Manufactured for
PENCO GROUP

Installation, Operation and Maintenance Manual

Nautilus Crane Model 340LA-160
Serial Number 059803C

ISO-9001
Reg. Firm
94-66

Oil States Industries

API SPEC 2C
LIC. NO., 2C-0007

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-160
Serial Number 059803C

Manufacture Date ..... September 1999

Engine N47101-006
Serial Number 64Z27270
Arrangement Number 131-2993

Main Hoist N46760-001
Serial Number 9807661

Auxiliary Hoist N46433-002
Serial Number 9800293

Boom Hoist N46430-002
Serial Number 9805550

Load Block (Main) N46831-139
Serial Number 9816587

Overhaul Ball (Auxiliary) N46832-031
Serial Number 9816929

Ballring N46397-002
Serial Number. 10867-4

Swing Drive Assembly:
Motor N45686-006
Gearboxes... ..... N47103-001
Brakes N45955-001
Pinions N61503-001

ORIGINAL

LICENSE NO. 2C-0007

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Certificate of Authority to Use Official Monogram

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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,

S. William Frick

Secretary

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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:

WARNING!

If for any reason, protective devices, guards, etc., have been removed for maintenance or are not operating, refit or correct before operating crane.

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

SEPTEMBER 1999

MANUFACTURER'S MODEL NO. 340LA-160

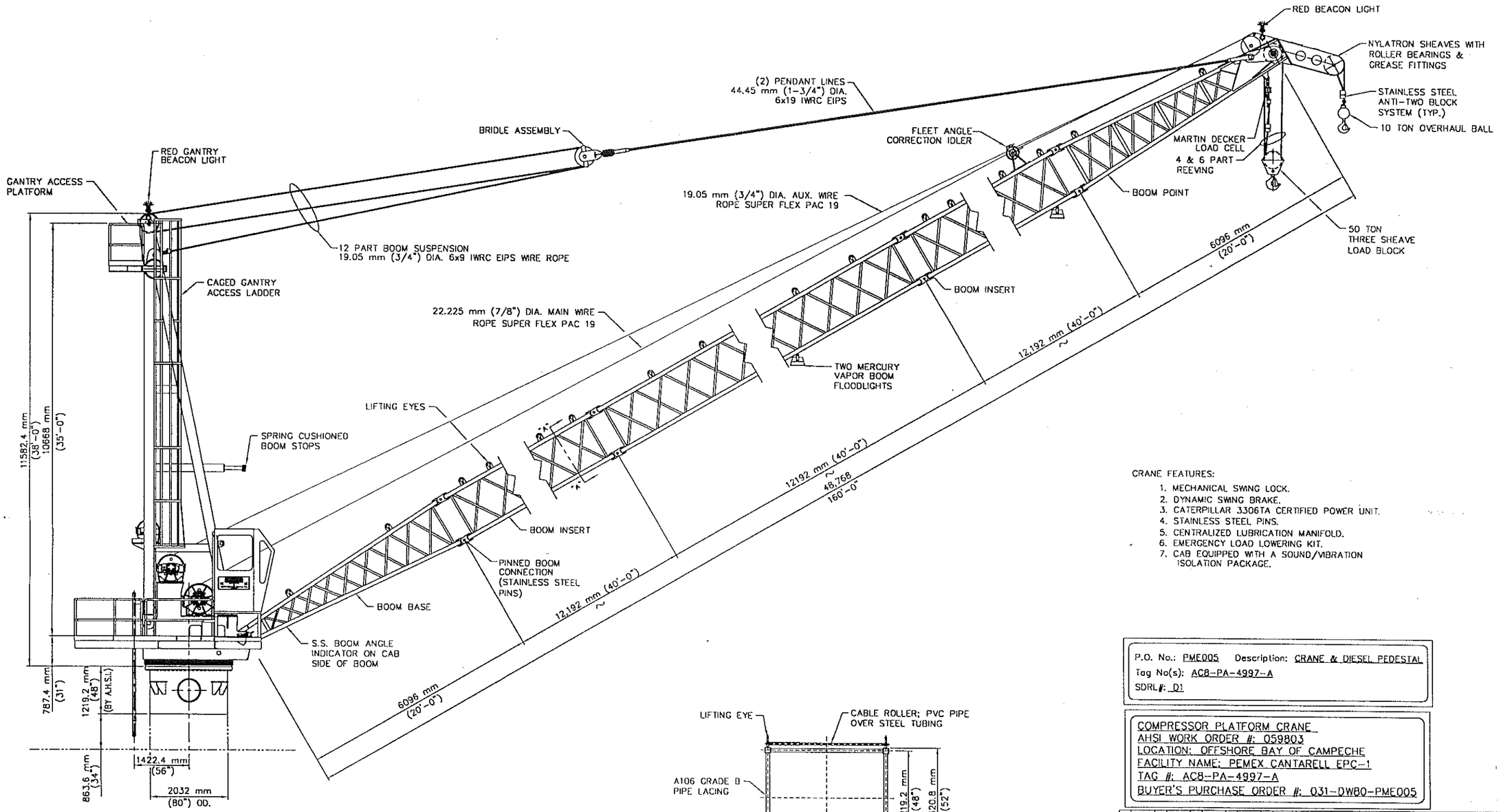
DESIGN SERVICE TEMPERATURE +68 DEG. F.

MANUFACTURER SERIAL NUMBER 059803C

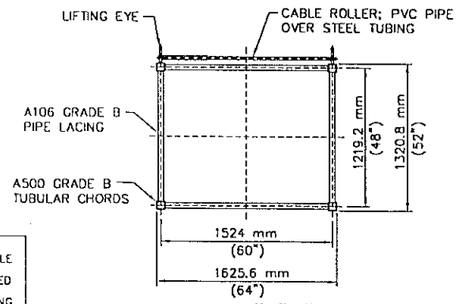
MANUFAC-TURED BY APPLIED HYDRAULIC SYSTEMS, INC
NAUTILUS MARINE CRANES

ADDRESS HOUMA, LOUISIANA 70363

CRANE GENERAL ARRANGEMENT DRAWING



* PLEASE PROVIDE THE DECK STUB HEIGHT OR ELEVATIONS



SECTION "A"-"A"
TYP. BOOM CROSS SECTION
N.T.S.

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. DEC. 07, 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.: PME005 Description: CRANE & DIESEL PEDESTAL
Tag No(s): AC8-PA-4997-A
SDRL#: D1

COMPRESSOR PLATFORM CRANE
AHSI WORK ORDER #: 059803
LOCATION: OFFSHORE BAY OF CAMPECHE
FACILITY NAME: PEMEX CANTARELL EPC-1
TAG #: AC8-PA-4997-A
BUYER'S PURCHASE ORDER #: 031-DW80-PME005

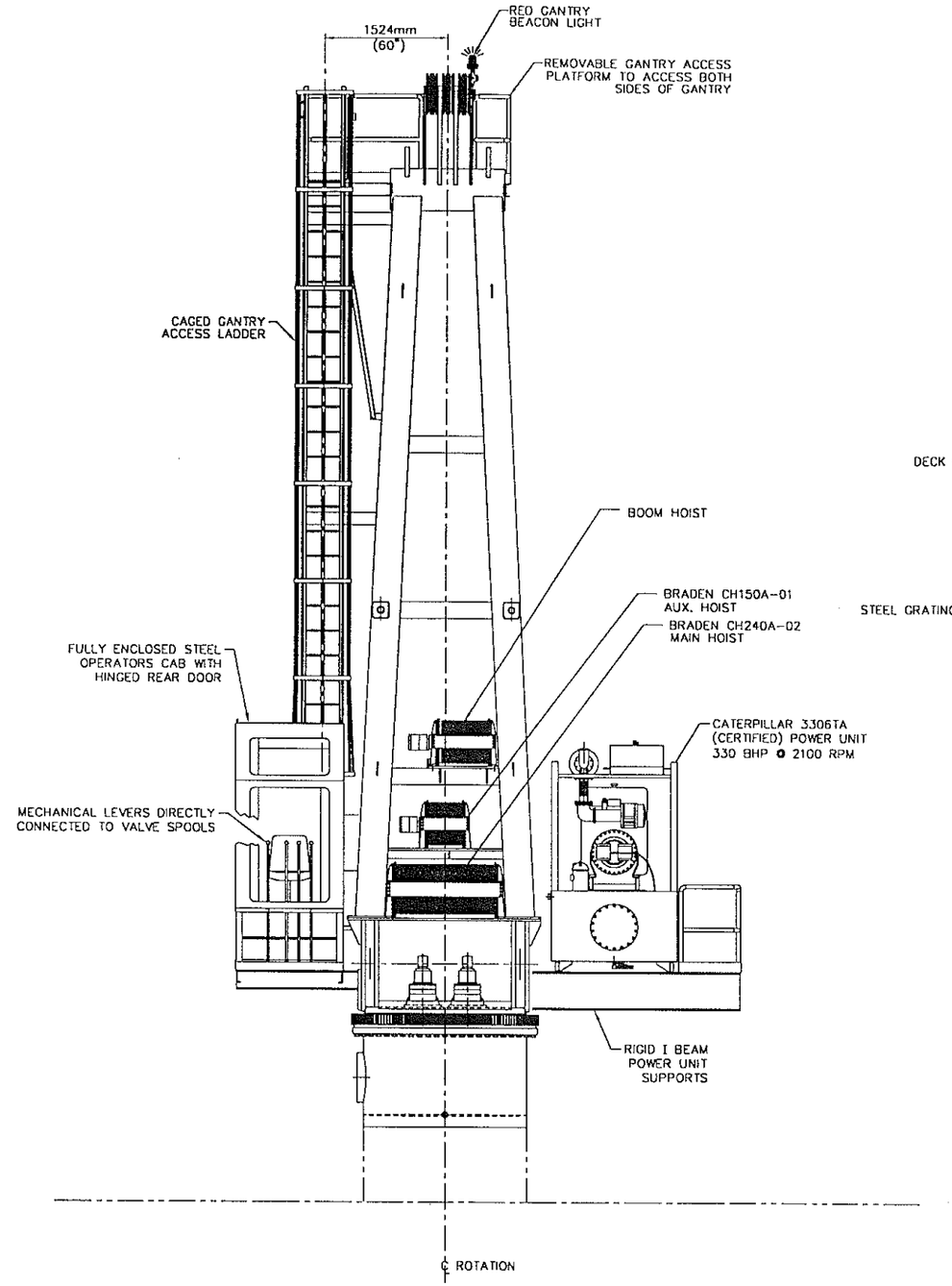
REVISIONS	DESCRIPTION
BY: JANELLE APP'D. AG DATE: 12/07/99	A ADDED LIFTING EYES

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

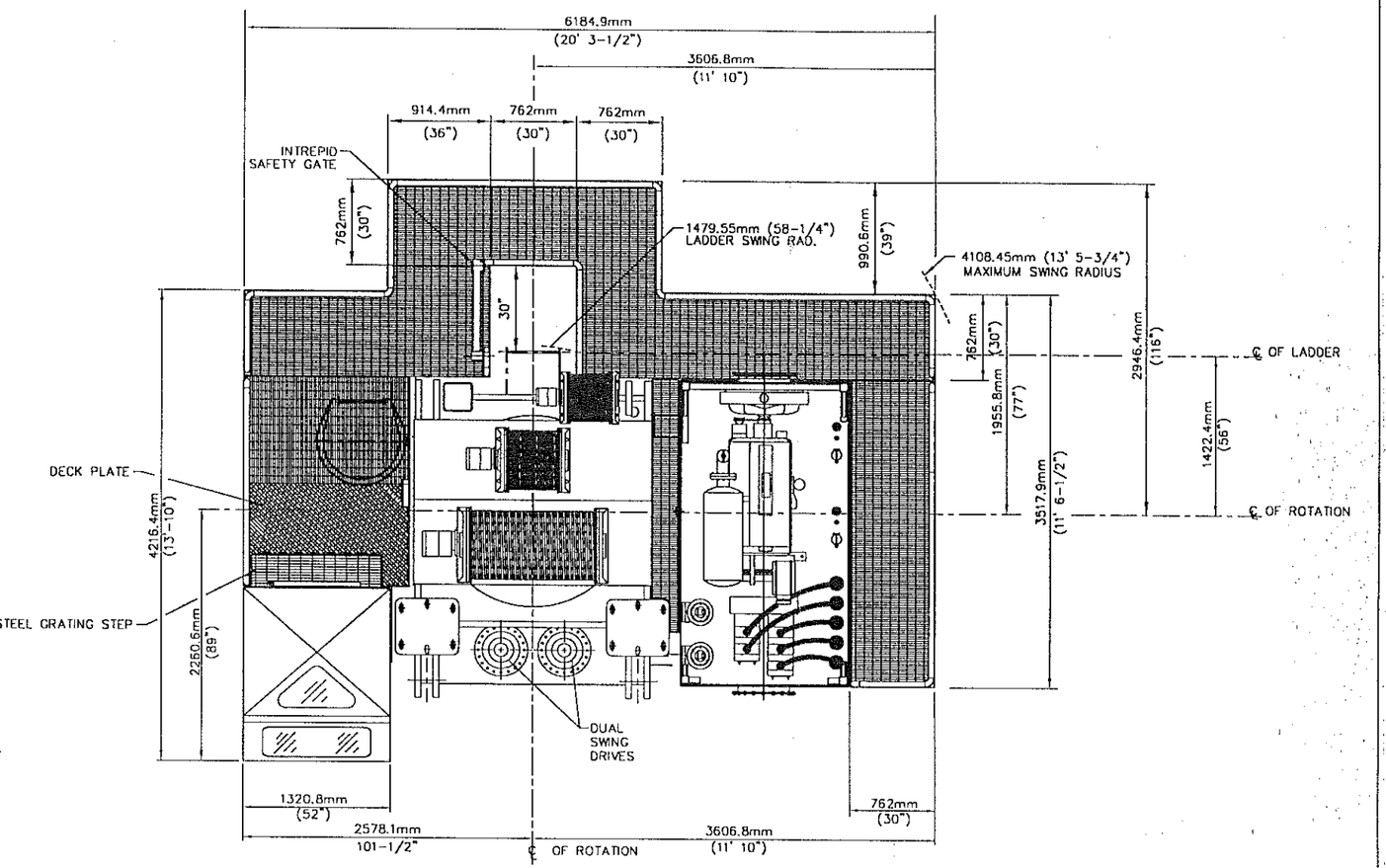
GENERAL ARRANGEMENT
MODEL 340LA-160
PEMEX

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.

DWG. NO. N99SK4-072 A
SCALE: 1/4"=1'-0" DRAWN BY: DANNY
DATE: 7/19/99 APP'D BY: SHT 1 OF 2



FRONT ELEVATION
(BOOM NOT SHOWN FOR CLARITY)



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

P.O. No.: PME005 Description: CRANE & DIESEL PEDESTAL
Tag No(s): AC8-PA-4997-A
SDRL#: D1

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. DEC. 07, 1999

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

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

GENERAL ARRANGEMENT
MODEL 340LA-160
PEMEX

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DWG. NO. N99SK4-072 A
SCALE: 3/8"=1'-0" DRAWN BY: DANNY
DATE: 7/19/99 APP'D BY: SHT 2 OF 2

Crane Acceptance Test Procedure and Report

Applied Hydraulic Systems, Inc.
Houma, Louisiana

NAUTILUS
Marine Cranes

Nautilus Model 340LA-160 Marine Crane

for

PEMEX Exploration Y Production (B & R)
Cantarell EPC-1 Project

Serial Number 059803C
Tag Number AC8-PA-4997-A

9-29-99

(Applied Hydraulic Systems, Inc. Representative)

(Brown & Root/ PEMEX Representative)

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	34,269	34,216	99.8%	2000	600	2500	1300	400	300	2800	800	34,500	40.5
2	41.1	7,152	7,147	99.9%	600	600	1200	1400	350	250	1700	700	7,500	

Auxiliary Hoist: 1-Part Reeving

Test No.	Radius (M)	Static Rated Load (Kg)	Test Load (Kg)	Percent of Rated Load	Cracking Pressure Aux. (PSI)		Full Speed Pressure Aux. (PSI)		Swing Pressure (PSI)		Boom Pressure (PSI)		Hook Speed (FPM)
					Up	Down	Up	Down	CCW	CW	UP	Down	
3	26.0	4,452	4,494	100.9%	2500	500	2800	1000	300	200	1100	600	250

TEST WEIGHTS

1	SLG + D + G + H + I +3 RD WTS	
	483 + 8,163 + 6,644 + 6,372 + 12,023 + 531	=34,216 Kg (75,446 Lb.)
2	SLG + H +4 RD WTS	
	68 + 6,372 + 707	=7,147 Kg (15,759 Lb.)
3	SLG + 3" PL + A + F +8 RD WTS	
	45 + 1,361 + 1,070 + 603 + 1,415	=4,494 Kg (9,909 Lb.)

SECTION 1 - Gauges:

Accept	Not Accept	
☒	☐	Hydraulic Pressure *(Main Hoist)*
☒	☐	Hydraulic Pressure *(Aux. Hoist)*
☒	☐	Hydraulic Pressure *(Boom)*
☒	☐	Hydraulic Pressure *(Swing)*
☒	☐	Hydraulic Pressure *(Return)*
☒	☐	Engine Oil Pressure
☒	☐	Accumulator Pressure
☒	☐	Engine Water Temperature
☒	☐	Hydraulic Oil Temperature
☒	☐	Engine Tachometer
☒	☐	Hydraulic Oil Level
☒	☐	Diesel Fuel Level
☒	☐	Load Cell

SECTION 2 - Function Test the Following:

Accept	Not Accept	
☒	☐	Engine Start
☒	☐	Engine Throttle
☒	☐	Engine Air Intake Shutdown
☒	☐	Engine Shutdown
☒	☐	Main Line Anti-Two Block
☒	☐	Auxiliary Line Anti-Two Block
☒	☐	Swing Park Brake
☒	☐	Mechanical Swing Lock
☒	☐	Free Swing Capability
☒	☐	Dynamic Swing Brake
☒	☐	High Angle Kickout
☒	☐	Low Angle Kickout
☒	☐	High/Low Boom Angle Kickout Override
☒	☐	Low Oil Pressure/High Water Temperature Shutdown
☒	☐	Engine Overspeed Shutdown
☒	☐	360° Continuous Rotation

SECTION 3 - Electrical:

Accept	Not Accept	
☒	☐	Boom Floodlights (2)
☒	☐	Boom Tip Beacon (Red)
☒	☐	Gantry Beacon (Red)
☒	☐	Cab Light
☒	☐	Power On Light
☒	☐	Circuit Breaker
☒	☐	Attention Horn
☒	☐	Air Conditioner
☒	☐	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:	60	900	1300
Boom Down:	60	700	1500
Main Hoist Up:	60	100	700
Main Hoist Down:	60	600	1400
Aux. Hoist Up:	60	300	600
Aux. Hoist Down:	60	700	1300
Swing CW:	60	200	1000
Swing CCW:	60	200	1000

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

NAUTILUS
MARINE CRANES

LIFTING LOAD CAPACITY CHART

NAUTILUS MODEL 340LA-160 MARINE CRANE

Applied Hydraulic Systems, Inc. Houma, La.

		MAIN HOIST				AUXILIARY HOIST		
		4 PART REEVING		6 PART REEVING		1 PART REEVING		
RADIUS (M)	BOOM ANGLE (DEG.)	STATIC (Kg)	DYNAMIC (Kg)	STATIC (Kg)	DYNAMIC (Kg)	STATIC (Kg)	DYNAMIC (Kg)	PERSONNEL (Kg)
9.1	81	25571	22498	34,269	22498			
10.7	79	25571	19458	29,709	19458			
12.2	77	25571	17249	26,396	17249			
13.7	76	23875	15568	23875	15568			
15.2	74	21878	14237	21878	14237			
16.7	72	20245	13148	20245	13148			
18.2	70	18875	12235	18875	12235			
19.8	68	17700	11452	17700	11452			
21.3	66	16675	10768	16675	10768			
22.8	64	15765	10162	15765	10162			
24.3	62	14947	9617	14947	9617			
26.0	60	14202	9120	14202	9120	4,452	4,452	1,334
27.4	58	13516	8663	13516	8663			
29.0	56	12674	8101	12674	8101			
30.4	54	11748	7484	11748	7484			
32.0	51	10909	6925	10909	6925			
33.5	49	10144	6415	10144	6415			
35.0	47	9444	5948	9444	5948			
36.5	44	8802	5520	8802	5520			
38.1	41	8209	5125	8209	5125			
39.6	39	7661	4759	7661	4759			
41.1	36	7152	4420	7152	4420			
42.6	32	6679	4105	6679	4105			
44.2	29	6237	3810	6237	3810	4,452	4,452	1,334
45.7	24	5823	3534	5823	3534	4,452	4,412	1,334
47.2	20	5435	3275	5435	3275	4,452	4,153	1,334
48.7	14	5067	3030	5067	3030	4,452	3,908	1,334
50.3	0	4398	2584	4398	2584	4,452	3,461	1,334

NOTE:
- MAIN HOIST CAPACITIES ARE BASED ON 4 OR 6 PART REEVING OF 22.2 mm DIAMETER, DYFORM 18 HSLR WIRE ROPE. (BREAKING STRENGTH = 39735 Kg) 663 M OF ROPE IS REQUIRED.
- AUXILIARY HOIST CAPACITIES ARE BASED ON SINGLE PART LINE OF 19 mm DIAMETER, DYFORM 18 HSLR WIRE ROPE. (BREAKING STRENGTH = 29302 Kg) 191M 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: 059803C

TAG#: AC8-PA-4997-A

P/N: N99SK3-058

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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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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Telephone: (985) 868-0630
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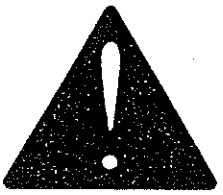
Fax: (985) 851-0778

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

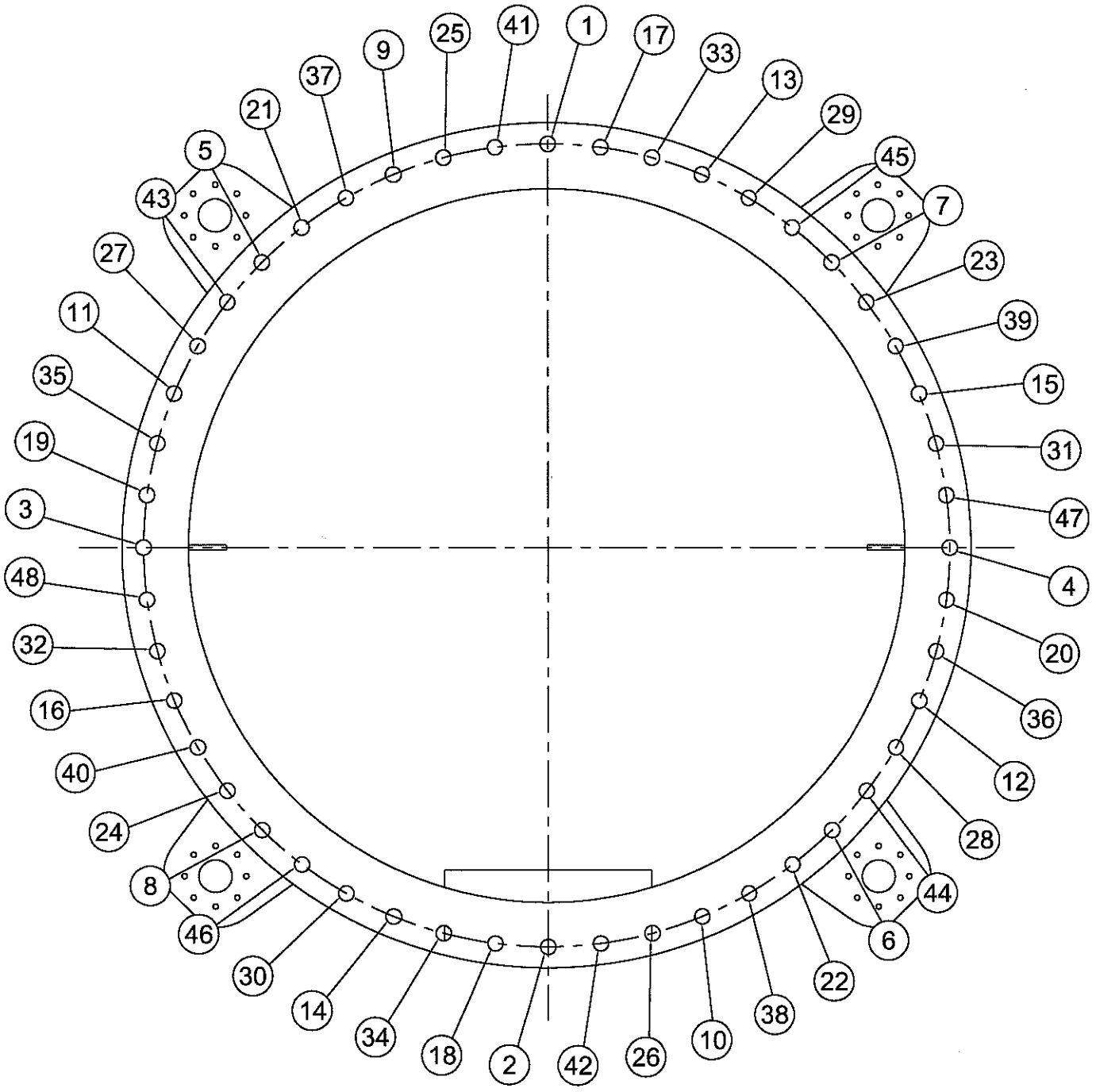
Telephone: + 66 (0) 38 691 643
Fax: + 66 (0) 38 691 644

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.

