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING  
 SPECIFICATIONS, AND THE RESULTS OF SUCH INSPECTIONS AND TESTS  
 CONFORM WITH THE APPLICABLE REQUIREMENTS.

APPROVED BY: JEPSON

NOTARY PUBLIC

BY Jeff Jepson  
 Supervisor-Met. Order Processing

THE TIMKEN COMPANY

FEB 19 1998

999-9487-0995

# TIMKEN

WORLDWIDE LEADER IN BEARINGS AND STEEL

## STEEL OPERATIONS

## CERTIFICATE OF TEST

1835 DUEBER AVE. S.W.

CANTON, OHIO 44706

JUNE 25, 1998

SOLD TO: MARMON/KEYSTONE CORPORATION  
10700 MARMON DRIVE  
BOLINGBROOK IL 60440 USA

SHIP TO: MARMON/KEYSTONE CORPORATION  
10700 MARMON DRIVE  
BOLINGBROOK IL 60440 USA

DESCRIPTION 1026 - HOT ROLLED - SCALE FREE  
OF MATERIAL: SPEC: ASTM-A519-94

TIMKEN ORDER 46272 RELEASE 1 CUSTOMER ORDER 60-27146-004 2QD COMBO  
SIZE OD 6.500" WALL 2.000"

HEAT	C	MN	P	CHEMICAL ANALYSIS						PIECE NO.	CV NO.
				S	SI	CR	NI	MO	CU		
J2215 LADLE	.24	.80	.011	.004	.21	.08	.12	.03	.29		

## LONGITUDINAL TENSILE TEST

HEAT NO.	.20% YIELD TENSILE		ELONG %			TEMP C	SPECIMEN
	PIECE STRENGTH P.S.I.	TENSILE P.S.I.	IN	%	RED		
J2215	61,810	81,330	2.0	26.0	61.0		.505" ROUND

THE MECHANICAL PROPERTY RESULT REPRESENTS ONE SAMPLE  
(PER HEAT) AND IS NOT A MINIMUM, MAXIMUM OR AVERAGE FOR THE  
ORDER/HEAT.

Q.C. REVIEWED  
7-13-98

WHEN SHIPPING NOTICE IS ATTACHED IT BECOMES PART OF THIS CERTIFICATION

WE CERTIFY THE ABOVE MATERIALS HAVE BEEN INSPECTED AND TESTED  
IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING  
SPECIFICATIONS, AND THE RESULTS OF SUCH INSPECTIONS AND TESTS  
CONFORM WITH THE APPLICABLE REQUIREMENTS.

APPROVED BY: JEPSON

NOTARY PUBLIC

BY

Jeff Jepson

Supervisor-Met. Order Processing

THE TIMKEN COMPANY

999-9467-0895

REQ., JOB, CONTRACT F.

PO DATE	PURCHASE ORDER NO.
---------	--------------------

PURCHASE ORDER NO.

CO  
E  
A  
N  
I

YES NO

GARY WORKS

SHIPERS NO.	H02314	VEHICLE IDENTITY	EV
-------------	--------	---------------------	----

MILL ORDER NO. 1856015

INVOICE NO. 154-01

DAY, INDIANA 46402

## MELTED AND MANUFACTURED IN THE US

W. LOCKNER NAMASCO CORP  
SOUTHWEST DIVISION  
4501 N MIRO ST  
NEW ORLEANS LA 70117-

KLOCKNER NAMASCO CORP  
SOUTHWEST DIVISION  
4501 N MIRO ST AT IND  
NEW ORLEANS LA 70117-

SI-A 10

4501 N MIRO ST AT INDL CANAL  
NEW ORLEANS LA 70117-4438

PREPARED BY THE OFFICE OF  
S. C. BAE, GEN. MGR

NEW ORLEANS LA 70117-4439

U.S. DEPT. OF JUSTICE

7-16-98

SPEC.  
&  
NSP.

PLATE CARBON ASTM A36-#96 FINE GRAIN CHARPY V-NOTCH LONGITUDINAL  
HEAT LOT IMPACT TESTS 15 FT/LBS AT + 10 DEG F

DATE:

15P 01 MILL CERTIFIED T/R ANALYSIS 3 T/R TO KLOCKNER NAMASCO 4501 N  
MIRO ST AT INDL CANAL NEW ORLEANS LA 70117

ITEM NO.	MATERIAL DESCRIPTION						QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD ST. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA				
	THICKNESS OR SECTION	WIDTH, DIA. OR FL. WT.	LENGTH	IN 8"	IN 2"														
05	1- 1/2 "	96.0000	240"	06	58806														
	STEEL-TYPE = CAST		REDUCTION RATIO = 8.0 TO 1																
	LONG. FL SZ CHARPY IMP T V-NTCH +010 DEG F																		
	-12 DEG C AVERAGE IMPACT STRENGTH +77 FT LBS																		
	LONG FL SZ CHARPY IMP T V-NTCH +010 DEG F																		
	-12 DEG C AVERAGE IMPACT STRENGTH +79 FT LBS																		
	***END OF DATA***																		
THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION																			
HEAT NO.	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
062424	HEAT 18	09B	016	007	024	03	02	04	01	028	001	001	001	001	001	001	001	001	FINE GRAIN
***END OF DATA***																			
ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA																			
DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.																			

## Gulf States Steel, Inc.

GADSDEN, AL 35904-1835

BB-9149-01

GSS ORDER NO.		PURCHASE ORDER DATE	
DIST	NUMBER	ITEM	MFG
6	53762	04	42
PURCHASE ORDER NO.		SHIPPED FROM	
NEW 72984		ALA CITY	

CERTIFICATE  
OF TESTS

ACCOUNT NUMBER	PAGE NO.	INVOICE NUMBER
71390006	1	742-01760
DATE SHIPPED	ROUTE/VEHICLE IDENTIFICATION	
01 29 98	DEATON INC	

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.

C.F. BEARDEN, JR.  
MGR, TECHNOLOGY AND  
QUALITY - PLATE PRODUCTS

(SHIP TO SAME AS "SOLD TO" UNLESS OTHERWISE INDICATED)

KLOCKNER HANASCO CORP  
SOUTHWEST DIVISION  
P O DRAWER 450469

HOUSTON TX 77245-0469

KLOCKNER HANASCO CORP  
SOUTHWEST DIV  
4501 N MIRO STREET

NEW ORLEANS LA 70117

## MATERIAL DESCRIPTION

PLATE CARBON ASTM A-36-96 ASME SA-36 DTD 07/01/95 SUPP S-91 KILLED FINE GRAIN  
PRACTICE IMPACT TEST HEAT QUAL MELTED & MFG IN USA

QUANTITY SHIPPED

1.2500 X .96 0000 GAS CUT EDGE X 740 0000 IN  
HT 7456306 3 PCS

24504

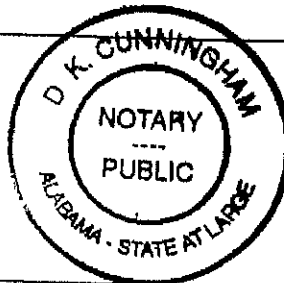
CH C 25MX MN 80/1.20 P 040MX S 050MX SI 15/40 CU RP1 NI RPT CR RPT NO RPT CB RPT V RPT AL  
020MIL

NR YLD 36000 MIN TEN 58/80000 XELONG MIN 2 IN 23 OR 8 IN 20 IMP HT QUAL LT AR 15 FT LBS AVG 10  
FT LBS MIN AT PLUS 10 DEG F

TI 3 NOTR TR CA

STATE OF ALABAMA COUNTY OF ETOWAH  
SIGNED AND SUBSCRIBED TO BEFORE ME  
THIS 29 DAY OF JANUARY 1998

Notary Public



ANALYSIS

HEAT NUMBER	GRAIN	C	Mn	P	S	SI	Cu	Ni	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E.
7456306		17	1.04	.012	.014	.240	0.03	0.01	0.02	.01	.001	.001	.051					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV. COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7456306	N823102	52.0	71.0		31			AR	.73									
7456306	N823301	58.0	75.0		27			AR	.77									

S.V. NOTCH

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	
7456306	N823101	AR	FUL	LT	10	115	115	100	110									

CHARPY

CONTINUED

780129113207

CONTINUED

780129113247

# OREGON STEEL MILLS

P.O. BOX 2760, Portland, Oregon 97208 • (503) 286-9651 Fax (503) 240-5268



**S O L D T O**  
KLOCKNER NAMASCO CORPORATION  
ATTN: MELANIE ELLIOTT  
5775-C GLENRIDGE DRIVE  
SUITE 110  
ATLANTA, GA 30328

NAMASCO-SOUTHWEST  
4501 N MIRO STREET  
NEW ORLEANS, LA 70117-4439

## REPORT OF CHEMICAL/PHYSICAL TESTS

CERTIFICATE NO. 497212P	DATE Sep 08, 1998	PAGE 1
MILL ORDER NO. 101244	DATE	
CUSTOMER ORDER NO. NEW-90274		
JOB REQ. NO.		
SHIPPING NO. 497212	DATE 09/08/1998	
CARRIER UNION PACIFIC		
CAR/TRUCK NO. CTRN501238		

THIS MATERIAL HAS BEEN MANUFACTURED, TESTED AND FOUND TO MEET THE SPECIFICATIONS AND PURCHASE ORDER REQUIREMENTS  
OSM CARBON STRUCTURAL QUALITY PLATE ASTM A36-96/ASME SA36 1995. FINE GRAIN  
PRACTICE. LCVN 15 FT/LBS AVG @ +10 F (H).

### PHYSICAL PROPERTIES

OSM ITEM	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8" 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
2	0.7500 X 96.000M X 240.000 1 PC 4901 LBS	+	392954	505	640	29				
	3 PCS 14703 LBS	+	393085	497	620	30				
3	1.0000 X 96.000M X 240.000 3 PCS 19602 LBS	+	394081	437 493	675 690	25 22				

### CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cr	Al	Mo	Ti	B	Nb	Ca	CE	Welding Grades
+392954	.06	.96	.006	.004	.24	.22	.11	<.008	.025	.022	.06	.05					
+393085	.05	.98	.005	.005	.25	.23	.10	<.008	.024	.027	.04	.03					
+394081	.15	.90	.006	.011	.27	.24	.11	<.008	.035	.035	.08	.03					
ALL HEATS INDICATED WITH (+) WERE MELTED AND MANUFACTURED IN THE USA.																	

I certify the above to be correct as contained in the records of OREGON STEEL MILLS BY

*Colleen Sharnell*  
COLLEEN SHARNELL  
O.C. RECORDS  
ADMINISTRATOR

# GLOBAL X-RAY & TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861

Post Office Box 1536  
Morgan City, Louisiana 70381

Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

24313

40909

CLIENT Applied Hydraulic DATE 10-26-98  
CONTRACTOR Same JOB LOCATION Houma, La. 70381  
JOB NO. 620th 059801 CLIENT REPRESENTATIVE Samuel J. Lefebvre  
MT TECH. Wade Mike REMARKS MT Insp.

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS			WELD NO.	WALL THICKNESS	RECOMMENDATIONS	
			✓ ACCEPT	REJECT				✓ ACCEPT	REJECT
1					REMARKS	51			
2						52			
3						53			
4						54			
5						55			
6						56			
7						57			
8						58			
9						59			
10						60			
11						61			
12						62			
13						63			
14						64			
15						65			
16						66			
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28						78			
29						79			
30						80			

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**SURFACE CONDITION**  
GOOD ( ☒ ) FAIR ( ) PAINTED ( ) WELD ( ☒ )

**EQUIPMENT**  
MAKE Parker MODEL B-300 S/N 6693

**CONTRACTS**  
PROD SPACING 3" 65" CONTINUOUS ( ☒ )  
AC ( ☒ ) DC ( ) HALF WAVE ( ) FULL WAVE ( )  
AMPS 6.25

**MEDIA**  
7C-BLACK WET ( ☒ ) 8A-DRY ( ) WHITE HIGHLIGHTER ( ☒ )

**CALIBRATION**  
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )  
CALIBRATION DATE: \_\_\_\_\_

**ACCEPTANCE CRITERIA**  
ASNT S-6

TOTAL TIME HRS. 1

# Material Traceability Log

CRANE WO. NO.:	059801
CUSTOMER:	PEMEX / B & R
WELDMENT PART NO.:	N61591-001
REV. LEVEL:	D
WELDMENT S/N:	98253-08
DESCRIPTION:	Bridle Weldment
MODEL:	340LA-140
CHECKED BY:	<i>Dan Sam</i>
DATE:	12-30-98

[illegible]

INSTRUMENT	SHIP DATE	BL. NO.	CUSTOMER P.O. NO.	SHIP METHOD	CAS OFFICE NUMBER	LOT OF COPIES	CO.	INSTR.	CONTR.	PRICE
21417	08-05-97	49623	LOAD124	WILL CALL	102	48	1	X	64	3

SHIP TO

SOLD TO

HOUSTON, TEXAS

LINE NO.	SECTION	SPEC./LENGTH	WEIGHT	HEAT #	TENSILE STRENGTH KSI	YIELD STRENGTH KSI	ELONG. 8"	C	PH	IN	P	S	CU	M	CV	AS	V	INSTR.
4	S 18 X 70	ASTM A36-94	2	Y/T	MPa	MPa	8"	CE	66	19	10	12	23	09	13	23	1	5n
	S 460 X 104	35"	4900	69780	39.5	58.7	31.3	07	26	26	26	26	26	26	26	26	26	26
		10.67 METERS		.67	272	405												12
				.67	273	404												

ANSI/AWS D1.1 PROCEDURES FOR MICRO ALLOYED STEEL SHOULD BE FOLLOWED.

Notary Public in  
TEXAS County.  
ROBERT C. OLSON hereby certify this affidavit was sworn to by  
under my Notarial Seal this day of AUGUST 19 97

My Commission Expires



AT THE STEELS HAVE BEEN TESTED IN ACCORDANCE WITH SPECIFICATIONS

STATE OF TEXAS

MANAGER OF METALLURGY



**MATERIAL  
TEST REPORT**

**COPPERWELD**

**SHELBY DIVISION  
ISO 9002 CERTIFIED**

SHELBY, OHIO 44875-1471  
Telephone 419/342-1200 FAX: 419/342-1473

SHELBY ORDER NO.  
089858

C U S T O M E R	J M TULL METALS CO INC PO BOX 4725 NORCROSS GA 30091 ATTN: TEST REPORT CENTER		SPECIFICATION ASTM A519 96 6161 I 07-91		CUSTOMER ORDER  M0158026

GRADE 1026	SIZE(O.D x WALL) 5.000 X .750	QUANTITY 10677 LB	313.66 FT	SHIPPED 05/04/98	DATE 05/04/98
CONDITION SMLS HF UNANNEALED OPEN HEARTH			PART NO. 22008	S# 00062892 50033095	

HEAT NO.	CHEMICAL ANALYSIS												GRAIN SIZE
	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	V	Al	OTHER	
3M23420	.26	.72	.010	.021	.230	.060	.120	.020	.140	.001	.023	.0008	CA 5-8

MECHANICAL PROPERTIES									MAGNAFLUX	
HEAT NO.	LOAD NO.	YIELD PSI	TENSILE PSI	ELONG %  2.0"	RED AREA %	HARDNESS		IMPACT FT.-LBS	FREQ.	SEVERITY
						BHN	ROCKWELL			

JOMINY HARDENABILITY (EXPRESSED IN 16THS)																
HEAT NO.	1	2	3	4	5	6	7	8	10	12	14	16	20	24	28	32

I-K RATING				SLAG-OXIDE RATING			
HEAT NO.	A	B	C	D	INGOT	OXIDE	SLAG

MELT SOURCE	OTHER INSPECTION	MACRO ETCH: SI R1 C2	THIS TEST REPORT NOTARIZED WHEN REQUIRED SWORN AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____
			NOTARY PUBLIC <i>William R. McManis</i>

MATERIAL PRODUCED TO THE SPECIFICATION(S) SHOWN ABOVE. NO ADDITIONAL SPECIFICATION(S) IS IMPLIED OR WARRANTED

32-9122-01

## Gulf States Steel, Inc.

GADSDEN, AL 35904-1935

GSS ORDER NO. ST NUMBER ITEM MFG 5 53762 03 142		PURCHASE ORDER DATE 11 18 97		ACCOUNT NUMBER 71390006		PAGE NO. 1		INVOICE NUMBER 742-01701	
PURCHASE ORDER NO. NEW 72984		SHIPPED FROM ALA CITY		DATE SHIPPED 01 29 98		ROUTE/VEHICLE IDENTIFICATION SOU 152139			
I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.				C F BEARDEN, JR. MGR, TECHNOLOGY AND QUALITY - PLATE PRODUCTS  ("SHIP TO" SAME AS "SOLD TO" UNLESS OTHERWISE INDICATED)					

KLOCKNER HANASCO CORP  
SOUTHWEST DIVISION  
P O DRAWER 450469

HOUSTON

TX 77245-0469

KLOCKNER HANASCO CORP  
SOUTHWEST DIV  
4501 N MIRO STREET

NEW ORLEANS

LA 70117

## MATERIAL DESCRIPTION

PLATE CARBON ASTM A-36-96 ASME SA-36 DTG 07/01/95 SUPP S-91 KILLED FINE GRAIN  
PRACTICE IMPACT TEST MEAT QUAL METED & DEL IN USA

1.0000 X .96.0000 SHEARED EDGE X 240.0000 IN  
HT 7456440 22 PCS

CH C 25MM RM 80/1 20 P 040KA S 050MM SL 15/40 CH RPT NI RPT CR RPT NO RPT CH RPT U RPT AL  
020MIN

NR VLD 36000 MIN TEN 58/80000 XELONG MIN 2 IN 23 OR 8 IN 20 INP HT QUAL LT NR 15 FT LBS AUG 10  
FT LBS MIN AT PLUS 10 DEG F

TI 3 NOTR TR CA

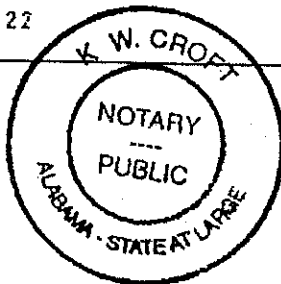
TOTAL WT. 143,748# PCS 22

QUANTITY SHIPPED

143748

STATE OF ALABAMA COUNTY OF ETOWAH  
SWORN AND SUBSCRIBED TO BEFORE ME  
THIS THE 29 DAY OF JANUARY 1998

Notary Public



ANALYSIS

HEAT NUMBER	GRAIN	C	Mn	P	S	SI	Cu	Ni	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E.
7456440		15	0.87	0.015	0.015	2.20	0.02	0.01	0.02	0.01	0.01	0.01	0.036					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7456440	M282701	53.0	68.0		27			AR	77									
7456440	M282702	50.0	67.0		26			AR	74									

WATERS

CHARPY V.

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	
7456440	M282701	AR	FUL	LT	10	54	57	60	57									
7456440	M282702	AR	FUL	LT	10	72	83	84	79									

LAST PAGE

080120101605

LAST PAGE

990129141645



# Metallurgical Test Report

REV. 587



35648

GENEVA STEEL COMPANY CERTIFIES ALL SMELTING, MELTING AND MANUFACTURING PROCESSES OCCURRED IN THE U.S.A.

REQ., JOB, CONTRACT NO.

P.O. DATE

PURCHASE ORDER NO.

GENEVA STEEL

P.O. BOX 2500

PROVO, UTAH 84603

12/11/97

NEW-74269/61-8085

SHIPERS NO.

MILL ORDER NO.

TALLY NO.

GP42423B

EA48880

GP42423B

VEHICLE

IDENTITY

TTPX 81643

MANNESMANN PIPE&STEEL CORP  
1990 POST OAK BLVD SUITE 1800  
HOUSTON TX 77056-3811

NAMASCO  
C/O NEW ORLEANS PUBLIC BELT RR  
DELIVERY WAREHOUSE #1  
NEW ORLEANS, LA

S  
H  
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T  
O

THIS IS TO CERTIFY THAT THE  
PRODUCT DESCRIBED HEREIN WAS  
MANUFACTURED, SAMPLED, TEST  
ED AND/OR INSPECTED IN  
ACCORDANCE WITH THE SPECIFI  
CATION AND FULFILLS REQUIRE  
MENTS IN SUCH RESPECTS.

*Larry D. Clugger*  
DIVISION MANAGER, QUALITY

DATE 03-10-98

SPEC PLATE ASTM A36-96 AND ASME SA-36 1995 EDITION 1996 ADDENDA  
INS. KILLED FINE GRAIN AND DIN 50049-3.18

01 MILL RA/SN CERTIFIED T/R

ITEM NO.	MATERIAL DESCRIPTION				QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PECE IDENTITY	YIELD ST. KSI	TENSILE STR. KSI	ELONGATION %		% RED. OF AREA	BENT
	THICKNESS OR SECTION	WIDTH DIA. OR PL. WT.	LENGTH								IN 8"	IN 2"		
01	2.0000"	96.0000"	240.0000"		4	52272#	100787	2.0000"	44.8	75.0	27.0			
02	3.0000"	96.0000"	240.0000"		1	19602#	100690	2.0000"	44.3	75.9	27.0			
	3.0000"	96.0000"	240.0000"		2	39204#	100788	3.0000"	46.7	73.1	20.0			
	3.0000"	96.0000"	240.0000"		1	19602#	100790	3.0000"	42.1	72.4	23.0			
								3.0000"	44.5	73.6	20.0			
								3.0000"	47.6	73.4	20.0			
								3.0000"	47.1	74.1	18.0			
								3.0000"	48.3	75.2	20.0			
								***END OF DATA***						

HEATNO.	TYPE	C	AN	P	S	SI	CU	N	CR	MO	SN	AL	N	V	B	TI	CB	CO	CA
100690	HEAT	23	104	012	014	20	01	01	02	004		041		004			003		
100787	HEAT	24	101	010	021	18	01	01	02	004		042		004			003		
100788	HEAT	23	103	009	012	19	01	01	01	004		040		004			003		
100790	HEAT	23	100	010	017	18	05	02	02	004		042		004			003		
GENEVA STEEL COMPANY CERTIFIES ALL SMELTING, MELTING AND MANUFACTURING PROCESSES OCCURRED IN THE U.S.A.																			
***END OF DATA***																			

019308

DECIMAL POSITIONS AND AROUND THE LEFT MARGIN. VERTICAL DOTTED LINE OR DECIMAL POINT 01



**AMERISTEEL**  
C = CHARLOTTE

**CHEMICAL AND PHYSICAL TEST REPORT**

TENNESSEE STEEL, MINERAL INDUSTRIES  
METALLURGICAL DEPARTMENT  
P.O. BOX 3670 JACKSON, TENN. 38301  
PRODUCING MILL IS KNOWN BY HEAT ID NUMBER PREFIX:  
J = JACKSONVILLE, K = KNOXVILLE, T = TAMPA, W = WEST TENNESSEE

SHIP DATE		SHIPMENT NUMBER																
10-16-97		8582-513604																
CUST. ACCOUNT NO.		CUST. P.O. NUMBER																
36791606		ASME-SA36																
O'NEAL STEEL, INC. ATTN: MIKE STANFORD PO BOX 2623 BIRMINGHAM		AL 35202-26																
INVOICE TO		SPECIFICATION																
GRADE		SIZE																
HEAT NO.	C	MN	P	S	V	SI	CR	CU	NI	SN	AL	MO	YIELD PT LBS/SQ IN.	TENSILE LBS/SQ IN.	% ELONG 8 IN.	BEND	DEF.	% LIGHT HEAVY
F 3/8 X 6	16	76	01	04	008	20	10	30	13	020	040	NBC-008	48490	8050468	73390	27352		CE.39
V8-2195	16	76	01	04	008	20	10	30	13	020	040	NBC-008	48490	8050468	73390	27352		CE.39
F 3/8 X 6	16	76	01	04	008	20	10	30	13	020	040	NBC-008	48490	8050468	73390	27352		CE.39
V8-2195	16	76	01	04	008	20	10	30	13	020	040	NBC-008	48490	8050468	73390	27352		CE.39
F 1/2 X 4	17	72	01	04	008	20	10	30	10	010	030	NBC-008	46770	8051314	68790	32524		CE.40
V8-2280	17	72	01	04	008	20	10	30	10	010	030	NBC-008	46770	8051314	68790	32524		CE.40
F 1/2 X 4	17	72	01	04	008	20	10	30	10	010	030	NBC-008	46770	8051314	68790	32524		CE.40
V8-2280	17	72	01	04	008	20	10	30	10	010	030	NBC-008	46770	8051314	68790	32524		CE.40
A 2 1/2 X 2 1/2 X 3/8	13	71	02	04	008	20	10	30	11	020	040	NBC-008	48660	8052077	70280	38172		CE.37
V8-1801	13	71	02	04	008	20	10	30	11	020	040	NBC-008	48660	8052077	70280	38172		CE.37
A 2 1/2 X 2 1/2 X 3/8	13	71	02	04	008	20	10	30	11	020	040	NBC-008	48660	8052077	70280	38172		CE.37
V8-1801	13	71	02	04	008	20	10	30	11	020	040	NBC-008	48660	8052077	70280	38172		CE.37

WE HEREBY CERTIFY THAT THE ABOVE FIGURES ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY

RECEIVED  
OCT 18 1997

THIS MATERIAL, INCLUDING THE BILLETS, WAS PRODUCED AND MANUFACTURED IN THE UNITED STATES OF AMERICA BY AMERISTEEL, A QUALITY ASSURANCE MGR.