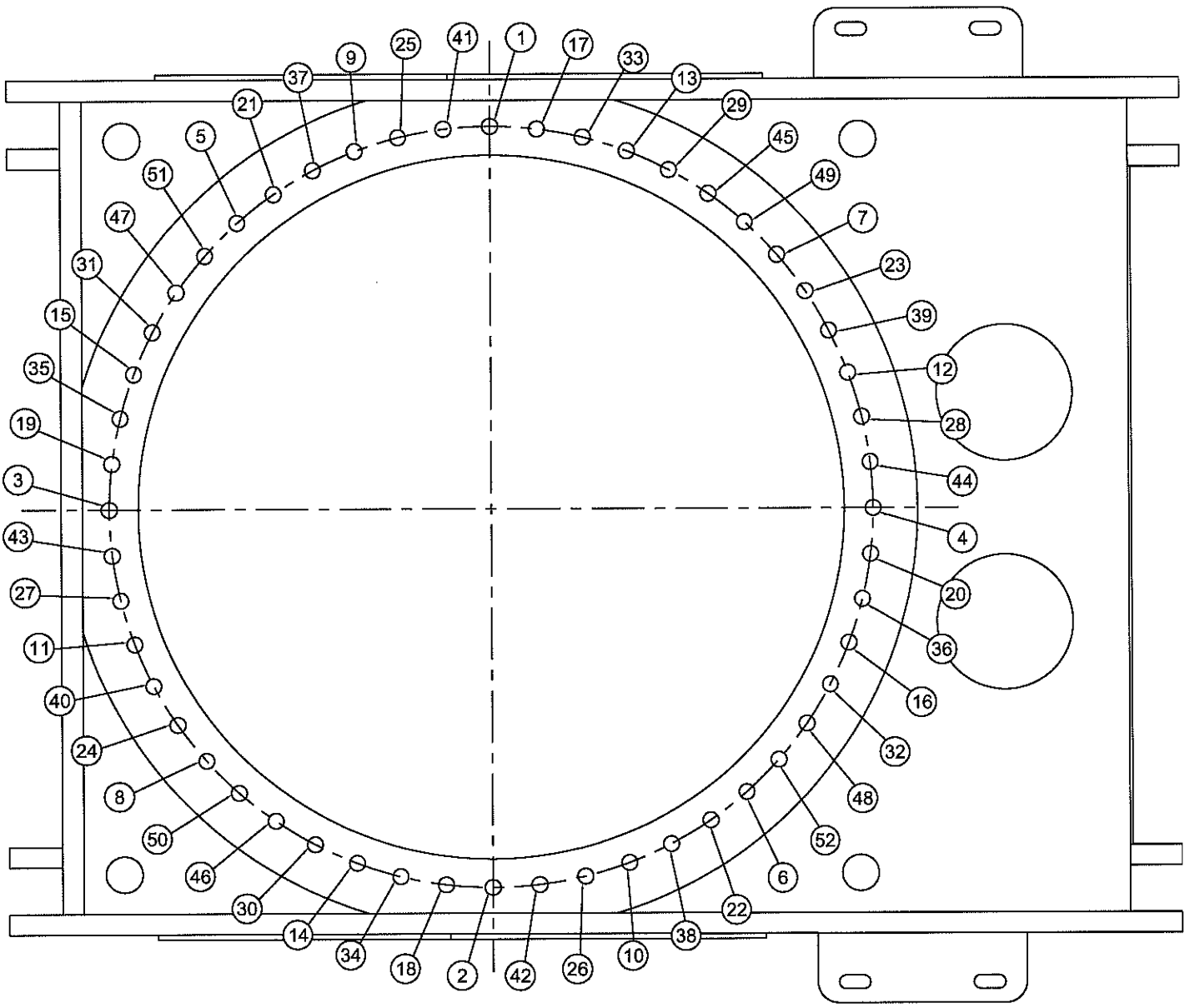


*NOTE: USE 1-1/2" - 6UNC x 5" LONG
GRADE 8 BOLTS MEETING
API 2C REQUIREMENTS

BOLT TORQUING PROCEDURE

BALLRING TO PEDESTAL

1. Do not use oil or grease (Hydraulic oil only).
2. Diagram shows the sequence bolts are to be tightened.
3. Bolts are to be torqued in increments of 50, 80 and 100% of the maximum torque value of 1,900 ft-lbs.
   a.) First iteration torque to 950 ft-lbs.
   b.) Second iteration torque to 1,520 ft-lbs.
   c.) Final iteration torque to 1,900 ft-lbs.



*NOTE: USE 1-1/2" - 6UNC x 5" LONG
GRADE 8 BOLTS MEETING
API 2C REQUIREMENTS

BOLT TORQUING PROCEDURE

BALLRING TO UPPERSTRUCTURE

1. Do not use oil or grease (hydraulic oil only).
2. Diagram shows the sequence bolts are to be tightened.
3. Bolts are to be torqued in increments of 50, 80 and 100% of the maximum torque value of 1,900 ft-lbs.
   a.) First iteration torque to 950 ft-lbs.
   b.) Second iteration torque to 1,520 ft-lbs.
   c.) Final iteration torque to 1,900 ft-lbs.

TORQUE FOR PLATED FASTENERS

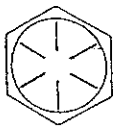
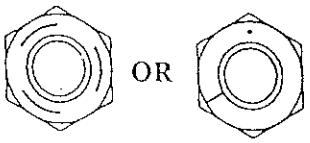
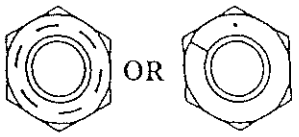
⚠ WARNING DO NOT APPLY TO CRANE MOUNTING BEARING.

- Threads must be free of debris, damage, and coated with hydraulic oil or a light machine oil. The torque valves 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

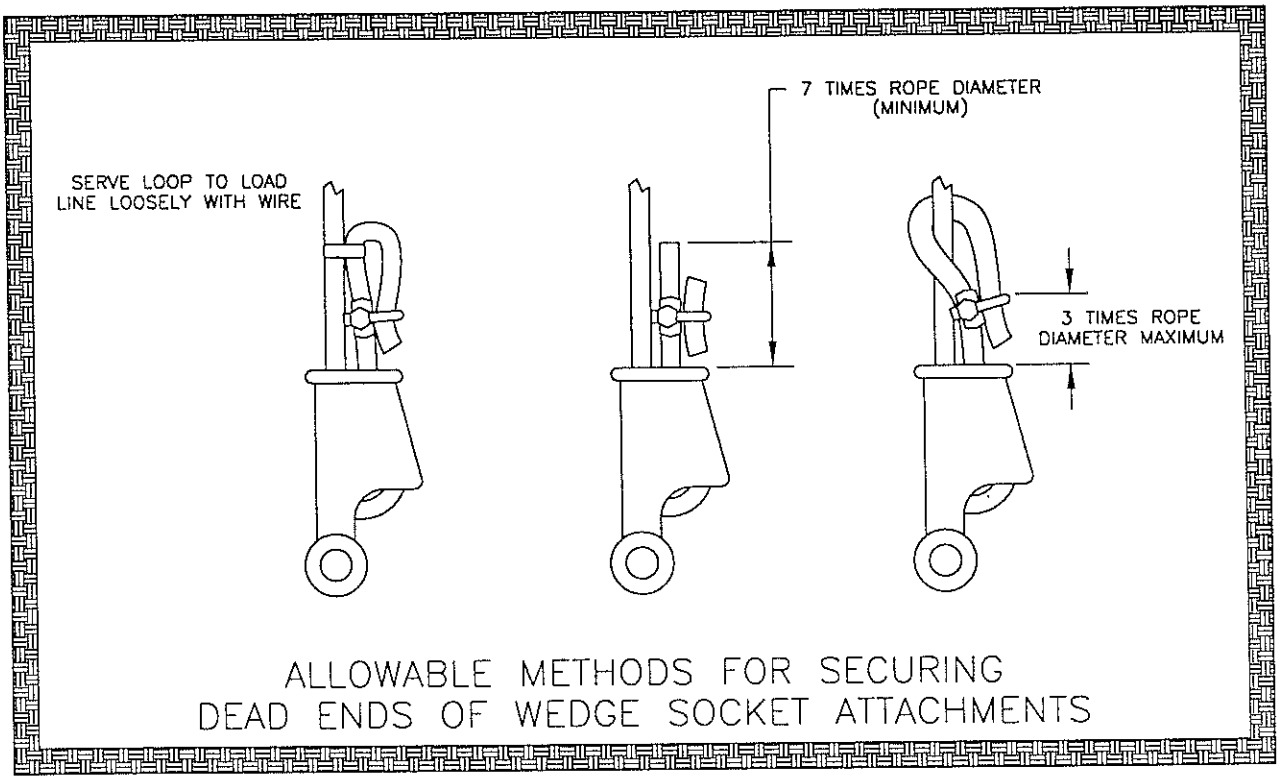
GRADE 5			
NOMINAL BOLT SIZE (IN)	MINIMUM (FT/LBS)	MID-RANGE (FT/LBS)	MAXIMUM (FT/LBS)
3/8 - 16	21	23	24
1/2 - 13	62	65	68
9/16 - 12	76	80	84
5/8 - 11	104	110	115
3/4 - 10	190	200	210
7/8 - 9	285	300	315
1 - 8	418	440	462
1-1/4 - 7	798	840	882
1-3/8 - 6	1,045	1,100	1,155
1-1/2 - 6	1,387	1,460	1,533

FASTENER MARKINGS

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

RECOMMENDED ANCHORING OF WIRE ROPE AT DEAD END

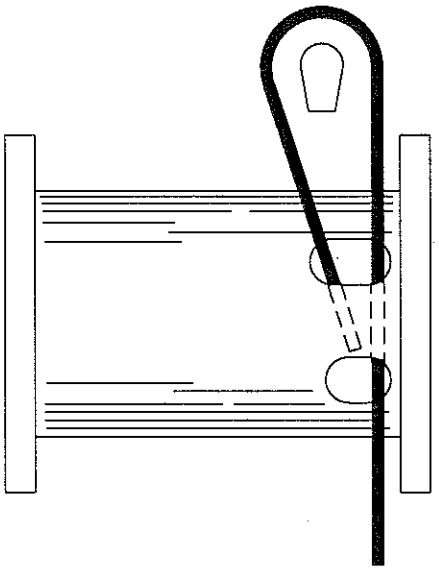
DEAD END – WEDGE SOCKET



ALLOWABLE METHODS FOR SECURING
DEAD ENDS OF WEDGE SOCKET ATTACHMENTS

ANCHORING WIRE ROPE

INSERT CABLE ANCHOR
SMALL END FIRST.



CH240A

MAIN HOIST – 7/8" WIRE ROPE

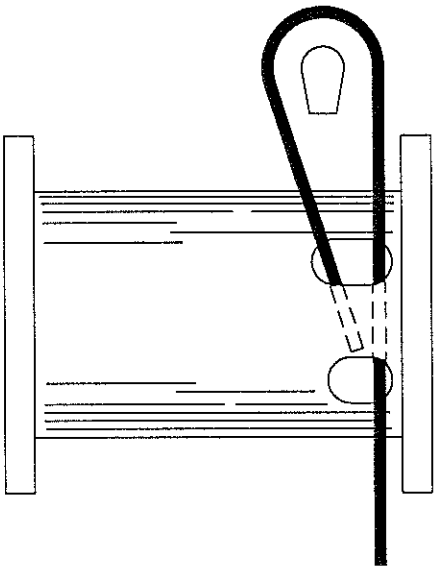
Anchoring wire rope on the hoist is very easy. Take the free end of the wire rope and insert it through the small opening of the anchor pocket. Loop the wire rope and push the free end about 3/4 of the way back through the pocket. Install the wedge, then pull the slack out of the wire rope. The wedge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

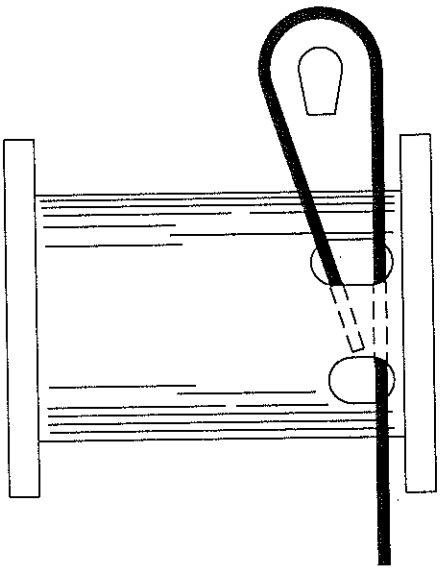
Anchoring wire rope on the hoist is very easy. Take the free end of the wire rope and insert it through the small opening of the anchor pocket. Loop the wire rope and push the free end about 3/4 of the way back through the pocket. Install the wedge, then pull the slack out of the wire rope. The wedge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

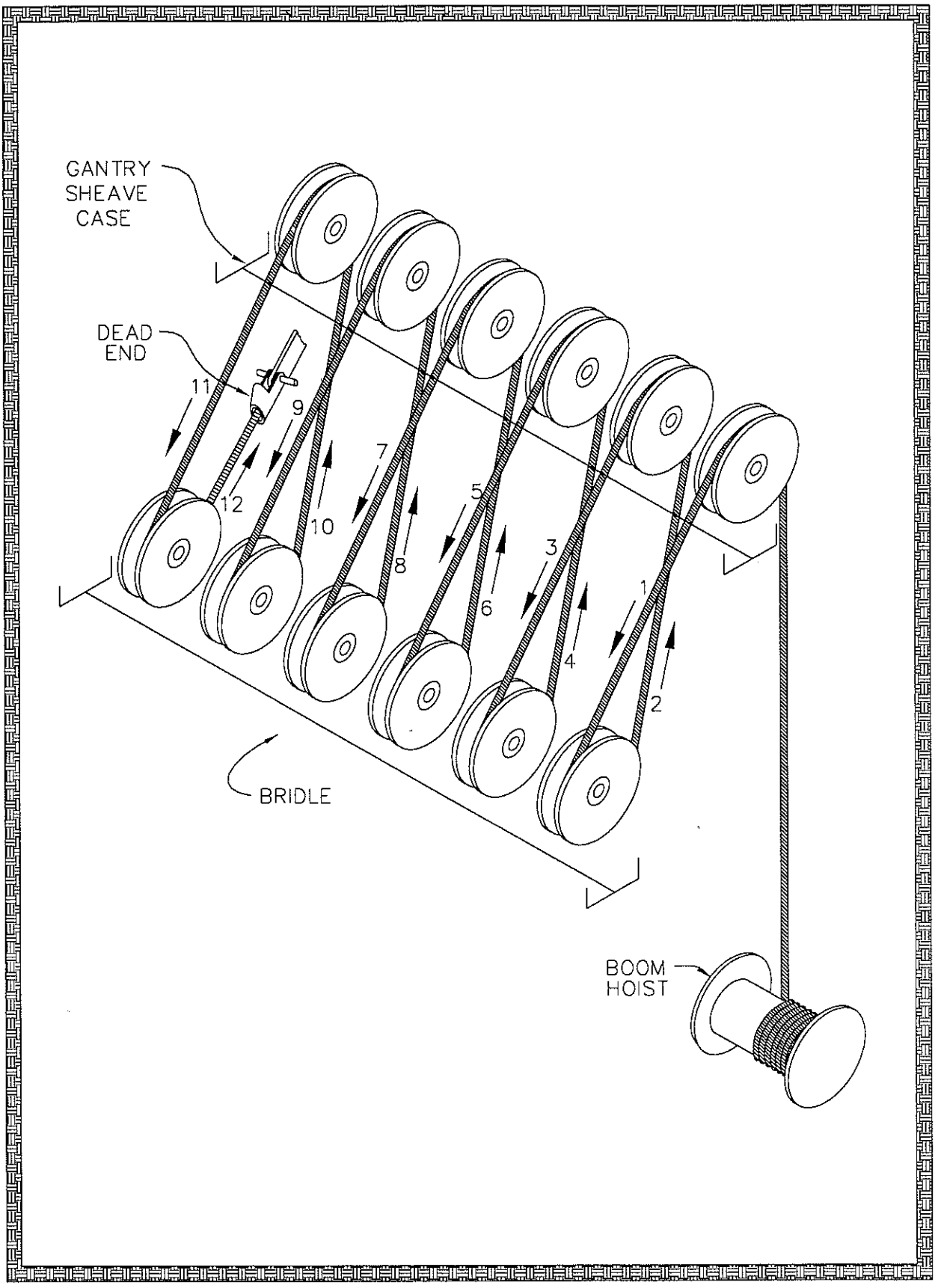
NAUTILUS
Marine Cranes

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.

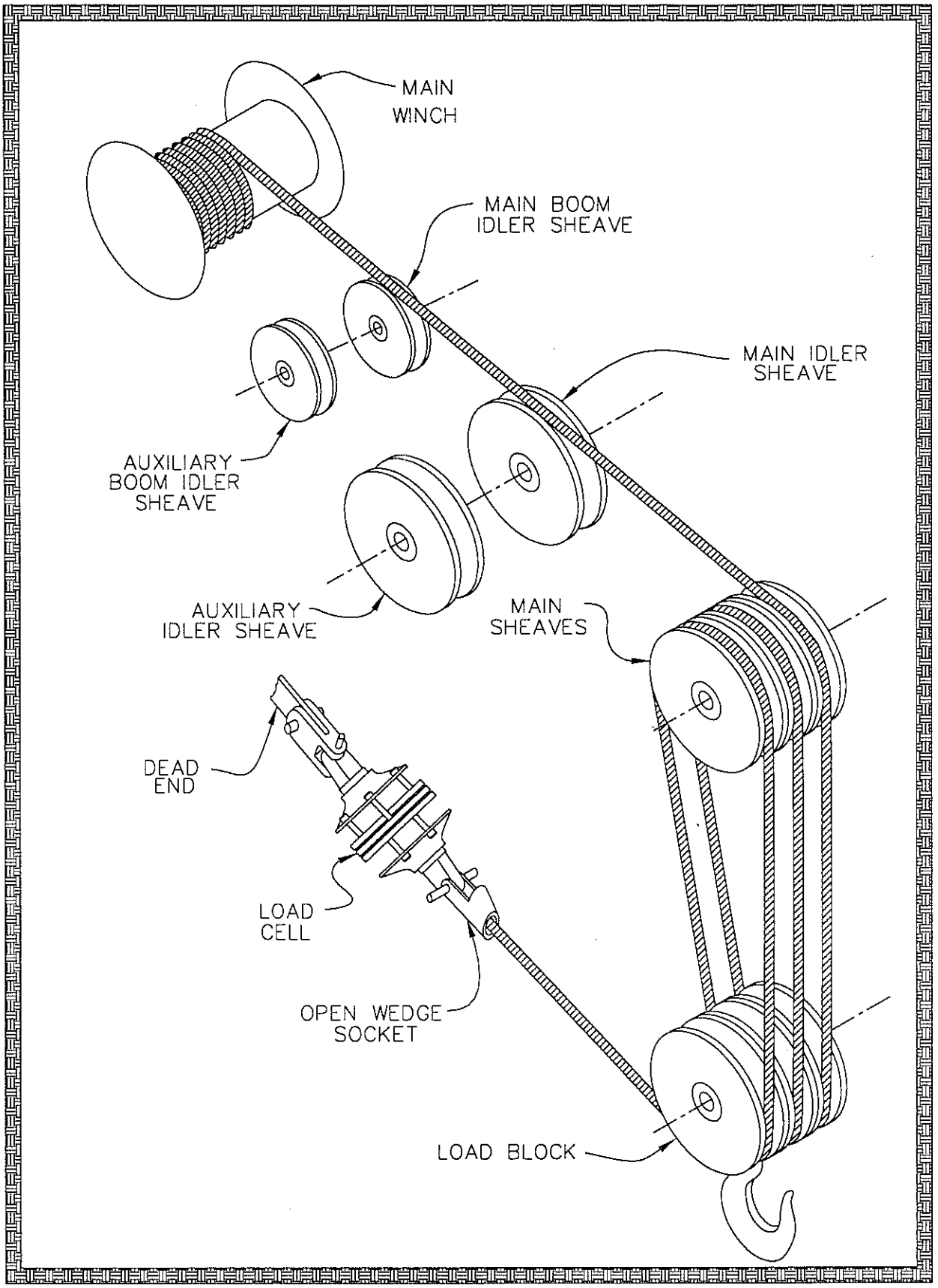
As you increase the loads, run each load weight from light to maximun expected load at least six times before proceeding, especially when the crane operator will make a series of heavy lifts with new ropes.

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



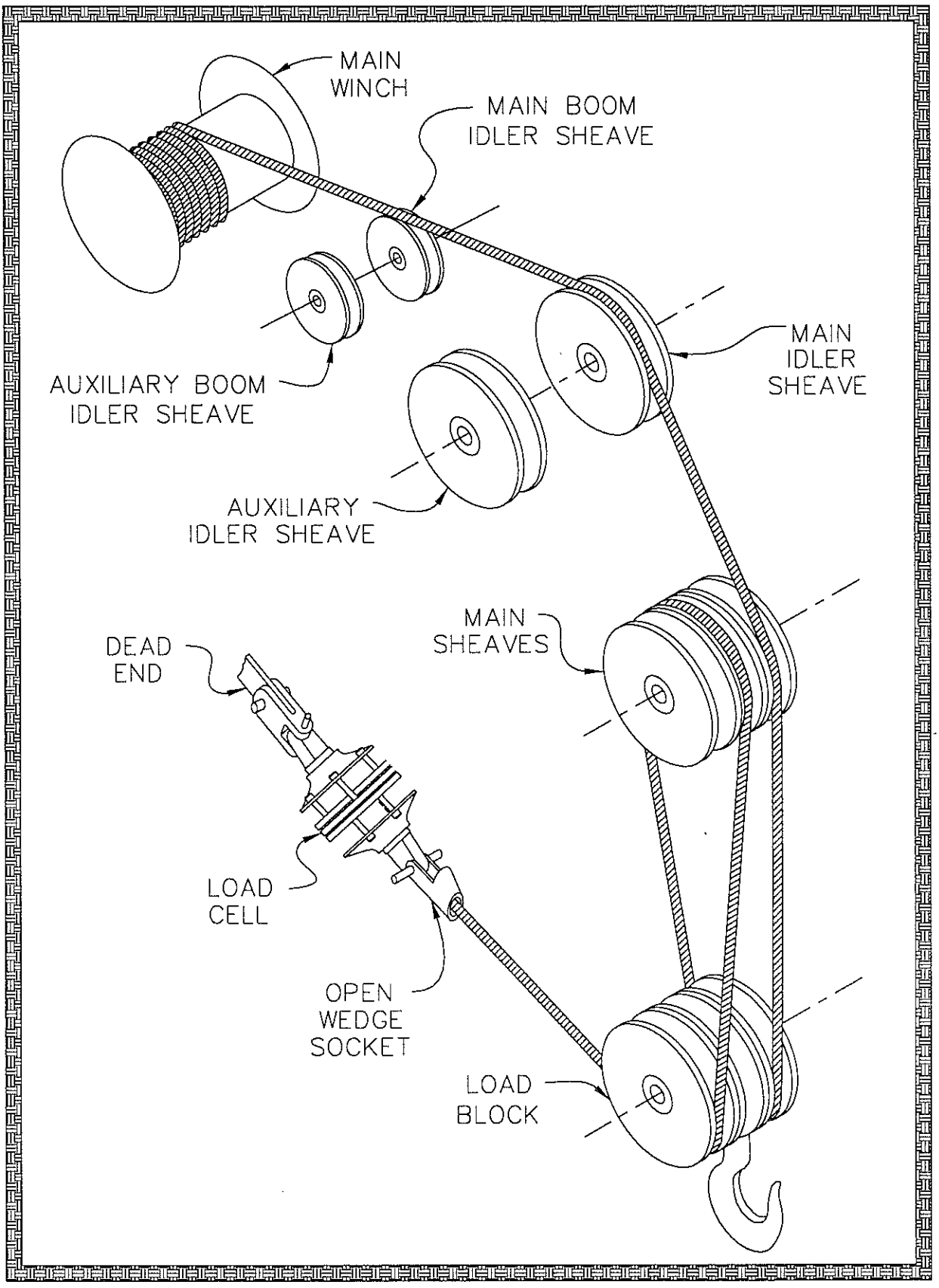
REEVING DIAGRAM

12 PART LINE



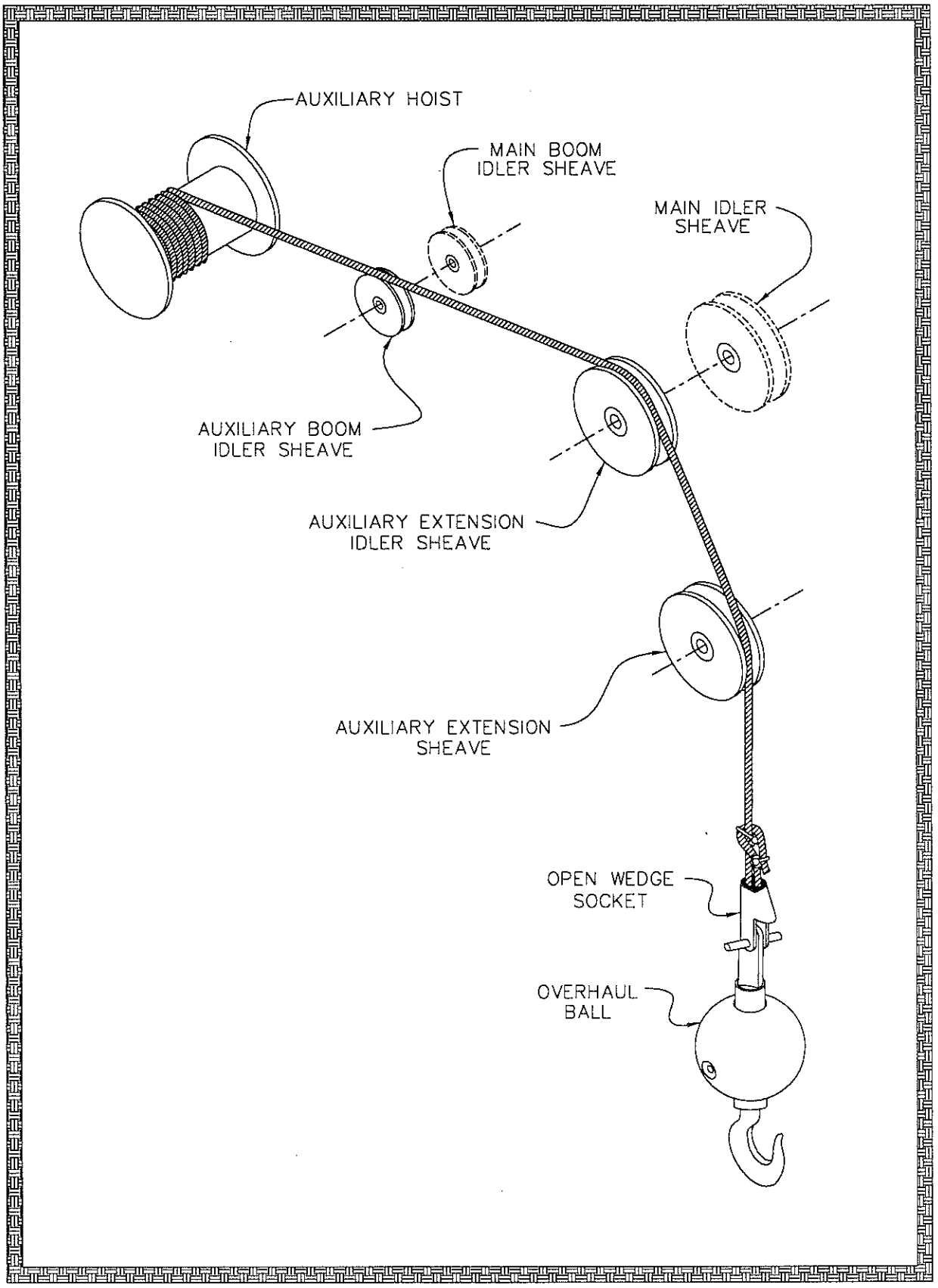
REEVING DIAGRAM

6 PART LINE



REEVING DIAGRAM

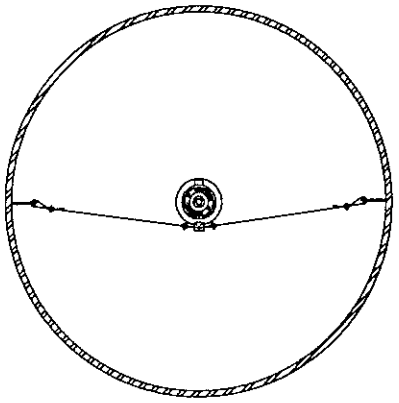
4 PART LINE



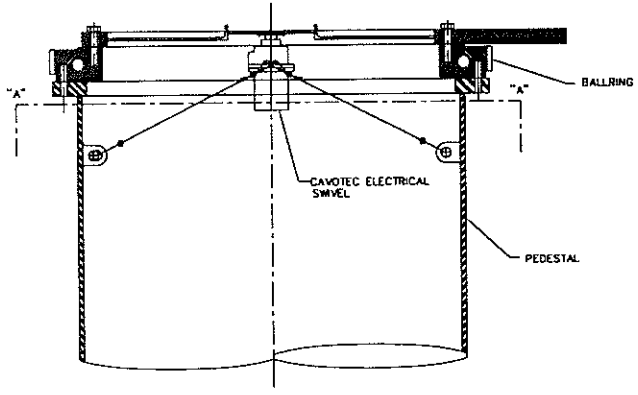
REEVING DIAGRAM

1 PART LINE

ELECTRICAL SWIVEL BRACKET



SECTION "A"–"A"



SIDE VIEW

APPLIED HYDRAULIC SYSTEMS, I

Manufacturer of NAUTILUS Marine Cranes

Sales & Service
(504) 851-3600
Fax No. (504) 851-0754

Manufacturing
204 Industrial A
Houma, LA

ELECTRICAL SWIVEL BRACKE
MODEL 340L

DWG. NO. N61638-008

DESCRIPTION

BY APP'D. DATE

REVISIONS

This drawing, including all novel and 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

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

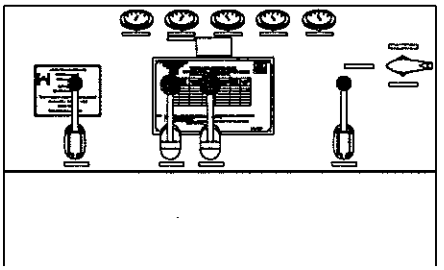
If difficulty is encountered with the repair of any assembly / component or if replacement parts are needed for any reason, contact the Oil States Industries Parts and Service Department for assistance at the following:

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.

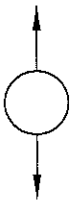
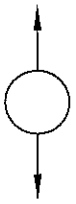
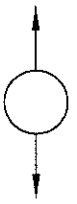
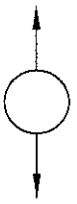
2. Check all pin connections and inspect ballring bolts for looseness and corrosion.

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)

SWING	AUXILIARY HOIST	MAIN HOIST	BOOM
PUSH – RIGHT	PUSH TO LOWER	PUSH TO LOWER	PUSH TO LOWER
			
PULL – LEFT	PULL TO RAISE	PULL TO RAISE	PULL TO RAISE

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 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 PUSH-BUTTON

Located on the cab floor to the left of the operator. Push button down to start engine.

10. DYNAMIC SWING BRAKE 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 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 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.

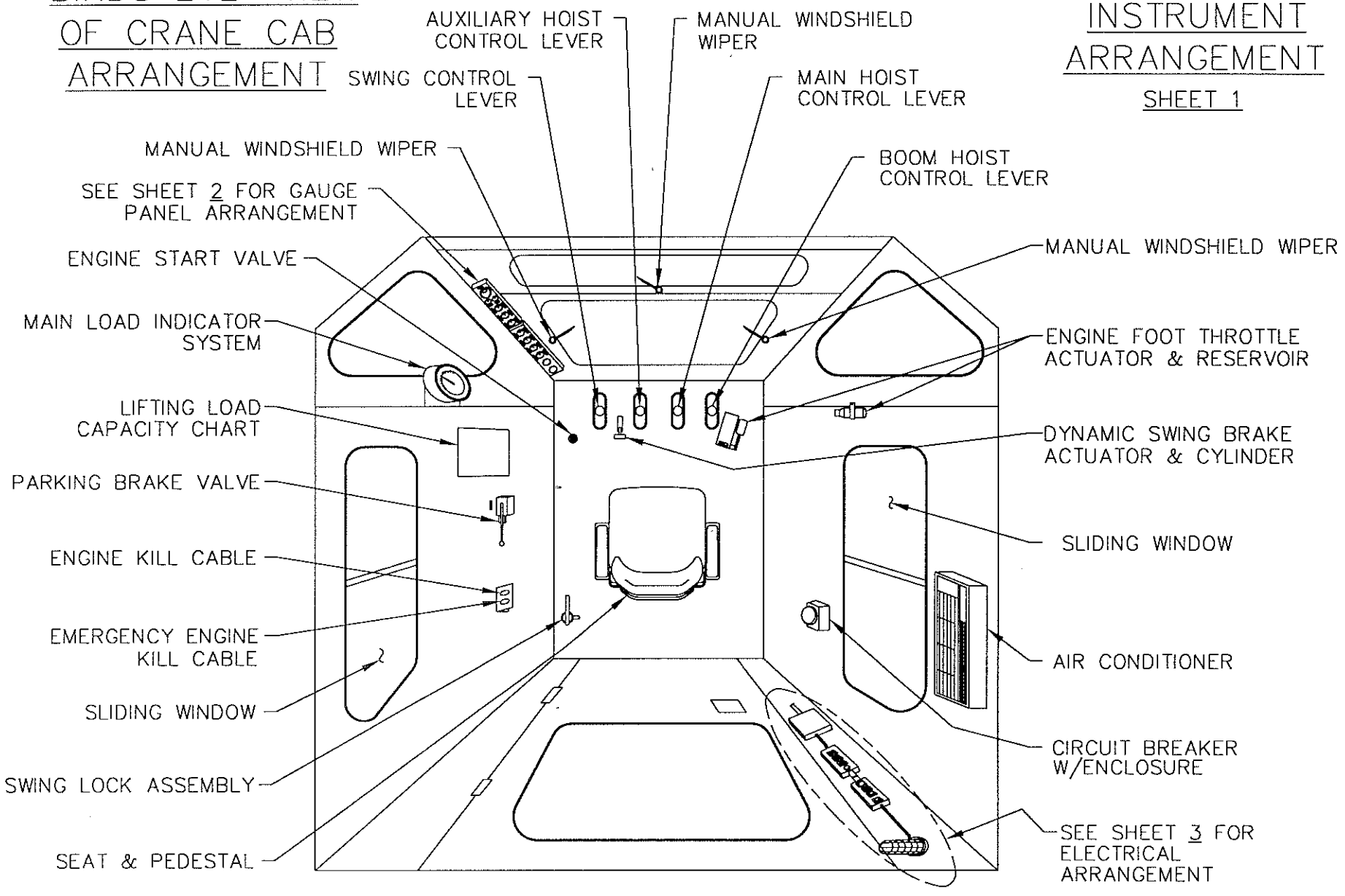
13. BOOM LOW ANGLE KICKOUT OVERRIDE VALVE

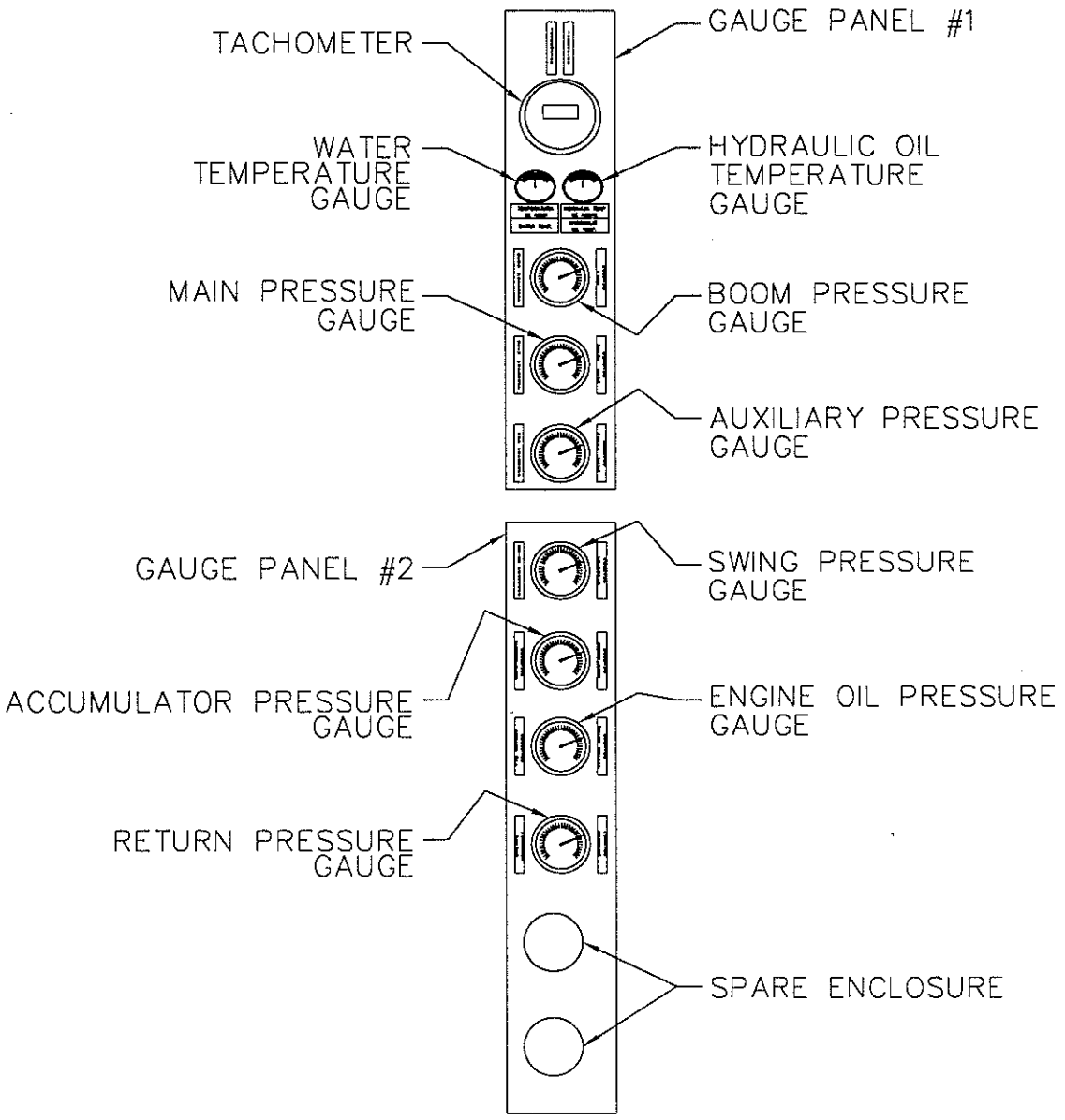
Located to the rear of the operator outside the cab. Handle must be pushed and held to override the low boom limit valve.

"BIRDS EYE" VIEW OF CRANE CAB ARRANGEMENT

CAB INSTRUMENT ARRANGEMENT

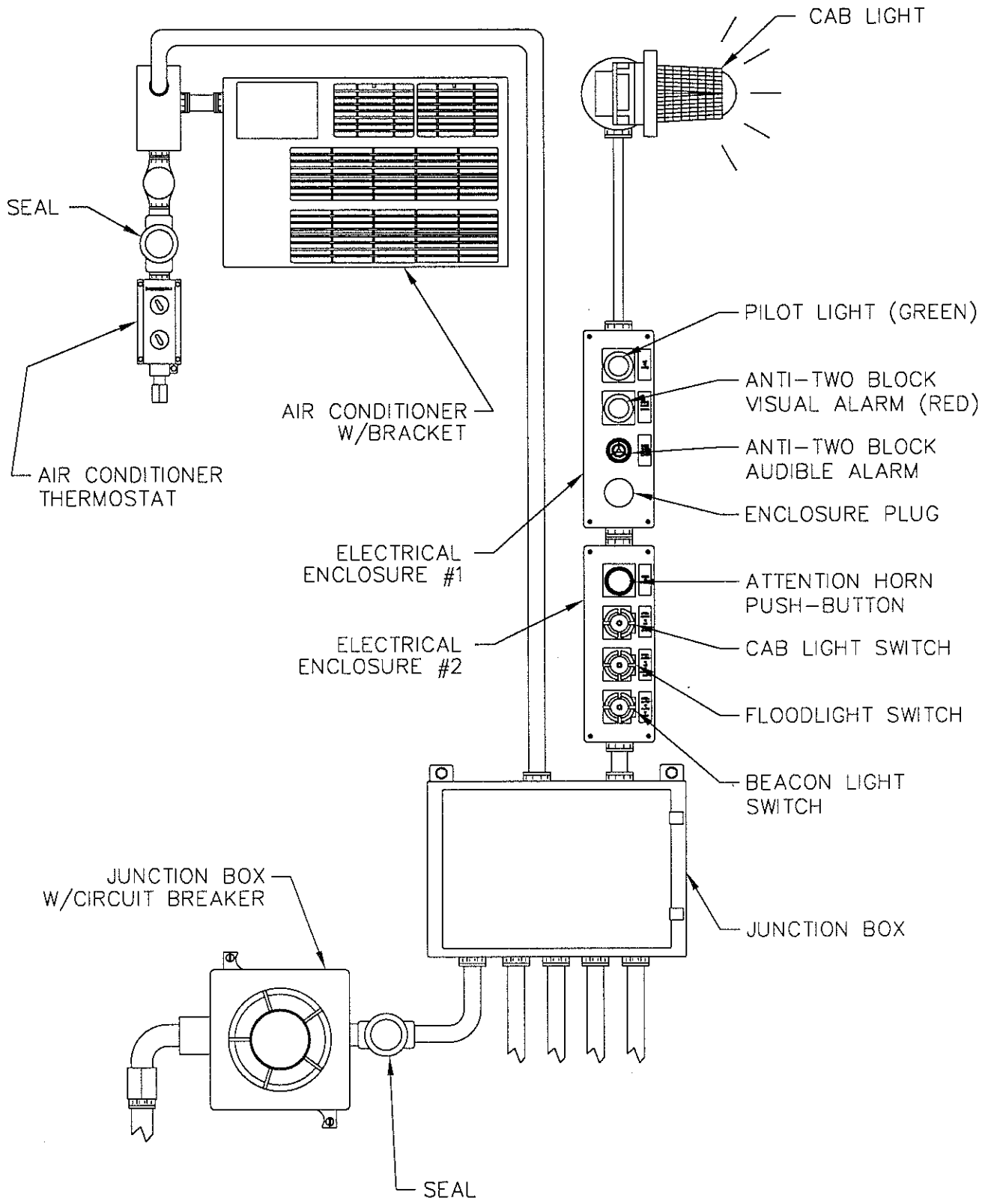
SHEET 1





CAB GAUGE PANEL ARRANGEMENTS

SHEET 2



ELECTRICAL ARRANGEMENTS

SHEET 3

CRANE SIGNALS

OIL STATES INDUSTRIES, INC.

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

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

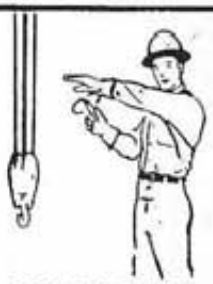
LOWER
With arm extended downward, forefinger pointing down, move hand in small horizontal circles

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

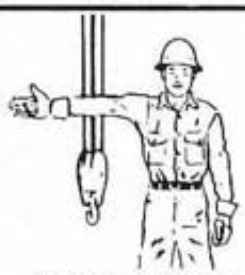
USE WHIP LINE
(Auxiliary Hoist)
Tap elbow with one hand; then use regular signals

RAISE BOOM
Arm extended, fingers closed thumb pointing upward

LOWER BOOM
Arm extended fingers closed, thumb pointing downward

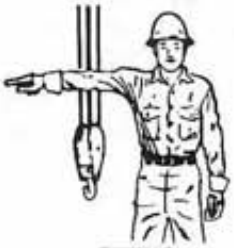


MOVE SLOWLY
Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist Slowly shown as example)

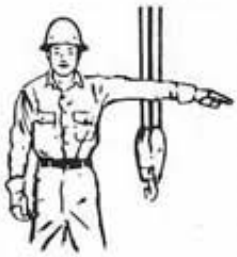


RAISE THE BOOM AND LOWER THE LOAD
With arm extended thumb point up, flex fingers in and out as long as load movement is desired.

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.

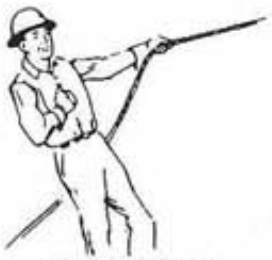
TRAVEL
Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

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.



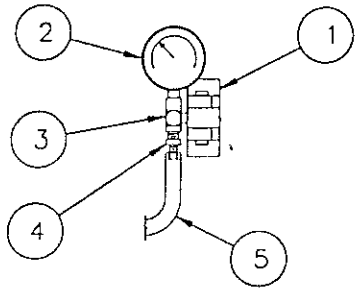
EXTEND BOOM
One Hand Signal. One fist in front of chest with thumb tapping chest.

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

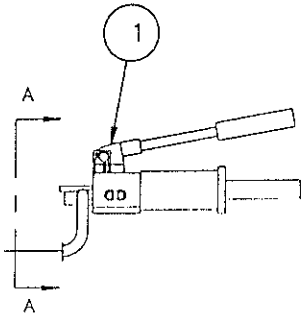
P.N. 45376

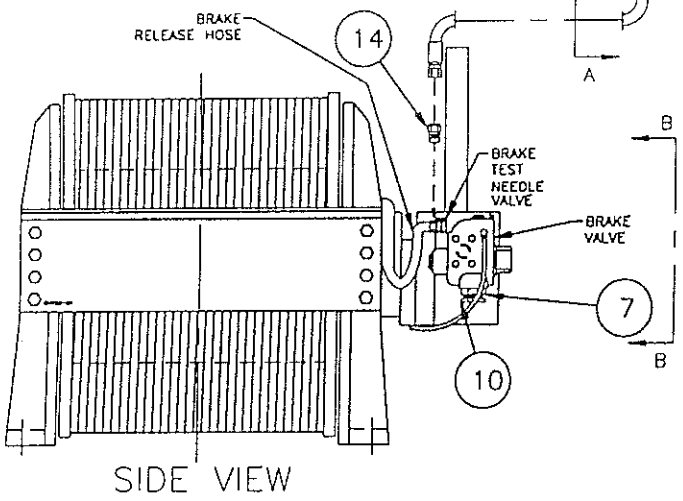
In Accordance with API SPECIFICATION RP2D

DWG. NO. N95SK5-040 SHT. 1 OF 2

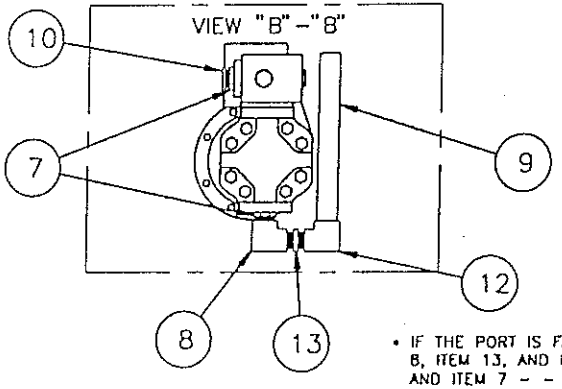


VIEW "A"-"A"

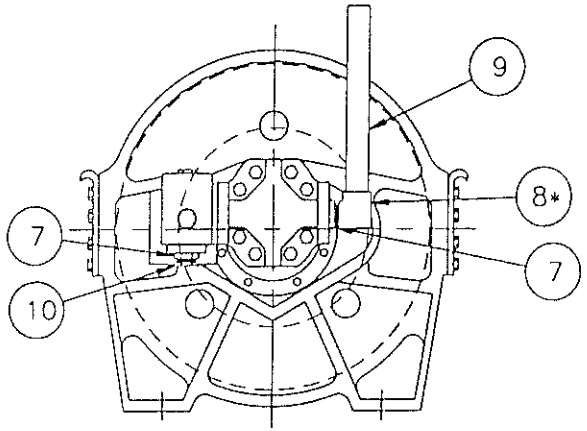




SIDE VIEW



* IF THE PORT IS FACING DOWN USE ITEM 8, ITEM 13, AND ITEM 12 WITH ITEM 9 AND ITEM 7 - - SEE VIEW "B"-"B"



FRONT VIEW

BILL OF MATERIAL

ITEM	QTY.	PART NUMBER / MATERIAL SPEC.	DESCRIPTION	ACTUAL WEIGHT (LBS)
1	1	N45215	HAND PUMP	
2	1	N45844-006	3000 PSI DIRECT MOUNT PRESSURE GAUGE WITH 2-1/2" FACE	
3	1	N40044-040	1/4" TEE, MNPT x MNPT x FNPT (2093-4-4S)	
4	1	N40063-040	ADAPTOR, 1/4" MJIC x 1/4"FNPT (2022-4-4S)	
5	1	N76404-120	HOSE ASSEMBLY, 1/4" DIA. X 5 FT. LONG WITH 1/4" FJIC SWIVEL ENDS (2500 PSI)	
6	-	-	-	
7	2	N46650-024	1-1/2" ANCHOR FLANGE, CODE 61	
8	1	N40039-240	90° ELBOW 1-1/2"FNPT x 1-1/2" MNPT (2089-24-24S)	
9	1	N46964-024	STAND PIPE, 1-1/2" DIA. SCH 40 X 12" LONG (THREAD ONE END ONLY)	
10	1	N40169-240	PLUG, 1-1/2" NPT (2082-24S)	
11	1	-	1/4" JIC CAP	
12	1	N40038-240	90° ELBOW, 1-1/2"FNPT x 1-1/2" FNPT (2087-24-24)	
13	1	N40030-240	NIPPLE, 1-1/2" MNPT x 1-1/2" MNPT (2083-24-24S)	
14	1	2027-4-4	UNION, 1/4" JIC FITTING	
15	1	N46649-002	TOOL BOX	

REVISIONS	BY:	APP'D.	DATE:	DESCRIPTION
				A
				MFG. DISCONTINUED ITEM #15 REPLACED AS SHOWN
	BY: CHERYL	APP'D.	DATE: 4/17/97	

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APPLIED HYDRAULIC SYSTEMS, INC.
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204 Industrial Ave. C
Houma, LA 70363

EMERGENCY LOAD LOWERING KIT INSTRUCTIONS CH SERIES

DWG. NO. N95SK5-040 A

SCALE: NOT TO SCALE | DRAWN BY: ANTHONY

DATE: 11/24/95 | APP'D BY: | SHT 1 OF 2

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.