## GLOBAL X-RAY &amp; TESTING CORPORATION

JOEL MOREAU, President  
Residence: 504-446-6861Post Office Box 1536  
Morgan City, Louisiana 70381Bus: 504-631-2426  
Fax: 504-631-0093

## MT WORK REPORT

Report No. M

8084

41350

CLIENT Applied HydraulicsDATE 11-24-98CONTRACTOR SameJOB LOCATION Houma, LA.JOB NO. 059801CLIENT REPRESENTATIVE Daniel L. LelievreMT TECH. Jeffrey RobicheauxREMARKS MT inspection

WELD NO.	WALL THICKNESS	RECOMMENDATIONS		WELD NO.	WALL THICKNESS	RECOMMENDATIONS	
		✓ ACCEPT ✗ REJECT	REMARKS			✓ ACCEPT ✗ REJECT	REMARKS
1				51			
2	100% MT of Bridle			52			
3				53			
4	Acceptable			54			
5				55			
6				56			
7				57			
8				58			
9				59			
10				60			
11				61			
12				62			
13				63			
14				64			
15				65			
16				66			
17				67			
18				68			
19				69			
20				70			
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48							
49							
50							

**SURFACE CONDITION**  
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

**EQUIPMENT**  
MAKE Contour MODEL B-300 S/N 9037

**CONTRACTS**  
PROD SPACING 3-5" CONTINUOUS (✓)  
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )  
AMPS 5.75

**MEDIA**  
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLIGHTER (✓)

**CALIBRATION**  
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )  
CALIBRATION DATE: 11-24-98

**ACCEPTANCE CRITERIA**  
AWS B.1.1 SEC 6

TOTAL TIME HRS 1 hr

## **PIN CERTIFICATES**

# Lattice Boom Style

## PIN CERTIFICATE SHEET

DATE: 10-20-98  
 CUSTOMER: Pemex/ Brown & Root

REV.: A

MODEL NO.: 340LA-140

WORK ORDER NO.: 059801C

MATERIAL: SS = Stainless Steel with 100,000 PSI Minimum Yield				4140 = 4140 with 100,000 PSI Minimum Yield				
COATING: U = Uncoated		F = Fluorocarbon Coated		S = Special				
COMPONENTS	PART NUMBER/REV.	PIN NO.*	HEAT NO.	MATERIAL		COATING (4140 Only)		
				SS	4140	U	F	S
BOOM FOOT PIN	N61595-001 (2) Rev. A	P1 P2	H5649	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GANRTY/UPPERSTRUCTURE	N61596-001 (2) Rev. A	P3 P4	H5649	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN/IDLER	N61604-001 (2) Rev. A	P5 P6	H6269	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LOWER AUX./EXTENSION	N61605-001 (1) Rev. B	P7	H6269	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BOOM CONNECTIONS	N60986-004 (16) Rev. A	P8-P23	6082H	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BRIDLE/GANTRY	N61603-001 (2) Rev. A	P24 P25	H6269	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXTENDED WEDGE SOCKET PIN/MAIN	N60645-001 (1) Rev. -	P26	3419H	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LOAD CELL PINS	N60646-004 (2) Rev. A	P27 P28	3419H	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BOOM IDLER	N95SKI-104 (2) Rev. F	P29 P30	5768H	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

NOTES: \* Pin number to be stamped on end of pin by machinist.  
 \*\* Heat Number to be recorded by machinist when material is pulled from inventory.

SPECIAL COATING REQUIREMENTS:

ALL TEST REPORTS FURNISHED BY  
INDUSTRIAL METALS OF THE SOUTH, INC.  
P.O. BOX 19567  
NEW ORLEANS, LA 70179

CUSTOMER Applied Mech  
YOUR P.O. 35-873  
DATE 4-2-98  
ITEM NO. 5  
OUR INV. NO. 35552



Atlas Specialty Steels  
A Division of Sammi Atlas Inc.  
10000 Highway 100  
Villanova, Ontario, Canada L3B 5R7

## CERTIFIED TEST REPORT



Customer:  
GULF GLOBAL INC.  
P.O. BOX 10158  
NEW ORLEANS, LA

Customer P/O: 24362-IMS

Date: JAN/12/1998

70181 Sales Order: N7L30841

P.O.C.: BR22601000

### Description

Grade:	S17400/H1150	Size:	4.0000 in	No. of Pcs:	4	Heat Treatment:	SOLN AN/AGED
Heat No:	H5649	Shape:	RD	Weight:	4166 lb	Finish Condition:	CG/P (25/30 RMS)
		Length:	24'2" -24'8"			Product Quality:	BSQ
						Melting Process:	VOD

### Specifications

RMS 30 MAX AWS 5643N	ASTM A564-95 (CHEN ONLY) COND H1150	CWN REQ'D	AQUATECH 17 SPEC	STR. .0015/FT TIR	NON STD PLUS TOL.
----------------------	-------------------------------------	-----------	------------------	-------------------	-------------------

### Chemical Analysis

C	Mn	P	S	Si	Cr	Ni	Nb	Cu	Mo	Ta	Co
0.011	0.430	.020	.018	0.379	15.36	4.300	0.186	3.130	0.271	.009	0.067

### Mechanical and Physical Properties of Material

Position	Specimen Size	Dir	Yield Strength Offset 0.2%	KSI	Tensile Strength KSI	Elongation %	Reduction Area	Hardness HRC	Impact Tests			Ferrite			
									Type	Size	Temp				
R/2	.5000	L	125.4		139.2	19.0	21N	64.0	31.0	CVN	10X10	RT	78.0	78.0	0.8%

### Special Testing

### Statements and Remarks

HEAT TREATMENT: SOLUTION ANNEAL - 1900 DEG.F.  
AGED  
MACRO STRUCTURE : SATISFACTORY  
TORSIONAL YIELD STRENGTH: 84,018 PSI.



No welding was performed on this material  
This material is free from mercury contamination

B. VALERIO  
SENIOR TEST REPORT CLERK

Basil Valerio





Atlas Specialty Steels  
One Centre Street, P.O. Box 1000  
Welland, Ontario, Canada L3B 5R7

# CERTIFIED TEST REPORT



AUG 25 1998

Customer:  
GULF GLOBAL INC.  
P.O. BOX 10158

Customer P/O: 24642-IMS

B/L No.: LA88040311

Date: AUG/04/1998

NEW ORLEANS, LA

70181

Sales Order: N7L37291

P.O.C.: BR24806000

## Description

Grade:	S17400/H1150	Size:	3.0000 in	No. of PCS:	4	Heat Treatment	SOLN ANN/AGED
Heat No:	H6269	Shape:	RD	Weight:	2140 lb	Finish Condition	CG/POL (RMS >20/30)
		Length:	22'2" - 22'8"			Product Quality:	BOAT SHAFT Q.L.T.Y
						Melting Process:	VOD

## Specifications

RMS 30 MX	ASTM A564-95 CHEM ONLY	COND H1150	AQUATECH 17 SPEC	STR .0011"/FT TIR
-----------	------------------------	------------	------------------	-------------------

## Chemical Analysis

C	Mn	P	S	Si	Cr	Ni	Nb	Cu	Mo	Ta	Co
0.026	0.800	.024	.023	0.400	15.12	4.580	0.213	3.500	0.269	.009	0.090

## Mechanical and Physical Properties of Material

Position	Specimen Size	Dir	Yield Strength ksi Offset 0.2%	Tensile Strength ksi	Elongation %	Reduction %	Hardness HRC	Type	Size	Temp	Impact Test:		Ferrite		
											FT. LB				
R/2	.5000	L	127.4	141.7	20.0	21N	64.0	30.0	CVN	10X10	RT	108.0	106.0	98.0	0.1%

## Special Testing

## Statements and Remarks

HEAT TREATMENT: SOLUTION ANNEAL - 1900 DEG.F  
AGED - 1150 DEG.F  
MACRO STRUCTURE : SATISFACTORY  
TORSIONAL YIELD STRENGTH: 85,358 PSI.

THE RESULTS SHOWN ABOVE ARE CERTIFIED No welding was performed on this material  
TO BE A TRUE COPY OF TEST RECORDS This material is free from mercury contamination  
CONTAINED WITHIN OUR COMPANY

B. VALERIOTE  
SENIOR TEST REPORT CLERK

*Beth Valeriote*



**Atlas Specialty Steels**  
One Centre Street, P.O. Box 1000  
Welland, Ontario, Canada L3B 5R7

CERTIFIED TEST REPORT



Customer: GULF GLOBAL INC.  
P.O. BOX 10158  
NEW ORLEANS, LA 70181

Customer P/O: 25045-IMS  
Sales Order: N7L1871

B/L No.: LA8A08027  
P.O.C.: BR24465000

Date: OCT/08/1998

Welland, Ontario, Canada L3B 5R7

Description			Heat Treatment:	SOLN ANN/AGED
Grade:	S17400/H1150	Size: 2.5000 in	No. of PCS: 4	
Heat No:	6082H	Shape: RD	Weight: 1105 lb	
		Length: 16'2" -16'8"		
				CG/POL (RHS >20/30)
				Product Quality: BDAT SHAFT QLTV
				Melting Process: V00

Specifications		
RMS 30 MX	ASTM A564-95 COND H1150	AQUATECH 17 SPEC STR. .0015/FT TIR

Chemical Analysis											
C	Mn	P	S	Si	Cr	Ni	Nb	Cu	Mo	Ta	Co
0.029	0.780	.021	.019	0.352	15.24	4.580	0.218	3.440	0.214	.009	0.083

## Mechanical and Physical Properties of Material

Specimen Position	Specimen Size	Yield Strength ksi	Yield Strength MPa	Tensile Strength ksi	Elongation %	Reduction %	Hardness HRC	Impact Tests			Femite 0.1%			
								Type	Size	Temp				
R/2	.5000	L	122.1	139.7	21.0	21N	63.0	28.0	CWN	10X10	RT	82.0	80.0	80.0

## Special Testing

Statements and Remarks
------------------------

HEAT TREATMENT: SOLUTION ANNEAL - 1900 DEG.F.  
AGED - 1150 DEG.F.  
MACRO STRUCTURE : SATISFACTORY  
TORSIONAL YIELD STRENGTH: 81,807 PSI.

THE RESULTS SHOWN ABOVE ARE CERTIFIED  
TO BE A TRUE COPY OF TEST RECORDS  
CONTAINED WITHIN OUR COMPANY

No welding was performed on this material  
This material is free from mercury contamination

**B. VALERIOTE**  
**SENIOR TEST REPORT CLERK**

MAIL TEST REPORTS FURNISHED BY  
INDUSTRIAL METALS OF THE SOUTH, INC.  
P O BOX 19557  
NEW ORLEANS, LA 70179

CUSTOMER Applied Hwy  
YOUR P.O. 40914  
DATE 10.29.98  
ITEM NO. # 1  
OUR INV. NO. 48004

SAMMIAL TECH INC.  
WILLOWBROOK AVENUE  
DUNKIRK, N.Y. 14046

Supplied by:  
**Atlas Specialty Steels**  
A division of Sammi/Atlas Inc.  
One Centre Street, P.O. Box 1000  
Welland, Ontario, Canada L3B 5K7.

# CERTIFIED TEST REPORT

**SAMMI**

Customer:

GULF GLOBAL INC.  
700 PETERS ROAD

Customer P/O: 18037-544 TMS

B/L No.: LA6624077

Date: JUN/27/1996

HARVEY, LA

70053

Sales Order:

N6L02221

P.O.C.: BR14553000

## Description

Grade: S17400/H1150 size: 1.2500

Heat No: 3419H Shape: RD

Length: 16'2" -16'8"

No. of Pcs: 23

Weight: 1.606

Heat Treatment: SOLN AIR/AGED

Finish Condition: CG/P (20 RMS MAX)

Product Quality: B SQ

Melting Process: VOO

## Specifications

RMS 20 MX AMS 5643N

ASTM A564-92A(CHEM ONLY) AQUATECH 17 SPEC

COND H1150 .0015" TIR/FT

## Chemical Analysis

C	Mn	P	S	Si	Cr	Mn	Nb	Cu	Mo	Ta
0.034	0.470	.021	.018	0.359	15.31	4.230	0.343	3.170	0.234	.009

## Mechanical and Physical Properties of Material

Position	Specimen Size	Yield Strength Offset 0.2%	KSI	Tensile Strength KSI	Elongation %	Reduction %	Hardness HRC	Impact Tests			Ferrite			
								Type	Size	Temp				
R/2	.5000	L	132.7	142.8	20.0	62.0	30.0	CVN	10X10	RT	97.0	86.0	90.0	0.2%

## Special Testing

## Statements and Remarks

MACRO STRUCTURE : SATISFACTORY  
HEAT TREATMENT : SOLUTION ANNEAL - 1900 DEG. F.  
AGED - 1150 DEG. F.  
TORSIONAL YIELD STRENGTH: 88,909 PSI.

THE RESULTS SHOWN ABOVE ARE CERTIFIED  
TO BE A TRUE COPY OF TEST RECORDS  
CONTAINED WITHIN OUR COMPANY

This material has not been repair welded  
This material is free from mercury contamination

B. VALERIOTE  
SENIOR TEST REPORT CLERK

*B. Valeriote*

MILL TEST REPORTS FURNISHED BY  
INDUSTRIAL METALS OF THE SOUTH, INC.  
P.O. BOX 19557  
NEW ORLEANS, LA 70179

CUSTOMER Applied by

YOUR P.O. 40450

DATE 10.7.98

ITEM NO. 2

OUR INV. NO. 46671



Atlas Specialty Steels  
One Centre Street, P.O. Box 1000  
Welland, Ontario, Canada L3B 5R7

## CERTIFIED TEST REPORT



Customer: GULF GLOBAL INC.  
P.O. BOX 10158  
NEW ORLEANS, LA 70181

Customer P/O: 24642-IMS  
B/L No.: LA8716003  
Date: JUL/16/1998

Sales Order: N7L37201  
P.O.C.: BR22364009

Description		Grade: S17400/H1150		Size: 2.5000 in	No. of Pcs: 12	Heat Treatment: SOLN ANNI/AGED					
Heat No: 5768H		Shape: RD	Weight: 2482 lb	Finish Condition: CG/POL (RMS >20/30)		Product Quality: BOAT SHAFT QLT					
Length: 12'2" - 12'8"		Welding Process: VWD									
Specifications											
RMS 30 MX ASTM A564-95 (SHEM ONLY) CONO H1150 AQUATECH 17 SPEC STR. .0015/FT TIR											
Chemical Analysis											
C	Mn	P	S	Si	Cr	Ni	Nb	Cu	Mo	Ta	Co
0.012	0.570	.023	.018	0.385	15.44	4.230	0.185	3.150	0.284	.009	0.067
Mechanical and Physical Properties of Material											
Position	Specimen Size	Yield Strength Offset 0.2%	Tensile Strength ksi	Elongation in	Reduction in	Hardness HRC	Type	Size	Temp	Impact Tests FT.LB	Fertile
R/2	.5000 L	127.5	137.3	18.5	2IN	65.0	CWN	10X10	RT	67.0	70.0
										65.0	3.0%

### Special Testing

### Statements and Remarks

HEAT TREATMENT: SOLUTION ANNEAL - 1900 DEG.F.  
AGED - 1150 DEG.F.  
MACRO STRUCTURE: SATISFACTORY  
TORSIONAL YIELD STRENGTH: 85,425 PSI.

THE RESULTS SHOWN ABOVE ARE CERTIFIED. No welding was performed on this material.  
TO BE IN COMPLIANCE WITH RECORDS  
CONTAINED WITHIN OUR COMPANY

B. VALERIO  
SENIOR TEST REPORT CLERK

*Bark Valerio*

## **BALLRING CERTIFICATES**

# MATERIAL TEST REPORT

McINNES ROLLED RINGS  
MEMPHIS OPERATIONS  
P. O. BOX 280749  
MEMPHIS, TN 38168  
901-358-6710  
800-238-1213  
FAX 901-358-0744  
A SUBSIDIARY OF McINNES STEEL COMPANY

CUSTOMER: AVON BEARINGS

CUSTOMER ORDER NO: 004816 ✓

MRR ORDER NO: 5418 MRR ITEM NO: 1

HEAT SYMBOL : G4346

MILL HEAT NO : G4346

PACKING LIST NO.: 19744

QUANTITY : 3

SPECIFICATION: AISI 4340 PER BES-2-1-055  
MATERIAL PER API 2C

HEAT TREAT: NORMALIZED @ 1600F 2 HRS. & AIR  
COOLED. AUSTENITIZED @ 1600F 2  
HRS. & OIL QUENCHED. TEMPERED @  
1100F 8 HRS. & AIR COOLED TO  
269-321 BRN HARDNESS.

DESCRIPTION: 91.20 X 79.42 X 6.60 ROUGH RINGS

TAG: 3080A1 OUTER/JOB# 10867

CHEM	C	Mn	P	S	Si	Mo	Cr	Ni
MILL	0.4200	0.1600	0.0080	0.0170	0.2800	0.2800	0.8600	1.7700

V NOTCH CHARPY IMPACTS

CHARGE NO.	PT.	ABS.	SHEAR	DIR.	TEST TEMP. DEG. F
6237	68-71	74	100-100-100	42-38-43	LL/4T. °-4F

TEST BAR PER BES-2-1-101

JOMINY HARDENABILITY: J1=58, J4=58, J8=56, J16=55, J32=55

BRN:

#1 = 321, 321, 302, 302  
#2 = 302, 302, 293, 302  
#3 = 302, 321, 321, 293

*[Signature]*  
QUALITY CONTROL REPRESENTATIVE

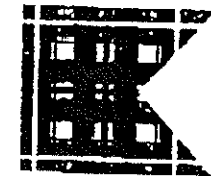
DATE: 09/25/98

# MATERIAL TEST REPORT

CUSTOMER: AVON BEARINGS

CUSTOMER ORDER NO: 004816 ✓

MRR ORDER NO: 5417 MRR ITEM NO: 1



McINNES ROLLED RINGS  
MEMPHIS OPERATIONS

P. O. BOX 280749  
MEMPHIS, TN 38168  
901-358-6710  
800-238-1213  
FAX 901-358-0744

A SUBSIDIARY OF McINNES STEEL COMPANY

HEAT SYMBOL : G4346

MILL HEAT NO : G4346

PACKING LIST NO.: 19743

QUANTITY : 3

SPECIFICATION: AISI 4340 PER BES-2-1-055  
MATERIAL PER API 2C

HEAT TREAT: NORMALIZED @ 1600F 2 HRS. & AIR  
COOLED. AUSTENITIZED @ 1600F 2  
HRS. & OIL QUENCHED. TEMPERED @  
1100F 8 HRS. & AIR COOLED TO  
269-321 BHN HARDNESS.

DESCRIPTION: 79.58 X 69.50 X 6.60 ROUGH RINGS  
TAG: 3080AL INNER/JOB# 10867

CHEM	C	Mn	P	S	Si	Mo	Cr	Ni
MILL	0.4200	0.7600	0.0080	0.0170	0.2800	0.2800	0.8600	1.7700

V NOTCH CHARPY IMPACTS

CHARGE NO.	FT.	68-71	74	100-100-100	42-38-43	LL/4T	TEST TEMP. DEG. F
6237	---	---	---	---	---	---	-4F

TEST BAR PER BES-2-1-101

JCMINY HARDENABILITY: J1=58, J4=58, J8=56, J16=55, J32=55

EFIN:

#1 = 321,321,302,321

#2 = 302,302,321,321

#3 = 321,321,321,321

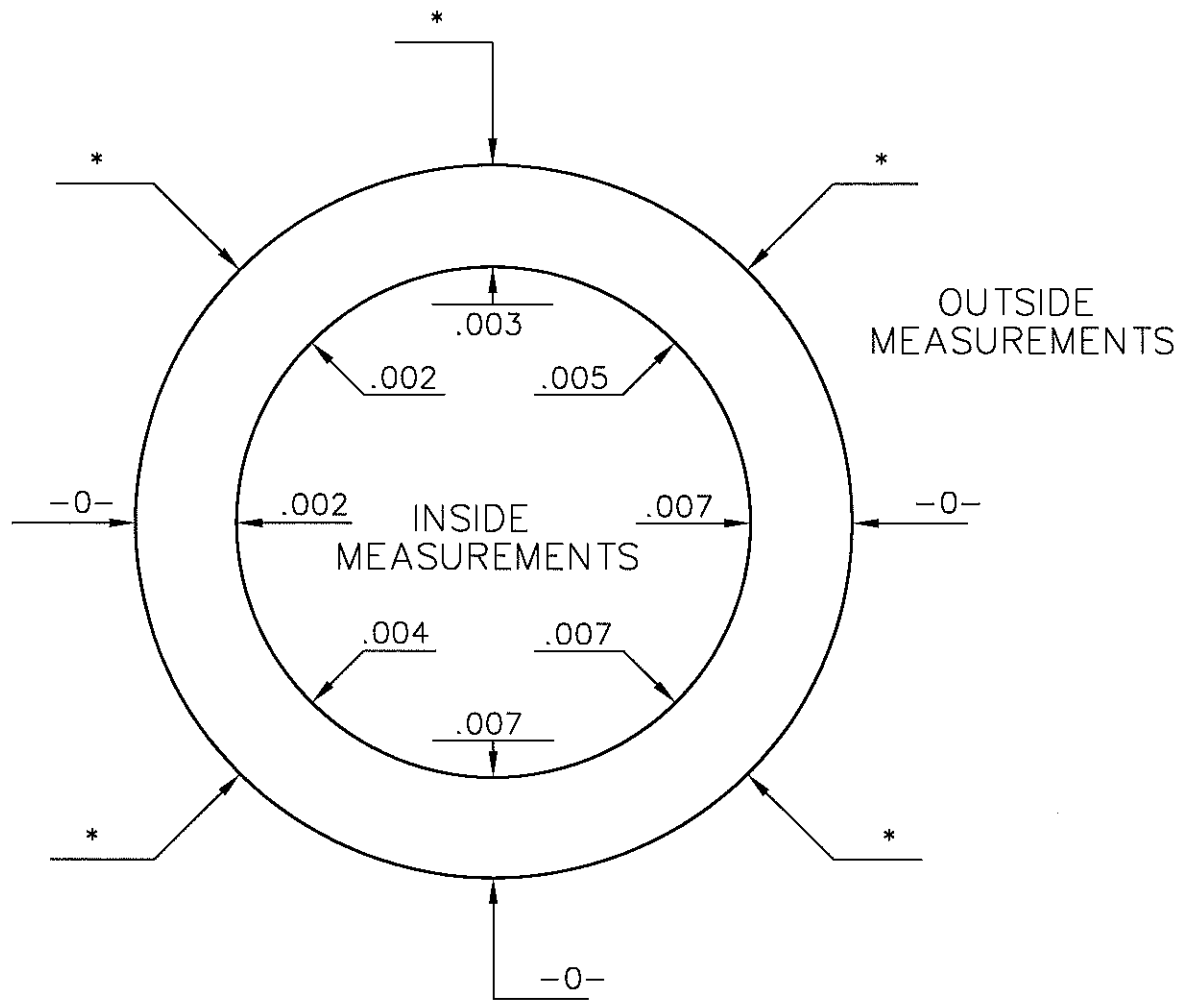
*[Signature]*  
QUALITY CONTROL REPRESENTATIVE

DATE: 09/25/96

## **BALLRING CLEARANCE REPORTS**



# BALLRING TO TURRET CLEARANCE REPORT

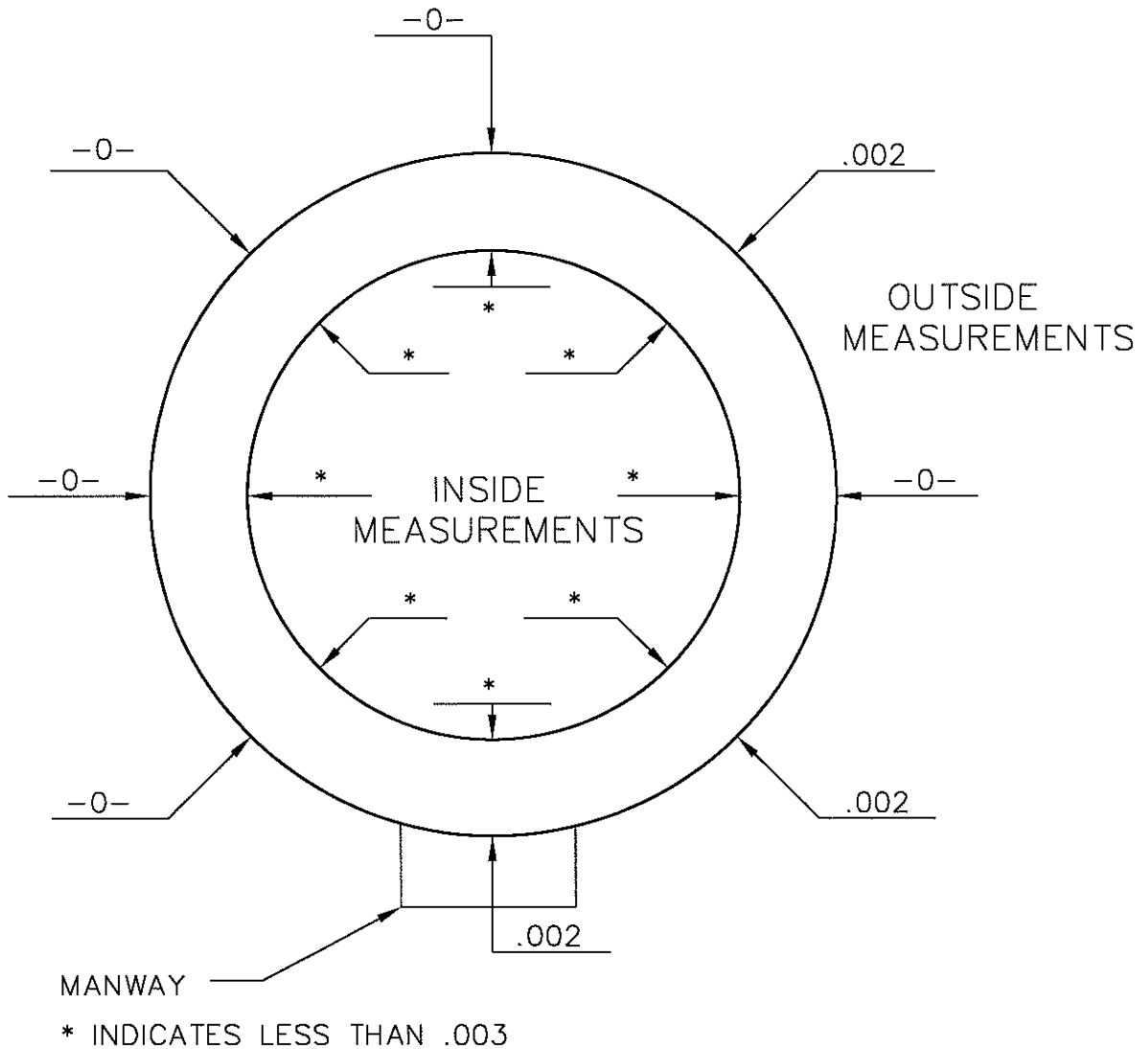


\* INDICATES LESS THAN .003

TOP VIEW

WELDMENT SERIAL NUMBER : 98253-01  
WELDMENT PART NUMBER : N61584-001  
CRANE MODEL NUMBER : 340LA-140  
CRANE SERIAL NUMBER : 059801C  
CUSTOMER : BROWN & ROOT/PEMEX  
REMARKS : ALL BOLTS FIT  
ALL MACHINED HOLES  
WITHIN TOLERANCE.

# BALLRING TO PEDESTAL CLEARANCE REPORT



## TOP VIEW

WELDMENT SERIAL NUMBER	: <u>98286-02</u>
WELDMENT PART NUMBER	: <u>N98SK1-219</u>
CRANE MODEL NUMBER	: <u>340LA-140</u>
CRANE SERIAL NUMBER	: <u>059801C</u>
CUSTOMER	: <u>PEMEX</u>
REMARKS	: <u>ALL BOLTS FIT</u>
	: <u>BOTTOM OF FLANGE</u>
	: <u>PARALLEL WITH TOP</u>

## **BOLT CERTIFICATES**

# NUCOR FASTENER

A Division of Nucor Corporation

Post Office Box 6100 - Saint Joe, Indiana 46785 - Telephone 219/337-1600

CUSTOMER NUMBER 267 DATE SHIPPED 8/19/98  
CUSTOMER NAME PORTEOUS FASTENER CO.  
CUSTOMER P.O. # 17121614-HOUSTN NUCOR ORDER # 258509  
CUSTOMER PART # 00080-4242-020 DATE TESTED 8/10/98



MANUFACTURER ID: n

## CERTIFIED MATERIAL TEST REPORT

PART NO. QUANTITY LOT NO. DESCRIPTION  
123350 280 97190C 1 1/4-7 X 4 1/2 GR 8 HX CAP SCREW PLAIN  
—CHEMISTRY MATERIAL GRADE -413PH  
MATERIAL HEAT CHEMISTRY COMPOSITION (WT% HEAT ANALYSIS) BY MATERIAL SUPPLIER  
NUMBER NUMBER C MN P S SI CR MO V  
RH012834 BT 6808185 .35 .90 .013 .010 .22 .90 .19 .029  
—MECHANICAL PROPERTIES IN ACCORDANCE WITH SAE J429-83 AND ASTM A354-95 GRADE BD BY NUCOR FASTENER

SURFACE HARDNESS (R30N)	CORE HARDNESS (RC)	PROOF LOAD 116300 LBS	TENSILE STRENGTH 6 DEG-WEDGE (LBS)	STRESS (PSI)
55.1	35.3	PASS	163260	168483
55.8	34.2	PASS	163300	168524
N/A		PASS	164500	169763
N/A		PASS	164920	170196
N/A		PASS	164390	169649
AVERAGE VALUES FROM TESTS		PRODUCTION LOT SIZE	4400 PCS	
55.5	34.8	166074		169323

—SURFACE QUALITY WITHIN LIMITS PRESCRIBED IN SAE J1061A

—MICROHARDNESS TEST RESULT IN ACCORDANCE WITH SAE J121(HKN)

POSITION 1. 371 2. 382 3. 386  
HEAT TREATMENT - AUSTENITIZED, OIL QUENCHED & TEMPERED (MIN 800 DEG F)

CERTIFICATE OF INSPECTION  
PROVIDED BY  
PORTEOUS FASTENER CO.  
TO: QUALITY BOLT & SCREW  
ORDER NO. 235-12759-HO

THE NUCOR FASTENER TESTING LABORATORY HAS BEEN ACCREDITED BY THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION IN THE FIELD OF MECHANICAL TESTING. ALL TESTS ARE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE METHODS PRESCRIBED IN THE APPLICABLE SAE AND ASTM SPECIFICATIONS. THE SAMPLES TESTED CONFORM TO ANSI B18.2.1-1992 DIMENSIONAL SPECIFICATIONS ALONG WITH THE SPECIFICATIONS AS DESCRIBED/LISTED ABOVE AND WERE MANUFACTURED FREE OF MERCURY CONTAMINATION. THE STEEL WAS MELTED AND MANUFACTURED IN THE U.S.A. AND THE PRODUCT WAS MANUFACTURED AND TESTED IN THE U.S.A.  
WE CERTIFY THAT THIS DATA IS A TRUE REPRESENTATION OF INFORMATION PROVIDED BY THE MATERIAL SUPPLIER AND OUR TESTING LABORATORY. THIS CERTIFIED MATERIAL TEST REPORT RELATES ONLY TO THE ITEMS LISTED ON THIS DOCUMENT AND MAY NOT BE REPRODUCED EXCEPT IN FULL.

NUCOR FASTENER  
A DIVISION OF NUCOR CORPORATION

*John R. Harden*

JOHN R. HARDEN  
QUALITY CONTROL SUPERVISOR



41994-120994 Ven Lot 7 9/19/98 P/O 5 235-12759-1

SEP 24 '98 08:24AM QUALITY BOLT BR  
04/20/98 13:01 FAX 310 834 0871

PORTCOUS FAST

310 834 0871

P.2/31/001

# NUCOR FASTENER

A Division of Nucor Corporation

Post Office Box 6100 • Saint Joe, Indiana 46785 • Telephone 219/337-1600

CUSTOMER NUMBER 267 DATE SHIPPED 3/17/98  
CUSTOMER NAME PORTEOUS FASTENER CO.  
CUSTOMER P.O. # 17090936-HOUSTH NUCOR ORDER # 247917  
CUSTOMER PART # 00080-4240-020 DATE TESTED 2/23/98



MANUFACTURER ID: 77

## CERTIFIED MATERIAL TEST REPORT

PART NO. QUANTITY LOT NO. DESCRIPTION  
123340 140 90072A 1 1/4-7 X 4 GR 8 HX CAP SCREW PLAIN

### CHEMISTRY

MATERIAL HEAT MATERIAL GRADE 4135MLV  
NUMBER NUMBER --CHEMISTRY COMPOSITION (WT% HEAT ANALYSIS) BY MATERIAL SUPPLIER

RM012456 NU 700781 C .35 MN .95 P .014 S .024 SI .23 CR .99 MO .18 V .024

MECHANICAL PROPERTIES IN ACCORDANCE WITH SAE J429-83 AND ASTM A354-95 GRADE BD BY NUCOR FASTENER

SURFACE HARDNESS (R30N)	CORE HARDNESS (RC)	PROOF LOAD 116300 LBS	TENSILE STRENGTH 4 DEG WEDGE (LBS)	STRESS (PSI)
56.3	37.5	PASS	170050	175490
56.6	38.0	PASS	170780	176244
56.3	37.0	PASS	169340	174757
56.3	37.8	PASS	171230	176708
59.1	38.3	PASS	169460	174881
AVERAGE VALUES FROM 5 TESTS		PRODUCTION LOT SIZE	8700 PCS	
56.9	37.7	170172	175616	

SURFACE QUALITY WITHIN LIMITS PRESCRIBED IN SAE J1061A

MICROHARDNESS TEST RESULT IN ACCORDANCE WITH SAE J121(HKN)

POSITION 1. 394 2. 405 3. 396

HEAT TREATMENT - AUSTENITIZED, OIL QUENCHED & TEMPERED (MIN 800 DEG F)

## CERTIFICATE OF INSPECTION

PROVIDED BY

PORTEOUS FASTENER CO.

TO: *Quality Bolt*

ORDER NO. *048-01481-HO*

THE NUCOR FASTENER TESTING LABORATORY HAS BEEN ACCREDITED BY THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION IN THE FIELD OF MECHANICAL TESTING. ALL TESTS ARE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE METHODS PRESCRIBED IN THE APPLICABLE SAE AND ASTM SPECIFICATIONS. THE SAMPLES TESTED CONFORM TO ANSI B18.2.1-1992 DIMENSIONAL SPECIFICATIONS ALONG WITH THE SPECIFICATIONS AS DESCRIBED/LISTED ABOVE AND WERE MANUFACTURED FREE OF MERCURY CONTAMINATION. THE STEEL WAS MELTED AND MANUFACTURED IN THE U.S.A. AND THE PRODUCT WAS MANUFACTURED AND TESTED IN THE U.S.A.

WE CERTIFY THAT THIS DATA IS A TRUE REPRESENTATION OF INFORMATION PROVIDED BY THE MATERIAL SUPPLIER AND OUR TESTING LABORATORY. THIS CERTIFIED MATERIAL TEST REPORT RELATES ONLY TO THE ITEMS LISTED ON THIS DOCUMENT AND MAY NOT BE REPRODUCED EXCEPT IN FULL.

NUCOR FASTENER  
A DIVISION OF NUCOR CORPORATION

*John R. Harden*

JOHN R. HARDEN  
QUALITY CONTROL SUPERVISOR



39343-12HML Ven Lot 8 9/26/24 P/O # 048-01481-1

SEP. -24' 97 (WED) 07:19

DARLING BOLT CO.

DARLING BOLT MI

TEL: 713 672 6642

TEL: 810 757 2565

P. 002

P. 003

DARLING BOLT COMPANY  
2941 E. 10 MILE RD  
WARREN, MI 48091  
(810) 757-4100  
FAX (810) 757-1555

### MATERIAL CERTIFICATION

CUSTOMER: A & B BOLT

CUSTOMER ORDER NO: CD60166

DARLING BOLT  
SHIPPER NO: 202439T

DATE SHIPPED: 9/11/97

CUSTOMER PART NO: --

QUANTITY SHIPPED: 20 PC

DESCRIPTION: 1 1/4-7X6 1/2 HEX CAP GR8  
CUT FROM 1 1/4-7X7

LOT NO: 6973/00130221

CUSTOMER SPECIFICATION: SAE J429

COUNTRY OF ORIGIN: USA

STEEL TYPE: 41B40 MOD

STEEL HEAT NO: USA21962

### STEEL CHEMISTRY

C	MN	P	S	SI	NI	CR	MO	CU	AL
.40	.85	.009	.009	.22	--	.27	.22	.01	.028
									B
									.0013

### PHYSICAL PROPERTIES

TENSILE STRENGTH	PROOF LOAD	RED. OF	SURFACE HDN	CORE HDN
PSI	LBS	AREA %	R30N	BHN
TEST RESULTS	ELONG %		RC	RC
150,000	164,000		35	35.3

"I certify that the material or product described in this report has been inspected and/or tested, and that such specimens or samples as have been inspected or tested were taken from the lot of quantity described herein and the material meets the blueprint specification or other requirements specifically stated on the purchase order."

DARLING BOLT COMPANY

  
Quality Assurance

**WALKER**

**BOLT** Manufacturing Co.  
P.O. Box 38502  
Houston, TX 77238-8502  
(281)-448-4321

Customer : A & B BOLT  
Customer PO # : 420117ABBOLT  
Sales Order # : 56815  
Date : 08/07/1998

Item	Quantity	Description
A	366	1-1/2" (6) X 5" HEX CAP SCREW W/CADMIUM PLATE W/COLORLESS CHROMATE

Customer Part # :  
Specification : SAE J429 AUGUST 1983 GR. 8 (4340) W/CHARPY PER API2-C  
Additional Req's : 100% HARDNESS TESTED  
100% VISUAL EXAMINATION

Heat #	C	Mn	P	S	Si	Ni	Cr	Mo
8067480	.40	.75	.013	.022	.22	1.68	.80	.25

Tensile	Lab #	Tensile PSI	Yield PSI	% Elong.	R.A. %
	TR25681	171,842	160,196	16.6	56.8
	TR25682	172,501	161,085	14.9	54.7

**Hardness**  
327/353 HBS

Charpy Impact	Lab #	Specimen Size	Value	Temperature
	C3380	10MM X 10MM	42.0/38.0/40.0 FT/LBF	0 F
	C3381	10MM X 10MM	44.0/41.0/40.0 FT/LBF	0 F

Metallurgical	Lab #	Specification	Result
	TR25681	SURFACE HARDNESS	55.0 HR30N
	TR25682	SURFACE HARDNESS	56.8 HR30N



STATE OF TEXAS  
COUNTY OF HARRIS

Subscribed and sworn to before me  
this 7th day of August, 1998

*Brenda D. Janczak*  
Notary Public in and for Texas

NVLAP Lab Code: 200126-0

This test report may NOT be reproduced except in full  
without the written approval of WALKER BOLT Mfg Co.  
I certify the above results to be correct as  
contained in the records of the Company.

*Tommy D. Helms*  
Tommy D. Helms  
QA/QC Manager

## **WIRE ROPE CERTIFICATES**



PO# 40200

CERTIFICATE OF EXAMINATION AND TEST OF WIRE ROPE  
BEFORE BEING TAKEN INTO USE

Reel No. 8015229

This certificate when properly executed by a competent person, in accordance with 29CFR 1919.37, is accepted by the Government of the United States of America as being in accordance with the requirements of 29CFR 1918.12 and 1919.33.

Name and address of maker or supplier of rope:

Williamsport Wirerope Works Inc.  
P.O. Box 3188  
Williamsport, PA 17701

Date Tested: September 30, 1998

Actual Break Strength in Pounds: 93,000

Description: 7/8 1919 BR EEI NR IFW D

Safe working load, subject to any stated qualifying conditions such as minimum pulley diameter, direct tensile load, etc.:  
"Using a design factor of 5 the safe working load would be one-fifth of the rated catalog breaking strength".

Name and address of public service, association, company, or firm making the examination and test:

Williamsport Wirerope Works Inc.  
100 Maynard Street  
Williamsport, PA 17701

Position of signatory in public service, association, company, or firm making the examination and test:

Manager of Technical Services

I certify that the above particulars are correct and that the examination and test were carried out by a competent person.

Certificate No: AA17095

Signature: 

per authority of Dennis J. Weaver  
Manager of Technical Services

Date: October 16, 1998

In substantial agreement with I.L.O. Form No. 5

PO# 40200

**CERTIFICATE OF EXAMINATION AND TEST OF WIRE ROPE  
BEFORE BEING TAKEN INTO USE**

Real No. 8013815

This certificate when properly executed by a competent person, in accordance with 29CFR 1919.37, is accepted by the Government of the United States of America as being in accordance with the requirements of 29CFR 1918.12 and 1919.33.

Name and address of maker or supplier of rope:

Williamsport Wire Rope Works Inc.  
P.O. Box 3188  
Williamsport, PA 17701

Date Tested: February 13, 1998

Actual Break Strength in Pounds: 66,900

Description: 3/4 1919 BR EEI NR IFW D

Safe working load, subject to any stated qualifying conditions such as minimum pulley diameter, direct tensile load, etc.;  
"Using a design factor of 5 the safe working load would be one-fifth of the rated catalog breaking strength".

Name and address of public service, association, company, or firm making the examination and test:

Williamsport Wire Rope Works Inc.  
100 Maynard Street  
Williamsport, PA 17701

Position of signatory in public service, association, company, or firm making the examination and test:

Manager of Technical Services

I certify that the above particulars are correct and that the examination and test were carried out by a competent person.

Certificate No: AA1995

Signature: 

per authority of Dennis J. Weaver  
Manager of Technical Services

Date: December 22, 1998

In substantial agreement with I.L.O. Form No. 5

PO# 40200

CERTIFICATE OF EXAMINATION AND TEST OF WIRE ROPE  
BEFORE BEING TAKEN INTO USE

Reel No. 0015369

This certificate when properly executed by a competent person, in accordance with 29CFR 1919.37, is accepted by the Government of the United States of America as being in accordance with the requirements of 29CFR 1918.12 and 1919.33.

Name and address of maker or supplier of rope:

Williamsport Wirerope Works Inc.  
P.O. Box 3188  
Williamsport, PA 17701

Date Tested: October 27, 1998

Actual Break Strength in Pounds: 63,500

Description: 3/4 0625 BR EIP RR IN

Safe working load, subject to any stated qualifying conditions such as minimum pulley diameter, direct tensile load, etc.:  
"Using a design factor of 5 the safe working load would be one-fifth of the rated catalog breaking strength".

Name and address of public service, association, company, or firm making the examination and test:

Williamsport Wirerope Works Inc.  
100 Maynard Street  
Williamsport, PA 17701

Position of signatory in public service, association, company, or firm making the examination and test:

Manager of Technical Services

I certify that the above particulars are correct and that the examination and test were carried out by a competent person.

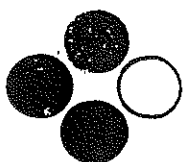
Certificate No: AA17319

Signature:

per authority of Dennis J. Weaver  
Manager of Technical Services

Date: November 17, 1998

In substantial agreement with I.L.O. Form No. 5



PO# 40200

GREEN &amp; WHITE STRAND®

**SOUTHERN WIRE CORPORATION**

3906 AIR PARK • MEMPHIS, TENNESSEE 38118 • (901) 795-1550

MILL TEST CERTIFICATE

Order No. 6539 L/C No. CHAI3008619 Reel No. 31-80  
Commodity: GALVANIZED AIRCRAFT CABLE  
Specification: ACC. TO M-W-1511A

CONSTRUCTION & SIZE

Construction: 7X19 Lay: R.H.R.L. Preforming: GOOD  
Rope Diameter: 3/8" Length/Reel: 5,000FT  
Wire Diameter: 0.62MM Wire Grade: IPS  
Lay Length: 57-76MM Net Wt./Reel: 521KGS

TEST RESULT

Rope Diameter: 9.60MM Lay Length: 66.7MM  
Wire Diameter: 0.63MM Breaking Strength: 14,750LBS  
Tensile Strength: 170KGS/SQ.MM No. of Bending:  
No. of Torsion: Adherence of Zinc Coating:  
Wt./Zinc Coating: 60.2G/SQ.MM

WIRE ROD CHEMICAL ANALYSIS (Wt.%)

Chemical Composition	C x100	Si x100	Mn x100	P x1000	S x1000	
(%)	63	22	47	15	2	

We hereby certify that the commodity is inspected according to the Specification and found good in all respects as stated above.

JINYANG WIRE ROPE INC.,

Inspection Section.

PO# 40200

CERTIFICATE OF EXAMINATION AND TEST OF WIRE ROPE  
BEFORE BEING TAKEN INTO USE

Reel No. 7012904

This certificate when properly executed by a competent person, in accordance with 29CFR 1919.37, is accepted by the Government of the United States of America as being in accordance with the requirements of 29CFR 1918.12 and 1919.33.

Name and address of maker or supplier of rope:

Williamsport Wirerope Works Inc.  
P.O. Box 3188  
Williamsport, PA 17701

Date Tested: December 19, 1997

Actual Break Strength in Pounds: 345,000

Description: 1 3/4 0619S BR EEI RR IWZ

Safe working load, subject to any stated qualifying conditions such as minimum pulley diameter, direct tensile load, etc.:  
"Using a design factor of 5 the safe working load would be one-fifth of the rated catalog breaking strength".

Name and address of public service, association, company, or firm making the examination and test:

Williamsport Wirerope Works Inc.  
100 Maynard Street  
Williamsport, PA 17701

Position of signatory in public service, association, company, or firm making the examination and test:

Manager of Technical Services

I certify that the above particulars are correct and that the examination and test were carried out by a competent person.

Certificate No: AA15024

Signature: 

per authority of Dennis J. Weaver  
Manager of Technical Services

Date: March 5, 1998

In substantial agreement with I.L.O. Form No. 5

# LoweryBrothers

a GlobalLIFT Technologies company

p.o. box 650, marrero, louisiana 70073

(504) 347-0213 - fax (504) 341-5555

APPLIED HYDRAULIC SYSTEMS INC.

DENNIS CALAMUSA

Tested By

09-81971-98

Certification No.

Company:

40200

P. O. No.

Job No.

## CERTIFICATE OF LOAD TEST (SEE REVERSE FOR WARRANTY)

Quantity Tested	Description of Gear	Date Test Load Applied	Test Load Applied (Short Tons)	Catalog Rated Capacity
2	1-3/4" X 95' LOWERY TYPE OSS-OSS OPEN SWAGE & OPEN SWAGE SOCKET PENDANT 6 X 25 IWRC EIPS BRIGHT DOMESTIC CERT# 09-81971-98-01 & 02 SOCKET OPENINGS AT RIGHT ANGLES	12-10-98	62. TONS	30.6 TONS
4	3/8" X 5' LOWERY TYPE ST-ST SWAGE THIMBLE & SWAGE THIMBLE WIRE ROPE SLING 7 X 19 AIRCRAFT GALVANIZED IWRC IMPORTED CERT# 09-81971-98-03 THRU 08	12-10-98	3. TONS	1.4 TONS

Name and Address of manufacturer,

LOWERY BROTHERS RIGGING CENTER, INC.