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EMERGENCY LOWERING PROCEDURE CH HOIST ONLY

DWG. NO. N95SK5-040 A

SCALE: NOT TO SCALE | DRAWN BY: PHIL

DATE: 11/28/95 | APP'D BY: [illegible] | SHT 2 OF 2

REVISIONS	DESCRIPTION	DATE	APP'D	BY

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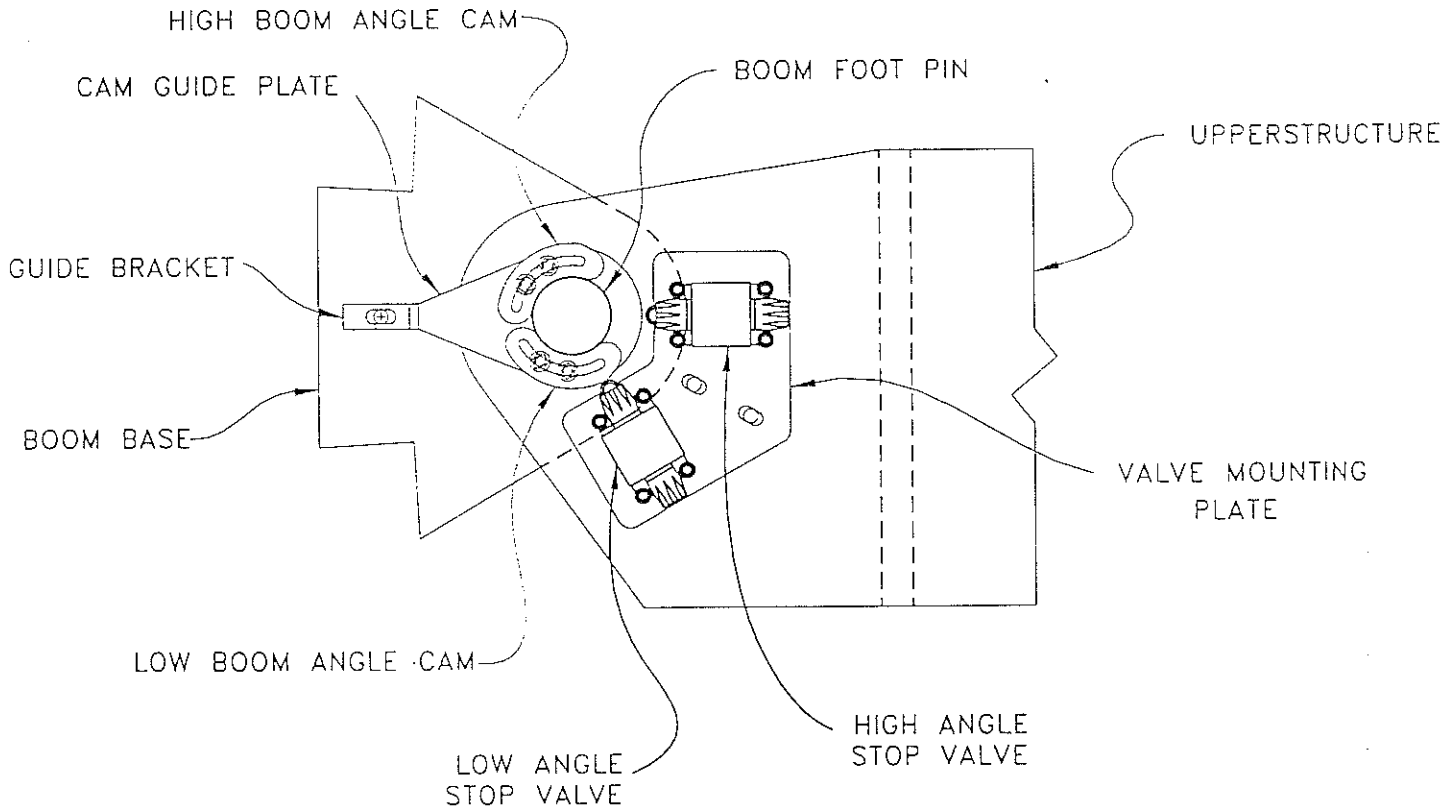
DWG. NO. N95SK5-040 SHT. 2 OF 2

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.



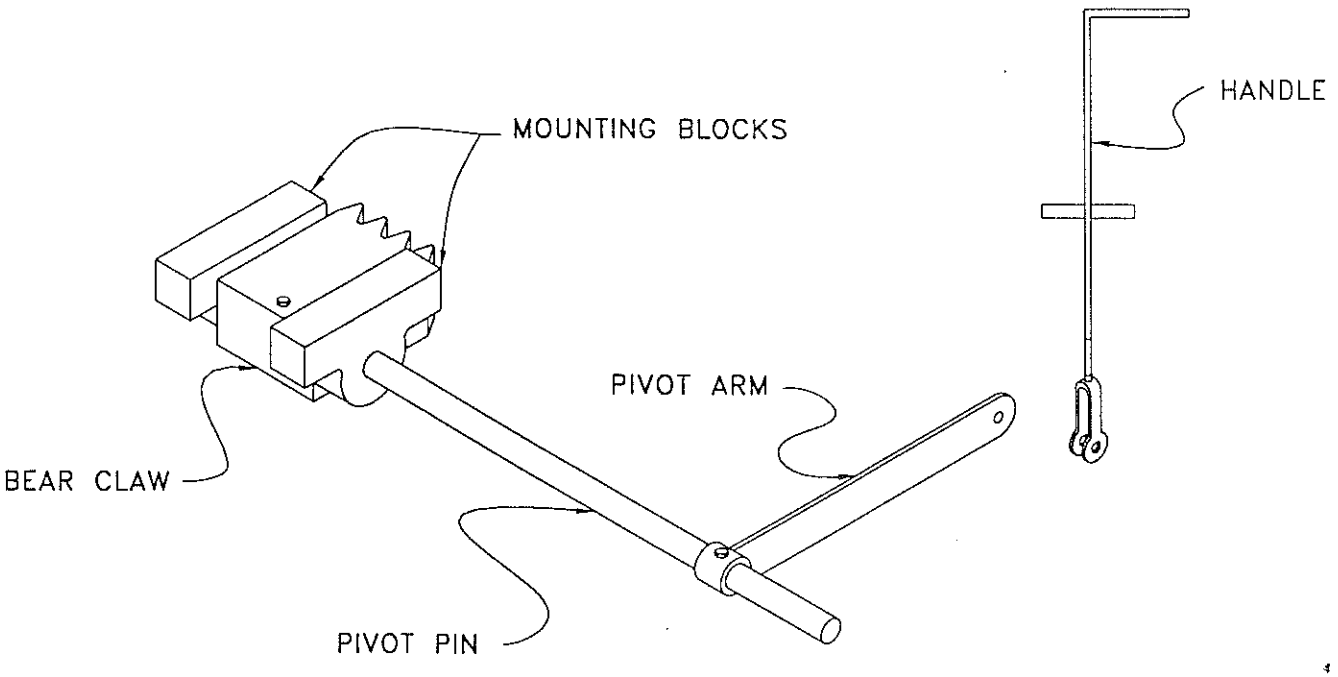
SWING LOCK OPERATION AND ADJUSTMENT

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 unit 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.

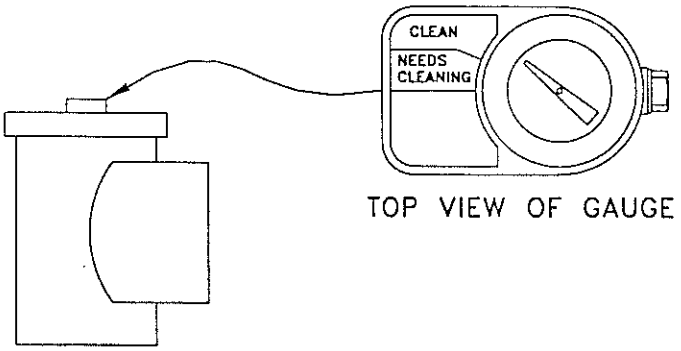
Adjustment of swing lock is performed by loosening the mounting bolts and jam nuts on adjustment bolts. Use adjustment bolts to position gear rack to obtain proper tooth engagement with ballring external gear. After proper positioning of gear rack is obtained, tighten mounting bolts and lock adjustment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



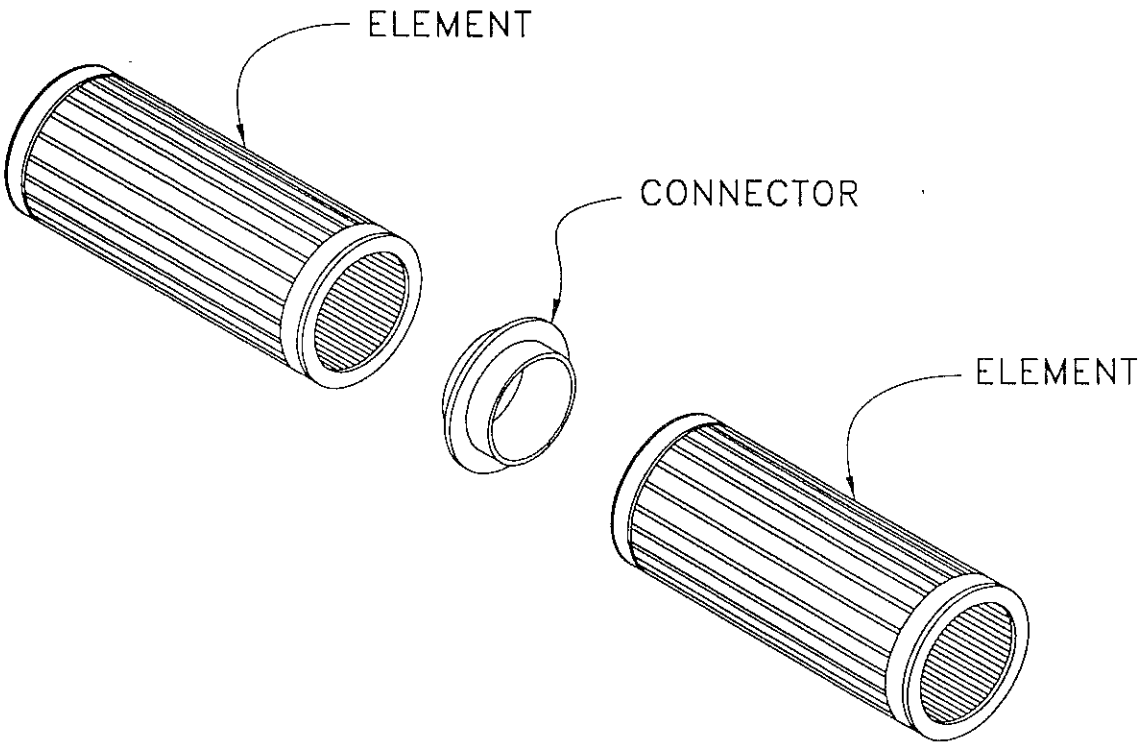
RETURN FILTER ELEMENT ASSEMBLY



TOP VIEW OF GAUGE

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

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

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. pressure.

SECTION IV
MAINTENANCE

INTRODUCTION

MAXIMUM CRANE PERFORMANCE IS MAINTAINED BY PROPER UPKEEP AND MAINTENANCE.

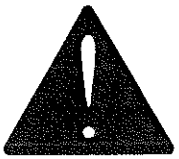
The maintenance section provides guidelines for proper upkeep of the crane. The maintenance of your crane falls into two areas (1) Routine Inspection and Service and (2) Scheduled Maintenance. Routine Inspection and Service should be performed each day the crane is operated or each 8 hours of operation. 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

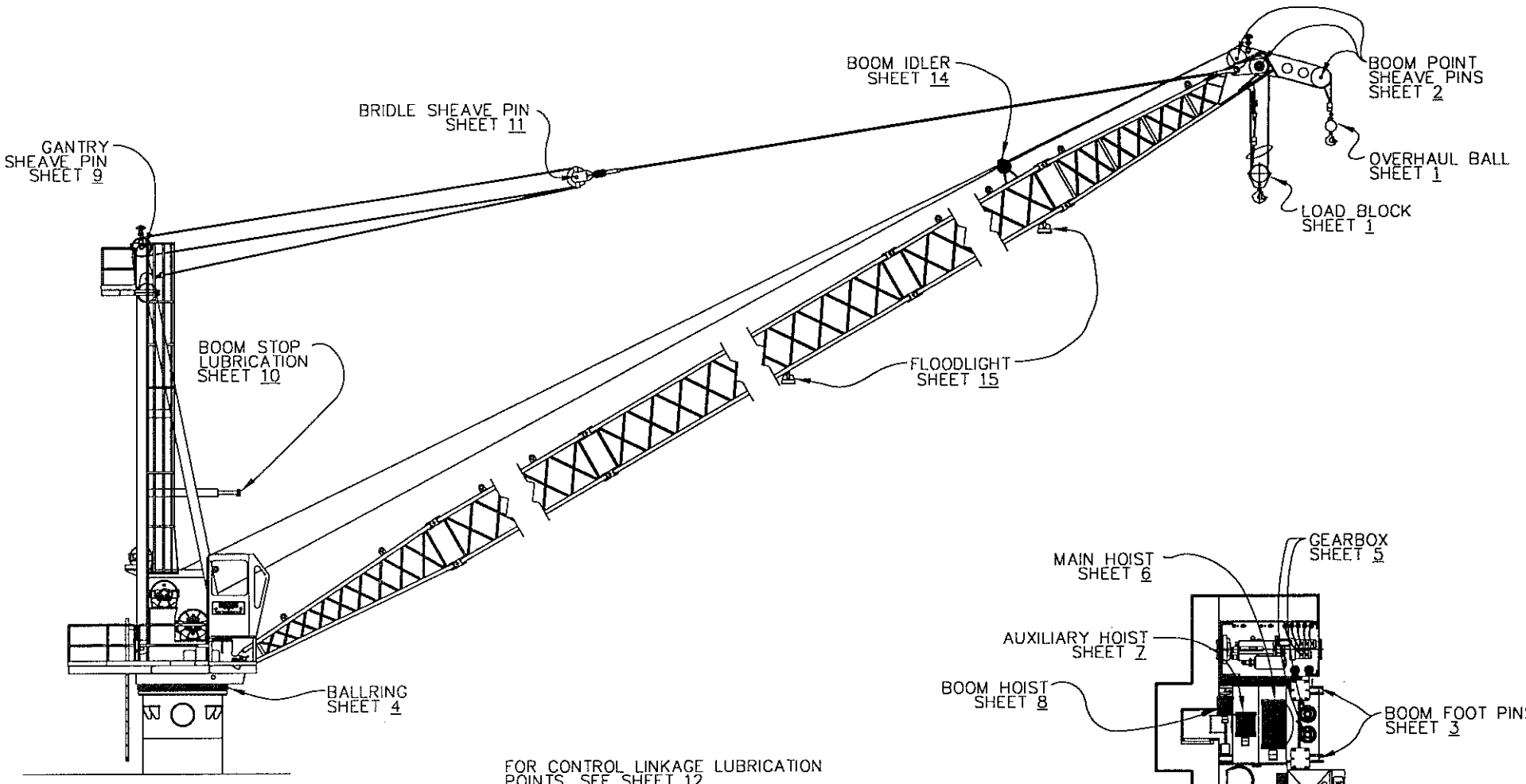
NOTES AND PRECAUTIONS

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.



ELEVATION

FOR CONTROL LINKAGE LUBRICATION POINTS, SEE SHEET 12

FOR HYDRAULIC ACTUATOR LUBRICATION POINTS, SEE SHEET 13

FOR SWING LOCK LUBRICATION POINTS, SEE SHEET 16

ROUTINE SERVICE LUBRICATION POINTS

GREASE FITTINGS – SEE RECOMMENDED LUBRICATION CHART

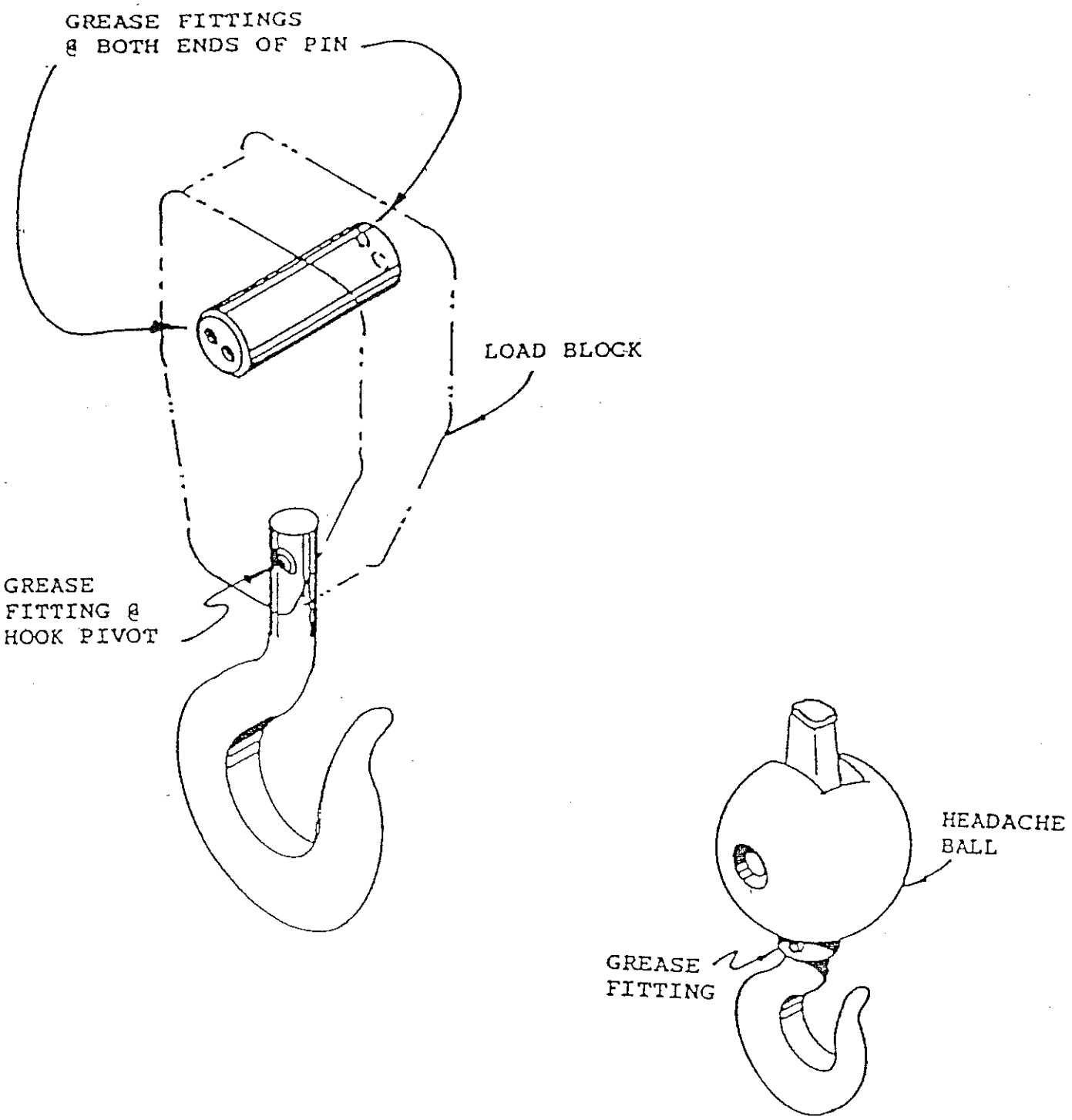
MAINTENANCE SCHEDULE

INSPECTION/ REPLACEMENT	BREAK IN 50 HRS.	BREAK IN 100 HRS.	EVERY 100 HRS.	3 MONTHS OR 150 HRS.	3 MONTHS OR 500 HRS.	6 MONTHS OR 1000 HRS.	ANNUALLY
WINCH OIL (MAIN/AUXILIARY/BOOM)		CHANGE					CHANGE
GEARBOX OIL		CHANGE				CHANGE	
*BALLRING & PEDESTAL BOLTS	RETORQUE		INSPECT				RETORQUE
HOSES			CHECK				
HOIST BOLTS			INSPECT				RETORQUE
PIN KEEPERS			INSPECT				
WELDS			INSPECT				
HYDRAULIC OIL							DRAIN & CLEAN
SUCTION STRAINERS							REPLACE
HYD. OIL RETURN FILTER ELEMENT	CHANGE				CHANGE		
FUEL FILTERS	CHANGE				CHANGE		
EXHAUST SYSTEM					DRAIN		
OIL FILTER				CHANGE			
HYDRAULIC/FUEL TANK					DRAIN		
EMERGENCY ENGINE KILL CABLE	TEST/INSPECT						
ENG. FOOT THROTTLE ACTUATOR	INSPECT						
DYNAMIC SWING BRAKE ACTUATOR	INSPECT						
AIR FILTER				CHANGE			
RADIATOR COOLANT							
NORMAL USE							CHANGE
HEAVY USE						CHANGE	
WIRE ROPE	API RECOMMENDED PRACTICE 2D (RP2D)						