6100 4th STREET • MARRERO, LA. 70072

I hereby certify that the above particulars are correct,

X

*Todd Hildreth*

Superintendent of Testing or Representative of Firm

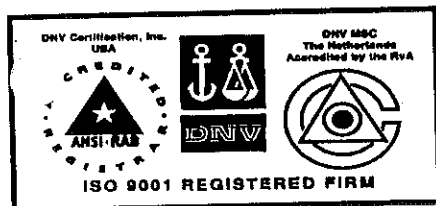
12-10-98

Date

*This is to certify that this product described herein has been subjected to the following test and has successfully withstood same. However in subjecting this product to the test, Lowery Brothers Rigging Center, Inc. does not warrant the product in any manner or certify it for any specific use whatsoever.*

## **LOAD BLOCK CERTIFICATES**





TELEPHONE 918/834-4611  
TELEX 262569 CRSBY UR  
FAX 918/834-9447

## **APPLIED HYDRAULIC SYSTEMS, INC.**

### ***SERIAL NO:***

**98-165-85**

**98-165-86**

**98-165-87**

***CROSBY PART NO:* 8014680**

***CROSBY CG NO:* 932288**

***CUSTOMER PO#:* 38140**

**JOB#: 059801-100298**

**JOB#: 059802-100298**

**JOB#: 059803-100298**

### ***DESCRIPTION:***

**M050T18EH 18" 45.5 METRIC TON  
API 2C CRANE BLOCK**

*products of uncompromising quality . . .*

*CROSBY Clips & Fittings, LEBUS Load Binders, McKISSICK Blocks & Sheaves, CROSBY- WESTERN Blocks, NATIONAL Swaging Systems*

*Plants and facilities in: Jacksonville, Arkansas - Los Angeles, California - Atlanta, Georgia - Chicago, Illinois - Tulsa, Oklahoma - Harrisburg, Pennsylvania  
Dallas, Texas - Longview, Texas - Seattle, Washington - Toronto (Brampton), Ontario - Barnsley, England - Mechelen (Putte), Belgium - Cergy St. Christophe, France*

## INDEX

- ORDER
- CERTIFICATE OF CONFORMANCE
- MATERIAL CERTIFICATION
- MAGNETIC CERTIFICATION
- PERSONNEL CERTIFICATION
- MACHINE CERTIFICATION

*products of uncompromising quality . . .*

*CROSBY Clips & Fittings, LEBUS Load Binders, McKISSICK Blocks & Sheaves, CROSBY- WESTERN Blocks, NATIONAL Swaging Systems*

*Plants and facilities in: Jacksonville, Arkansas - Los Angeles, California - Atlanta, Georgia - Chicago, Illinois - Tulsa, Oklahoma - Harrisburg, Pennsylvania  
Dallas, Texas - Longview, Texas - Seattle, Washington - Toronto (Brampton), Ontario - Barnsley, England - Mechelen (Putte), Belgium - Cergy St. Christophe, France*

Regular Order

Discounted Order-

4 % Entered By DOUG

7/23/98

Customer No. 2980 Order Number 932288

Last maintained by MEB

7/17/98

APPLIED HYDRAULIC SYSTEMS, INC

APPLIED HYDRAULIC SYSTEMS, INC

BOX 10155, STA 1

204 INDUSTRIAL AVE C

HOUMA

LA

HOUMA

LA

70363

70363

Customer PO # Ship Via PO Date Order Date Ship-to PO # Whse SR DR

38140 6/30/98 6/30/98 MK 52 - 12

Inv#: Ship: Frt Amt: Pick: Shipv:

Inv Date: 0/00/00 Frt Code: 1 Ship Info.: 0000000 00

Line Qty Qty Invoice Priority: 1

# Ordered Allocat. Prod. # WH U Sts Ctlg and Description Sell Price

SH- JOBS 059801-100298

SH- 059802 100298

SH- 059803-100298

1

2

3 3 0 8014680 MK ENT 383 CRANE BLK 7/8L SP

Records to Roll (1-24): 8 Total Weight 8295.00 Order Total:

F1=End F3=Fold F6=New Inquiry F24=More keys

APPLIED HYDRAULIC SYSTEMS, INC.  
BOX 10155, STA 1  
HOUMA, LA 70363

**the Crosby group**  
**inc.**

Certificate Form No. 932288

Customer Purchase Order No. 38140

Crosby Group Order No. 932288

**CERTIFICATE OF CONFORMANCE OF CHAINS, RINGS, HOOKS, SHACKLES,  
SWIVELS AND PULLEY BLOCKS**

(1) Distinguishing number or mark (if any)	(2) Description of gear	(3) Number	(4) Date	(5) Working Load Limit
<b>SERIAL NO</b> <b>98-165-85</b> <b>98-165-86</b> <b>98-165-87</b>  <b>ART NO</b> <b>8014680</b>	<b>M050T18EH 18" 45.5 METRIC TON</b>  <b>API 2C CRANE BLOCK</b>  <b>JOB#: 59801-100298</b> <b>JOB#: 59802-100298</b> <b>JOB#: 59803-100298</b>	<b>3</b>	<b>09-22-98</b>	<b>45.5 (MT)</b> <b>METRIC</b> <b>TON</b>

(7) Name and address of makers or suppliers **The Crosby Group / McKissick Products**

**2801 Dawson Road Tulsa OK 74110-5040 U.S.A.**

(8) Name and address of public service, association, company or firm making the test and examination \_\_\_\_\_

**Same**

(9) Position of signatory in public service, association, company or firm \_\_\_\_\_

**Quality Assurance Clerk**

We hereby certify that the above described material was manufactured and processed in a manner compatible to meeting the specified load ratings when used under normal and proper applications.

(Date) **September 22, 1998**

(Signature) \_\_\_\_\_

*Joanne Nutter*  
**Joanne Nutter**

# KREHER STEEL COMPANY, LLC

Oct97 16:28

## TEST CERTIFICATE

No: 1 105

P/O No P49077

Rel

S/O No 1 11695-001

B/L No 1 989-001

Inv No

Shp 29Oct97

Inv

Sold To: ( 376)  
CROSBY-LEBUS MFG.  
P.O. BOX 271  
900 FISHER RD.  
LONGVIEW, TX 75606

Ship To: (000)  
CROSBY-LEBUS MFG.  
P.O. BOX 271  
900 FISHER RD.  
LONGVIEW, TX 75606

Tel: 903-759-4424 Fax: 000000000000

### CERTIFICATE of ANALYSIS and TESTS

Cert. No: 1 1053  
29Oct97

Part No  
HOT ROLLED ROUNDS 4130  
5.6250 X 17'

Pcs Wgt  
21,406

KREHER CERTS WITH SHIPMENT  
HOLD FOR CUSTOMER RELEASE  
E #0092960  
M 5 TONS LIFTS  
MOLY SURCHARGE  
SCRAP SURCHARGE

Heat Number	Tag No	Pcs	Wgt
143654	H256219		8,421
143031	H256239		3,197
143031	H256242		3,350
143031	H256243		3,131
143031	H256244		3,307

Heat Number  
143031

#### \*\*\* Chemical Analysis \*\*\*

C=(.30) Mn=(.47) P=(.022) S=(.016) Si=(.29) Cr=(.86) Mo=(.17)  
Al=(.028) Cu=(.17) Sn=(.0051) V=(.02) Ti=(.010) W=(.02) Gr=(9)

#### \*\*\* Jominy Tests \*\*\*

1=	2=	3=	4=	5=	6=	7=	8=
9=	10=	12=	14=	16=	18=	20=	24=
28=	32=						

143654

C=(.31) Mn=(.53) P=(.027) S=(.013) Si=(.29) Ni=(.17) Cr=(.89)  
Mo=(.17) Al=(.034) Cu=(.24) Sn=(.0079) V=(.02) Ti=(.010) Gr=(10)

#### \*\*\* Jominy Tests \*\*\*

1=	2=	3=	4=	5=	6=	7=	8=
9=	10=	12=	14=	16=	18=	20=	24=
28=	32=						

We hereby certify that the contents of  
this report are correct and accurate.

*D. W. Rocha*

THE CROSBY GROUP - TULSA

TENSILE TEST DATA SHEET

DATE: 04/16/98 SERVICE QCP 1400 LAB LOG NO. L-98-104

DESCRIPTION: 19-A-60-X5B DIE NO. 585

SPECIFICATIONS: ASTM CLASS AD (521-76(92) OR J (668-93)

SPECIMEN SIZE: 0.505 INCHES DIAMETER

SPECIMEN AREA: 0.2 SQUARE INCHES

ELONGATION: 22 %

REDUCTION OF AREA: 57 %

YIELD STRENGTH: 76.5 KSI

YIELD LOAD: 15,300 LBS

ULTIMATE STRENGTH: 107.0 KSI

ULTIMATE LOAD: 21,400 LBS

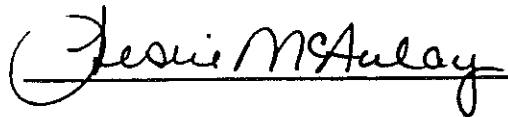
HARDNESS: 241 BHN

SURFACE OF TENSILE BAR: BHN 212

EXCEPTIONS: NONE

TEST PERFORMED BY MIDSTATES ANALYTICAL LABORATORIES, INC.

PREPARED BY: LESLIE MCAULAY



APPROVED BY: JAMES E. FRYAR





**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
*Metallurgical Testing Services, Inc.*

Fax 918-627-3062  
800-324-8378

682 38th Street  
Tulsa, OK 74145-3241  
Telephone 918-664-7767

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998060276- 2  
Date Received: 06/16/98  
Date Reported: 06/19/98  
P.O. No: M9803922

Sample Description: 5.00 Barstock API 2C  
Material: 4140  
Heat No: 21838  
PIC Code: XDDJ  
WO#: 198220 - P/N: 2015015.  
Specimen removed from 4/5 radius.

#### Test Report (ASTM E 8-96) RT, Longitudinal Tensile

<u>Parameter</u>	<u>Result</u>
Diameter, in.	.502
Tensile Strength, psi	151,900
Yield Strength, psi by 0.2% offset	134,700
Elongation in 4D, %	18
Reduction of Area, %	58

#### Hardness Test

Testing Specification: ASTM E18-94  
Hardness Scale: ROCKWELL "C"  
Acceptance Criteria: N.A.  
Actual Coupon Hardness: 33.0, 32.5, 33.0

Approved By: A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

**SHERRY LABORATORIES**

INDIANA

LOUISIANA

OKLAHOMA  
Metlab Testing Services, Inc.Fax 918-627-3062  
800-324-837868<sup>th</sup> East 38th Street  
Tulsa, OK 74145-3241  
Telephone 918-664-7767**LABORATORY REPORT**Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101Report No: 1998060276- 2  
Date Received: 06/16/98  
Date Reported: 06/19/98  
  
P.O. No: M9803922Sample Description: 5.00 Barstock API 2C  
Material: 4140  
Heat No: 21838  
PIC Code: XDDJ  
WO#: 198220 - P/N: 2015015.  
Specimen removed from 4/5 radius.**Impact Test Report**Style and Model of Machine: Tinius Olsen, 74  
Available Impact Energy: 264 Ft-Lbs.  
Impact Velocity: 17 Ft/Sec.  
Method of Test: SA-370/ASTM-E23  
Specimen Type: Charpy "V" Notch  
Specimen Location: ASTM-A370 Longitudinal  
Notch Orientation: ASTM-A370  
Specimen Size: 10mm X 10mm  
Test Temperature: -25 °F

Notch Location:	Base
Surface Impact Values (Ft-Lbs.):	42, 42, 43
Lateral Expansion(Mils):	17, 15, 16
Shear(%):	40, 40, 40

Approved By:   
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing





# Stålvalseværk A/S

DK 1300 Frederiksberg - Telefon 47 77 31 31 - Telefax 42 12 46 44 - Telex 40191

8110 SAS167 00

CHARLEROI (USA)  
FABRIQUE DE FER DE CHARLEROI  
88 DANBURY ROAD  
WILTON, CONNECTICUT  
06897-4409 U.S.A.

SA 516-70, ASME SEC II PART A (95)  
GVN : -46°C

Order/Bestellungsnummer: 86064  
Seite/Page: 2  
Type: DIN 50049/3.19

Ihrer Auftrag/Your order: MUS-29385  
Unser Auftrag/Our order: 28257  
Datum/Date: 23.05.1997

Lieferstelle/Delivery address:  
NEW ORLEANS  
USA  
FOR FURTHER TRANSPORTATION BY BAR  
MUSKOGEE, OKLAHOMA

Lieferung  
Delivery: M/S ELISABETH G

Technik/  
Technical: ASME SA20

Pos.	Zusatz/Marking	Abmessungen/Dimensions	Stk./Pcs.	Gewicht/Weight	Seitendruck/Load	Stab	Wärmer./Millino.	N
16	3 MUS-29385	12192 2438 25,4	1	5927	38527	X8	8890V 1	N
17	3 MUS-29385	12192 2438 25,4	1	5927	38527	X5	8891V 1	N
18	3 MUS-29385	12192 2438 25,4	1	5927	38527	X6	8892V 1	N
19	3 MUS-29385	12192 2438 25,4	1	5927	38527	X7	8895V 1	N
20	3 MUS-29385	12192 2438 25,4	1	5927	38159	A3	9209V 1	N
21	4 MUS-29385	12192 3048 9,5	1	2771	38938	D3	3199A 1	N
22	4 MUS-29385	12192 3048 9,5	1	2771	38938	A2	3200A 1	N
23	4 MUS-29385	12192 3048 9,5	1	2771	38938	D2	3206A 1	N
24	4 MUS-29385	12192 3048 9,5	1	2771	38940	X8	7839A 1	N
25	4 MUS-29385	12192 3048 9,5	1	2771	38940	D1	7843A 1	N
26	4 MUS-29385	12192 3048 9,5	1	2771	38370	C3	9365V 1	N
		General durch nominelle Abmessungen berechnet Calculated weight based on nominal dimensions		26	99670			

C	Mn	Si	P	S	Cr	Cu	Ni	Mo	Sn	Al	Mn	Ti	V	B	N	Ceq - Carbon-Äquivalent (IFW - formula)
16	17	111	30	16	8	9	27	8	1	26	0	1	1			40
17	17	111	30	16	8	9	27	8	1	26	0	1	1			40
18	17	111	30	16	8	9	27	8	1	26	0	1	1			40
19	17	111	30	16	8	9	27	8	1	26	0	1	1			40
2	8	109	27	26	15	13	22	8	2	35	0	2	2			41
21	19	115	26	18	3	11	30	9	1	50	13	2	2			43
22	19	115	26	18	3	11	30	9	1	50	13	2	2			43
23	19	115	26	18	3	11	30	9	1	50	13	2	2			43
24	19	118	26	23	15	12	31	10	1	54	14	1	1			43
25	19	118	26	23	15	12	31	10	1	54	14	1	1			43
26	19	120	27	24	7	11	31	9	1	41	14	2	2			44

Zugversuch quer/Tensile test transverse						Kerbschlagbiegeversuch/Impact test						KVA = ASTM - V						Wärmeversuch/Heat treatment	
	Re	Rm	A	Re	Rm	A	1	2	3	Mittel Average	Temp	1	2	3	Mittel Average	Temp	*	R63	Temp
16	347	514	28				100	70	99	90	-46						1X		
17	352	515	28				108	91	66	88	-46						1X		
18	348	515	27				93	88	124	102	-46						1X		
19	356	518	28				140	87	130	119	-46						1X		
20	350	523	28				78	50	63	64	-46						7X		
21	420	574	23				80	117	74	90	-46						7X		
22	426	579	23				35	120	108	88	-46						7X		
23	429	584	21				129	176	179	161	-46						7X		
24	419	578	22				56	57	32	48	-46						7X		
25	419	576	26				70	64	61	65	-46						7X		
26	432	573	20				123	107	136	122	-46						7X		
							Joule				°C				Joule	°C		N/mm²	°C

Customer's Requirements: A200

TEST REPORTS FURNISHED

DATE 12-17-97

CUSTOMER McKissick Div.

CUSTOMER P.O. # M-9708292

CUSTOMER PART # 2008045

HEAT # 38527 PCS 1

HEAT # \_\_\_\_\_ PCS \_\_\_\_\_

Prebake and Zustand  
Testpiece location and condition

Prebake  
Weld or temp. Location

1 15.8 Oberflächentiefen  
2 12.0 Mittel/Center  
3 12.0 1/3 von Oberfl./from surface  
4 12.0 1/3 von Oberfl./from surface  
5 12.0  
6 12.0  
7 12.0  
8 12.0  
9 12.0  
10 12.0  
11 12.0  
12 12.0  
13 12.0  
14 12.0  
15 12.0  
16 12.0  
17 12.0  
18 12.0  
19 12.0  
20 12.0  
21 12.0  
22 12.0  
23 12.0  
24 12.0  
25 12.0  
26 12.0

Zustand/Condition

X=KVA-LONG

Für unsere Bed. Th  
Wir bestätigen, dass die Lieferung den Anforderungen  
der oben genannten Lieferbedingungen entspricht.  
We hereby certify that the material has been made and  
used in accordance with the mentioned specification.

26 MAY 1997

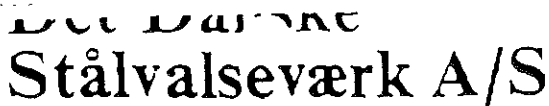
Z. Greisen

Z. Greisen

Chief Metallurgist

Det Danske Stålvalseværk A/S

SIDE PLATE  
PIC - WHCB  
P/N 8014681



(2)

DK-1100 Fredensborg. Telefon 47 72 03 33. Telefax 42 12 46 66. Telex 45191.

811C SAS-67 00

CHARLEROI (USA)  
FABRIQUE DE FER DE CHARLEROI  
88 DANBURY ROAD  
WILTON, CONNECTICUT  
06897-4409 U.S.A.

Ihrer Auftr./Your order: MUS-29385

Unser Auftrag/Our order: 28257

Datum/Date: 23.05.1997

**Lieferstelle/Delivery address:**

NEW ORLEANS

USA

FOR FURTHER TRANSPORTATION BY BAR  
MUSKOGEE, OKLAHOMA

Lieferung  
Datum: M/S ELISABETH G

Telephone: **ASME SA20**

[illegible]

Reference Number: A200

■ Probezeit und Zustand  
Testpiece location and condition

7. Discontinued/Retired Total

We besichtigen, dass die Lieferung den Anforderungen der obengenannten Lieferbedingungen entspricht.  
We hereby certify, that the material has been made and tested in accordance with the mentioned specifications.

26 MAY 1997

Z. Grøisen  
Chief Metallurgist  
Det Danske Stålvalseværk A/S

2-19-98  
McKissick Div  
P.O. # M-9801241  
REF. # 2008045  
38529 FOS 3  
FOS

[illegible]



**HIGHVELD**

TELEPHONE: 01351 909911  
FACSIMILE: 01351 909911

WORKS & ADMINISTRATION  
P.O. BOX 111 WITBANK 1035  
TELEPHONE: 01351 909911  
FACSIMILE: 01351 909911

**METALLURGICAL DIVISION**

**TEST CERTIFICATE**

PAGE: 1 OF 1

Test Certificate No P 2596

Sales Order No 200137/ 7  
Account No 08EP 01  
Quality ASTM A516 GRADE 70 - 90  
ASTM A515 GRADE 70 - 90  
ASME SA516 GRADE 70 - 90  
ASME SA515 GRADE 70 - 90

Customer Order 25562/5  
Product PRIME HOT ROLLED MILD STEEL PLATE

TO WHOM IT MAY CONCERN

Length 480"

Dimensions 1 1/4" X 96" X 607.641 KG/M

Cast No	Slab No	C	SI	S	P	MM	V	NI	CR	CU	AL	MO	MO	PIECES	AREA SQ IN	CL INCH	YP KSI	UTS KSI	ELG %	C1	C2	C3
R2743	257516 A	0.202	0.273	0.016	0.019	1.060	0.011	0.109	0.074	0.043	0.051	0.004	0.001	1	0.187	2	53	74	36	107	93	100
R2743	257517 A													1	0.193	2	53	74	36	107	93	100
R2743	257518 A													1	0.192	2	53	74	36	107	93	100
R2745	257515 A	0.204	0.245	0.022	0.013	1.027	0.003	0.101	0.051	0.040	0.033	0.004	0.001	TOTAL	0.191	2	50	74	38	107	93	100

REMARKS: CL = GAUGE LENGTH, P = YIELD POINT, UTS = ULTIMATE TENSILE STRENGTH, ELG = ELONGATION

SLAB 257516/A WAS NORMALISED AT 910°C FOR 0 HR 45 MIN  
SLAB 257517/A WAS NORMALISED AT 931°C FOR 0 HR 45 MIN  
SLAB 257518/A WAS NORMALISED AT 896°C FOR 0 HR 45 MIN  
SLAB 257515/A WAS NORMALISED AT 896°C FOR 0 HR 45 MIN

DATE: 1996-10-16  
METALLURGIST

MILL TEST REPORTS FURNISHED

BY CRU-STEEL, INC.

DATE 10-3-97

CUSTOMER MacKinnon Div.

CUSTOMER P.O. # M-9706526

CUSTOMER PART # 2008032

HEAT # B2743 PCS 1

HEAT # \_\_\_\_\_ PCS \_\_\_\_\_

PLATE ADAPT P/N 6008806  
PIC - WHBV

Certification Date  
13-FEB-1998

Invoice Number  
S365909

**CERTIFICATE OF TEST**

CL MER ORDER NUMBER  
M9800974

7311 EAST PINE STREET  
TULSA OK 74115

CUSTOMER PART NUMBER  
2008049

SOLD TO: MCKISSICK PRODUCTS CO  
  
P O BOX 3128  
TULSA OK 741013128

SHIP TO: MCKISSICK PRODUCTS CO  
  
2801 DAWSON RD GATE 5  
TULSA OK 74110

Description: PRESSURE VESSEL QUALITY PLATE NORMALIZED ASTM A516 GR 70  
5" FC 1 PC 48" X 99" CUT 1 PC 6" SQ FOR CHY Line Total: 6878.9 LB  
HEAT: U8968 ITEM: 505123

Specifications:  
ASTM A516 GR 70 90 ASME SA516 GR 70 89 ASTM A515 GR 70 82  
ASME SA515 GR 70

## CHEMICAL ANALYSIS

C	MN	P	S	CU	SI	NI	CR
0.24	0.95	0.02	0.01	0.23	0.2	0.2	0.16
MB	V	CB					
0.06	0.004	0.002					

RCPT: R966578  
MILL : LUKENS STEEL COMPANY

COUNTRY OF ORIGIN : USA

## MECHANICAL PROPERTIES

DESCRIPTION	YLD STR PSI	ULT TEN PSI	%ELONG IN 02 IN	%RED IN AREA	HARDNESS
	45600.0	80300.0	27.0		

GRAIN SIZE : 7 - 8

TRUNNION

P/N 8009762  
PIC-XHBC

above data were transcribed from the manufacturer's Certificate of Test after verification for completeness and specification requirements of the information on the certificate. All test results remain on file subject to examination.

We hereby certify that the material covered by this report will meet the applicable requirements described herein, including any specification forming a part of the description.

The willful recording of false, fictitious, or fraudulent statements in connection with test results may be punishable as a felony under federal statutes.

Material did not come in contact with mercury while in our possession.  
JENNIFER WERNIMONT

MANAGER, QUALITY ASSURANCE

FMI-917

**CERTIFICATE OF TEST**

Page 02 of 02

Certification Date  
13-FEB-1978CUSTOMER ORDER NUMBER  
M98009747311 EAST PINE STREET  
TULSA OK 74115Invoice Number  
S365909CUSTOMER PART NUMBER  
2008049SOLD TO: MCKISSICK PRODUCTS CO  
P O BOX 3128  
TULSA OK 741013128SHIP TO: MCKISSICK PRODUCTS CO  
2801 DAWSON RD GATE 5  
TULSA OK 74110

Description: PRESSURE VESSEL QUALITY PLATE NORMALIZED ASTM A516 GR 70  
5" FC 1 PC 48" X 99" CUT 1 PC 6" SQ FOR CHY Line Total: 6878.9 LB  
HEAT: U8968 ITEM: 505123

THERMAL TREATMENT:  
NORMALIZED

## COMMENTS

IMPACT TEST:  
METHOD OF TEST: ASTM A370/ASTM E23  
SPECIMEN TYPE: TYPE A (CHARPY V)  
SPECIMEN LOCATION: LONGITUDINAL 1/4t  
NOTCH ORIENTATION: PERPENDICULAR TO SURFACE  
SPECIMEN SIZE: 10 X 10 MM  
TEST TEMPERATURE: -25 DEG F  
IMPACT VALUES (FT-LBS): 27, 30, 24  
LATERAL EXPANSION (MILS): 24, 26, 21  
PERCENT SHEAR: 20, 20, 15

The above data were transcribed from the manufacturer's Certificate of Test after verification for completeness and specification requirements of the information on the certificate. All test results remain on file subject to examination.

We hereby certify that the material covered by this report will meet the applicable requirements described herein, including any specification forming a part of the description.

The willful recording of false, fictitious, or fraudulent statements in connection with test results may be punishable as a felony under federal statutes.

Material did not come in contact with mercury while in our possession. JENNIFER WERNIMONT

MANAGER, QUALITY ASSURANCE

**CERTIFICATE OF MATERIAL TEST REPORTS**



**Castle Metals®**



**HYALLOY STEELS CO.**  
A DIVISION OF  
**A. M. CASTLE & CO.**

MC KISSICK PRODUCTS CO  
2857 DAWSON ROAD  
PO BOX 3128  
TULSA OK 74101-3128 USA

CASTLE METALS CERTIFIES THAT THE FOLLOWING INFORMATION IS TAKEN FROM CHEMICAL AND METALLURGICAL TEST REPORTS FURNISHED TO US BY OUR SUPPLIER AND WHICH ARE ON FILE IN OUR OFFICE.

WE CERTIFY THAT WE HAVE NO KNOWLEDGE OF MERCURY OR RADIOACTIVE MATERIAL USED IN THE MELTING OR PROCESSING OF STEEL SOLD BY OUR COMPANY.