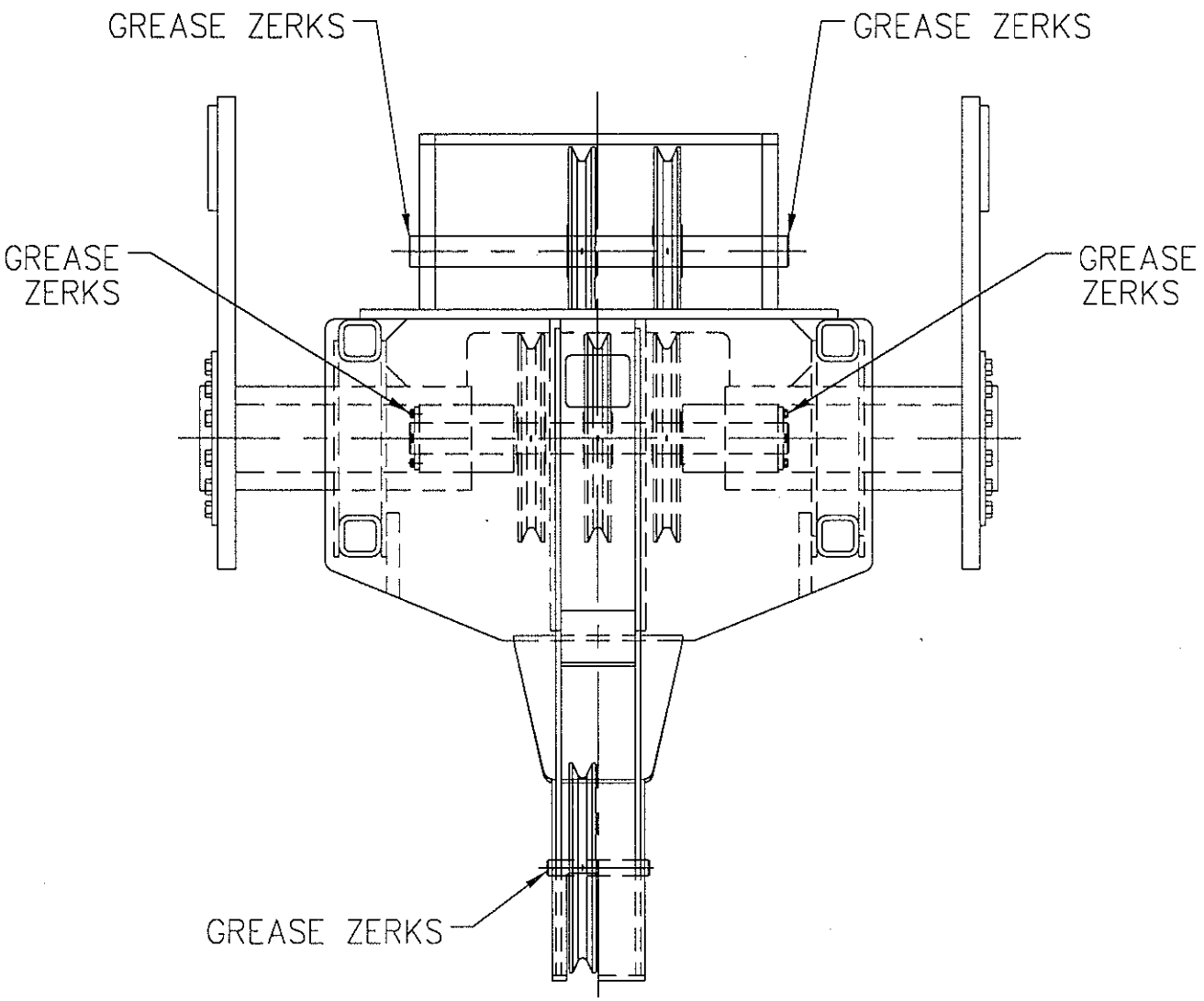
LUBRICATION	1 MONTH OR 50 HRS.	3 MONTHS OR 100 HRS.	6 MONTHS OR 1000 HRS.
OVERRIDE VALVE SPOOLS	LUBRICATE		
BOOM FOOT PINS	LUBRICATE		
SHEAVE PINS (MAIN/AUX./IDLER)	LUBRICATE		
SHEAVE PINS (GANTRY/BRIDLE)	LUBRICATE		
GANTRY/UPPERSTRUCTURE PINS	LUBRICATE		
LOAD BLOCK/OVERHAUL BALL	LUBRICATE		
PARKING BRAKE SPOOLS	LUBRICATE		
GEARBOXES	LUBRICATE		
HOISTS (MAIN/AUXILIARY/BOOM)	LUBRICATE		
CONTROL VALVE SPOOLS	LUBRICATE		
CONTROL LEVER LINKAGE PIN	LUBRICATE		
ENG. FOOT THROTTLE ACTUATOR	LUBRICATE		
DYNAMIC SWING BRAKE ACTUATOR	LUBRICATE		
BOOM STOPS	LUBRICATE		
SWING LOCK BEARCLAW	LUBRICATE		
WIRE ROPES (MAIN/AUX./BOOM)			LUBRICATE
PENDANT LINES (BOOM)			LUBRICATE
*BALLRING		LUBRICATE	
PINION GEARS		LUBRICATE	

SOME ITEMS DO NOT HAVE GREASE ZERK FITTINGS, BUT SHOULD BE LUBRICATED BY HAND ON EXPOSED SHAFTS FOR ENVIRONMENTAL PROTECTION.

*CAUTION: BALLRING AND PEDESTAL BOLTS MUST BE RETORQUED AT THE INTERVALS SHOWN TO PREVENT PREMATURE BEARING WEAR AND/OR FAILURE.

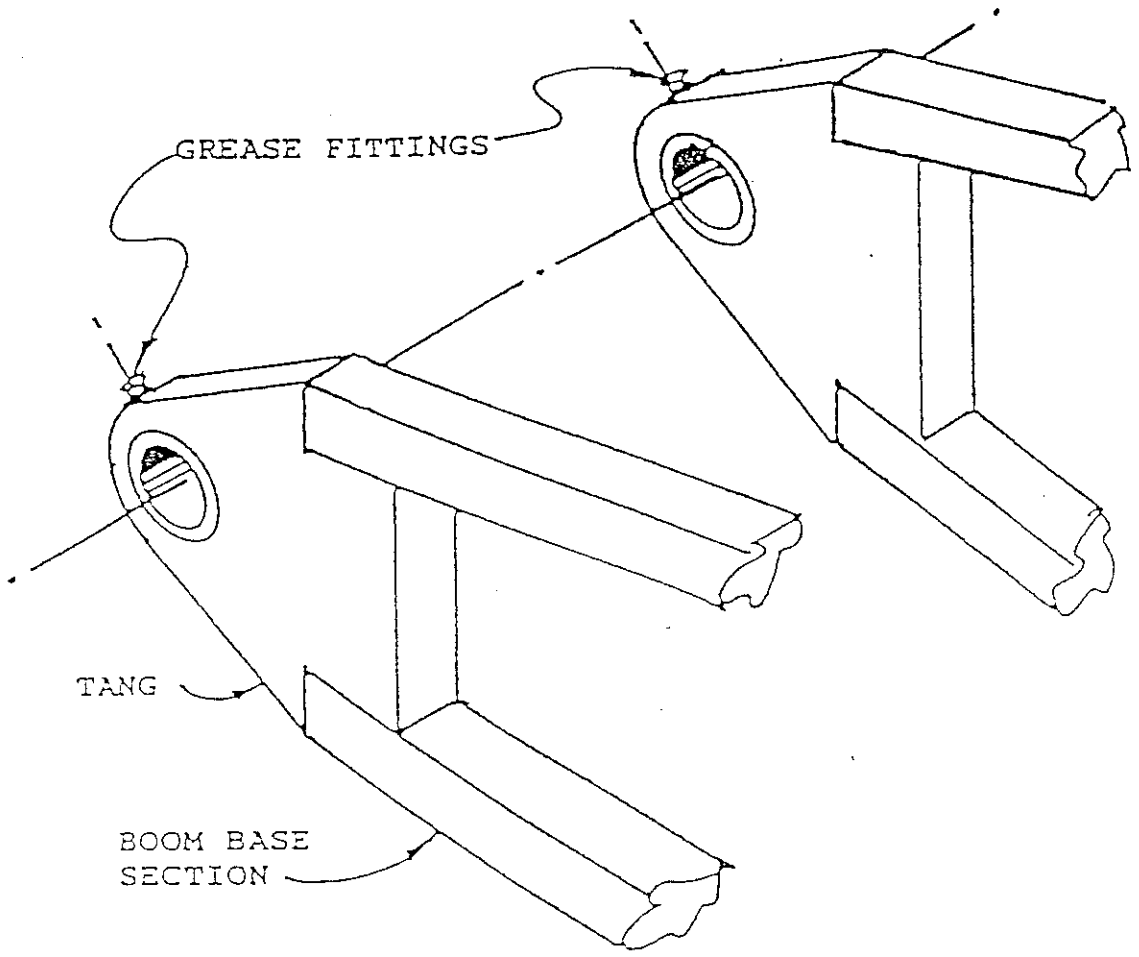


LOAD BLOCK & OVERHAUL BALL
LUBRICATION POINTS
SHEET 1

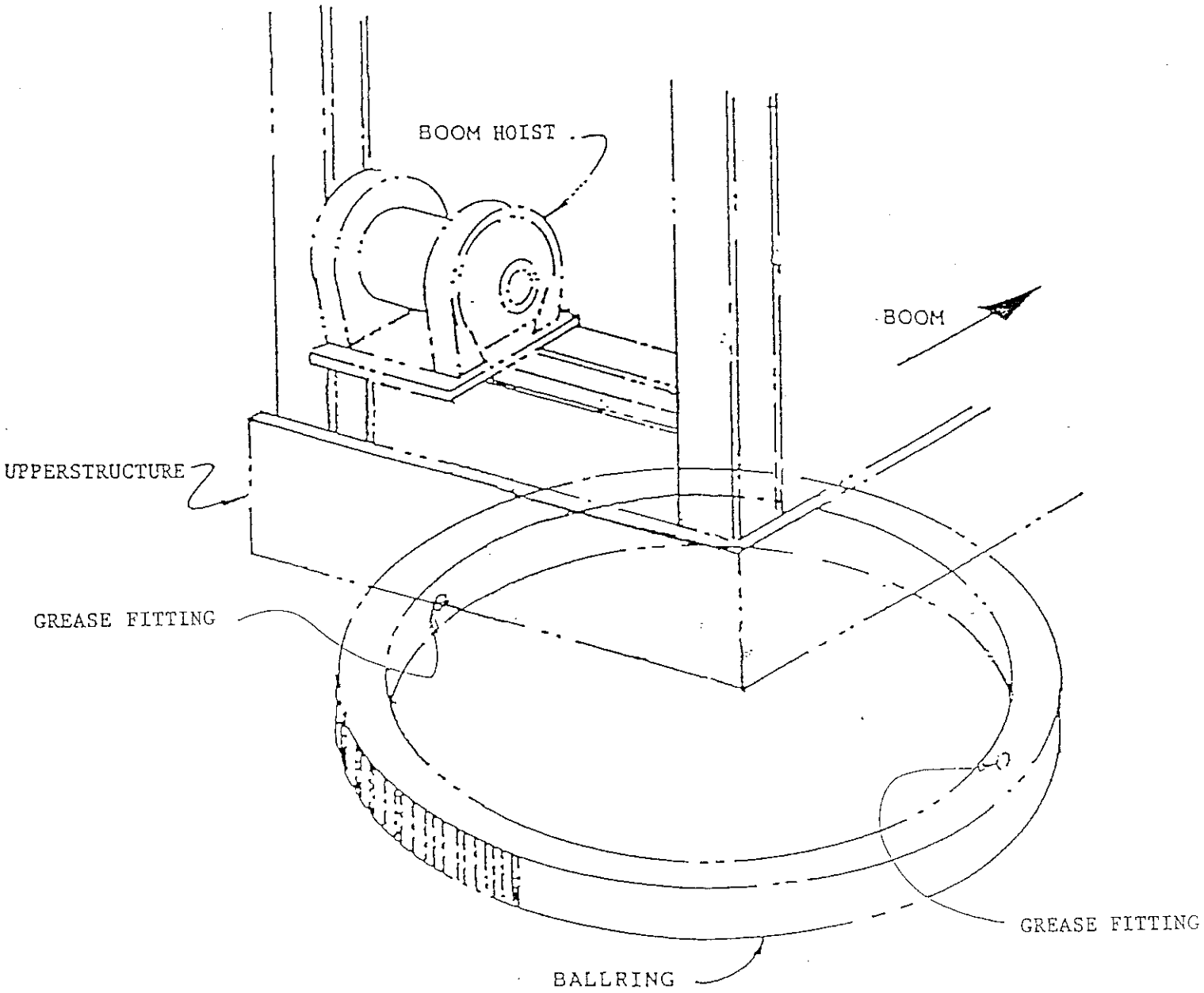


BOOM POINT ASSEMBLY LUBRICATION POINTS

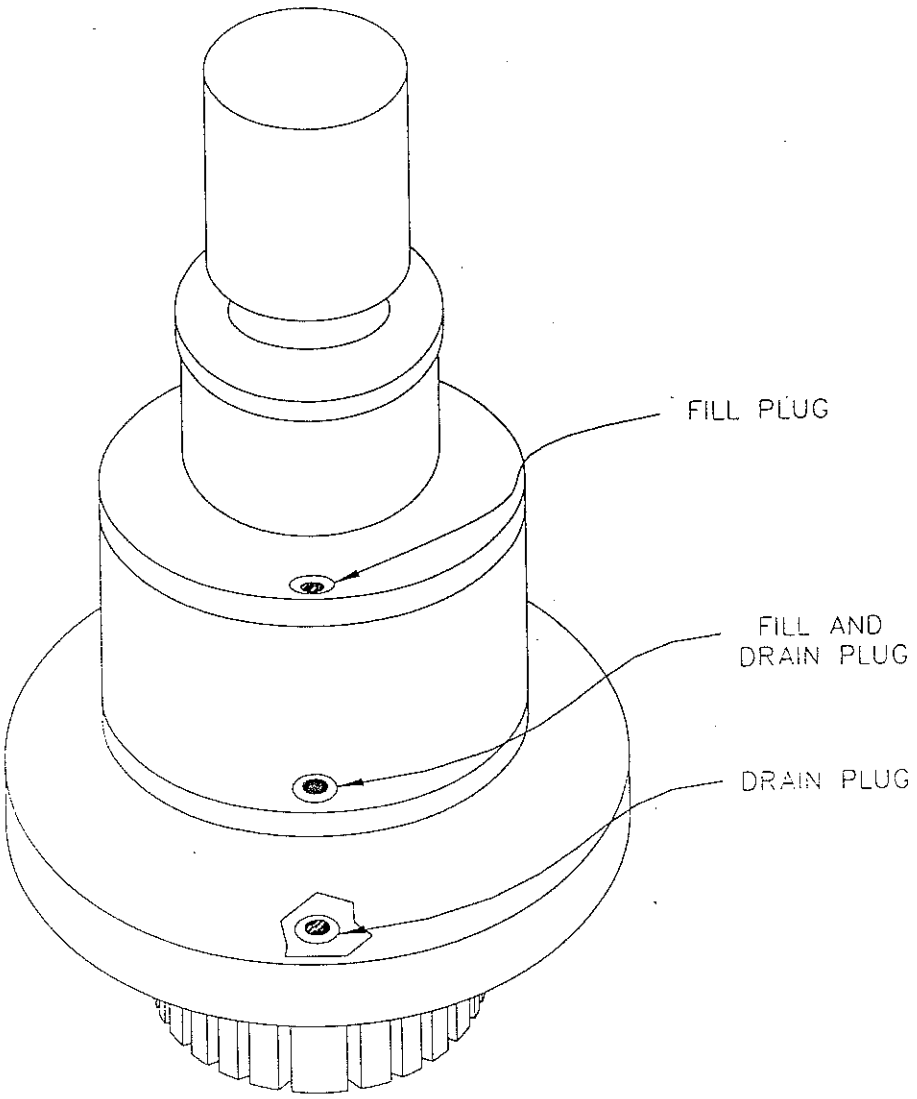
SHEET 2



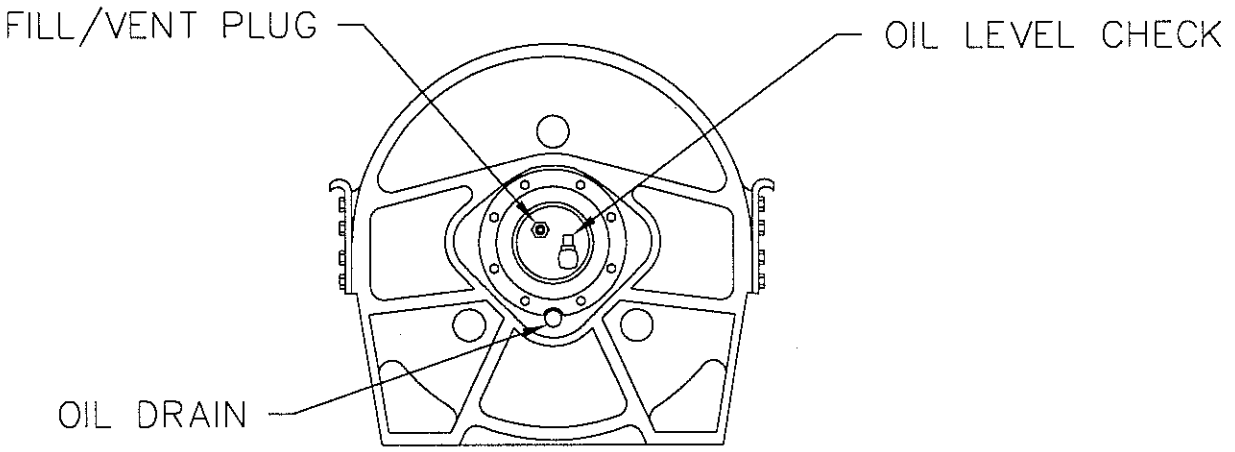
BOOM FOOT PINS
LUBRICATION POINTS
SHEET 3



BALLRING
LUBRICATION POINTS
SHEET 4



GEARBOX LUBRICATION POINTS
SHEET 5



MAIN HOIST

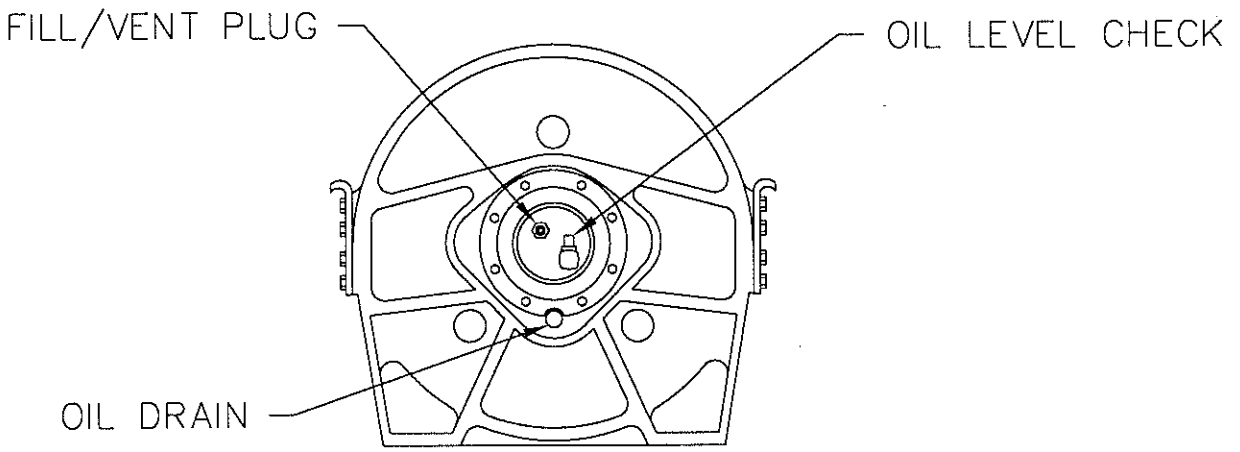
OIL LEVEL: TO CHECK OIL LEVEL, REMOVE THE 1/8" PIPE PLUG. THE OIL SHOULD BE LEVEL WITH THE BOTTOM OF THE OPENING. IF MORE OIL IS NEEDED, USE TEXACO MEROPA 220 OR EQUIVALENT API GL-2/3, MEETING API CLASSIFICATION GL-5.

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.

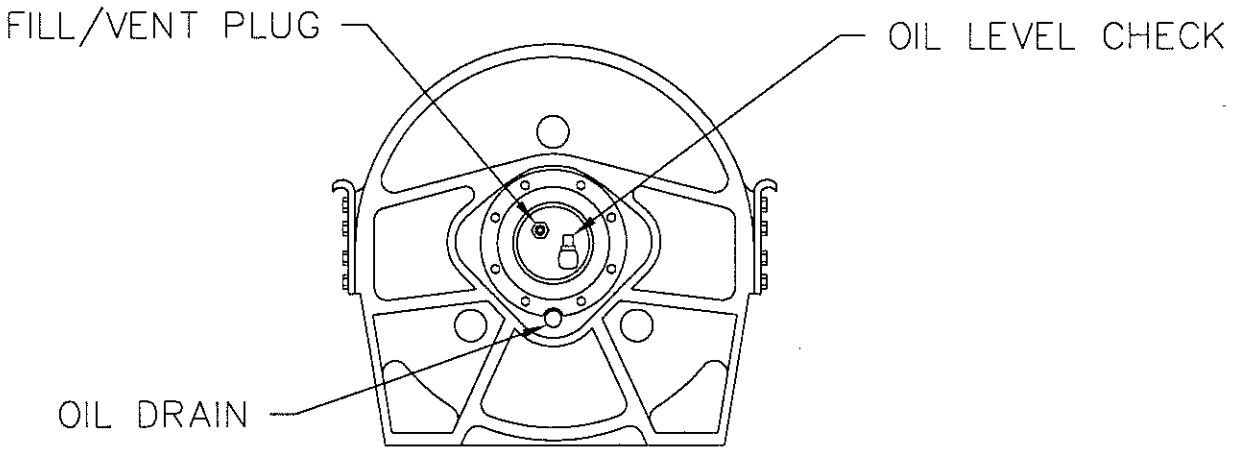
OIL FILL AND VENT: THE HOIST FILL PLUG AND VENT ARE LOCATED AS SHOWN. IT IS VERY IMPORTANT THAT THIS VENT BE KEPT CLEAR AND UNPLUGGED. DO NOT PAINT OVER VENT OPENING. NEVER REPLACE VENT WITH A SOLID PLUG.

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

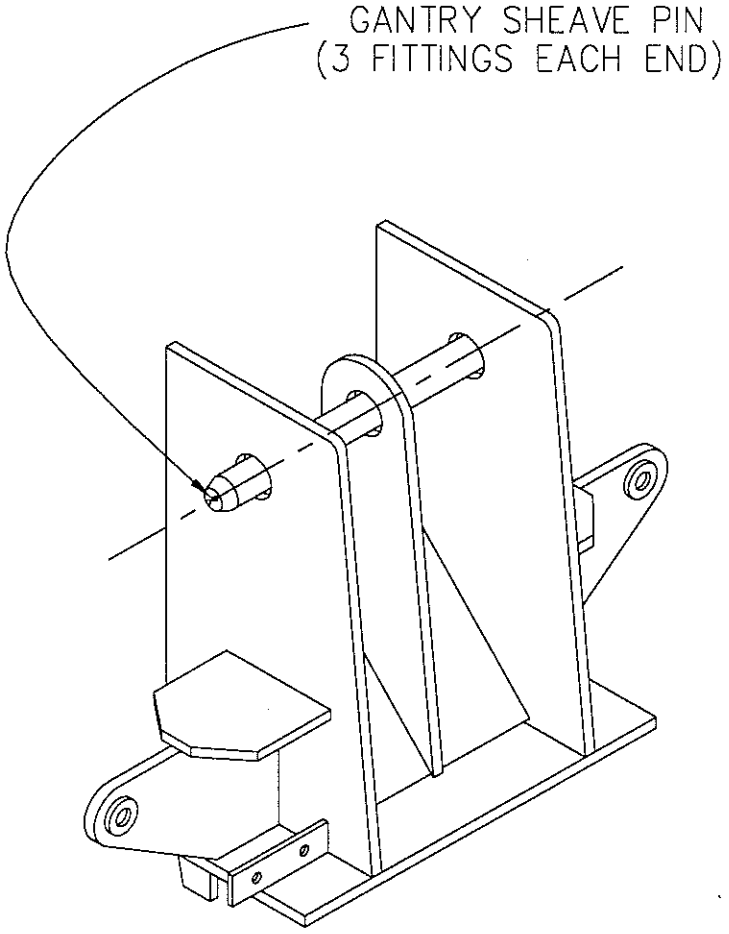
OIL LEVEL: TO CHECK OIL LEVEL, REMOVE THE 1/8" PIPE PLUG. THE OIL SHOULD BE LEVEL WITH THE BOTTOM OF THE OPENING. IF MORE OIL IS NEEDED, USE TEXACO MEROPA 220 OR EQUIVALENT API GL-2/3, MEETING API CLASSIFICATION GL-5.

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.

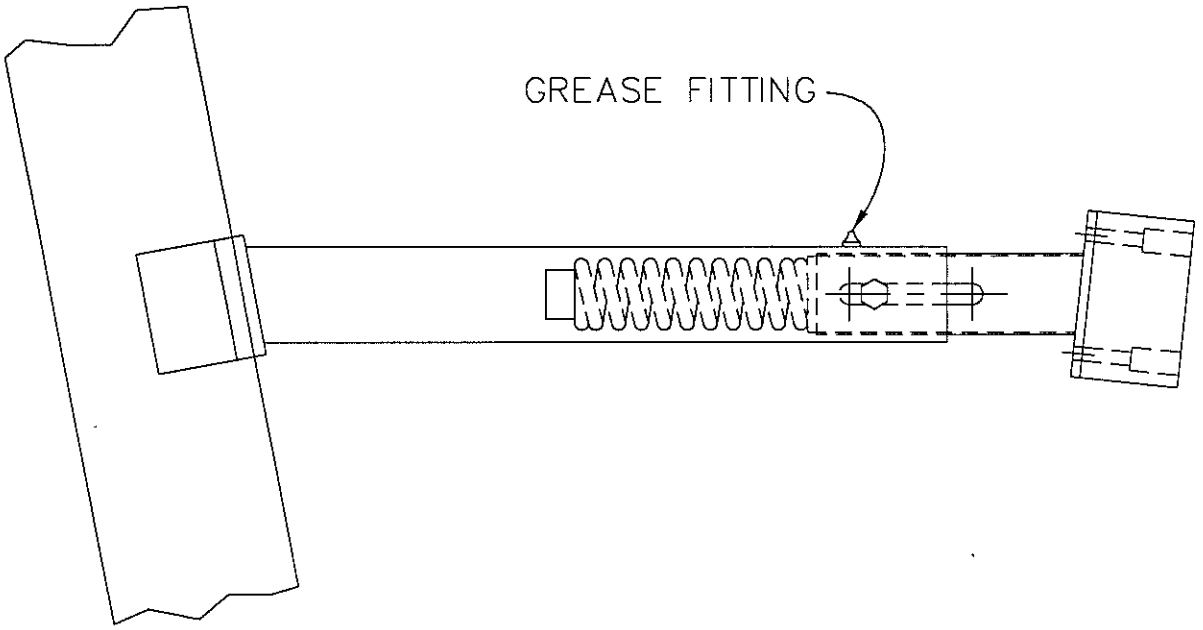
OIL CHANGE: OIL SHOULD BE CHANGED AFTER THE FIRST ONE HUNDRED HOURS OF OPERATION. OIL SHOULD THEN BE CHANGED EVERY THOUSAND HOURS OF OPERATING TIME, OR EVERY SIX MONTHS.
OIL CAPACITY: CH230 – 16 PINTS

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.

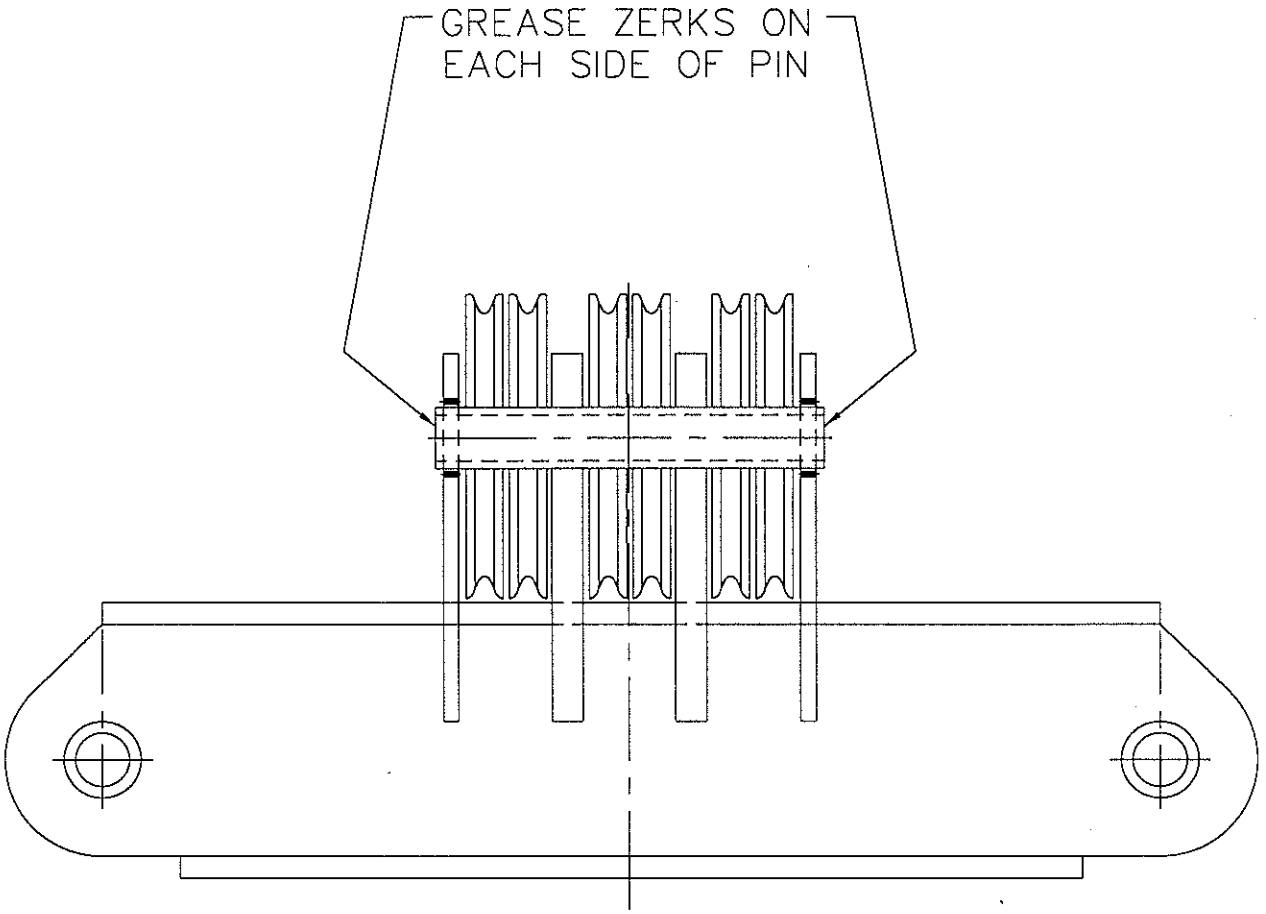
BOOM HOIST LUBRICATION POINTS
SHEET 8



GANTRY SHEAVE CASE LUBRICATION POINTS SHEET 9

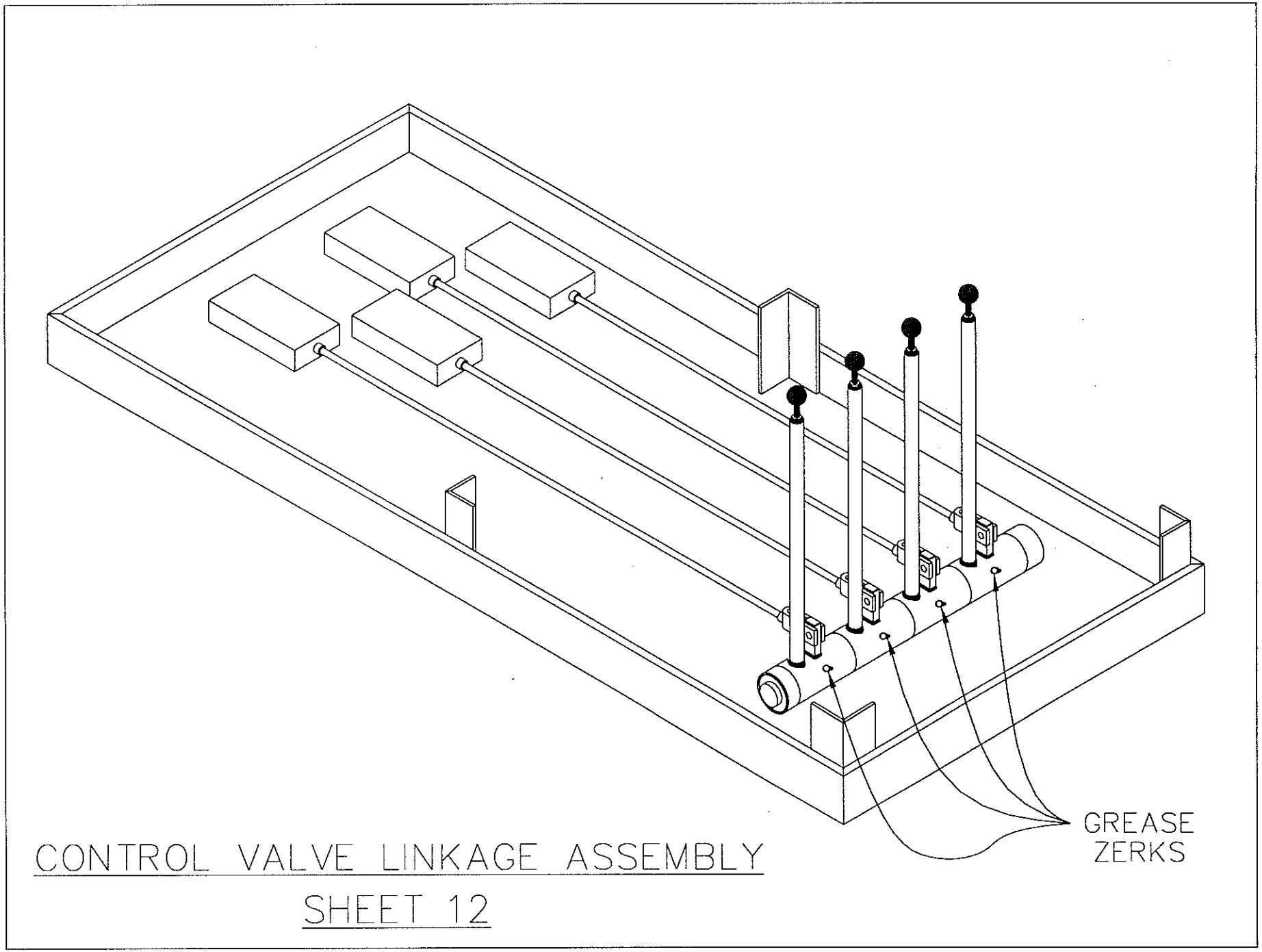


BOOM STOP LUBRICATION POINTS
SHEET 10



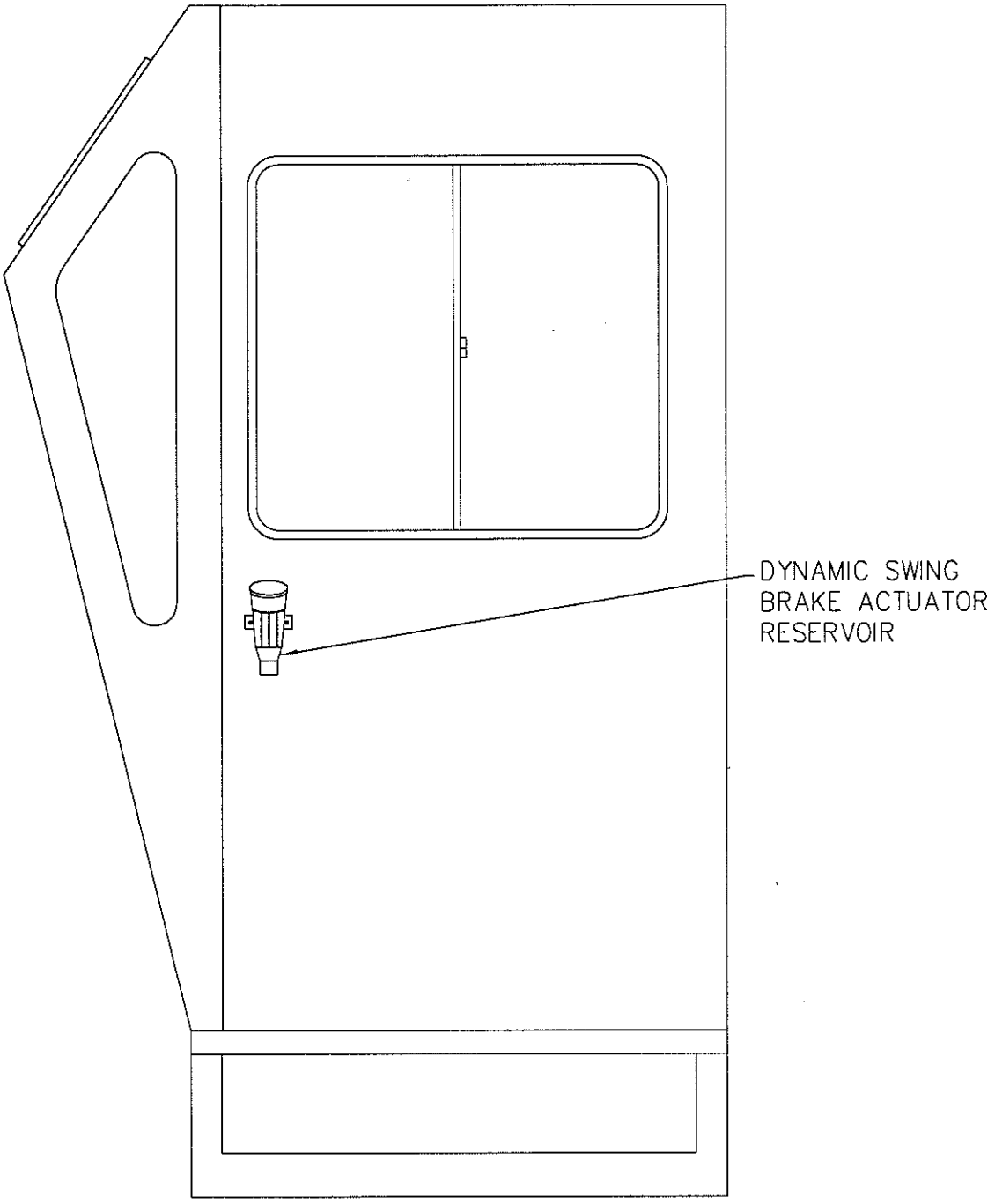
BRIDLE SHEAVE PIN LUBRICATION POINTS

SHEET 11



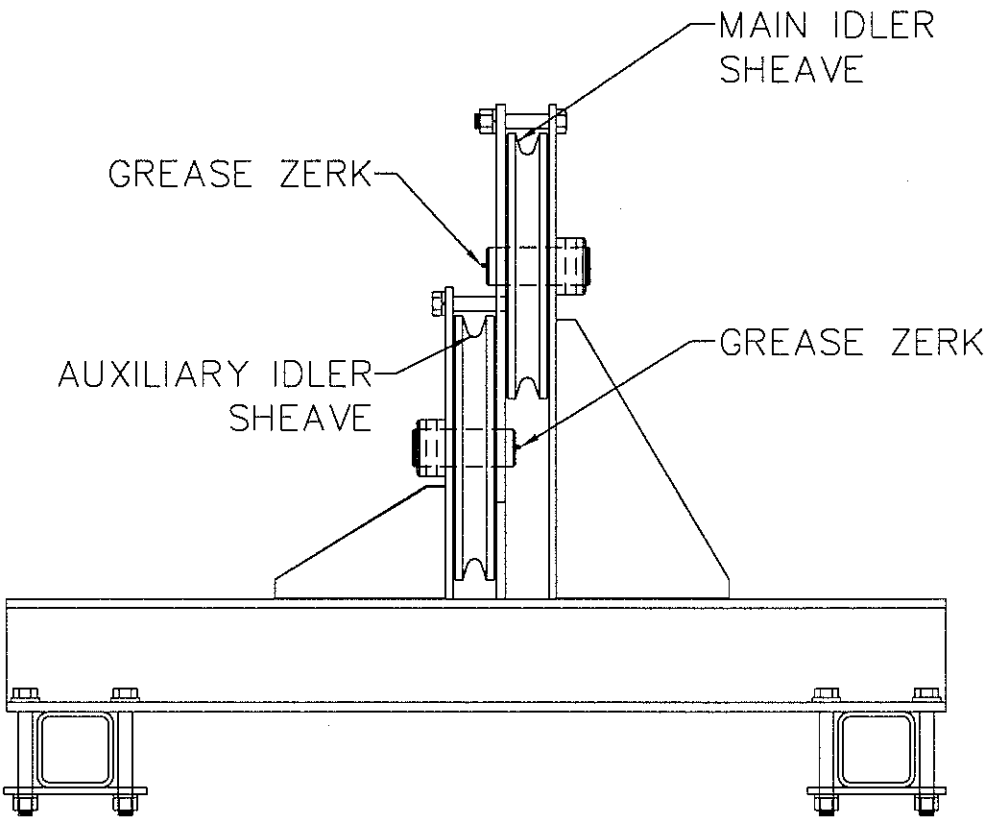
CONTROL VALVE LINKAGE ASSEMBLY

SHEET 12

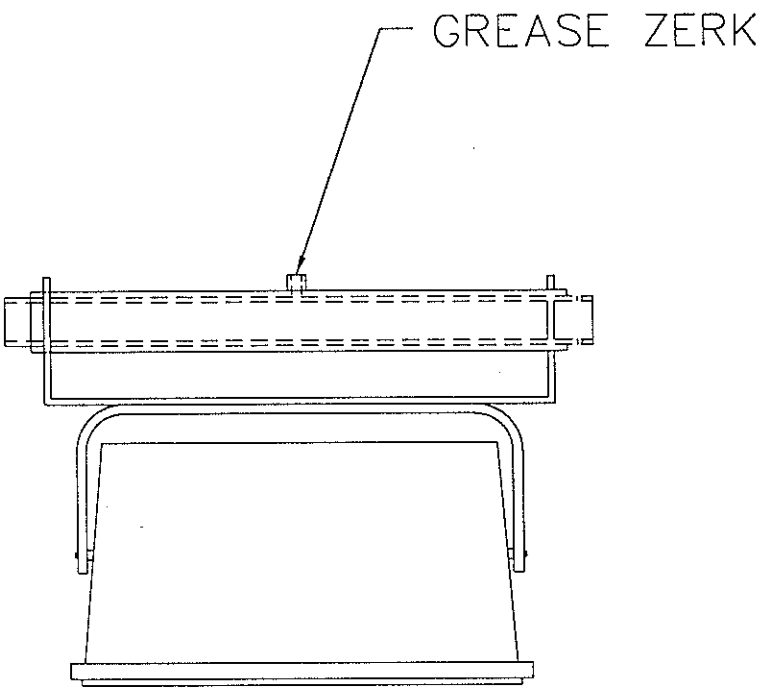


INSIDE CAB
(LEFT WALL)

HYDRAULIC ACTUATOR RESERVOIR
SHEET 13

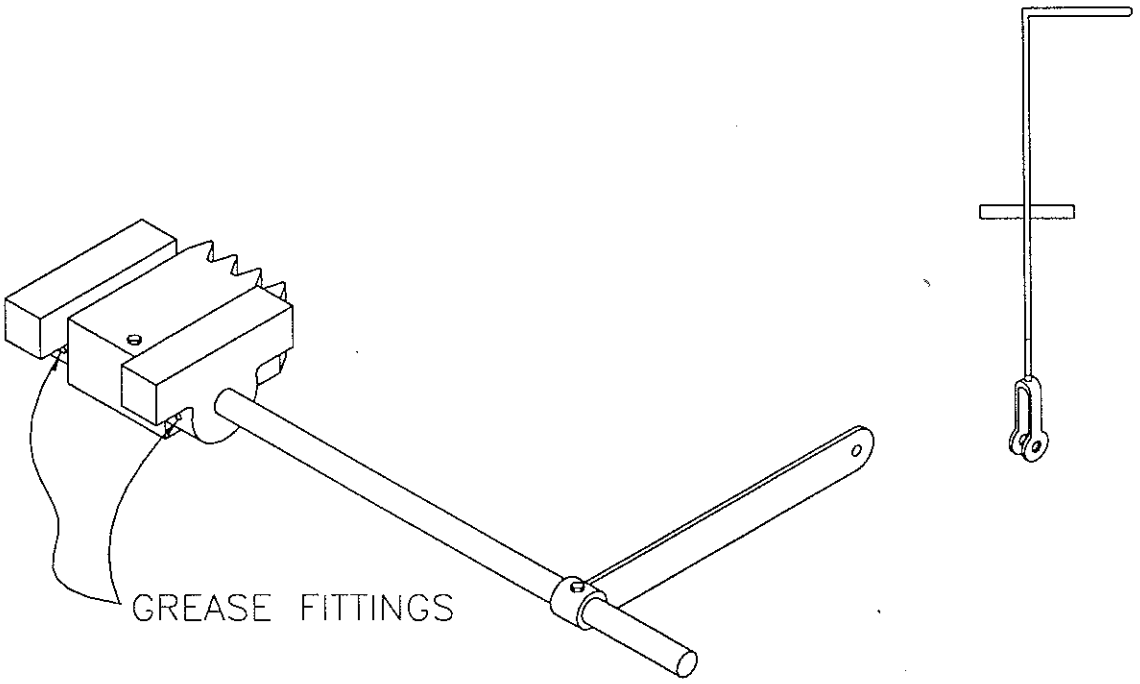


BOOM IDLER LUBRICATION POINTS
SHEET 14



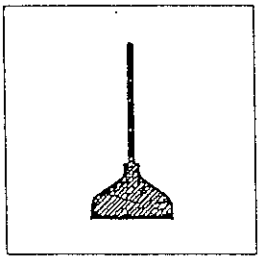
FLOODLIGHT LUBRICATION POINT

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

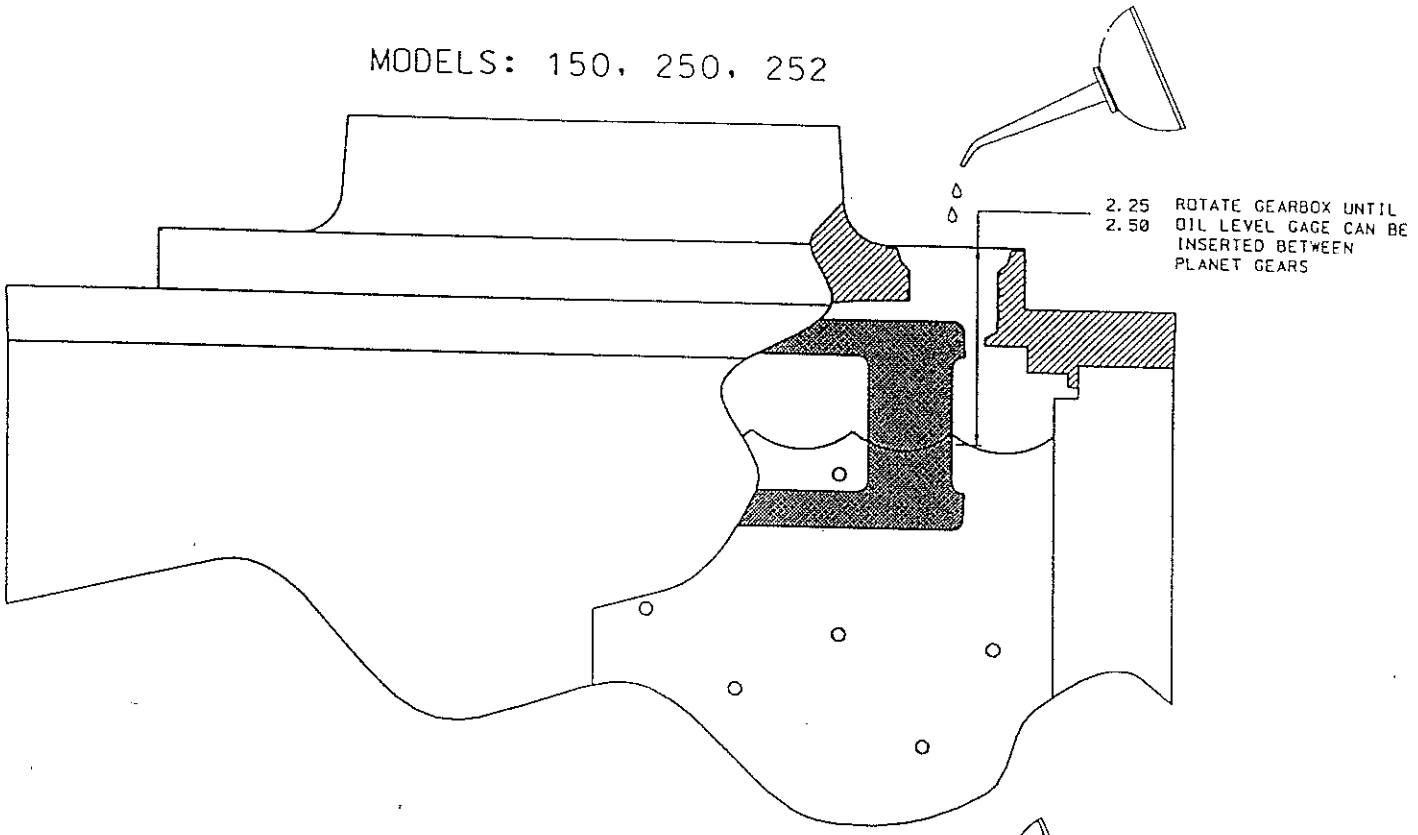
SUPPLIER	DESIGNATION
Conoco	Universal Gear 140w
CITGO	Premium Gear Oil 140w
Exxon	Gear Oil GX 140
Gulf	Multi-Purpose G.L. 140
Mobil	Mobilube HD 140w
Pennzoil	Pennzoil - 140w
Phillips	Philube SMP 140
Shell	Spirex HD 140w
Sun	Sunfleet GL 5 140w
Tenneco	
Texaco	Multigear EP 140w
Union	MP Gear Lube LS 140w

WARNING

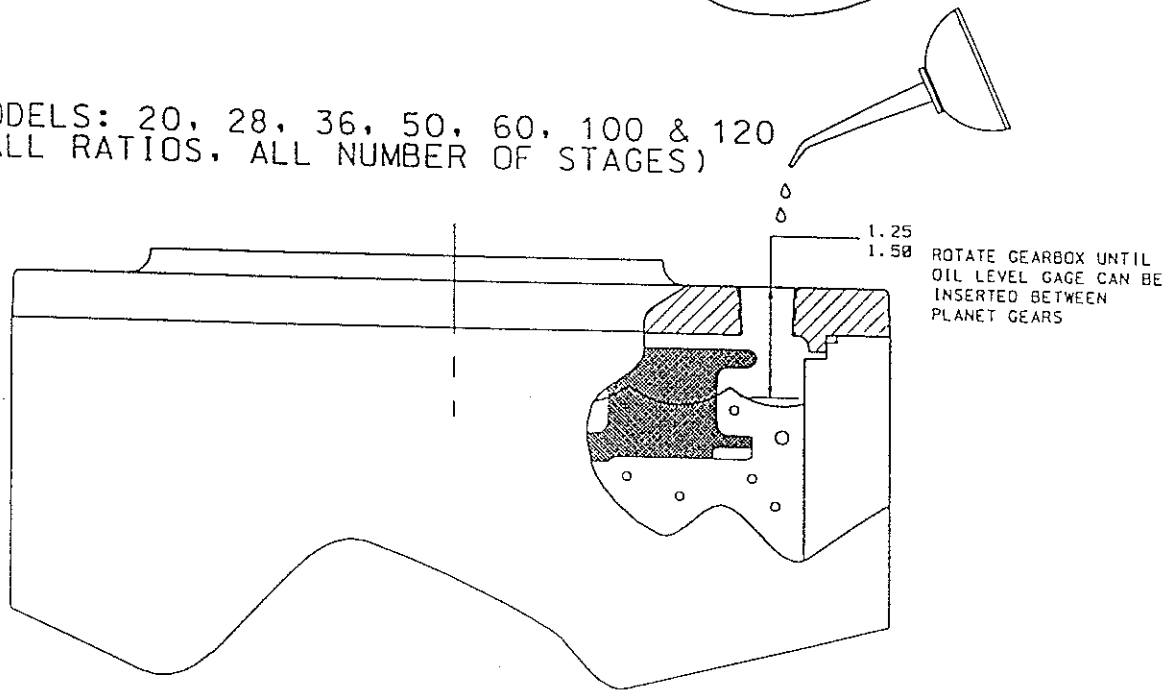
Failure to use the proper type and viscosity of planetary gear oil could result in property damage, severe personal injury, or death.