MANUFACTURER (MILL) <b>REPUBLIC ENGINEERED STEELS</b>		CUST. ORDER NO. <b>M-9802774</b>		CUST. REQUISITION NO.	
IAC <b>13738</b>	HEAT NO. <b>8990870</b>	ORDER NO. <b>185549</b>	LINE NO. <b>1</b>	SHIP QTY. <b>914.0</b>	SHIP DATE

**DESCRIPTION**

**3-3/4 RD A8620 HR 18/24 PART NO. 92740**

* * * CHEMICAL ELEMENTS									
C	MN	P	S	SI	NI	CR	MO	AL	
.19	.83	.008	.029	.23	.43	.52	.16	.025	
CU	V								
.18	.003								

\* \* \* MECHANICAL PROPERTIES

HARDNESS BHN 158/ 158, GRAIN = FINE, GRAIN 7/ 7, R.R. 11.8

CARBON = STRAND, MERCURY FREE, WELD FREE, MEETS NAFTA = Y

J O M I N Y

1	2	3	4	5	6	7	8	12
44	44	39	32	28	25	23	22	20

\* \* \* INDUSTRY SPECIFICATIONS

A.I.S.I.-8620, ASTM-A29-93A, ASTM-A322-91, UNS#-G86200, VACUUM DEGASSED

RD-43005 3-1998 REPUBLIC

CENTER PIN      P/N 8009761  
PIC-XDCV

5/4/98

A.M. CASTLE & CO.  
*Quena Watson*

**END**



4025 East 38th Street  
Tulsa, OK 74145-3241  
Telephone 918-664-7767

**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
Metlab Testing Services, Inc.

Fax 918-627-3062  
800-324-8378

To: The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998050151- 1  
Date Received: 05/11/98  
Date Reported: 05/12/98

Attn: Steve Kendrick

P.O. No: M9803133

Sample Description: 3/4" Bar, API 2C  
Material: 8620  
Heat No: 8990870  
PIC Code: XDCV  
WO#: 196179 - P/N: 2008553.  
Specimen removed from 4/5 radius.

**Test Report (ASTM E 8-96) RT, Longitudinal Tensile**

<u>Parameter</u>	<u>Result</u>
Diameter, in.	.499
Tensile Strength, psi	100,000
Yield Strength, psi by 0.2% offset	68,500
Elongation in 4D, %	20
Reduction of Area, %	49

**Hardness Test**

Testing Specification: ASTM E18-94  
Hardness Scale: ROCKWELL "B"  
Acceptance Criteria: N.A.  
Actual Coupon Hardness: 91.0, 93.0, 92.0

Approved By: A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

**SHERRY LABORATORIES**

INDIANA

LOUISIANA

OKLAHOMA  
Metlab Testing Services, Inc.Fax 918-627-3062  
800-324-837868 W 38th Street  
Tulsa, OK 74145-3241  
Telephone 918-664-7767**To: The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101****Report No: 1998050151- 1  
Date Received: 05/11/98  
Date Reported: 05/12/98****Attn: Steve Kendrick****P.O. No: M9803133****Sample Description: 3/4" Bar, API 2C  
Material: 8620  
Heat No: 8990870  
PIC Code: XDCV  
WO#: 196179 - P/N: 2008553.  
Specimen removed from 4/5 radius.****Impact Test Report**

**Style and Model of Machine:** Tinius Olsen, 74  
**Available Impact Energy:** 264 Ft-Lbs.  
**Impact Velocity:** 17 Ft/Sec.  
**Method of Test:** SA-370/ASTM-E23  
**Specimen Type:** Charpy "V" Notch  
**Specimen Location:** ASTM-A370 Longitudinal  
**Notch Orientation:** ASTM-A370  
**Specimen Size:** 10mm X 10mm  
**Test Temperature:** -25 °F

**Notch Location:** Base  
**Impact Values (Ft-Lbs.):** 29, 29, 27  
**Lateral Expansion(Mils):** 8, 9, 5  
**Shear(%):** 15, 15, 15

**Approved By:** A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing



# Gulf States Steel, Inc.

UNIVERSAL AL 35004-1036

17-1812-01	72802 02 14	10-01-97	<b>CERTIFICATE OF TESTS</b>	ACCOUNT NUMBER 76200002	PAGE NO. 1	INVOICE NUMBER 742-78932
MUS 17402	SHIP FROM ALB CITY			DATE SHIPPED 11 25 97	QUANTITY/VEHICLE IDENTIFICATION SOU 152055	
I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS				I. F. BEARDEN, JR. NCR, TECHNOLOGY AND QUALITY PLATE PRODUCTS		

UNI - STEEL INC  
P O BOX 3528  
ENID OF 73707

UNI - STEEL INC  
YAFFE DIVISION  
MUSKOGEE OK

## MATERIAL DESCRIPTION

PLATE CARBON SAE-1035 MOD KILLED PHYSICAL PROPERTIES INFO ONLY DIN 50049PAR 3.1B  
RELIED & MFG IN USA

2750 X 98 0000 SHEARED (USE 2 AND 3000 IN  
HT 7261797 1 PCS  
HT 7461797 3 PCS

CH C 31/38 MM 50/90 P 040MX S 050MX SI 15/30 AL RPT

NR YLD RPT TEN RPT XELONG MIN 8 IN 1

TI 3 TR CA SIGNED COPIES REQUIRED

## QUANTITY SHIPPED

MILL TEST REPORTS FURNISHED 25720  
BY UNI-STEEL, INC.

DATE 6-12-98

CUSTOMER McKissick

CUSTOMER P.O. # m-9803850

CUSTOMER PART # 94090

HEAT # 7461797 PCS 1

HEAT # PCS

TEST CERTIFICATES ARE PREPARED IN ACCORDANCE  
WITH PROCEDURE OUTLINED IN DIN 50049 PARA 3.1B

*C. F. Bearden, Jr.*

HEAT NUMBER	CHM	C	Mn	P	S	Si	Cu	Fe	Cr	Mn	Ch	V	Al	N	B	Ca	Ti	C.E
7261797		36	0.81	.007	.012	220							042					
7461797		36	0.01	.007	.012	220							042					

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YNTS RATIO	% RED AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7261797	Y276401	52.0	86.0		22			AR	.60									
7461797	Y276501	51.0	86.0		20			AR	.59									
7461797	Y839101	44.0	93.0		23			AR	.53									

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION					
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG		

SHEAVE  
PIC-WEB-XEBG

P/N 2004369

SHEAVE

P/N 2004369

PIC-WEB-XEBG

*4/24/98*

# Gulf States Steel, Inc.

34050N AL 35004-1335

12-M744-01

333 ORDER NO		PURCHASE ORDER DATE	
1ST NUMBER	ITEM	08 13 97	
6 32051	01 742		
PURCHASE ORDER NO		SHIPPED FROM	
31814		ALA CITY	

## CERTIFICATE OF TESTS

ACCOUNT NUMBER	PAGE NO	INVOICE NUMBER
76200005	1	742-77104
DATE SHIPPED		ROUTE/VEHICLE IDENTIFICATION
10 28 97		SOU 152155

WE HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.

C. F. BEARDEN, JR.  
MGR. TECHNOLOGY AND  
QUALITY - PLATE PRODUCTS

S  
O  
C  
I  
O  
UNI - STEEL INC  
P O BOX 3528  
ENID OK 73702

UNI - STEEL INC  
JOHNSTON TERMINAL TRAC#747  
4901 HAROLD STOGGINS DR  
MUSKOGEE OK 74402

### MATERIAL DESCRIPTION

PLATE CARBON SAE-1035 HOB KILLED PHYSICAL PROPERTIES INFO ONLY DIN 50049 PAR 3 1B  
MELTED & MFG IN USA

6250 X 96.0000 SHEARED EDGE X 252.0000 IN  
HT 7441585 4 PCS

CH C 31/38 MM 60/30 P 0400X 5 0500X S1 15/30 AL RPT

MR YLD RPT TEN RPT XELONG MIN 8 IN 1

TL 3 TR CA SIGNED COPIES REQUIRED

TOTAL WT 17.152# PCS 4

### QUANTITY SHIPPED

MILL TEST REPORTS FURNISHED 17152  
BY UNI-STEEL, INC.

DATE 2-3-98

CUSTOMER McKISSICK

CUSTOMER P.O. # M-9800670

CUSTOMER PART # 94090

HEAT # 7461585 PCS 3

HEAT # \_\_\_\_\_ PCS \_\_\_\_\_

SHEAVE

P/N 2004369

PIC-WEB-XEBR

TEST CERTIFICATES ARE PREPARED IN ACCORDANCE  
WITH PROCEDURE OUTLINED IN DIN 50049 PARA 3 1B

*C. F. Bearden, Jr.*

ANALYSIS

HEAT NUMBER	GRAN	C	Mn	P	S	SI	Cu	Ni	Cr	Mo	Co	V	Al	N	B	Ca	Ti	CE
7461585		34	0.71	0.03	0.08	219							0.35					

TEST OF 2015

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7461585	X227301	53.0	82.0		25			AR	64									
7461585	X808501	45.0	92.0		24			AR	54									

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	

TEST OF 2015

2/3/98  
12

# TIMKEN

WORLDWIDE LEADER IN BEARINGS AND STEEL

## STEEL OPERATIONS

## CERTIFICATE OF TEST

1636 DUESER AVE. S.W.

CANTON, OHIO 44706

OCTOBER 21, 1997

SOLD TO: MARMON/KEYSTONE CORPORATION  
4901 STILWELL ST  
KANSAS CITY MO 64120 USA

SHIP TO: MARMON/KEYSTONE CORPORATION  
4901 STILWELL ST  
KANSAS CITY MO 64120 USA

DESCRIPTION 1026 - HOT ROLLED - SCALE FREE  
OF MATERIAL: SPEC: ASTM-A519-94

TIMKEN ORDER 39742 RELEASE 1 CUSTOMER ORDER 30-19796 4QD COMBO  
SIZE OD 4.500" WALL 1.250"

HEAT	C	MN	P	CHEMICAL ANALYSIS						PIECE NO.	CV NO.
				S	SI	CR	NI	MO	CU		
25054 LADLE	.27	.86	.012	.030	.26	.12	.11	.02	.15		

## LONGITUDINAL TENSILE TEST

PIECE NO.	STRENGTH P.S.I.	YIELD STRENGTH P.S.I.	ELONG IN	RED TEMP	C	SPECIMEN
25054	51,092	85,086	2.0 26.6 58.7			.505" ROUND

THE MECHANICAL PROPERTY RESULT REPRESENTS ONE SAMPLE  
(PER HEAT) AND IS NOT A MINIMUM, MAXIMUM OR AVERAGE FOR THE  
ORDER/HEAT.

SHEAVE P/N 2004369  
PIC-HUB-XFCD

WHEN SHIPPING NOTICE IS ATTACHED IT BECOMES PART OF THIS CERTIFICATION

WE CERTIFY THE ABOVE MATERIALS HAVE BEEN INSPECTED AND TESTED  
IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING  
SPECIFICATIONS, AND THE RESULTS OF SUCH INSPECTIONS AND TESTS  
CONFORM WITH THE APPLICABLE REQUIREMENTS.

APPROVED BY: JACOBY

NOTARY PUBLIC

BY

*Jeff Jensen*  
Jeff Jensen  
Supervisor-Met. Order Processing

THE TIMKEN COMPANY

900-9457-0006

# Gulf States Steel, Inc.

240SDEN AL 35904-1935

AA-1760-01

DIS#	ORDER NO.	ITEM	MPG	PURCHASE ORDER DATE
6	50490	01	742	05 22 97
PURCHASE ORDER NO.		SHIPPED FROM		
10678		ALA CITY		

## CERTIFICATE OF TESTS

ACCOUNT NUMBER	PAGE NO.	INVOICE NUMBER
76200005	2	742-69430
DATE SHIPPED	ROUTE/VEHICLE IDENTIFICATION	
06 25 97	TIPX 80834	

WE CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE METHODS PRESCRIBED IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING HAS BEEN APPROVED FOR CONFORMANCE TO THE SPECIFICATIONS.

C. F. BEARDEN, JR.  
MGR, TECHNOLOGY AND  
QUALITY - PLATE PRODUCTS

\*\*\* THIS COPY SAME AS SENT TO \*\*\* UNLESS OTHERWISE INDICATED \*\*\*

UNI - STEEL INC  
P O BOX 3528  
ENID OK 73702

UNI - STEEL INC  
DECOIL WAREHOUSE  
4901 HAROLD STOCCINS DRIVE  
MUSKOGEE OK 74402

### MATERIAL DESCRIPTION

PLATE CARBON SAE-1035 HND KILLED PHYSICAL PROPERTIES INFO ONLY DIM 50049PAR 3.1B  
MELTED & MFG IN USA

QUANTITY SHIPPED

.6250 X 96.0000 SHEARED EDGE X 252.0000 IN  
HT 7249739 2 PCS

CH C 31/38 MM 60/90 P 040MX S 050MX SI 13/30 AL RPT

MR YLD RPT TEN RPT XELONG MIN 8 IN 1

II 3 TR CA SIGNED COPIES REQUIRED

TOTAL WT. 76,202# PCS 11

MILL TEST REPORTS FURNISHED  
BY UNI-STEEL, INC.

8576

DATE 4-24-98

CUSTOMER M<sup>4</sup> Kissick

CUSTOMER P.O. # M-9800702

CUSTOMER PART # 94090

HEAT # 7249739 PCS 2

HEAT # PCS

SHEAVE P/N 2004369  
PIC-WEB-XECF

*C. F. Bearden, Jr.*

HEAT NUMBER	GRAIN	C	Mn	P	S	SI	Cu	Ni	Cr	Mo	Co	V	Al	N	B	Ca	Ti	CE
7249739		.35	0.75	.008	.013	.250							0.66					

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG		HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS						
				2"	8"							DIR	TEMP °F	1	2	AVG		
7249739	S213102	57.0	82.0		25			AR	.69									

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY				% SHEAR				MILS LATERAL EXPANSION				
						1	2	3	AVG	1	2	3	AVG	1	2	3	AVG	

4/27/95  
62

4/27/98  
EB

BUYER'S ORDER D1175 - tubular steel 1247H SIDERCA CORPORATION  
 BUYER'S REFER. TSI/1247H  
 ORDER / ITEM 3901139/006 4511 BRITTMORE RD.  
 REFERENCE c/61776 HOUSTON SH8030 HOUSTON TX 77041  
 USA

**BL 12**

PRODUCT SEAMLESS HOT FINISHED CARBON STEEL MECHANICAL TUBING ACC. TO ASMT  
 A 519 GR. 1026, ASTM A 106 B, ASME SA 106 B, C PHYSICALS, AS  
 ROLLED, EXTERNALLY OILED, INSIDE BLACK, PLAIN ENDS, SQUARE CUT

DIMENSIONS: Lg. From Lg. To O.D. mm O.D. Inch W.T. mm W.T. Inch  
 5200 12000 165,100 6,500 31,750 1,250

SHIPPING NOTE : E1250244 DATE 19/03/1997  
 QUANTITY : Nr 6 Mt 42,26 Kg 4476 Ft 138' 8" Lbs 9867,8

TEST N. 00001 HEAT N. 970942

TENSION TEST + 20,0°C

TEST SPEC. : LONGITUDINAL

YIELD POINT 0,2% (KSI) : requir min 40 result 52,0

TENSILE STRENGTH (KSI) : requir min 70 result 80,0

ELONGATION : CALIBRATED ON 2" 50,0 mm result 33,0

(%): requir.min 19,5 result 60,0

REDUCTION (%) : requir min result from 164,0 to 166,0

HARDNESS HB requ. max 187,0 result from 164,0 to 166,0

TECNOLOGICAL TESTS PERFORMED WITH SATISFACTORY RESULTS:

FLATTENING TEST : TEST PERFORMED AT ONE END OF 1 PIPE OF THE LOT

HEAT N. 970942

HEAT ANALYSIS %

C	0,260	Mn	0,76	Si	0,25	P	0,011	S	0,004	Cu	0,16
Ni	0,11	Cr	0,13	Mo	0,04	Nb	0,005	V	0,005		

PRODUCT ANALYSIS %

TEST N. 00001

C	0,260	Mn	0,75	Si	0,25	P	0,011	S	0,001	Cu	0,15
Ni	0,11	Cr	0,12	Mo	0,04	Nb	0,005	V	0,005		

LEAK-TIGHTNESS TEST PERFORMED WITH SATISFACTORY RESULTS BY:  
 NON DESTRUCTIVE TEST

VISUAL AND DIMENSIONAL CONTROL OF THE TUBES HAS BEEN CARRIED OUT WITH  
 SATISFACTORY RESULT

STEEL IS FULLY KILLED AND PRODUCED BY ELECTRIC FURNACE

REMARKS:

NO WELD REPAIR --- MATERIALS MERCURY FREE  
 VACUUM DEGASSED --- GRAIN SIZE FINE  
 THE MATERIAL WAS PRODUCED ACCORDING TO ASTM A519/93 AND ASTM / ASME

SHEAVE P/N 2004369  
 PIC-HUB-WFHI

A T E

DALMINE S.p.A

CHIEF OF  
 INSPECTION DPT  
 Marco BRAMBILLA

01/04/1997

Follows



# Dalmine

PLANT:  
ARCORE

INSPECTION CERTIFICATE

(UNI EN 10204 3.1.B)

Page

1

CUSTOMER'S ORDER D1476 - tubular steel 2849T SIDERCA CORPORATION  
 CUSTOMER'S REFER. TSI/2849 - 123  
 BILL ORDER / ITEM 3901371/009 MORELOS SH8031 BRITTMORE RD.  
 EXP REFERENCE c/61923 BL 80F HOUSTON TX 77041  
 USA

PRODUCT SEAMLESS HOT FINISHED CARBON STEEL MECHANICAL TUBING ACC. TO ASTM  
 A 519 GR 1026, ASTM A 106 B, ASME SA 106 B, C PHYSICALS, AS  
 ROLLED, OILED, PLAIN ENDS, SQUARE CUT

DIMENSIONS: Lg. From Lg. To O.D. mm O.D. Inch W.T. mm W.T. Inch  
 5200 12000 165,100 6,500 31,750 1,250

SHIPPING NOTE : E1250336 DATE 18/04/1997  
 QUANTITY : Nr 6 Mt 46,27 Kg 4832 Ft 151'10" Lbs 10652,7

TEST N. 00001 HEAT N. 972534

TENSION TEST + 20,0°C

TEST SPEC. : LONGITUDINAL

YIELD POINT 0,2% (KSI) : requir min 40 result 51,0

TENSILE STRENGTH (KSI) : requir min 70 result 83,0

ELONGATION : CALIBRATED ON 2" 50,0 mm result 34,6

(%): requir.min 19,5 result 60,0

(%): requir min max 187,0 result from 170,0 to 172,0

REDUCTION  
HARDNESS HB

TECNOLOGICAL TESTS PERFORMED WITH SATISFACTORY RESULTS:

FLATTENING TEST : TEST PERFORMED AT ONE END OF 1 PIPE OF THE LOT

HEAT N. 972534

HEAT ANALYSIS %

C 0,260	Mn 0,72	Si 0,22	P 0,010	S 0,006	Cu 0,12
Ni 0,06	Cr 0,13	Mo 0,01	Nb 0,005	V 0,005	

PRODUCT ANALYSIS %

C 0,260	Mn 0,72	Si 0,21	P 0,010	S 0,002	Cu 0,11
Ni 0,06	Cr 0,12	Mo 0,01	Nb 0,005	V 0,005	

LEAK-TIGHTNESS TEST PERFORMED WITH SATISFACTORY RESULTS BY:  
 NON DESTRUCTIVE TEST

VISUAL AND DIMENSIONAL CONTROL OF THE TUBES HAS BEEN CARRIED OUT WITH  
 SATISFACTORY RESULT

STEEL IS FULLY KILLED AND PRODUCED BY ELECTRIC FURNACE

REMARKS:

NO WELD REPAIR --- MATERIALS MERCURY FREE  
 VACUUM DEGAISED --- GRAIN SIZE FINE

THE MATERIAL WAS PRODUCED ACCORDING TO ASTM A519/93 AND ASTM / ASME

SHEAVE

P/N 2004369

PIC-HUB-WFGL

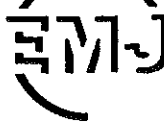
DATE

DALMINE S.p.A

CHIEF OF  
INSPECTION DPT  
Marco BRAMBILLA

18/04/1997

Follows

**CERTIFICATE OF TEST**Certification Date  
13-MAY-1997CUSTOMER ORDER NUMBER  
M97030377311 EAST FINE STREET  
TULSA OK 74115Invoice Number  
T330403CUSTOMER PART NUMBER  
51411SOLD TO: MCKISSICK PRODUCTS CO  
P O BOX 3128  
TULSA OK 741013128SHIP TO: MCKISSICK PRODUCTS CO  
2801 DAWSON RD GATE 1  
TULSA OK 74110Description: CARBON HFS 1026, MECH A519  
6.500 OD X 1 1/4 ID X 20 R/L  
HEAT: N3371 ITEM: 113464

Quantity: 22.75 FT

Specifications:  
ASTM A519 94

## CHEMICAL ANALYSIS

C	MN	P	S	SI	CR	NI	MO
0.27	0.85	0.008	0.031	0.26	0.1	0.28	0.04

CU  
0.35RCPT: R 56516  
MILL: TIMKEN COMPANY

COUNTRY OF ORIGIN: USA

*lw*  
5.14.97SHEAVE  
PIC-HUB-WFEH  
P/N 2004369

The above data were transcribed from the manufacturer's Certificate of Test after verification for completeness and specification requirements of the information on the certificate. All test results remain on file subject to examination.

We hereby certify that the material covered by this report will meet the applicable requirements described herein, including any specification forming a part of the description.

The willful recording of false, fictitious, or fraudulent statements in connection with test results may be punishable as a felony under federal statutes.

Material did not come in contact with mercury while in our possession.

JENNIFER WERNIMONT

MANAGER, QUALITY ASSURANCE

EMJ-917





APPLIED HYDRAULIC SYSTEMS, INC.  
BOX 10155, STA 1  
HOUMA, LA 70363

TELEPHONE 918/834-4611  
TELEX 262569 CRSBY UR  
FAX 918/834-9447

## CERTIFICATE OF NONDESTRUCTIVE TESTING

\*\*\*\*\*

INSPECTION PERFORMED ON: 3 PC(S)-M050T18EH 18" 45.5 MT API 2C CRANE BLOCK

TESTING SERIAL NO: 98-165-85 THRU 98-165-87

CUSTOMER PURCHASE ORDER NO: 38140

CROSBY ORDER NO: 932288

### TEST PERFORMED:

\_\_\_\_\_ ULTRASONIC INSPECTION PER ASTM A-609.  
ALTERNATE SPECIFICATION:

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_ MAGNETIC PARTICLE INSPECTION PER ASTM E-709.  
\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_ WET METHOD \_\_\_\_\_ DRY METHOD.

\_\_\_\_\_ DYE PENETRANT INSPECTION PER ASTM E-165.  
ALTERNATE SPECIFICATION:

DEFECTS AND DISPOSITION: NO REJECTABLE INDICATIONS  
PART NO: 8014680

PIC: HOOK - X5B	HOOK NUT -PIC-XDDJ
SIDE PLATE- PIC - XHBD-WHCB	CENTER PIN-PIC-XDCV
TRUNNION- PIC-XHBC	PLATE ADAPT-PIC-WHBV
SHEAVE-PIC-WEB	SHEAVE-PIC- HUB
WECV-XEBG-XECF-XEBR	WFGL-WFEH-WFHI-XFCD-XFFZ

WE CERTIFY THAT THE INDICATED INSPECTIONS WERE PERFORMED ON THE DESCRIBED MATERIAL.

DATE: 09-22-98

BY:

  
DION DOUT, LEVEL II

products of uncompromising quality . . .

CROSBY Clips & Fittings, LEBUS Load Binders, McKISSICK Blocks & Sheaves, CROSBY- WESTERN Blocks, NATIONAL Swaging Systems

Plants and facilities in: Jacksonville, Arkansas - Los Angeles, California - Atlanta, Georgia - Chicago, Illinois - Tulsa, Oklahoma - Harrisburg, Pennsylvania  
Dallas, Texas - Longview, Texas - Seattle, Washington - Toronto (Brampton), Ontario - Barnsley, England - Mechelen (Putte), Belgium - Cergy St. Christophe, France



**S H E R R Y L A B O R A T O R I E S**  
INDIANA LOUISIANA OKLAHOMA  
Metallurgical Testing Services, Inc.

Fax 918-627-3062  
800-324-8378

68 t 38th Street  
Tulsa OK 74145-3241  
Telephone 918-664-7767

To: The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998040428- 2  
Date Received: 04/24/98  
Date Reported: 04/30/98

Attn: Steve Kendrick

P.O. No: M9802840

Sample Description: Hook 319-A 60 ton API 2C. PIC Code: X5B  
WO#: 195677 - P/N: 2008042.  
Specimen removed from 4/5 radius.