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
No response to control	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
Poor hydraulic system performance	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 to heavy	Check Capacity Chart and reduce load
Swing moves erratic or loosely	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
Swing will not turn	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
Excessive noise during operation	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
	Tank breather plugged	Clean breather
Cylinders drift loosely	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
Winch will not lift or hold load	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 recommendation 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.

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	Mobiltac 375
SHELL	Alvania	EPR0	EP2	Omala 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.

WIRE ROPE BREAK – IN PROCEDURE

NAUTILUS
Marine Cranes

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 maximun 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 alows for slight stretching and diameter reduction to occur.

MANUFACTURER
ENGINE DATA

CATERPILLAR 3300 ENGINE MAINTENANCE INFORMATION

CONSULT OPERATOR'S MANUAL FOR FURTHUR 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

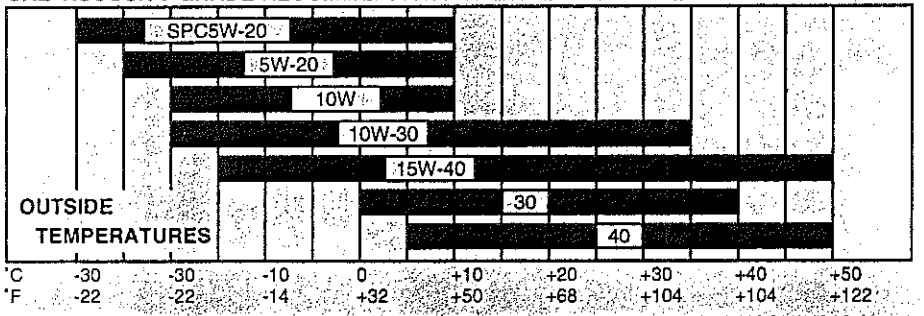
FILL CAPACITY MUST BE ADJUSTED WHEN USING AUXILIARY FILTERS

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 SULFER CONTENT IS GREATER THAN 0.5% THE CD ENGINE OIL MUST HAVE A TOTAL BASE NUMBER (TBN) OF TWENTY TIMES THE PERVENTAGE 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 PRECARGE 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.

CATERPILLAR®

SEBU6251-05
June 1996

Supplement

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

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

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:

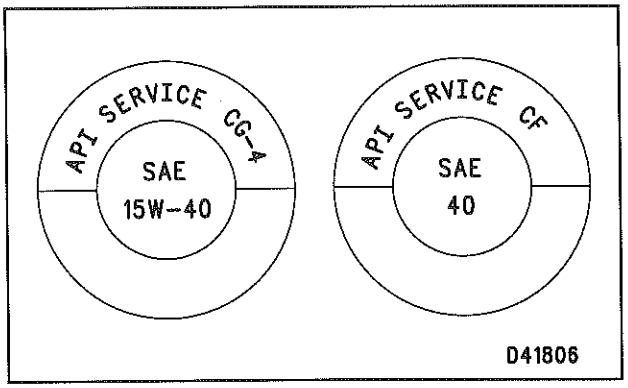
- SEBU6250, Caterpillar Built Machine Fluids Recommendations
- SEBU6385, Caterpillar On-Highway Diesel Truck Engine Fluids Recommendations
- SEBU6400, Lubrication Recommendations for Caterpillar Gaseous Fueled Spark Ignited Engines
- SEBU7003, Caterpillar 3600 Series Diesel Engine Fluids Recommendations

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[1]	CD-2[1]
CF-4, CG-4	CE

[1]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 Comite 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).

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

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°C (−4°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°C (−22°F), use a synthetic base stock multi-grade oil with a 0W or 5W low temperature viscosity grade and a pour point of −50°C (−58°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

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

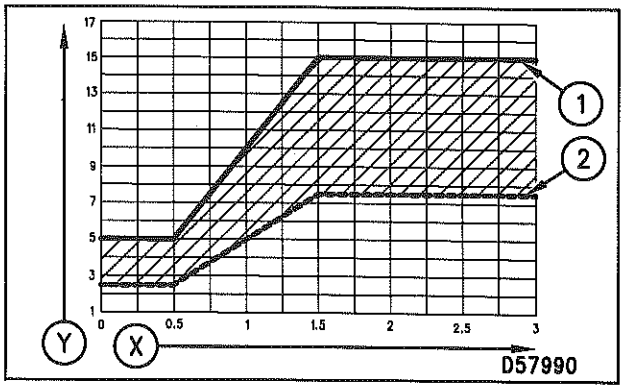
After-Market Oil Additives

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.

Engine Oil Viscosity Protection		
Caterpillar DEO API CG-4 & CF-4 Viscosity Grade	Ambient Temperature	
	Minimum °C (°F)	Maximum °C (°F)
SAE 0W20	–40 (–40)	10 (50)
SAE 5W30	–30 (–22)	30 (86)
SAE5W40	–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

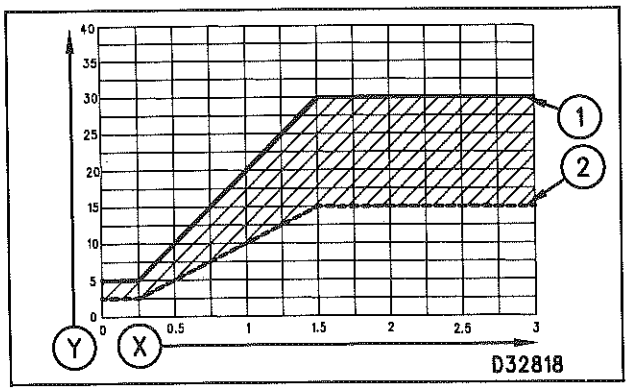
If Caterpillar DEO is not used, the following commercial oils are recommended for Caterpillar PC engines:

- 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.

NOTICE

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

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)

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 Viscositites**	**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, sever 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[1] (D3605 or D1552)	3% maximum
Viscosity[2] (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

[1] 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.

[2] 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		
	Protection	
Concentration % Glycol/% Water	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		
	Protection	
Concentration % Glycol/% Water	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 Two Years
Commercial heavy duty coolant/antifreeze meeting ASTM D4985	3000 Hours or One Year
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°C (−33°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°C (−60°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 (9 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[1] ASTM D5345 ASTM D4985 HD Coolant L (fl oz)	SCA At 250 Hours For All HD Type Coolants[2] L (fl oz)	SCA Element At 250 Hours For All HD Type Coolants[3] 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)

[1] SCA is NOT required for Caterpillar DEAC at initial fill.
[2] Do not exceed the six percent maximum concentration. Check the SCA concentration with a SCA test kit.
[3] 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

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BILL OF MATERIAL

REFERENCE DRAWINGS

M99SK4- 072 CRANE GENERAL ARRANGEMENT (FOR MANUAL USE)

M99SK4- 073 POWER UNIT GENERAL ARRANGEMENT (FOR MANUAL USE)

M99SK1- 138 HYDRAULIC SCHEMATIC (FOR MANUAL USE)

M99SK1- 139 ELECTRICAL SCHEMATIC (FOR MANUAL USE)

M99SK1- 140 WIRING DIAGRAM (FOR MANUAL USE)

HOSE LIST

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 (Outlet)
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	N76624-470	Boom Down Dump Valve (Inlet)	Boom Control Valve (Down)
13	1	1-1/2	N76624-500	Boom Hoist (Down)	Boom Down Dump Valve (Outlet)
14	1	1-1/2	N76624-522	Boom Up Dump Valve (Inlet)	Boom Control Valve (Up)

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HOSE LIST

ITEM	QTY.	HOSE ID (IN)	PART NUMBER	LOCATION TO	LOCATION FROM
15	1	1-1/2	N76624-550	Boom Hoist (Up)	Boom Up Dump Valve (Outlet)
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 (Up)
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	N76520-520	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	N76512-240	Swing Motor #1	Swing Control Valve (Tee)
28	2	3/4	N76512-250	Swing Motor #2	Swing Control Valve (Tee)
29	1	1/4	N76404-242	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 (Inlet)	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)

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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	Anti-Two Block Hose (Union- Pressure)	Main Dump Valve #2 – Check Valve (Tee)
39	1	1/2	N76508-276	Anti-Two Block Hose (Tank-Union)	Hydraulic Tank
40	2	1/2	N77208-160	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	3/8	N76406-492	Boom Low Angle Override Valve	Boom Dump Valve (Down) – Check Valve
51	1	3/8	N76406-104	Boom Low Angle Limit Valve (In)	Boom Low Angle Override Valve
52	1	3/8	N76406-408	Hydraulic Tank	Boom High Angle Limit Valve (Tee Out)
53	1	1/4	N76404-380	Return Pressure Gauge	Hydraulic Return Manifold
54	1	3	N76348-312	Return Manifold #1	Hydraulic Filter #1
55	1	3	N76348-292	Return Manifold #2	Hydraulic Filter #1
56	1	3	N76348-300	Return Manifold #1	Hydraulic Filter #2
57	1	3	N76348-280	Return Manifold #2	Hydraulic Filter #2

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HOSE LIST

ITEM	QTY.	HOSE ID (IN)	PART NUMBER	LOCATION TO	LOCATION FROM
58	1	1/4	N76904-170	Load Cell	Load Cell Gauge
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	Overhead Tank
68	1	3/8	N76406-160	Unloading Relief	Hand Recharge Pump
69	1	1/2	N76508-080	Start Motor	Soft Engage Valve
70	1	1/2	N76508-260	Overhead Tank	Start Motor
71	1	3/8	N76406-260	Recharge Pump	Overhead Tank
72	1	3/8	N76406-140	High Pressure Filter	Recharge Pump
73	1	3/8	N76406-100	Unloading Relief (In)	High Pressure Filter
74	1	3/8	N76406-256	Accumulator	Unloading Relief (Out)
75	1	1/2	N76508-052	Unloading Relief (Vent)	Unloading Relief (Vent Tee)
76	1	1/2	N76508-230	Overhead Tank	Unloading Relief (Vent Tee)
77	1	1/2	N76508-570	Start Valve	Accumulator
78	1	1/2	N76508-532	Soft Engage Valve	Start Valve
79	1	1/4	N76404-174	Accumulator Pressure Gauge	Start Valve

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HOSE LIST					
ITEM	**QTY.**	**HOSE ID (IN)**	**PART NUMBER**	**LOCATION TO**	**LOCATION FROM**
80	1	1/4	N76404-052	Water Temperature Valve (Probe)	Engine Oil Pressure (Block)
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	Throttle Cylinder	Foot Throttle Actuator
87	-	-	-	-	-
88	-	-	-	-	-
89	-	-	-	-	-
90	-	-	-	-	-
91	-	-	-	-	-
92	-	-	-	-	-
93	-	-	-	-	-
94	-	-	-	-	-
95	-	-	-	-	-
96	-	-	-	-	-
97	-	-	-	-	-
98	-	-	-	-	-
99	-	-	-	-	-
100	-	-	-	-	-
101	-	-	-	-	-

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LUBRICATION MANIFOLD HOSE LIST					
ITEM	**QTY**	**HOSE ID (IN)**	**PART NUMBER**	**LOCATION TO**	**LOCATION FROM**
102	1	1/4	N76804-080	Aux. Idler Sheave	Boom Grease Manifold
103	1	1/4	N76804-081	Main Idler Sheave	Boom Grease Manifold
104	1	1/4	N76804-169	Lower Auxiliary Pin	Boom Grease Manifold
105	1	1/4	N76804-165	Upper Main Sheave Pin	Boom Grease Manifold
106	1	1/4	N76804-166	Upper Auxiliary Sheave Pin	Boom Grease Manifold
107	1	1/4	N76804-164	Lower Main Sheave Pin (Left)	Boom Grease Manifold
108	1	1/4	N76804-162	Lower Sheave Pin (Center)	Boom Grease Manifold
109	1	1/4	N76804-161	Lower Main Sheave Pin (Center)	Boom Grease Manifold
110	-	-	-	-	-
111	-	-	-	-	-
112	-	-	-	-	-
113	-	-	-	-	-
114	-	-	-	-	-
115	-	-	-	-	-
116	-	-	-	-	-
117	-	-	-	-	-
118	-	-	-	-	-
119	-	-	-	-	-
120	-	-	-	-	-
121	-	-	-	-	-
122	-	-	-	-	-

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PARTS LIST

ITEM	QTY.	NUMBER	PART DESCRIPTION
			BOOM AND RIGGING
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	N00018-003	Boom Foot Pin Insert Bushings
128	1	N45916-001	Boom Angle Indicator (Right Hand)
129	1	N60255-005	Boom Angle Indicator Needle
130	16	N60986-004	Boom Connection Pins
131	1	N61587-040	Boom Mid #1Weldment (Rev. B)
132	1	N61587-040	Boom Mid #2 Weldment (Rev. B)
133	1	N61587-040	Boom Mid #3 Weldment (Rev. B)
134	12	N60980-004	Boom Mid Rollers
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-160 BILL OF MATERIALS

PARTS LIST (CONT'D)

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

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			BOOM AND RIGGING (CONT'D)
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 (Not Shown)
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	N46501-115	Pendant Lines
187	2	N61597-001	Pendant Anchor Plates
188	2	N61594-001	Pendant Keepers

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			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	N99SK1-137	Pedestal Weldment (Rev. -)
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.

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			UPPERSTRUCTURE (CONT'D)
206	2	N46837-002	Seals
207	2	N46547-005	Outlet Box
208	1	N61584-001	Upperstructure Weldment, (Rev. M)
-	1	N61585-001	Upperstructure Machining, (Rev. B)
-	1	N46500-001	Upperstructure/Gantry Bolt Kit
209	1	N61596-001	Upperstructure/Gantry Pins
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 w/Socket Base
224	1	N46830-003	Time Delay Relay
225	2	N46837-002	Seals

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			UPPERSTRUCTURE (CONT'D)
226	1	N61627-004	Return Manifold
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 Open Wedge Socket
245	1	N30606-012	Gantry Rope Clamp (Not Shown)
246	1	N46238-003	Beacon Light
247	1	N46238-501	Beacon Light Bulb

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			UPPERSTRUCTURE (CONT'D)
248	1	N46547-003	Outlet Box
249	2	N60982-001	Boom Stops
250	2	N47008-001	Boom Stop Bumpers
251	2	N15969-001	Boom Stop Springs
252	2175 ft.	N00163-014	Main Wire Rope
253	1	N46647-001	Main Wire Rope Anchor
254	1	N46760-001	Main Hoist
-	**1**	**N80376-004**	**Main Hoist Check Valve Poppet Modifications**
255	1	N46419-006	Main Hoist Bolt Kit (Not Shown)
256	-	-	-
257	628 ft.	N00163-012	Auxiliary Wire Rope
258	1	N46647-003	Auxiliary Wire Rope Anchor
259	1	N46433-002	Auxiliary Hoist
-	**1**	**N80376-004**	**Auxiliary Hoist Check Valve Poppet Modifications**
260	1	N46419-001	Auxiliary Hoist Bolt Kit (Not Shown)
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 (Not Shown)
265	1	N45002-502	Boom Hoist Ratchet and Pawl
-	1	N47140-002	Boom Hoist Ratchet and Pawl Installation
266	1	N46865-003	Attention Horn

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			UPPERSTRUCTURE (CONT'D)
267	1	N46866-004	Modular
268	1	N46057-001	Mirror
269	1	N80196-003	Emergency Load Lowering Kit (Not Shown)
270	2	N46474-002	Junction Boxes
271	-	-	-
272	-	-	-
273	-	-	-
274	-	-	-
			CAB
275	1	N80278-025	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	N46798-001	Cab Door Grab Handle
-	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

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			CAB (CONT'D)
281	1	N47010-001	Main Hoist Control Valve
282	1	N47010-001	Boom Hoist Control Valve
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	-	-	-

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			CAB (CONT'D)
304	1	N45727-037	Load Indicator System
305	1	N45727-037-1	Gauge
306	1	N45727-037-2	Load Cell
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

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			CAB (CONT'D)
324	1	N99SK1-141	Crane Name Plate (Not Shown)
325	1	N99SK3-058	Lifting Load Capacity Chart
326	1	N45376-001	Hand Signal Chart (Not Shown)
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)

340LA-160 BILL OF MATERIALS

PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			CAB (CONT'D)
347	1	N46545-002	Anti-Two Block Audible Alarm
348	1	N46535-001	Enclosure Plug
349	1	N47045-003	Electrical Enclosure #2
350	1	N46536-001	Attention Horn Push-Button
351	1	N46537-001	Cab Light Switch
352	1	N46537-001	Floodlight Switch
353	1	N46537-001	Beacon Light Switch
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.	N13764-032	Hydraulic Oil (Storage Capacity)
-	225 gal.	N00178-001	Fuel (Storage Capacity)
364	2	N45012-002	Cleanout Covers
365	2	N46178-012	Ball Valve

340LA-160 BILL OF MATERIALS

PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			POWER UNIT
366	1	N45125-001	Hydraulic Oil Fill/Vent
367	1	N45690-030	Hydraulic Oil Level Gauge
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

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			POWER UNIT (CONT'D)
389	1	N45923-001	Tachometer Magnetic Pickup
390	1	N45683	Soft Engage Valve
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

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PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			POWER UNIT (CONT'D)
411	1	N47101-549	Air Cleaner Element
412	1	N46178-004	Ball Valve
413	-	-	-
414	-	-	-
415	-	-	-
416	-	-	-
			THE FOLLOWING ITEMS ARE NOT SHOWN ON POWER UNIT GERERAL ARRANGEMENT
417	1	N47101-519	Instrument Panel
418	1	N47101-527	Water Temperature Gauge
419	1	N47101-528	Oil Pressure Gauge
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

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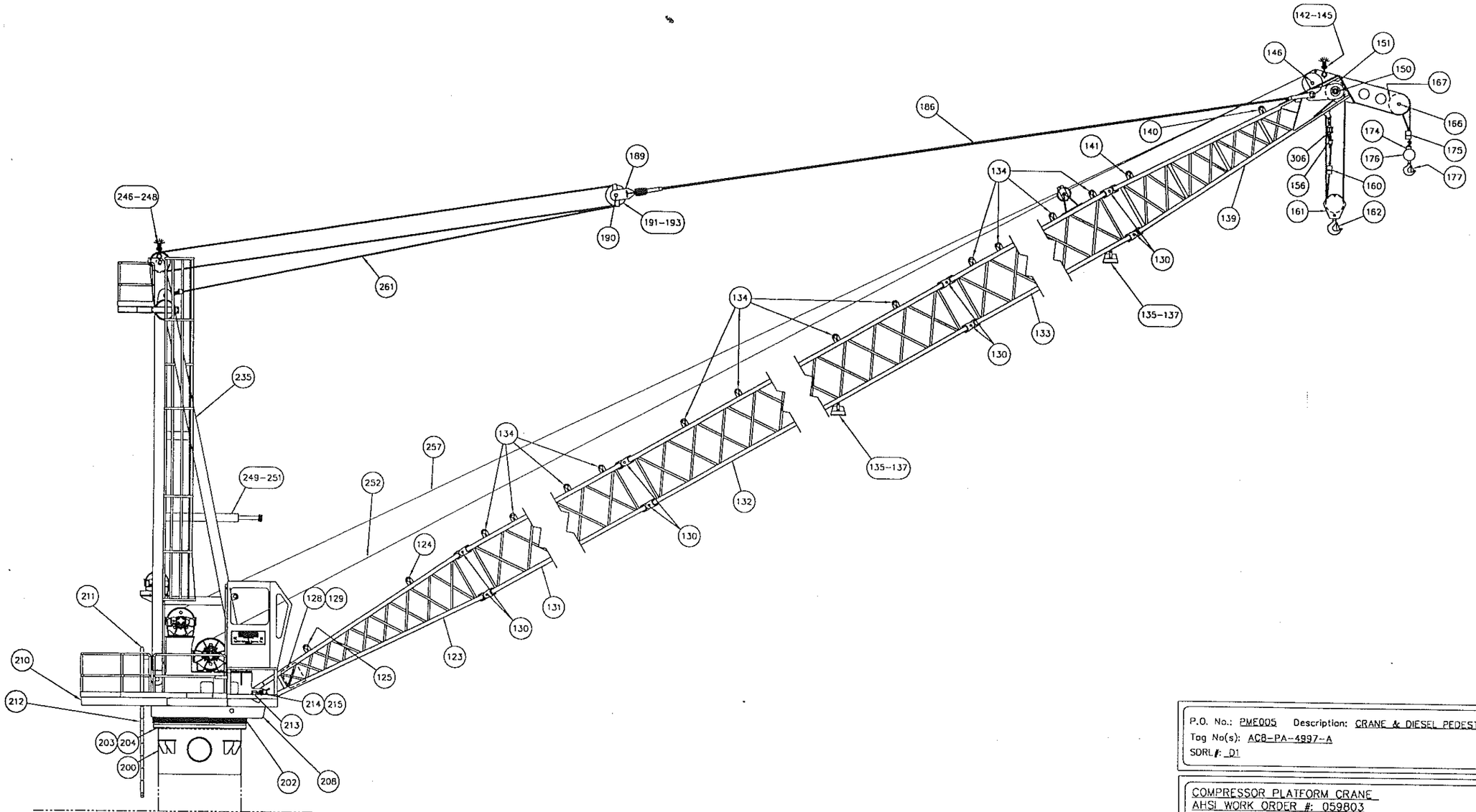
PARTS LIST (CONT'D)