#### Hardness Test

Testing Specification: ASTM E18-94  
Hardness Scale: ROCKWELL "C"  
Acceptance Criteria: N.A.  
Actual Coupon Hardness: 31.0, 31.0, 32.0

#### Impact Test Report

Style and Model of Machine: Tinius Olsen, 74  
Available Impact Energy: 264 Ft-Lbs.  
Impact Velocity: 17 Ft/Sec.  
Method of Test: SA-370/ASTM-E23  
Specimen Type: Charpy "V" Notch  
Specimen Location: ASTM-A370 Longitudinal  
Notch Orientation: ASTM-A370  
Specimen Size: 10mm X 10mm  
Test Temperature: -40 °F

Notch Location: Base  
Impact Values (Ft-Lbs.): 30, 30, 28  
Lateral Expansion(Mils): 8, 7, 6  
Shear(%): 60, 60, 50

Approved By:   
-Steve Reilly, Director  
Metallurgical Services



# CERTIFICATE OF TEST

Page 01 of 02

Certification Date  
8-JUL-1998

## CUSTOMER ORDER NUMBER

M-9804274-3

3116 E. 31ST STREET NORTH  
TULSA OK 74110

Invoice Number  
T355736

## CUSTOMER PART NUMBER

92884

Ship# T216232

SOLD TO: MCKISSICK PRODUCTS CO  
P O BOX 3128  
TULSA OK 741013128

SHIP TO: MCKISSICK PRODUCTS CO  
2801 DAWSON RD GATE 5  
TULSA OK 74110

Description: 4142 HR HT A434BD (>4) RD  
5 RD X 20' R/L  
HEAT: 21838  
ITEM: 506574

Line Total: 2740 LB

Specifications:  
ASTM A434 CL BD

ASTM A304 96

ASTM A322 96

### CHEMICAL ANALYSIS

C	SI	MN	S	P	CR	NI	CU
0.42	0.29	0.92	0.02	0.012	0.99	0.08	0.14
	MO	V					
0.033	0.21	0.003					

RCPT: R801939

MILL : MAGELLAN/FLAME METALLURGICAL

COUNTRY OF ORIGIN : FOREIGN

### MECHANICAL PROPERTIES

DESCRIPTION	YLD STR KSI	ULT TEN KSI	%ELONG IN 02 IN	%RED IN AREA	HARDNESS BHN
	111.28	139.25	18.0	56.6	293

GRAIN SIZE :8 -

HOOK NUT

P/N 2015015  
PIC - XDDJ

The above data were transcribed from the manufacturer's Certificate of Test after verification for completeness and specification requirements of the information on the certificate. All test results remain on file subject to examination.

We hereby certify that the material covered by this report will meet the applicable requirements described herein, including any specification forming a part of the description.

The willful recording of false, fictitious, or fraudulent statements in connection with test results may be punishable as a felony under federal statutes.

Material did not come in contact with mercury while in our possession.

KAREN NEWCOMB

*Karen Newcomb*  
MANAGER, QUALITY ASSURANCE

# CERTIFICATION

**DION DOUT**

HAS SUCCESSFULLY COMPLETED THE TESTING REQUIREMENTS FOR CERTIFICATION IN  
MAGNETIC PARTICLE TESTING LEVEL II

THE EXAMINATIONS WERE CONDUCTED TO THE GUIDELINES OF SNT-TC-1A BY

EDWARDS SERVICES

COMPOSITE GRADE 96  
ON A TOTAL OF: 55 EXAMINATION QUESTIONS

DATE: JULY 27, 1998

  
JOHN D. EDWARDS, P.E. JM-1231

### Vision Examination Record

Patient: Dout, Olon  
N: 5-76-6517  
DOB: 2/06/65  
Gender: M

Address: 4103 W Pipestem Drive  
Address: SKIATOOK, OK 74070  
Phone: (918) 396-1944

Employer: McKissick Products  
Address: PO Box 3128  
Tulsa, OK 74101  
Auth. by:

Contact: Shirley Stone  
Role:  
Phone: (918) 834-4611 Ext  
Fax:

### MEDICAL HISTORY (Historia Medica)

Have you ever had any disease or injury to your eyes? Yes ☒ No ☐ Yes, please explain: \_\_\_\_\_  
Alguna vez ha tenido una enfermedad o lesión en sus ojos? Si contestó afirmativamente, explique: \_\_\_\_\_  
Has any member of your immediate family suffered from eye disease (glaucoma, vision loss, tumors, cataracts, etc?) Yes ☒ No ☐  
Ningún miembro de su familia sufre de una enfermedad de los ojos? (glaucoma, pérdida de visión, tumores, cataratas, etc?)  
If yes, please explain: \_\_\_\_\_  
Si contestó afirmativamente, explique: \_\_\_\_\_  
Name of physician and date of last eye examination: \_\_\_\_\_  
Nombre del doctor y fecha de la última examinación de vista: \_\_\_\_\_

### Have you ever had disease of, or injury to: (Ha tenido o padecido alguna vez de:)

Back/Spine (Espalda-Espinazo)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Back Pain (Dolor de espalda)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Nervous Breakdown (Ataque nervioso)	Yes <input checked="" type="radio"/> No <input type="radio"/>
Head (Cabeza)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Rheumatism (Reumatismo)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Excessive Drinking (Tomar exceso)	Yes <input checked="" type="radio"/> No <input type="radio"/>
Bones (Huesos)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Diabetes (Diabetes)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Drug Habits (Habitó de drogas)	Yes <input checked="" type="radio"/> No <input type="radio"/>
Joints (Articulaciones)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Seizures (Ataque repentino)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Cancer (Cancer)	Yes <input checked="" type="radio"/> No <input type="radio"/>
Heart (Corazón)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Dizziness (Desvanecimiento)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Varicose Veins (Venas varicosas)	Yes <input checked="" type="radio"/> No <input type="radio"/>
Lymph nodes (Ganglios)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Asthma (Asma)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Encephalitis (Encefalitis)	Yes <input checked="" type="radio"/> No <input type="radio"/>
Kidneys (Riñones)	Yes <input checked="" type="radio"/> No <input type="radio"/>	TB (Tuberculosis)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Stomach Ulcer (Úlceras)	Yes <input checked="" type="radio"/> No <input type="radio"/>
Intestines (Intestinos)	Yes <input checked="" type="radio"/> No <input type="radio"/>	High Blood Pressure (Presión alta)	Yes <input checked="" type="radio"/> No <input type="radio"/>	Incurable Disease (Enfermedad Incurable)	Yes <input checked="" type="radio"/> No <input type="radio"/>

Do you smoke? Yes ☒ No ☐ If yes, packs per day: \_\_\_\_\_  
Fuma Usted? Si ☒ No ☐ Si así es, cuantos paquetes por día?: \_\_\_\_\_

Do you take medication regularly? Yes ☒ No ☐ If yes, please list: \_\_\_\_\_  
Esta tomando alguna medicina regularmente? Si ☒ No ☐ Si así es, describa por favor: \_\_\_\_\_

### VISUAL ACUITY

	Uncorrected		Corrected	
	Right	Left	Right	Left
Distance:	20/20	20/20	_____	_____
Near:	20/20	20/20	_____	_____

### FUNDUS EXAM

	RIGHT	LEFT
Opacities:	_____	_____
Disc: Margins:	_____	_____
Color:	NL	NL
Cup Depth:	NL	NL
V/A:	_____	_____
Foveal Reflex:	_____	_____
Retinal Pathology:	_____	_____

Physician's Signature

Examination Date: 07/14/97



# Baker Electronic Services, Inc.

P.O. Box 742228  
Houston, Texas 77274-2228  
(713) 774-7132

## MAGNETIC PARTICLE UNIT CERTIFICATION

INSTRUMENT: MAL particle CA 610 CALIBRATION  
DATE: 1 Oct 97  
MANUFACTURER: MAGNAFLUX - EXPIRATION  
DATE: 1 Oct 98  
SERIAL NO.: 54333

The above instrument has been checked for correct current output and ammeter calibration and has been found to be within the limits of  $\pm 5\%$  of the reading indicated by the meter. This Magnetic Particle Current Generator Unit is certified and capable of producing current consistent with the requirements in Table I of ASTM E109-63 and Table II ASTM E709-81.

A graph showing the Magnetic Particle Meter or Digital Read Out and Shunt Meter Unit reading has been posted on the above unit.

Baker Electronic Services, Inc.

*Albert J Baker*  
Albert J Baker

AMP and Time Meter Model ATS-203  
S/N 2929233

The above instrument was tested at Test Systems International, Inc., Santa Fe Springs, California and calibration test covered all ranges provided by the instrument. Instrumentation used in calibration have calibration accuracy traceable to the National Institute of Standards and Technology (NBS) either directly or indirectly in an unbroken chain.

# CALIBRATION CERTIFICATION # 990424481

CALIBRATION DATE: 24 APR 98

CALIBRATION DUE: 23 APR 99



## TEST SYSTEMS INTERNATIONAL INC.

27963 CABOT ROAD, LAGUNA NIGUEL CALIFORNIA 92677 U.S.A.  
(714) 582-3163 1 (800) 835-1954 FAX (714) 582-3164

CUSTOMER BAKER ELECTRONIC SERVICE

INSTRUMENT AMMETER STANDARD

ADDRESS 5918 GRAPE ST.

MANUFACTURE TEST SYSTEMS INT'L.

CITY HOUSTON,

MODEL NUMBER ATS-20B

STATE TX ZIP 77074

SERIAL NO. 2929233

PHONE NUMBER (713) 774-7132

PURCHASE ORDER NO. 834910

**CERTIFICATION:** The above instrument was calibrated to meet or exceed the requirements of  
MIL-STD-271, ASTM SE-709, ASME Section V Article 7, MIL-STD-1949 or  
ASTM-E-1444, using the following test equipment.

INSTRUMENT	MANUFACTURE	MODEL NUMBER	SERIAL NUMBER	CALIBRATION		CONTROL ACCURACY
				DATE	DUE	
DVM TRMS Meter	Fluke	45	5455027	4-15-98	4-15-99	DC .03% AC .2%
Meter Shunt	Empro	2500-50	1861	7-22-97	7-22-98	0.25%
DVM TRMS Meter	Beckman Instrument	Tech 360	11210011	3-30-98	3-30-99	DC .1% AC .6%
AVG Meter	Beckman Instrument	Tech 350	00111868	3-30-98	3-30-99	DC .1% AC .6%

Standards listed are traceable to the NIST (NBS) reference to test No. 223-406, 332-826, WWV  
Service provided is in compliance with MIL-I4528A, MIL-STD-45662, ANSI/ASME N45.2  
ISO 10012-1 AND ANSI/NCSL 7540-1

**TEST CONDITIONS:** Temperature 73°F Humidity 42% Line Voltage N/A

**AS RECEIVED:** ☒ In Conformance ☐ Out of Conformance

### TEST RESULTS

REFERENCE INPUT AMPERES	CURRENT METER AMPERES X1000							DURATION METER SECONDS	
	AVG			TRMS			PEAK	REF. INPUT	METER
	FWDC	AC	HWDC	FWDC	AC	HWDC			
500	1.500	1.500	1.500	1.500	1.500	1.500	—	2.016	2.02
1000	1.000	1.000	1.001	1.000	1.000	1.000	1.010	10.03	10.01
1500	1.500	1.500	1.501	1.500	1.500	1.500	—		
5000	5.01	5.01	5.02	5.00	5.00	5.00	—		
10000	10.02	10.01	10.03	10.02	10.00	10.00	10.12		
15000	15.02	15.01	15.04	15.00	15.00	15.00	—		

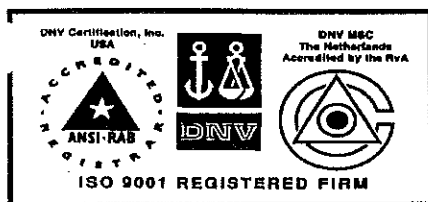
Performed By: Dm

Approved By: Om. Wang EE

## **OVERHAUL BALL CERTIFICATES**



TELEPHONE 918/834-4611  
TELEX 262569 CRSBY UR  
FAX 918/834-9447



**APPLIED HYDRAULIC  
SYSTEMS, INC.**

**SERIAL NO:**

**98-169-27**

**CROSBY PART NO: 8014742**

**CROSBY CG NO: 932288**

**CUSTOMER PO#: 38140**

**JOB #: 059801-100298**

**JOB #: 059802-100298**

**JOB #: 059803-100298**

**DESCRIPTION:**

**MB10T285E 10 TON UB500  
API 2C OVERHAUL BALL (365#)**

*Products of uncompromising quality . . .*

*CROSBY Clips & Fittings, LEBUS Load Binders, McKISSICK Blocks & Sheaves, CROSBY- WESTERN Blocks, NATIONAL Swaging Systems*

*Plants and facilities in: Jacksonville, Arkansas - Los Angeles, California - Atlanta, Georgia - Chicago, Illinois - Tulsa, Oklahoma - Harrisburg, Pennsylvania  
Dallas, Texas - Longview, Texas - Seattle, Washington - Toronto (Brampton), Ontario - Barnsley, England - Mechelen (Putte), Belgium - Cergy St. Christophe, France*

## INDEX

- ORDER
- CERTIFICATE OF CONFORMANCE
- MATERIAL CERTIFICATION

*products of uncompromising quality . . .*

*CROSBY Clips & Fittings, LEBUS Load Binders, McKISSICK Blocks & Sheaves, CROSBY- WESTERN Blocks, NATIONAL Swaging Systems*

*Plants and facilities in: Jacksonville, Arkansas - Los Angeles, California - Atlanta, Georgia - Chicago, Illinois - Tulsa, Oklahoma - Harrisburg, Pennsylvania  
Dallas, Texas - Longview, Texas - Seattle, Washington - Toronto (Brampton), Ontario - Barnsley, England - Mechelen (Putte), Belgium - Cergy St. Christophe, France*

Regular Order

Discounted Order-

4 % Entered By DOUG

7/23/98

Customer No. 2980 Order Number 932288

Last maintained by MEB

7/17/98

APPLIED HYDRAULIC SYSTEMS, INC

APPLIED HYDRAULIC SYSTEMS, INC

BOX 10155, STA 1

204 INDUSTRIAL AVE C

HOUMA

LA

HOUMA

LA

70363

70363

Customer PO # Ship Via PO Date Order Date Ship-to PO # Whse SR DR

38140 6/30/98 6/30/98 MK 52 - 12

Inv#: Ship: Frt Amt: Pick: Shipv:

Inv Date: 0/00/00 Frt Code: 1 Ship Info.: 0000000 00

Line Qty Qty Invoice Priority: 1

# Ordered Allocat. Prod. # WH U Sts Ctlg and Description Sell Price

4 3 0 8014742 MK ENT UB500 UTILITY OHB10T 285#

JOB # 059801-100298  
059802-100298  
059803-100298

SE YELLOW

HB YELLOW

LA YELLOW

CH AM FRT

LV SAIA

MK SAIA

AT SAIA

+

Records to Roll (1-24): 8 Total Weight 8295.00 Order Total:

F1=End F3=Fold F6=New Inquiry F24=More keys

**APPLIED HYDRAULIC SYSTEMS, INC.****BOX 10155, STA 1****HOUMA, LA 70363****932288****the Crosby<sup>®</sup> group, inc.**Certificate Form No. 38140Customer Purchase Order No. 932288

Crosby Group Order No. \_\_\_\_\_

**CERTIFICATE OF CONFORMANCE OF CHAINS, RINGS, HOOKS, SHACKLES,  
SWIVELS AND PULLEY BLOCKS**

(1) Distinguishing number or mark (if any)	(2) Description of gear	(3) Number	(4) Date	(5) Working Load Limit
<b>SERIAL NO</b> <b>98-169-27</b>	<b>MB10T285E 10 TON</b> <b>UB500</b> <b>API 2C OVERHAUL BALL</b> <b>(365#)</b>	<b>1</b>	<b>10-09-98</b>	<b>20,000LBS</b>
<b>ART NO</b> <b>8014742</b>	<b>JOB# 059801-100298</b> <b>JOB# 059802-100298</b> <b>JOB# 059803-100298</b>			

(7) Name and address of makers or suppliers **The Crosby Group / McKissick Products****2801 Dawson Road Tulsa OK 74110-5040 U.S.A.**

(8) Name and address of public service, association, company or firm making the test and examination \_\_\_\_\_

**Same**

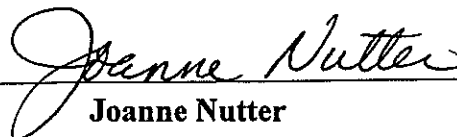
(9) Position of signatory in public service, association, company or firm \_\_\_\_\_

**Quality Assurance Clerk**

We hereby certify that the above described material was manufactured and processed in a manner compatible to meeting the specified load ratings when used under normal and proper applications.

(Date) **October 9, 1998**

(Signature) \_\_\_\_\_

  
**Joanne Nutter**

Regular Order

Discounted Order-

4 % Entered By DOUG

7/23/98

Customer No. 2980 Order Number 932288

Last maintained by MEB

7/17/98

APPLIED HYDRAULIC SYSTEMS, INC

APPLIED HYDRAULIC SYSTEMS, INC

BOX 10155, STA 1

204 INDUSTRIAL AVE C

HOUMA

LA

HOUMA

LA

70363

70363

Customer PO #	Ship Via	PO Date	Order Date	Ship-to PO #	Whse SR	DR
---------------	----------	---------	------------	--------------	---------	----

38140		6/30/98	6/30/98		MK 52 -	12
-------	--	---------	---------	--	---------	----

Inv#:	Ship:	Frt Amt:	Pick:	Shipv:
-------	-------	----------	-------	--------

Inv Date:	0/00/00	Frt Code:	1	Ship Info.:	0000000 00
-----------	---------	-----------	---	-------------	------------

Line	Qty	Qty	Invoice	Priority:	1
------	-----	-----	---------	-----------	---

#	Ordered	Allocat.	Prod. #	WH U	Sts	Ctlg and Description	Sell Price
---	---------	----------	---------	------	-----	----------------------	------------

4	3		0 8014742	MK	ENT	UB500 UTILITY OHB10T 285#	
---	---	--	-----------	----	-----	---------------------------	--

JOB #

059801-100298

SE YELLOW

059802-100298

HB YELLOW

059803-100298

LA YELLOW

CH AM FRT

LV SAIA

MK SAIA

AT SAIA

+

Records to Roll (1-24): 8 Total Weight 8295.00 Order Total:

F1=End

F3=Fold

F6=New Inquiry

F24=More keys

APPLIED HYDRAULIC SYSTEMS, INC.  
BOX 10155, STA 1  
HOUMA, LA 70363

932288

the Crosby group  
INC.

Certificate Form No. \_\_\_\_\_

38140

Customer Purchase Order No. \_\_\_\_\_

932288

Crosby Group Order No. \_\_\_\_\_

CERTIFICATE OF CONFORMANCE OF CHAINS, RINGS, HOOKS, SHACKLES,  
SWIVELS AND PULLEY BLOCKS

(1) Distinguishing number or mark (if any)	(2) Description of gear	(3) Number	(4) Date	(5) Working Load Limit
SERIAL NO 98-169-27	MB10T285E 10 TON UB500 API 2C OVERHAUL BALL (365#)	1	10-09-98	20,000LBS
PART NO 3014742	JOB# 059801-100298 JOB# 059802-100298 JOB# 059803-100298			

The Crosby Group / McKissick Products

(7) Name and address of makers or suppliers \_\_\_\_\_  
2801 Dawson Road Tulsa OK 74110-5040 U.S.A.

(8) Name and address of public service, association, company or firm making the test and examination \_\_\_\_\_  
Same

(9) Position of signatory in public service, association, company or firm \_\_\_\_\_  
Quality Assurance Clerk

We hereby certify that the above described material was manufactured and processed in a manner compatible to meeting  
the specified load ratings when used under normal and proper applications.

(Date) \_\_\_\_\_ (Signature) \_\_\_\_\_

October 9, 1998

Joanne Nutter

N20-A-11-W5G

Chaparral Steel MILLFAX 1-800-645-4155

Page 3/7

11-JUL-1997 05:51


 MBL070MAN 304 WARD RD.  
 TEXAS 75604  
 (940) 775-4044

 CERTIFIED  
 MATERIAL  
 TEST REPORT
SOLD  
TO
 LEBUS MANUFACTURING  
 SUB. OF CROSBY GROUP  
 P.O. BOX 271  
 LONGVIEW , TX 75606
SNP  
TO
 LEBUS MANUFACTURING  
 900 FISHER ROAD

LONGVIEW , TX 75604

CUSTOMER PURCHASE ORDER NUMBER	DATE	QUANTITY	DESCRIPTION	LENGTH
49375*	07/10/97	23.229	2 1/8 ROUNDS	19.583

TESTED ACCORDING TO	SIZE	GRADE	PRODUCT	HEAT NO.
ASTM A29-91 A322-91, AISI	2 1/8 ROUNDS	4130R I	ROUNDS SPECIAL BAR QUALITY	3-4011

## CHEMICAL ANALYSIS

C	Mn	P	S	Si	CH	NI	Cr	Mo	V	Nb	Al
0.31	0.46	0.007	0.007	0.20	0.23	0.09	0.90	0.180	0.000	0.000	0.020

## MECHANICAL PROPERTIES

YIELD STRENGTH (K.S.I.)	TENSILE STRENGTH (K.S.I.)	SPECIMEN AREA (SQ. IN.)	ELONGATION %	GAUGE LENGTH	BEND TEST FMA	SPREAD T	GRAIN SIZE	REDUCTION OF AREA

Acertify certify that the contents of this report are correct and accurate. All test results and operations performed by this material manufacturer or its sub-contractors, when applicable, are in compliance with the requirements of the material specification, and when designated by the purchaser meet the specific applicable material requirements of Section II of the A.S.M.E. Boiler and Pressure Vessel Code.

Signed

 Tom L. Heston - Quality Assurance Manager  
 Signed and Submitted to before me, in and for Ellis County on

this 11th day July, 1997

(NOTARY PUBLIC)

My Commission Expires

(notary seal)

## REMARKS

DI=2.4535

MANIFEST 1159925

 LEBUS MANUFACTURING  
 900 FISHER ROAD

LONGVIEW , TX 75604

ALL MANUFACTURING PROCESSES OF THE STEEL MATERIALS IN THIS PRODUCT,  
 INCLUDING MELTING, HAVE OCCURRED WITHIN THE UNITED STATES IN COMPLIANCE  
 WITH THE "BUY AMERICA" PROVISION OF THE SURFACE TRANSPORTATION  
 ASSISTANCE ACT OF 1982.



**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
Metal Testing Services, Inc.

5 East 35th Street  
Tulsa, OK 74145-3241  
Telephone 918-664-7767

Fax 918-627-3062  
800-324-8378

To: The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998030355- 1  
Date Received: 03/23/98  
Date Reported: 03/24/98

Attn: Steve Kendrick

P.O. No: M9802012

Sample Description: Hook 320 AN 11 Ton API 2C.

PIC Code: W5G

WO# 194516 - P/N 8010401

Specimen removed from 4/5 radius.

Test Report (ASTM E 8-96) Longitudinal Tensile

<u>Parameter</u>	<u>Result</u>
Diameter, in.	.500
Elongation in 4D, %	19
Reduction of Area, %	59
Yield Strength, psi by 0.2% offset	113,000
Tensile Strength, psi	133,000

**Hardness Test**

Testing Specification: ASTM E18-94  
Hardness Scale: ROCKWELL "C"  
Acceptance Criteria: N.A.  
Actual Coupon Hardness: 25.0, 25.0, 25.0

Approved By:

*A. Zubillaga*  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

3/24/98

This document shall not be reproduced, except in full, without the written approval of Sherry Laboratories/Oklahoma.  
A2LA Certification # 785.01 & 785-02.





6825 East 38th Street  
Tulsa, OK 74145-3261  
Telephone 918-664-7767

**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
Metal Testing Services, Inc.

Fax 918-627-3062  
800-324-8376

To: The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998030355- 1  
Date Received: 03/23/98  
Date Reported: 03/24/98

Attn: Steve Kendrick

P.O. No: M9802012

Sample Description: Hook 320 AN 11 Ton API 2C.  
PIC Code: W5G  
WO#: 194516 - P/N 8010401  
Specimen removed from 4/5 radius.

### Impact Test Report

Style and Model of Machine:	Tinius Olsen, 74
Available Impact Energy:	264 Ft-Lbs.
Impact Velocity:	17 Ft/Sec.
Method of Test:	SA-370/ASTM-E23
Specimen Type:	Charpy "V" Notch
Specimen Location:	ASTM-A370 Longitudinal
Notch Orientation:	ASTM-A370
Specimen Size:	10mm X 10mm
Test Temperature:	-40 °F

Notch Location:	Base
Impact Values (Ft-Lbs.):	37, 37, 38
Lateral Expansion (mils):	9, 9, 9
% Shear:	40, 40, 40

Approved By: A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

3/24/98

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LA Certification # 785.01 & 785-02.

**DATA MATERIAL**

**CROSBY/McKISSICK PRODUCT**  
**NUMBER: 2009243**

TELEPHONE 918/834-4611  
TELEX 262569 CRSBY UR  
FAX 918/834-9447  
**DATE: 10/09/98**

**theCrosbygroup<sup>®</sup>**  
**INC.**

**DESCRIPTION/SPECIFICATIONS:**  
**SWIVEL EYE BARREL**

**CHEMICAL ANALYSIS**

<b>HEAT NO:</b> B37S-CF	<b>C.</b> .280	<b>Mn.</b> .770	<b>P</b> .017	<b>S</b> .010	<b>Si</b> .530
	<b>Cr</b> .560	<b>Mo</b> .170	<b>Ni</b> .500	<b>Cu</b> .090	<b>V</b> .008
	<b>W</b> .020				

**PHYSICAL PROPERTIES**  
**(PSI)**

**YIELD STRENGTH**  
98,900

**TENSILE STRENGTH**  
116,100

**ELON %**  
20

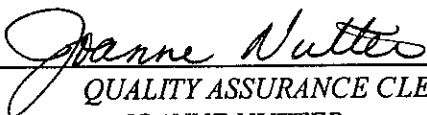
**RED OF AREA %**  
54

**HRC**  
22

**CHARPY "V" NOTCH**  
-25° F (FT-LBS )  
61-61-61

THE ABOVE DATA WERE TRANSCRIBED FROM THE MANUFACTURER'S CERTIFICATE OF TEST AFTER A VERIFICATION FOR COMPLETENESS AND SPECIFICATION REQUIREMENTS OF THE INFORMATION ON THE CERTIFICATE. ALL TEST RESULTS REMAIN ON FILE SUBJECT TO EXAMINATION.

THE WILLFUL RECORDING OF FALSE, FICTITIOUS, OR FRAUDULENT STATEMENTS IN CONNECTION WITH TEST RESULTS MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES.

  
**QUALITY ASSURANCE CLERK**  
**JOANNE NUTTER**

*Products of uncompromising quality . . .*

CROSBY Clips & Fittings, LEBUS Load Binders, McKISSICK Blocks & Sheaves, CROSBY- WESTERN Blocks, NATIONAL Swaging Systems

Plants and facilities in: Jacksonville, Arkansas - Los Angeles, California - Atlanta, Georgia - Chicago, Illinois - Tulsa, Oklahoma - Harrisburg, Pennsylvania  
Dallas, Texas - Longview, Texas - Seattle, Washington - Toronto (Brampton), Ontario - Barnsley, England - Mechelen (Putte), Belgium - Cergy St. Christophe, France

**MATERIAL DATA**

**CROSBY/McKISSICK PRODUCT**  
**NUMBER: 2009245**

TELEPHONE 918/834-4611  
TELEX 262569 CRSBY UR  
FAX 918/834-9447

**DATE: 10/09/98**

**DESCRIPTION/SPECIFICATIONS:**

**SWIVEL LOWER EYE**

**PIC:H30**

**CHEMICAL ANALYSIS**

<b>HEAT NO:</b> H30	<b>C.</b> .1665	<b>Mn.</b> .8627	<b>P</b> .0211	<b>S</b> .0190	<b>Si</b> .4724
	<b>Cr</b> .4838	<b>Mo</b> .2524	<b>Ni</b> .6994	<b>Cu</b> .1035	<b>Al</b> .0194
	<b>V</b> .0014				

**PHYSICAL PROPERTIES ( P S I )**

**YIELD STRENGTH**

90,300

**TENSILE STRENGTH**

107,800

**ELON %**

21

**RED OF AREA %**

55

**BHN**

217

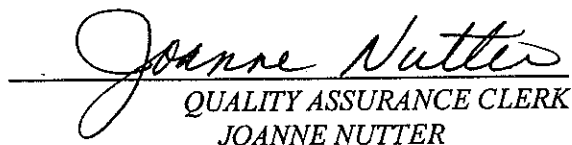
**CHARPY "V" NOTCH**

-25°F (FT-LBS)

40 - 43 - 30

THE ABOVE DATA WERE TRANSCRIBED FROM THE MANUFACTURER'S CERTIFICATE OF TEST AFTER A VERIFICATION FOR COMPLETENESS AND SPECIFICATION REQUIREMENTS OF THE INFORMATION ON THE CERTIFICATE. ALL TEST RESULTS REMAIN ON FILE SUBJECT TO EXAMINATION.

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QUALITY ASSURANCE CLERK  
JOANNE NUTTER

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CROSBY Clips & Fittings, LEBUS Load Binders, McKISSICK Blocks & Sheaves, CROSBY- WESTERN Blocks, NATIONAL Swaging Systems

Plants and facilities in: Jacksonville, Arkansas - Los Angeles, California - Atlanta, Georgia - Chicago, Illinois - Tulsa, Oklahoma - Harrisburg, Pennsylvania  
Dallas, Texas - Longview, Texas - Seattle, Washington - Toronto (Brampton), Ontario - Barnsley, England - Mechelen (Putte), Belgium - Cergy St. Christophe, France

# CERTIFICATE OF MATERIAL TEST REPORTS



MC KISSICK PRODUCTS CO  
2857 DAWSON ROAD  
PO BOX 3128  
TULSA OK 74101-3128 USA

CASTLE METALS CERTIFIES THAT THE FOLLOWING INFORMATION IS TAKEN FROM CHEMICAL AND METALLURGICAL TEST REPORTS FURNISHED TO US BY OUR SUPPLIER AND WHICH ARE ON FILE IN OUR OFFICE.

WE CERTIFY THAT WE HAVE NO KNOWLEDGE OF MERCURY OR RADIOACTIVE MATERIAL USED IN THE MELTING OR PROCESSING OF STEEL SOLD BY OUR COMPANY.

MANUFACTURER (MILL) <b>BARTECH INC.</b>			CUST. ORDER NO. <b>M-9804550</b>		CUST. REQUISITION NO.	
IAC <b>2243</b>	HEAT NO. <b>680W019 H186</b>	ORDER NO. <b>206997</b>	LINE NO. <b>2</b>	SHIP QTY. <b>873.0</b>	SHIP DATE	

## DESCRIPTION

3 RD A4140 CF HT A193-B7 10/13 PART NO. 94784

* * * CHEMICAL ELEMENTS * * *									
C	MN	P	S	SI	NI	CR	MO	AL	
.43	.88	.017	.028	.27	.08	1.00	.20	.029	
CU	V	N	CB						
.13	.007	.007	.003						

\* \* \* MECHANICAL PROPERTIES \* \* \*

TENSILE 139000 PSI, YIELD 122000 PSI, ELONG 17.1, R.A. 53.5  
 10NS BHN 298/ 298, GRAIN = FINE, GRAIN 7/ 7, MACRO - C1 R1 S1, R.R. 6.2  
 L ST = STRAND, MERCURY FREE, WELD FREE, MEETS NAFTA = N

* J O M I N Y													
1	2	3	4	5	6	7	8	12	16	20	24	28	32
58	58	58	58	58	58	58	57	52	49	48	45	43	41

\* \* \* INDUSTRY SPECIFICATIONS \* \* \*

A.I.S.I.-4140, ASTM-A193-96B-GR-B7, ASTM-A29-93A, ASTM-A331-95  
 ASTM-A434-90A-CLS-8C (1/4" THROUGH 4" ONLY), UNS#-G41400  
 DI=5.65 \*\*CONFORMS TO ASTM A 331 90 AND ASTM A 29 91\*\* 5-1998 RD#43579 BAR TE  
 CH

LWR EYE NUT      P/N 2015014  
 PIC - XBDY

7/27/4f  
82

A.M. CASTLE & CO.  
*Amenia Gatta*



SHERRY LABORATORIES  
INDIANA LOUISIANA OKLAHOMA  
Metallurgical Testing Services, Inc.

Fax 918-627-3062  
800-324-8378

6825 38th Street  
Tulsa 74145-3241  
Telephone 918-664-7767

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998070487-1  
Date Received: 07/30/98  
Date Reported: 08/06/98  
P.O. No: M9804996

Sample Description: 3.00", Bar, API 2C  
Material: 4140  
Heat No: 680W019H186  
PIC Code: XBDY  
WO#: 199582 - P/N: 2015014.  
Specimen removed from 4/5 radius.

#### Room Temperature Tensile Test (ASTM E 8-96), Longitudinal

<u>Parameter</u>	<u>Result</u>
Diameter, in.	.501
Tensile Strength, psi	147,200
Yield Strength, psi by 0.2% offset	122,000
Elongation in 4D, %	17
Reduction of Area, %	55

#### Hardness, ASTM E 18-94

Reading No.	Location	Result
1	4/5 radius	HRC 31.0, 30.0, 30.0

Approved By: A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing



**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
Metallurgical Testing Services, Inc.

Fax 918-627-3062  
800-324-8378

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998070487-1  
Date Received: 07/30/98  
Date Reported: 08/06/98  
P.O. No: M9804996

Sample Description: 3.00", Bar, API 2C  
Material: 4140  
Heat No: 680W019H186  
PIC Code: XBDY  
WO#: 199582 - P/N: 2015014.  
Specimen removed from 4/5 radius.

### Impact Test Report

Style and Model of Machine: Tinius Olsen, 74  
Available Impact Energy: 264 Ft-Lbs.  
Impact Velocity: 17 Ft/Sec.  
Method of Test: SA-370/ASTM-E23  
Specimen Type: Charpy "V" Notch  
Specimen Location: ASTM-A370 Longitudinal  
Notch Orientation: ASTM-A370  
Specimen Size: 10mm X 10mm  
Test Temperature: -25 °F

Notch Location:	Base
Surface Impact Values (Ft-Lbs.):	54, 46, 46
Lateral Expansion(Mils):	26, 27, 21
Shear(%):	95, 95, 95

Approved By: A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

## : 21

PLATE ADAPT P/N 2009242  
PIC - WHCB

# CERTIFICATE OF MATERIAL TEST REPORTS



**CUSTOMER**  
 MC KISSICK PRODUCTS CO  
 2857 DAWSON ROAD  
 PO BOX 3128  
 TULSA OK 74101-3128 USA

CASTLE METALS CERTIFIES THAT THE FOLLOWING INFORMATION IS TAKEN FROM CHEMICAL AND METALLURGICAL TEST REPORTS FURNISHED TO US BY OUR SUPPLIER AND WHICH ARE ON FILE IN OUR OFFICE.

WE CERTIFY THAT WE HAVE NO KNOWLEDGE OF MERCURY OR RADIOACTIVE MATERIAL USED IN THE MELTING OR PROCESSING OF STEEL SOLD BY OUR COMPANY.

MANUFACTURER (MILL) <b>NORTH STAR STEEL COMPANY</b>		CUST. ORDER NO. <b>M-9804149</b>		CUST. REQUISITION NO. <b>3</b>	
QAC <b>2148</b>	HEAT NO. <b>M68505 H256</b>	ORDER NO. <b>202812</b>	LINE NO. <b>1</b>	SHIP QTY. <b>337.0</b>	SHIP DATE <b>07/08/98</b>

## DESCRIPTION

1-5/8 RD A4140 CF HT A193-B7 10/13 PART NO. 2008059

* * * CHEMICAL ELEMENTS * * *									
C	MN	P	S	SI	NI	CR	MO	AL	
.412	.87	.021	.034	.29	.09	1.01	.22	.021	
CU	V	PB	TI	CO					
.17	.006	.00/.00	.003	.0082					

\* \* \* MECHANICAL PROPERTIES \* \* \*

TENSILE 151000 PSI, YIELD 133000 PSI, ELONG 19.0, R.A. 54.7  
 RONS BHN 304/ 304, GRAIN = FINE, GRAIN 5/ 8, MACRO - S1 R1 C1, R.R. 16.1  
 LAST = STRAND, MERCURY FREE, WELD FREE, MEETS NAFTA = Y

* J O M I N Y													
1	2	3	4	5	6	7	8	12	16	20	24	28	32
58	57	57	56	55	55	56	55	52	50	48	46	45	43

\* \* \* INDUSTRY SPECIFICATIONS \* \* \*

A.I.S.I.-4140, ASTM-A193-96B-GR-B7, ASTM-A29-93A, ASTM-A322-91  
 ASTM-A331-95-FASTENER QUALITY ACT, ASTM-A434-90A-CLS-BC  
 (1/4" THROUGH 4" ONLY), UNS#-G41400

VD DI=5.98 ASME SA 193 B7 95ED 96AD STRESS FREE NORTH STAR RD-43965 6-1998

BOLT ASSY                      P/N 2009240  
 1.625 X 6.656                  PIC - XBDZ

A.M. CASTLE & CO.

7/14/98  
 ED

*See = Shanty*





68. Jt 38th Street  
Tulsa, OK 74145-3241  
Telephone 918-664-7767

**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
Metallurgical Testing Services, Inc.

Fax 918-627-3062  
800-324-8378

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998080017- 1  
Date Received: 08/04/98  
Date Reported: 08/07/98  
P.O. No: M9805060

Sample Description: 1.625" Bar, API 2C  
Heat No: M68505H256  
PIC Code: XBDZ  
WO#: 199662 - P/N: 2015012.  
Specimen removed from 4/5 radius.

#### Room Temperature Tensile Test (ASTM E 8-96), Longitudinal

<u>Parameter</u>	<u>Result</u>
Diameter, in.	.500
Tensile Strength, psi	144,700
Yield Strength, psi by 0.2% offset	128,600
Elongation in 4D, %	18

#### Hardness, ASTM E 18-94

Reading No	Location	Result
1	4/5 radius	HRC 31.5, 31.5, 31.5

Approved By: A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing



68 138th Street  
Tulsa, OK 74145-3241  
Telephone 918-664-7767

**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
Metallab Testing Services, Inc.

Fax 918-627-3062  
800-324-8378

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998080017-1  
Date Received: 08/04/98  
Date Reported: 08/07/98  
P.O. No: M9805060

Sample Description: 1.625" Bar, API 2C  
Heat No: M68505H256  
PIC Code: XBDZ  
WO#: 199662 - P/N: 2015012.  
Specimen removed from 4/5 radius.

### Impact Test Report

Style and Model of Machine: Tinius Olsen, 74  
Available Impact Energy: 264 Ft-Lbs.  
Impact Velocity: 17 Ft/Sec.  
Method of Test: SA-370/ASTM-E23  
Specimen Type: Charpy "V" Notch  
Specimen Location: ASTM-A370 Longitudinal  
Notch Orientation: ASTM-A370  
Specimen Size: 10mm X 10mm  
Test Temperature: -25 °F

Notch Location:	Base
Surface Impact Values (Ft-Lbs.):	56, 61, 56
Lateral Expansion(Mils):	29, 30, 28
Shear(%):	90, 90, 90

Approved By: A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

# CERTIFICATE OF MATERIAL TEST REPORTS



**HYALLOY STEELS CO.**  
A DIVISION OF  
**A. M. CASTLE & CO.**

**CUSTOMER**

MC KISSICK PRODUCTS CO  
2857 DAWSON ROAD  
PO BOX 3128  
TULSA OK 74101-3128 USA

CASTLE METALS CERTIFIES THAT THE FOLLOWING INFORMATION IS TAKEN FROM CHEMICAL AND METALLURGICAL TEST REPORTS FURNISHED TO US BY OUR SUPPLIER AND WHICH ARE ON FILE IN OUR OFFICE.

WE CERTIFY THAT WE HAVE NO KNOWLEDGE OF MERCURY OR RADIOACTIVE MATERIAL USED IN THE MELTING OR PROCESSING OF STEEL SOLD BY OUR COMPANY.

MANUFACTURER (MILL) <b>NORTH STAR STEEL COMPANY</b>			CUST. ORDER NO. <b>M-9803470</b>		CUST. REQUISITION NO.	
IAC <b>2148</b>	HEAT NO. <b>M69430 H167</b>	ORDER NO. <b>195474</b>	LINE NO. <b>1</b>	SHIP QTY. <b>332.0</b>	SHIP DATE	

**DESCRIPTION**

1-5/8 RD A4140 CF HT A193-B7 10/13 PART NO. 2008059

* * * CHEMICAL ELEMENTS * * *									
C	MN	P	S	SI	NI	CR	MO	AL	
.414	.88	.014	.032	.28	.07	1.03	.19	.03	
CU	V	PB	TI	CO					
.18	.008	.00/.00	.003	.0076					

\* \* \* MECHANICAL PROPERTIES \* \* \*

TENSILE 153000 PSI, YIELD 138000 PSI, ELONG 18.4, R.A. 54.5  
 ARONS BHN 311/ 311, GRAIN = FINE, GRAIN 5/ 8, MACRO - S1 R1 C1, R.R. 16.1  
 CAST = STRAND, MERCURY FREE, WELD FREE, MEETS NAFTA = Y

\* J O M I N Y \*

1	2	3	4	5	6	7	8	12	16	20	24	28	32
58	57	55	55	55	55	54	54	49	46	44	42	41	40

\* \* \* INDUSTRY SPECIFICATIONS \* \* \*

A.I.S.I.-4140, ASTM-A193-968-GR-B7, ASTM-A29-93A, ASTM-A322-91  
 ASTM-A331-95-FASTENER QUALITY ACT, ASTM-A434-90A-CLS-BC  
 (1/4" THROUGH 4" ONLY), UNS\*-G41400  
 VD DI=5.76 ASME SA 193 B7 93ED 96AD STRESS FREE \*\*CONFORMS TO ASTM A 331 95 A  
 N D ASTM A 29 91\*\* 5/27/98 RD#12181

BOLT ASSY  
1.625 X 13.438

P/N 2009241  
PIC - XBDO

4/4/96  
bb

A.M. CASTLE & CO.  
*Armenia. Gaton*

END



**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
Metlab Testing Services, Inc.

6225 East 38th Street  
OK 74145-3241  
phone 918-664-7767

Fax 918-627-3062  
800-324-8378

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998060276- 1  
Date Received: 06/16/98  
Date Reported: 06/19/98  
P.O. No: M9803922

Sample Description: 1.624" barstock API 2C.  
Material: 4140  
Heat No: M69430H167  
PIC Code: XBDO  
WO#: 198169 - P/N: 2015012.  
Specimen removed from 4/5 radius.

#### Test Report (ASTM E 8-96) RT, Longitudinal Tensile

<u>Parameter</u>	<u>Result</u>
Diameter, in.	.501
Tensile Strength, psi	147,900
Yield Strength, psi by 0.2% offset	130,000
Elongation in 4D, %	18
Reduction of Area, %	57

#### Hardness Test

Testing Specification: ASTM E18-94  
Hardness Scale: ROCKWELL "C"  
Acceptance Criteria: N.A.  
Actual Coupon Hardness: 29.0, 30.0, 30.0

Approved By: A. Zubillaga  
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

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**SHERRY LABORATORIES**  
INDIANA LOUISIANA OKLAHOMA  
Metals Testing Services, Inc.

East 38th Street  
Tulsa, OK 74145-3241  
Telephone 918-664-7767

Fax 918-627-3062  
800-324-8378

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998060276-1  
Date Received: 06/16/98  
Date Reported: 06/19/98  
P.O. No: M9803922

Sample Description: 1.624" barstock API 2C.  
Material: 4140  
Heat No: M69430H167  
PIC Code: XBDO  
WO#: 198169 - P/N: 2015012.  
Specimen removed from 4/5 radius.

### Impact Test Report

Style and Model of Machine: Tinius Olsen, 74  
Available Impact Energy: 264 Ft-Lbs.  
Impact Velocity: 17 Ft/Sec.  
Method of Test: SA-370/ASTM-E23  
Specimen Type: Charpy "V" Notch  
Specimen Location: ASTM-A370 Longitudinal  
Notch Orientation: ASTM-A370  
Specimen Size: 10mm X 10mm  
Test Temperature: -25 °F

Notch Location:	Base
Surface Impact Values (Ft-Lbs.):	63, 57, 52
Lateral Expansion(Mils):	32, 25, 18
Shear(%):	60, 60, 55

Approved By:   
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

# CERTIFICATE OF TEST



Page 01 of 02

Certification Date  
8-JUL-1998**CUSTOMER ORDER NUMBER**

M-9804274-3

3116 E. 31ST STREET NORTH  
TULSA OK 74110Invoice Number  
T355736**CUSTOMER PART NUMBER**

92884

Ship# T216232

**SOLD TO:** MCKISSICK PRODUCTS CO**SHIP TO:**

MCKISSICK PRODUCTS CO

P O BOX 3128  
TULSA OK 7410131282801 DAWSON RD GATE 5  
TULSA OK 74110**Description:** 4142 HR HT A434BD (>4) RD

5 RD X 20' R/L

Line Total: 2740 LB

HEAT: 21838

ITEM: 506574

**Specifications:**

ASTM A434 CL BD

ASTM A304 96

ASTM A322 96

**CHEMICAL ANALYSIS**

C	SI	MN	S	P	CR	NI	CU
0.42	0.29	0.92	0.02	0.012	0.99	0.08	0.14
	MO	V					
0.033	0.21	0.003					

RCPT: R801939

MILL : MAGELLAN/FLAME METALLURGICAL

COUNTRY OF ORIGIN : FOREIGN

**MECHANICAL PROPERTIES**

DESCRIPTION	YLD STR KSI	ULT TEN KSI	%ELONG IN 02 IN	%RED IN AREA	HARDNESS BHN
	111.28	139.25	18.0	56.6	293

GRAIN SIZE :8 -

SWVL BASE PLUG P/N 2009244  
PIC - XDDJ

The above data were transcribed from the manufacturer's Certificate of Test after verification for completeness and specification requirements of the information on the certificate. All test results remain on file subject to examination.

We hereby certify that the material covered by this report will meet the applicable requirements described herein, including any specification forming a part of the description.

The willful recording of false, fictitious, or fraudulent statements in connection with test results may be punishable as a felony under federal statutes.

Material did not come in contact with mercury while in our possession.

KAREN NEWCOMB

*Karen Newcomb*  
MANAGER, QUALITY ASSURANCE



6825 East 38th Street  
Tulsa, OK 74145-3241  
Tel. 918-664-7767

**S H E R R Y L A B O R A T O R I E S**  
INDIANA      LOUISIANA      OKLAHOMA  
Metlab Testing Services, Inc.

Fax 918-627-3062  
800-324-8378

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998060276- 2  
Date Received: 06/16/98  
Date Reported: 06/19/98  
P.O. No: M9803922

Sample Description: 5.00 Barstock API 2C  
Material: 4140  
Heat No: 21838  
PIC Code: XDDJ  
WO#: 198220 - P/N: 2015015.  
Specimen removed from 4/5 radius.

#### Test Report (ASTM E 8-96) RT, Longitudinal Tensile

<u>Parameter</u>	<u>Result</u>
Diameter, in.	.502
Tensile Strength, psi	151,900
Yield Strength, psi by 0.2% offset	134,700
Elongation in 4D, %	18
Reduction of Area, %	58

#### Hardness Test

Testing Specification: ASTM E18-94  
Hardness Scale: ROCKWELL "C"  
Acceptance Criteria: N.A.  
Actual Coupon Hardness: 33.0, 32.5, 33.0

Approved By: A. Zubillaga

Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

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6826 East 38th Street  
Tulsa, OK 74145-3241  
Tel. 918-664-7767

**S H E R R Y L A B O R A T O R I E S**  
INDIANA      LOUISIANA      OKLAHOMA  
Metlab Testing Services, Inc.

Fax 918-627-3062  
800-324-8378

### LABORATORY REPORT

Attn: Steve Kendrick  
The Crosby Group, Inc.  
P.O. Box 3128  
Tulsa OK, 74101

Report No: 1998060276- 2  
Date Received: 06/16/98  
Date Reported: 06/19/98  
  
P.O. No: M9803922

Sample Description: 5.00 Barstock API 2C  
Material: 4140  
Heat No: 21838  
PIC Code: XDDJ  
WO#: 198220 - P/N: 2015015.  
Specimen removed from 4/5 radius.

### Impact Test Report

Style and Model of Machine: Tinius Olsen, 74  
Available Impact Energy: 264 Ft-Lbs.  
Impact Velocity: 17 Ft/Sec.  
Method of Test: SA-370/ASTM-E23  
Specimen Type: Charpy "V" Notch  
Specimen Location: ASTM-A370 Longitudinal  
Notch Orientation: ASTM-A370  
Specimen Size: 10mm X 10mm  
Test Temperature: -25 °F

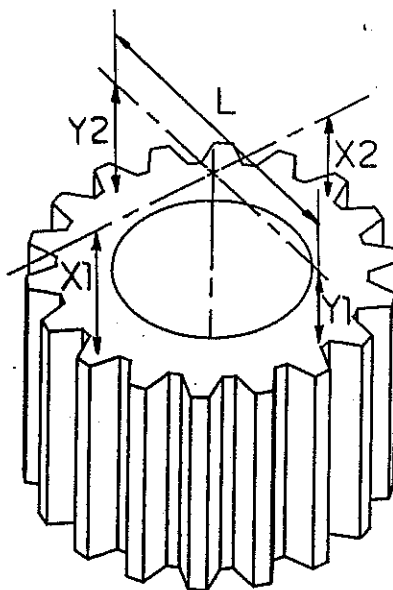
Notch Location:	Base
Surface Impact Values (Ft-Lbs.):	42, 42, 43
Lateral Expansion(Mils):	17, 15, 16
Shear(%):	40, 40, 40

Approved By:   
Aurelio Zubillaga, Supervisor  
Metallurgical/Mechanical Testing

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## **BACKLASH CERTIFICATES**



## BACKLASH REPORT

PINION/BALLRING

*left*

SERIAL NUMBER 059801

BACKLASH TOP .027 BOTTOM .027

ALIGNMENT X1 2<sup>12</sup>/<sub>32</sub>", X2 2<sup>12</sup>/<sub>32</sub>" L 11<sup>1</sup>/<sub>4</sub>" SLOPE  $X = \frac{X2 - X1}{L} = \underline{0}$

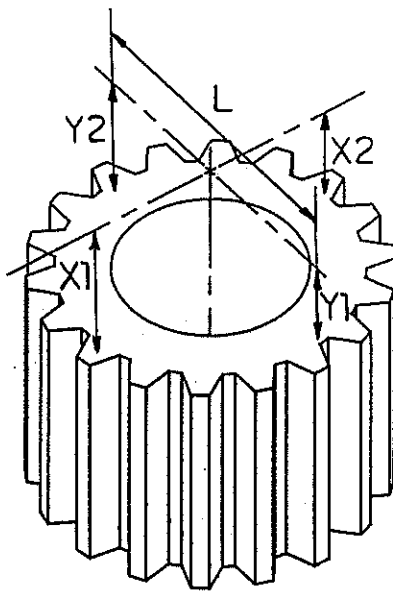
Y1 2<sup>12</sup>/<sub>32</sub>", Y2 2<sup>12</sup>/<sub>32</sub>" L 11<sup>1</sup>/<sub>4</sub>" SLOPE  $X = \frac{X2 - X1}{L} = \underline{0}$

ARE ALL BOLTS (TURRET/BALLRING) IN PLACE? ☒ YES ☐ NO

DATE 11-11-98

ACCEPTABLE *Kevin J. Mollere*

NOT ACCEPTABLE \_\_\_\_\_



# BACKLASH REPORT

PINION/BALLRING

*right*

SERIAL NUMBER 059801

BACKLASH TOP .027 BOTTOM .027

ALIGNMENT X1 2 12/32", X2 2 12/32" L 1 1/4" SLOPE  $X = \frac{X2 - X1}{L} = \underline{0}$

Y1 2 12/32", Y2 2 12/32" L 1 1/4" SLOPE  $X = \frac{X2 - X1}{L} = \underline{0}$

ARE ALL BOLTS (TURRET/BALLRING) IN PLACE? ☒ YES ☐ NO

DATE 11-11-98

ACCEPTABLE *Terrie J. Mollere*

NOT ACCEPTABLE \_\_\_\_\_

## **MISCELLANEOUS**

# Certificate of Leak Test

Vessel Description  
Applied Hydraulic Systems, Inc., Work Order Number  
Test Pressure (PSIG)  
Test Date

*Power Unit*  
*059801*  
*2 1/2 Hpa.*  
*11-13-98*

It is hereby certified that:

- The referenced vessel has been pressure tested to the recorded value in accordance with the procedure on the reverse side.
- The test has proven the vessel to be free of leaks.
- The test was performed correctly and is accurately recorded.

Applied  
Hydraulic  
Systems, Inc.  
Houma, Louisiana  
**NAUTILUS**

*Annally Mollere*  
Quality Agent

# Certificate of Leak Test

Vessel Description  
Applied Hydraulic Systems, Inc., Work Order Number  
Test Pressure (PSIG)  
Test Date

*Return Manifold (60")*  
*05-9801*  
*45 Hpa.*  
*11-17-99*

It is hereby certified that:

- The referenced vessel has been pressure tested to the recorded value in accordance with the procedure on the reverse side.
- The test has proven the vessel to be free of leaks.
- The test was performed correctly and is accurately recorded.

Applied  
Hydraulic  
Systems, Inc.  
Houma, Louisiana  
**NAUTILUS**

*Arnold J. Molere*  
Quality Agent

# Certificate of Leak Test

Vessel Description  
Applied Hydraulic Systems, Inc., Work Order Number  
Test Pressure (PSIG)  
Test Date

*Return Manifold (32")*  
*058801*  
*45 Psi.*  
*11-17-88*

It is hereby certified that:

- The referenced vessel has been pressure tested to the recorded value in accordance with the procedure on the reverse side.
- The test has proven the vessel to be free of leaks.
- The test was performed correctly and is accurately recorded.

Applied  
Hydraulic  
Systems, Inc.  
Houma, Louisiana  
**NAUTILUS**

*David A. Modlere*  
Quality Agent

# Certificate of Leak Test

Vessel Description  
Applied Hydraulic Systems, Inc., Work Order Number  
Test Pressure (PSIG)  
Test Date

*Return piping (long)*  
*05989*  
*45 W.*  
*11-17-98*

It is hereby certified that:

- The referenced vessel has been pressure tested to the recorded value in accordance with the procedure on the reverse side.
- The test has proven the vessel to be free of leaks.
- The test was performed correctly and is accurately recorded.

Applied  
Hydraulic  
Systems, Inc.  
Houma, Louisiana  
**NAUTILUS**

*Arnold J. Molera*  
Quality Agent



# Certificate of Leak Test

Vessel Description  
Applied Hydraulic Systems, Inc., Work Order Number  
Test Pressure (PSIG)  
Test Date

*Return piping (short)*  
*05980, 45 lbs.*  
*11-16-98*

It is hereby certified that:

- The referenced vessel has been pressure tested to the recorded value in accordance with the procedure on the reverse side.
- The test has proven the vessel to be free of leaks.
- The test was performed correctly and is accurately recorded.

Applied  
Hydraulic  
Systems, Inc.  
Houma, Louisiana  
**NAUTILUS**

*Terrell Mollere*  
Quality Agent

# Certificate of Leak Test

Vessel Description  
Applied Hydraulic Systems, Inc., Work Order Number  
Test Pressure (PSIG)  
Test Date

*Section Line (5-3") (1-1/2")*  
*059891*  
*292 lbs.*  
*11-4-98*

It is hereby certified that:

- The referenced vessel has been pressure tested to the recorded value in accordance with the procedure on the reverse side.
- The test has proven the vessel to be free of leaks.
- The test was performed correctly and is accurately recorded.

Applied  
Hydraulic  
Systems, Inc.  
Houma, Louisiana  
**NAUTILUS**

*Annally Molone*  
Quality Agent

# Certificate of Leak Test

(20 gal.)

Vessel Description  
Applied Hydraulic Systems, Inc., Work Order Number  
Test Pressure (PSIG)  
Test Date

Hydraulic start recharge tank  
059801  
2 1/2 hrs.  
11-16-98

It is hereby certified that:

- The referenced vessel has been pressure tested to the recorded value in accordance with the procedure on the reverse side.
- The test has proven the vessel to be free of leaks.
- The test was performed correctly and is accurately recorded.

Applied  
Hydraulic  
Systems, Inc.  
Houma, Louisiana  
**NAUTIDUS**

Terrell J. Mollere  
Quality Agent

# Certificate of Leak Test

Vessel Description  
Applied Hydraulic Systems, Inc., Work Order Number  
Test Pressure (PSIG)  
Test Date

*Return piping*  
*059801*  
*45 Ma.*  
*2-4-99*

It is hereby certified that:

- The referenced vessel has been pressure tested to the recorded value in accordance with the procedure on the reverse side.
- The test has proven the vessel to be free of leaks.
- The test was performed correctly and is accurately recorded.

Applied  
Hydraulic  
Systems, Inc.  
Houston, Louisiana  
**NAUTILUS**

*Tennely Molbee*  
Quality Agent

## Vessel Leak Test

(Bubble Method)

**⚠ WARNING:** Overpressuring vessels can cause bursting. Death or injury may result.

1. Sweep clean tank prior to sealing.

Seal fittings with teflon tape.

Seal manway openings, etc. with gasket and all bolts.

2. Select test pressure:

- Return manifolds, 4" and smaller up to 4 ft. long - 45-55 PSI. Relief set at 60 PSI.
- Tanks - 2½ to 3 PSI. Relief set at 3½ PSI.

3. Pressurize vessel to test pressure.

**⚠ If vessel bulges or if situation appears dangerous for any reason, stop and immediately obtain assistance of supervisor.**

4. Use soapy water mixture: ½ oz. clear ivory dishwashing liquid in 1 qt. of tap water. Spray all outside welds which seal the vessel. Be sure to test "bulkhead" welds inside the adjacent compartment. If leaks are detected, mark location and bleed off tank pressure. Repair defective welds. Retest.

5. When vessel is proven to be air tight:

- Obtain Quality witness and signature.
- Quality to maintain record of test and certificate.
- Remove test equipment and reseal tank.

NO NES184-058  
REV: D  
PRV: 7/27/96  
DATE: 07/11/96

APPROVED:

TYPE ☐ 400AL T  
3-4 miles

RESIN L709367  
CURE L708207

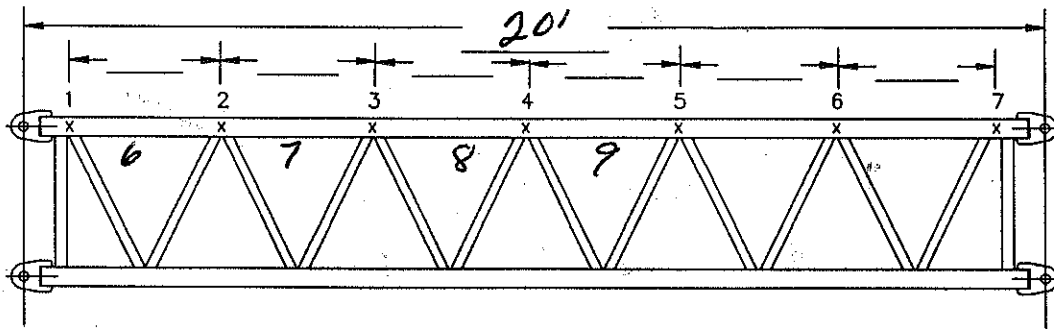
OFFSHORE  
YELLOW  
3-4 miles  
LR 1998110111

TOTAL MILLAGE: 6-8 miles

FORM: 0069  
REV.:  
DATE:

# WORK ORDER #: 059801

## MAIN CHORD STRAIGHTNESS CHECK



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TOP RIGHT	A	0	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{64}$		$\frac{1}{16}$	$\frac{1}{32}$	0	0							
	B	0	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	0	0	$\frac{1}{32}$	$\frac{1}{64}$	0							
TOP LEFT	A	0	$\frac{1}{64}$	0	0		0	0	0	0							
	B	0	$\frac{1}{32}$	$\frac{1}{32}$	0		$\frac{1}{64}$	$\frac{1}{64}$	0	0							
BOTTOM RIGHT	A	0	$\frac{1}{64}$	0	0		$\frac{1}{64}$	0	$\frac{1}{64}$	0							
	B	0	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{1}{64}$		$\frac{1}{32}$	$\frac{3}{64}$	$\frac{1}{32}$	0							
BOTTOM LEFT	A	0	0	$\frac{1}{64}$	0	0	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{1}{64}$							
	B	0	0	$\frac{1}{64}$	$\frac{1}{32}$	0	0	0	$\frac{1}{32}$	$\frac{1}{64}$							

BOOM CONSTRUCTION

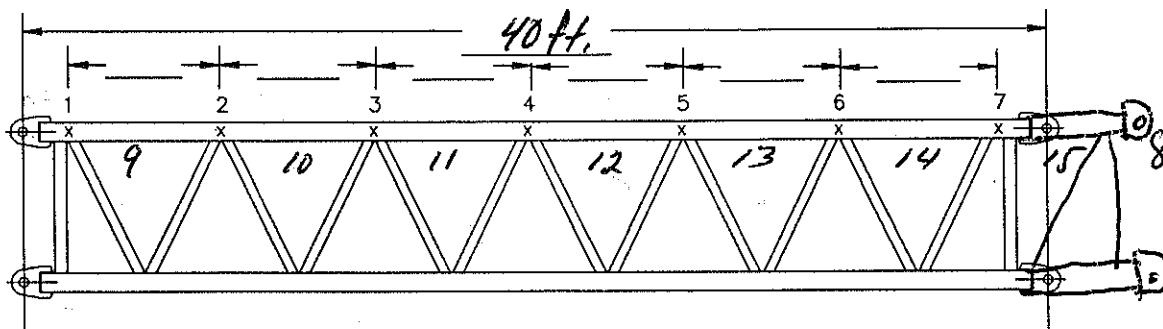
1		2	
3		4	OTHER:

BOOM TYPE: Boom Print (3406)

Q C BY: Dennis J. Mollere

DATE: 10-26-98

# WORK ORDER #: 059801 MAIN CHORD STRAIGHTNESS CHECK



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TOP RIGHT	A	0	0	0	$\frac{1}{64}$	0	0	$\frac{3}{64}$	0	$\frac{3}{64}$	$\frac{1}{64}$	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{1}{64}$	$\frac{3}{64}$	$\frac{3}{64}$	
	B	0	$\frac{1}{64}$	$\frac{1}{64}$	0	$\frac{1}{32}$	0	$\frac{1}{32}$	0	0	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{16}$	$\frac{1}{32}$	0	0	
TOP LEFT	A	0	$\frac{1}{16}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{3}{64}$	$\frac{1}{64}$	$\frac{3}{64}$	0	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{16}$	$\frac{1}{16}$	0	$\frac{1}{32}$	0	
	B	0	$\frac{1}{32}$	$\frac{1}{32}$	0	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{3}{64}$	0	0	0	$\frac{1}{64}$	$\frac{3}{64}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	
BOTTOM RIGHT	A	0	$\frac{3}{64}$	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{1}{32}$	0	$\frac{1}{32}$	0	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	0	
	B	0	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{3}{32}$	0	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{32}$	0	$\frac{1}{16}$	$\frac{1}{16}$	
BOTTOM LEFT	A	0	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{1}{32}$	0	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{32}$	0	$\frac{3}{64}$	$\frac{1}{32}$	$\frac{1}{32}$	
	B	0	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{3}{32}$	0	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{1}{32}$	0	$\frac{3}{64}$	$\frac{1}{16}$	

BOOM CONSTRUCTION

1		2	
3		4	OTHER:

BOOM TYPE:

Boom Mid

Q C BY:

Wendy J. Mollere

DATE:

10-29-98

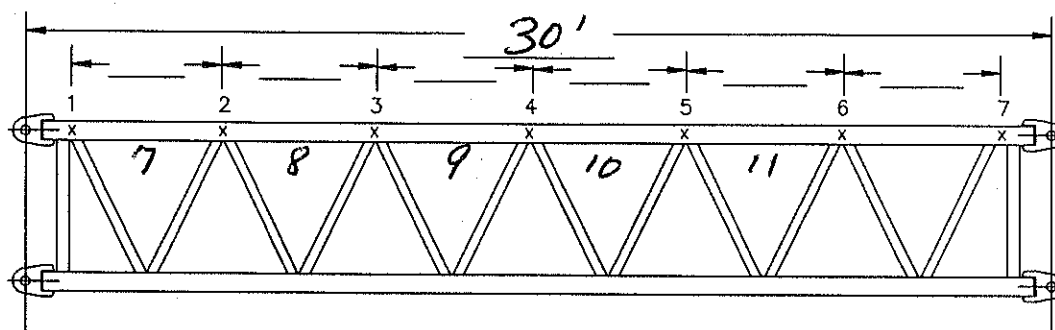
340L  
340 40 ft



FORM: 0069  
REV.:  
DATE:

# WORK ORDER #: 058401

## MAIN CHORD STRAIGHTNESS CHECK



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TOP RIGHT	A	0	$\frac{3}{64}$	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{3}{64}$	0	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$					
	B	0	0	$\frac{1}{64}$	$\frac{1}{32}$	0	0	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{1}{32}$					
TOP LEFT	A	0	$\frac{3}{64}$	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{16}$	0	0	0	0	0	$\frac{1}{64}$					
	B	0	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{64}$	0	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{64}$					
BOTTOM RIGHT	A	0	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{32}$	0	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{64}$	0					
	B	0	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{64}$	$\frac{1}{64}$	0	0	$\frac{1}{32}$	$\frac{1}{32}$	0	$\frac{1}{64}$					
BOTTOM LEFT	A	0	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{32}$	0	0	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{1}{32}$					
	B	0	$\frac{3}{64}$	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{3}{64}$	0	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{5}{64}$	$\frac{1}{16}$					

BOOM CONSTRUCTION

1		2	
3		4	OTHER:

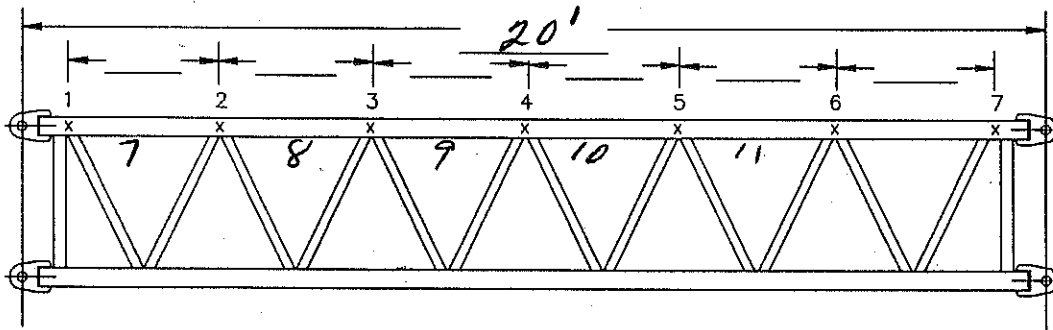
BOOM TYPE: Boom Mid #1 (340 L)

Q C BY: Derrick Moller

DATE: 11-2-98

FORM: 0069  
REV.:  
DATE:

# WORK ORDER #: 059801 MAIN CHORD STRAIGHTNESS CHECK



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TOP RIGHT	A	0	$\frac{1}{64}$	0	0	$\frac{1}{32}$	0	0	$\frac{1}{32}$	0	$\frac{1}{64}$	$\frac{1}{32}$					
	B	0	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{32}$	0	0	$\frac{1}{64}$	$\frac{1}{32}$	0	0	0					
TOP LEFT	A	0	0	0	$\frac{1}{64}$	0	0	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{32}$	0					
	B	0	$\frac{1}{64}$	0	0	$\frac{1}{64}$	0	$\frac{1}{64}$	$\frac{1}{32}$	0	0	0					
BOTTOM RIGHT	A	0	$\frac{1}{64}$	0	$\frac{1}{64}$	$\frac{1}{64}$	0	$\frac{1}{64}$	$\frac{1}{64}$	0	$\frac{1}{64}$	$\frac{1}{64}$					
	B	0	$\frac{1}{64}$	0	0	0	0	$\frac{1}{64}$	0	0	0	0					
BOTTOM LEFT	A	0	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{32}$	0	$\frac{1}{64}$	$\frac{1}{32}$	0	$\frac{1}{64}$	$\frac{1}{32}$					
	B	0	$\frac{3}{64}$	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{3}{64}$	0	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{1}{64}$					

BOOM CONSTRUCTION

1	
2	
3	
4	OTHER:

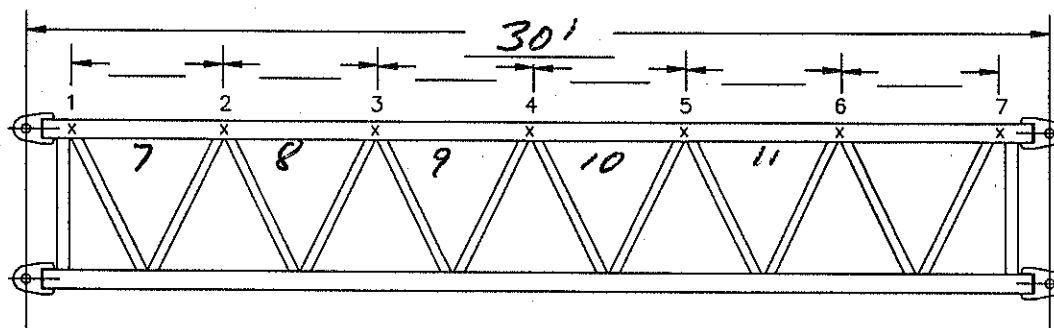
BOOM TYPE: Boom Base (340L)

Q C BY: Kevin J. Moller

DATE: 11-3-98

# WORK ORDER #: 059801

## MAIN CHORD STRAIGHTNESS CHECK



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TOP RIGHT	A	0	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{1}{32}$	$\frac{1}{16}$	0	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{16}$	$\frac{3}{32}$					
	B	0	0	0	0	$\frac{1}{64}$	0	0	$\frac{1}{32}$	0	$\frac{1}{32}$	$\frac{1}{32}$					
TOP LEFT	A	0	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{64}$	$\frac{3}{32}$	0	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{32}$					
	B	0	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{32}$	0	0	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	0					
BOTTOM RIGHT	A	0	$\frac{1}{64}$	0	$\frac{1}{64}$	$\frac{1}{64}$	0	0	0	$\frac{1}{64}$	$\frac{1}{32}$	0					
	B	0	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{1}{32}$	$\frac{3}{64}$	0	0	0	$\frac{1}{32}$	0	$\frac{1}{64}$					
BOTTOM LEFT	A	0	$\frac{1}{64}$	0	$\frac{1}{64}$	0	0	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{1}{32}$					
	B	0	$\frac{1}{64}$	$\frac{1}{64}$	0	$\frac{1}{64}$	0	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{1}{32}$					

BOOM CONSTRUCTION

1		2	
3		4	OTHER:

BOOM TYPE: Boom Mid #2 (3402)

Q C BY: univ/j muller

DATE: 11-4-98

# Paint Inspection Log

NO : NES18-058  
REV : 0  
APPRV : T. H.  
DATE : 07/1/95

APPROVED: [Signature]

059801 PEMEX 340 LA-140

Weldment	SECOND COAT							THIRD COAT						
	Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	DFT	Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	DFT
Boom Base	11/19	100	77	77	68	74	6-10							
Boom mid <sup>04</sup>	11/24	100	72	75	63	73	6-10							
Boom mid <sup>05</sup>	11/19	100	77	77	68	74	7-11							
Boom Top	11/24	100	72	75	63	73	6-10							
Gantry	11/19	1200	77	73	65	67	8-12							
CAB	11/24	1000	71	72	65	81	6-10							
POWER UNIT	11/24	1000	71	72	65	81	6-10							
UPPER STRUCTURE	11/27	1100	75	74	68	78	6-10							
Boom mid	11/29	1000	75	74	66	74	6-10							
Idler	11/29	1100	75	74	66	74	6-10							
Bridle	11/29	1100	75	74	66	74	6-10							
PEDESTAL	3/31	330	73	91	59	61	6-0							

TYPE ☐ D-9 TYPE ☒ PSX-700 TYPE ☐ TYPE ☐

2-3 miles OFFSHORE YELLOW  
4-7 miles

## BATCH NUMBERS:

LIQUID LK 19980410532  
POWDER G 804290

LR 1998090168

# Paint Inspection Log

059801 REMEX 340LA-140

APPROVED:

Weldment	BLAST					FIRST COAT								
	Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	Profile	Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	DFT
BOOM BASE	11/6	900	51	53	43	75	2.0	11/6	200	63	66	47	53	2-4
BOOM MID <sup>64</sup>	11/6	900	51	53	43	75	2.2	11/6	330	63	86	44	50	2-3 1/2
BOOM MID <sup>05</sup>	11/9	1000	78	75	68	71	2.1	11/9	200	81	87	66	61	2-3
BOOM TIP	11/9	1000	78	75	68	71	1.7	11/9	330	79	81	67	68	2-3
CAB	11/9	1000	78	75	68	71	2.1	11/9	200	81	87	66	61	
GANTRY	11/11	1000	56	56	42	60	2.0	11/11	300	63	62	49	60	2-3
CAB	11/19	1200	77	77	69	74	2.0	11/19	330	77	85	68	74	2-3
POWER UNIT	11/20	100	80	80	70	72	2.1	11/20	330	78	81	68	71	2 1/4
UPPER STRUCTURE	11/24	1000	71	72	65	81	2.2	11/24	300	72	75	63	73	2-4
BOOM MID	11/25	1100	76	75	67	74	2.0	11/25	200	77	80	58	52	2-4
IPILER	11/28	1200	75	71	64	70	2.0	11/28	200	75	71	64	70	2-3
BRIDLE	11/28	1200	75	71	64	70	2.3	11/28	200	75	71	64	70	2-4
PEDESTAL	3-3	100	62	70	38	41	1.9	3-3	400	61	82	39	44	2-3

**PRESS-O-FILM™**  
 No. Boon 4.0  
 Reading 4.0  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. Boon 4.2  
 Reading 4.2  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. Boon 4.2  
 Reading 4.2  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. Boon 4.2  
 Reading 4.2  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. Boon 4.2  
 Reading 4.2  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. CAB 3.0  
 Reading 3.0  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. CAB 3.1  
 Reading 3.1  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. CAB 3.1  
 Reading 3.1  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. CAB 3.1  
 Reading 3.1  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. CAB 3.1  
 Reading 3.1  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. 30-2.5  
 Reading 2.5  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. 30-2.5  
 Reading 2.5  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. 30-2.5  
 Reading 2.5  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. 30-2.5  
 Reading 2.5  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

**PRESS-O-FILM™**  
 No. 30-2.5  
 Reading 2.5  
 Gage less 2.0 mils or 50 microns  
 COARSE (8-2.0 mils) or (20 to 50 microns)

ILLAGE: 6-10