ITEM	QTY.	NUMBER	PART DESCRIPTION
			POWER UNIT (CONT'D)
			THE FOLLOWING ITEMS ARE NOT SHOWN ON POWER UNIT GERERAL ARRANGEMENT
433	1	N47101-525	Lower Radiator Hose
434	1	N47101-516	Engine Fan Belt
435	1	N61628-017	Return Filter Piping
436	1	N61628-018	Return Filter Piping
437	1	N46276-002	Fuel Check Valve
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



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P.O. No.: PME005 Description: CRANE & DIESEL PEDESTAL
Tag No(s): AC8-PA-4997-A
SDRL #: D1

COMPRESSOR PLATFORM CRANE
AHSI WORK ORDER #: 059803
LOCATION: OFFSHORE BAY OF CAMPECHE
FACILITY NAME: PEMEX CANTARELL EPC-1
TAG #: AC8-PA-4997-A
BUYER'S PURCHASE ORDER #: 031-DW80-PME005

BY:	APP'D.	DATE:	REVISIONS	DESCRIPTION

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

GENERAL ARRANGEMENT
MODEL 340LA-160
PEMEX

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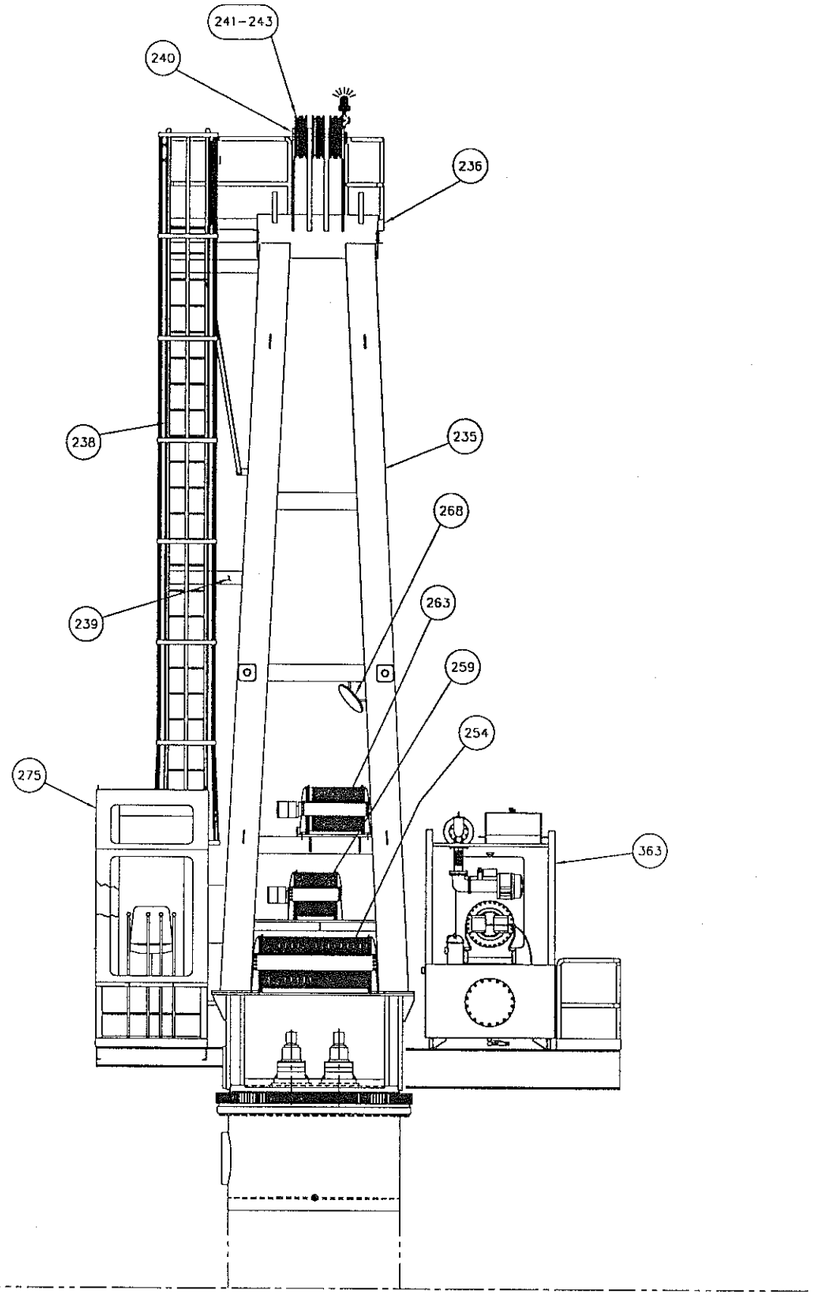
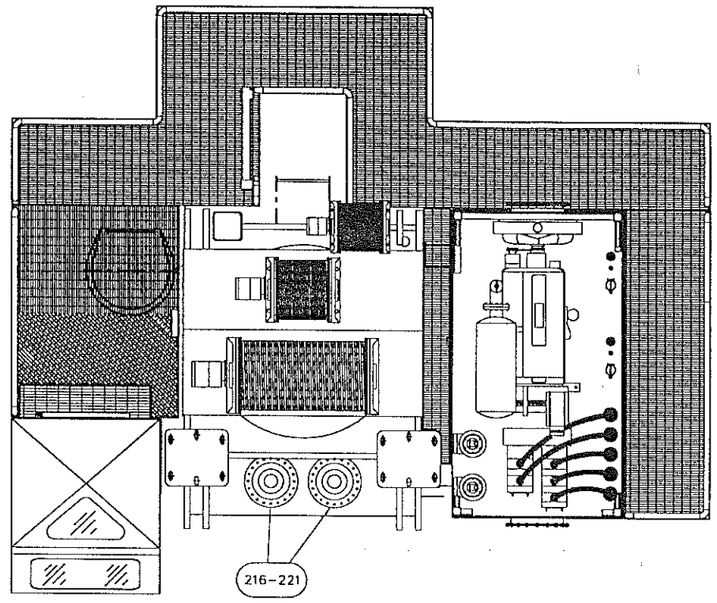
DWG. NO. M99SK4-072
SCALE: 1/4"=1'-0" DRAWN BY: DANNY
DATE: 7/19/99 APP'D BY: T. M SHT 1 OF 2



FRONT ELEVATION
(BOOM NOT SHOWN FOR CLARITY)



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

P.O. No.: PME005 Description: CRANE & DIESEL PEDESTAL
Tag No(s): AC8-PA-4997-A
SDRL#: D1

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BY: APP'D. DATE: — DESCRIPTION / REVISIONS

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

GENERAL ARRANGEMENT
MODEL 340LA-160
PEMEX

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DWG. NO. M99SK4-072
SCALE: 3/8"=1'-0" DRAWN BY: DANNY
DATE: 7/19/99 APP'D BY: SHT. 2 OF 2

POWER UNIT
ARRANGEMENT DRAWING

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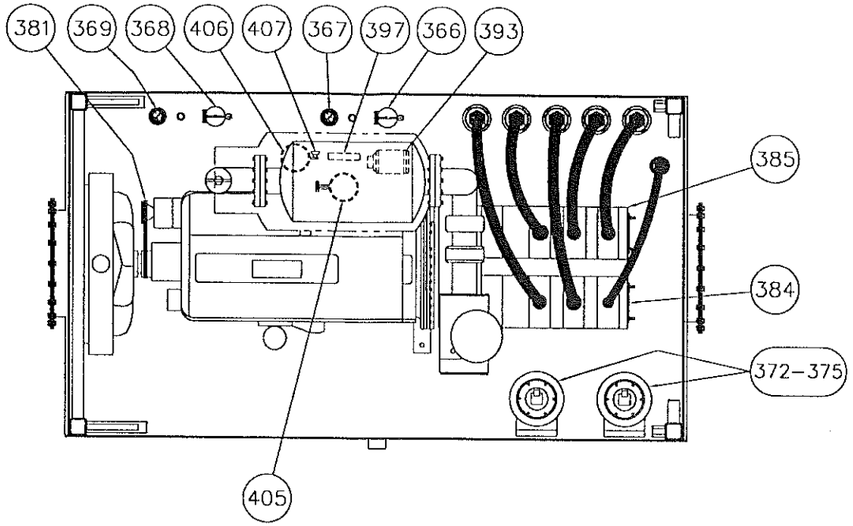
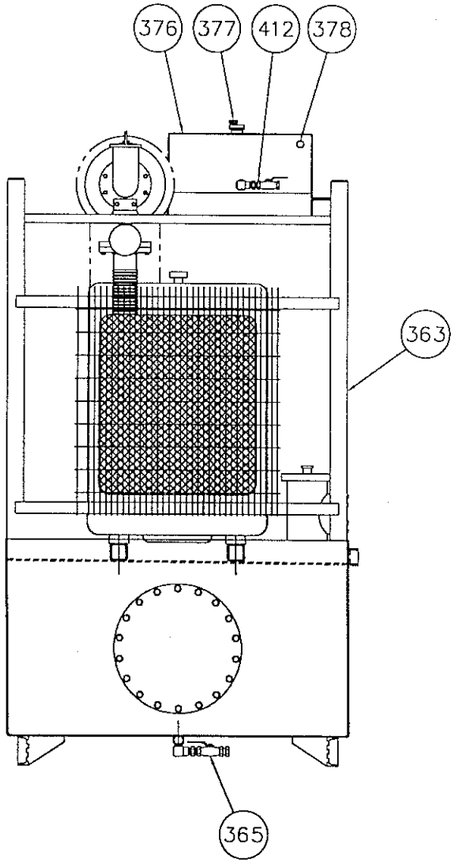
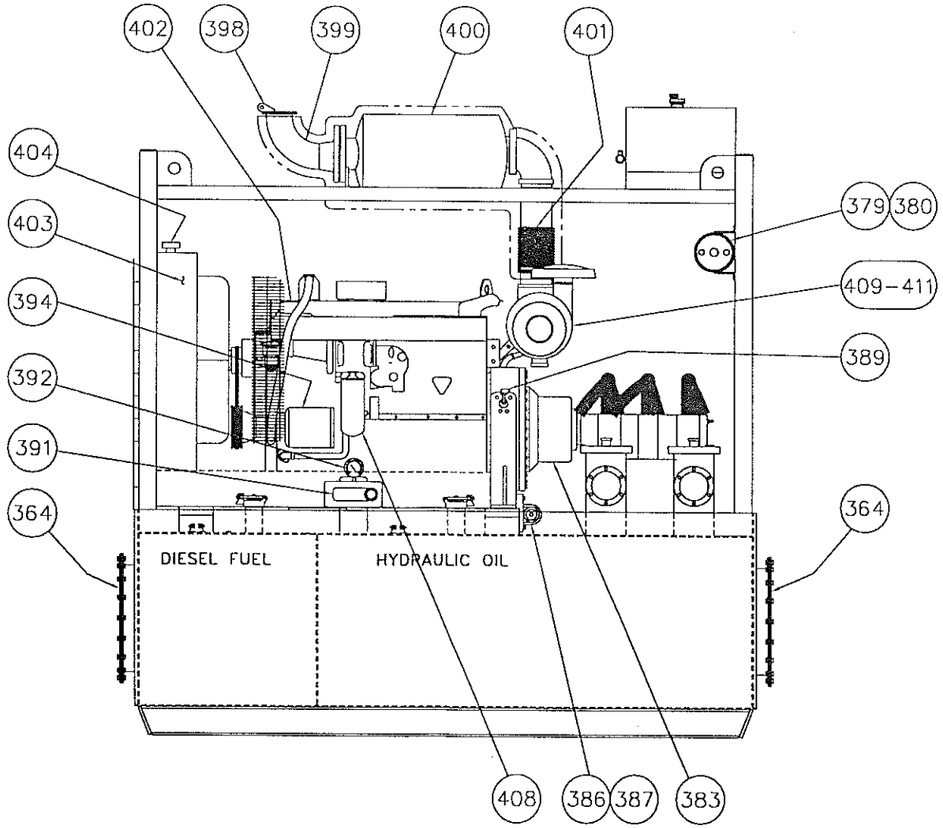
DEC. 07, 1999







P.O. No.: PME005 Description: CRANE & DIESEL PEDESTAL
Tag No(s): AC8-PA-4997-A
SDRL#: D1

COMPRESSOR PLATFORM CRANE
AHSI WORK ORDER #: 059803
LOCATION: OFFSHORE BAY OF CAMPECHE
FACILITY NAME: PEMEX CANTARELL EPC-1
TAG #: AC8-PA-4997-A
BUYER'S PURCHASE ORDER #: 031-DW80-PME005

DESCRIPTION
BY: APP'D. DATE:
REVISIONS

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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

GENERAL ARRANGEMENT
CATERPILLAR 3306TA
PEMEX

DWG. NO. M99SK4-073
SCALE: 1"=1'=0" DRAWN BY: DANNY
DATE: 7/19/99 APP'D BY: SHT 1 OF 1

HYDRAULIC SCHEMATIC
AND
HOSE DIAGRAM

AUX. HOIST
CH150-01
190 Kg/cm² (2700 PSI)

NOTE: MODIFIED CHECK VALVE POPPET (N46117-004)

MAIN HOIST
CH240A-02
206.3 kg/cm² (2935 PSI)

SWING DRIVE SYSTEM

SLEWING MOTOR

SLEWING MOTOR

SPRING SET

PARKING BRAKE

SPRING RELEASE

GEAR REDUCER

DYNAMIC SERVICE BRAKE

PINION GEAR

DYNAMIC BRAKE ACTUATOR (FOOT OPERATED)

SWING CONTROL VALVE V-90

PARKING BRAKE VALVE

RELIEF VALVE

AUX. CONTROL VALVE V-90

OIL COOLER W/ INTEGRAL 60 PSI

DUMP VALVE

RELIEF VALVE

MAIN CONTROL VALVE V-90

AUX. TWO BLOCK LIMIT VALVE

MAIN TWO BLOCK LIMIT VALVE

RATCHET & PAWL CYLINDER ASSEMBLY

EXTERNAL VALVE FOR BRAKE ISOLATION

PLUGGED PORT FOR EMERGENCY LOAD LOWERING

BRAKE

BOOM HOIST CH230 2500 PSI

BRAKE VALVE

MARTIN-DECKER LOAD CELL

MAIN HOIST MARTIN-DECKER INDICATOR GAUGE

HIGH ANGLE OVERRIDE VALVE

BOOM LOW ANGLE LIMIT VALVE

HIGH BOOM ANGLE LIMIT VALVE

LOW ANGLE OVERRIDE VALVE

BOOM CONTROL VALVE V-90

RETURN MANIFOLD

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DECEMBER 6, 1999

HYDRAULIC POWER UNIT

PLUGGED GAUGE PORTS

CATERPILLAR 3306TA DIESEL ENGINE (330 HP.)

DUAL DRIVE GEARBOX

PUMP ROTATION OPPOSITE ENGINE

RETURN FILTERS

SUCTION STRAINERS

ENGINE DRIVEN RECHARGE PUMP

UNLOADING/ RELIEF VALVE

ACCUMULATOR (1500 PSI NITROGEN PRECHARGE)

START MOTOR

SOFT ENGAGE VALVE

HAND RECHARGE PUMP

START VALVE

START SYSTEM OVERHEAD RESERVOIR

ENGINE HYDRAULIC START SYSTEM

COMPRESSOR PLATFORM CRANE
AHSI WORK ORDER #: 059803
LOCATION: OFFSHORE BAY OF CAMPECHE
FACILITY NAME: PEMEX CANTRELL EPC-1
TAG #: AC8-PA-4997-A
BUYER'S PURCHASE ORDER #: 031-DWBO-PME005

P.O. No.: PME005 Description: CRANE & DIESEL PEDESTAL
Tag No(s): AC8-PA-4997-A
SORL #: 010

NOTES:
1. ANTI-TWO BLOCK VALVES ARE NORMALLY CLOSED.
2. DUMP VALVES ARE USED TO DUMP MAIN, AUX. AND BOOM PUMPS WHEN VENT LINES ARE OPENED TO THE RESERVOIR.
3. ALL HOIST CASE DRAINS TO BE CONNECTED TO RESERVOIR.
4. ALL HYDRAULIC HOSES AEROQUIP WITH 37° JIC ENDS AND 4:1 SAFETY FACTOR.
5. DRAIN LINE ----------
6. PILOT LINE - - - - - - -

BY:	APP'D.	DATE:	DESCRIPTION
			REVISIONS

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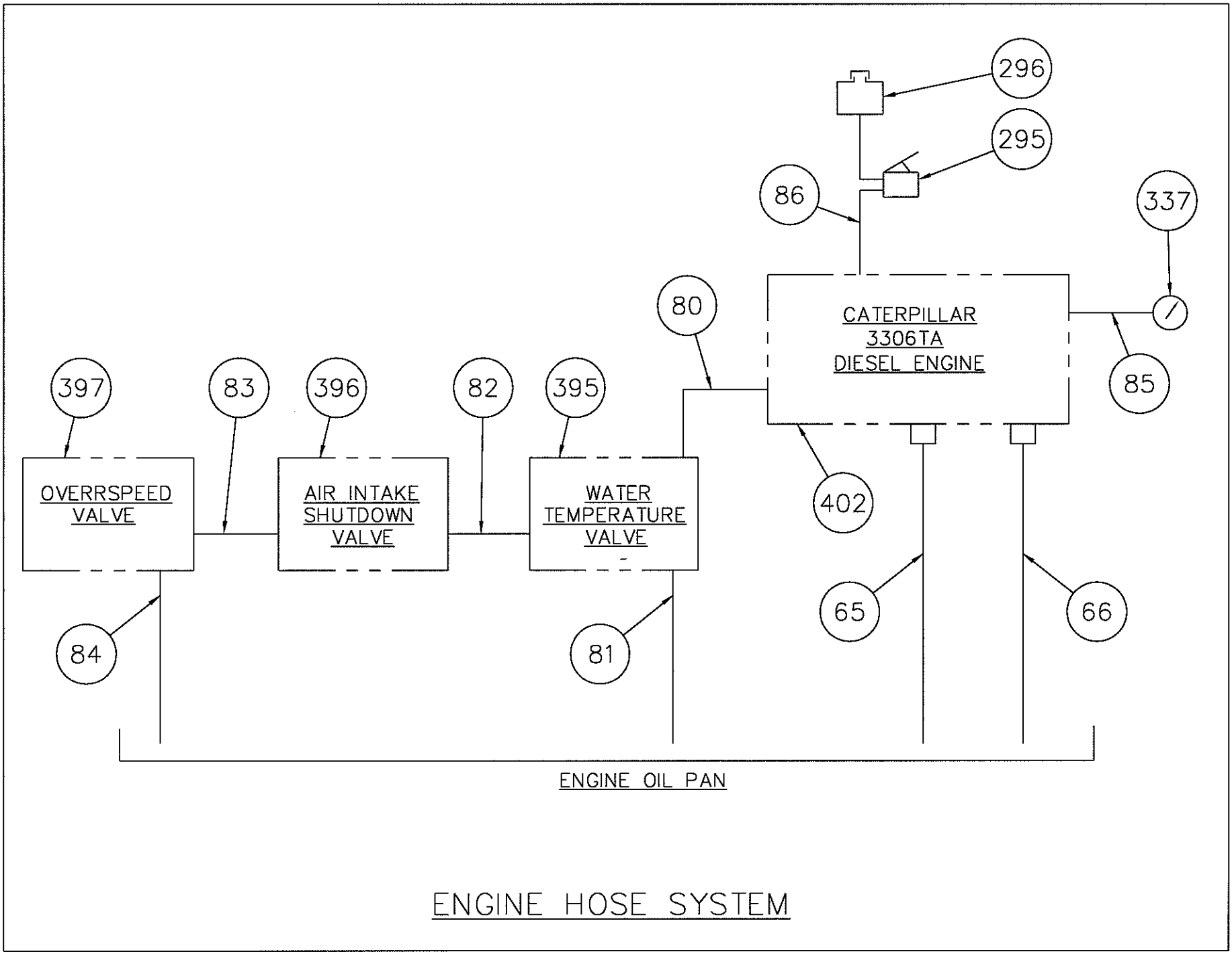
Manufacturing Plant
204 Industrial Ave. C
Houma, LA 70363

HYDRAULIC SCHEMATIC
MODEL 340LA-160
PEMEX

DWG. NO. M99SK1-138

SCALE: NONE | DRAWN BY: DANNY

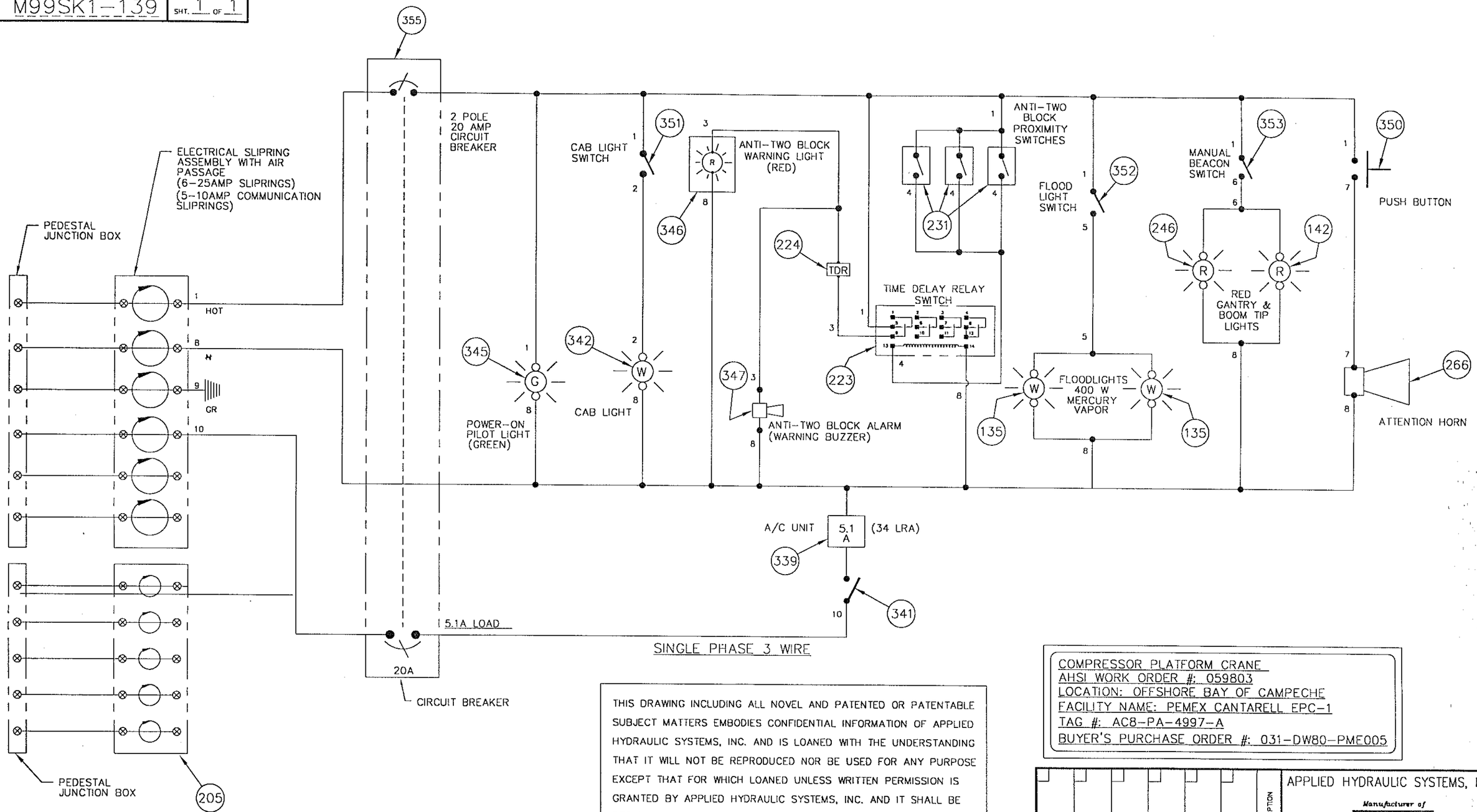
DATE: 7/19/99 | APP'D BY: | SHT. 1 OF 1



ENGINE HOSE SYSTEM

ELECTRICAL SCHEMATIC

DWG. NO. M99SK1-139 SHT. 1 OF 1



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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P.O. No.: PME005 Description: CRANE & DIESEL PEDESTAL
Tag No(s): AC8-PA-4997-A
SDRL#: D16

COMPRESSOR PLATFORM CRANE
AHSI WORK ORDER #: 059803
LOCATION: OFFSHORE BAY OF CAMPECHE
FACILITY NAME: PEMEX CANTARELL EPC-1
TAG #: AC8-PA-4997-A
BUYER'S PURCHASE ORDER #: 031-DW80-PME005

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

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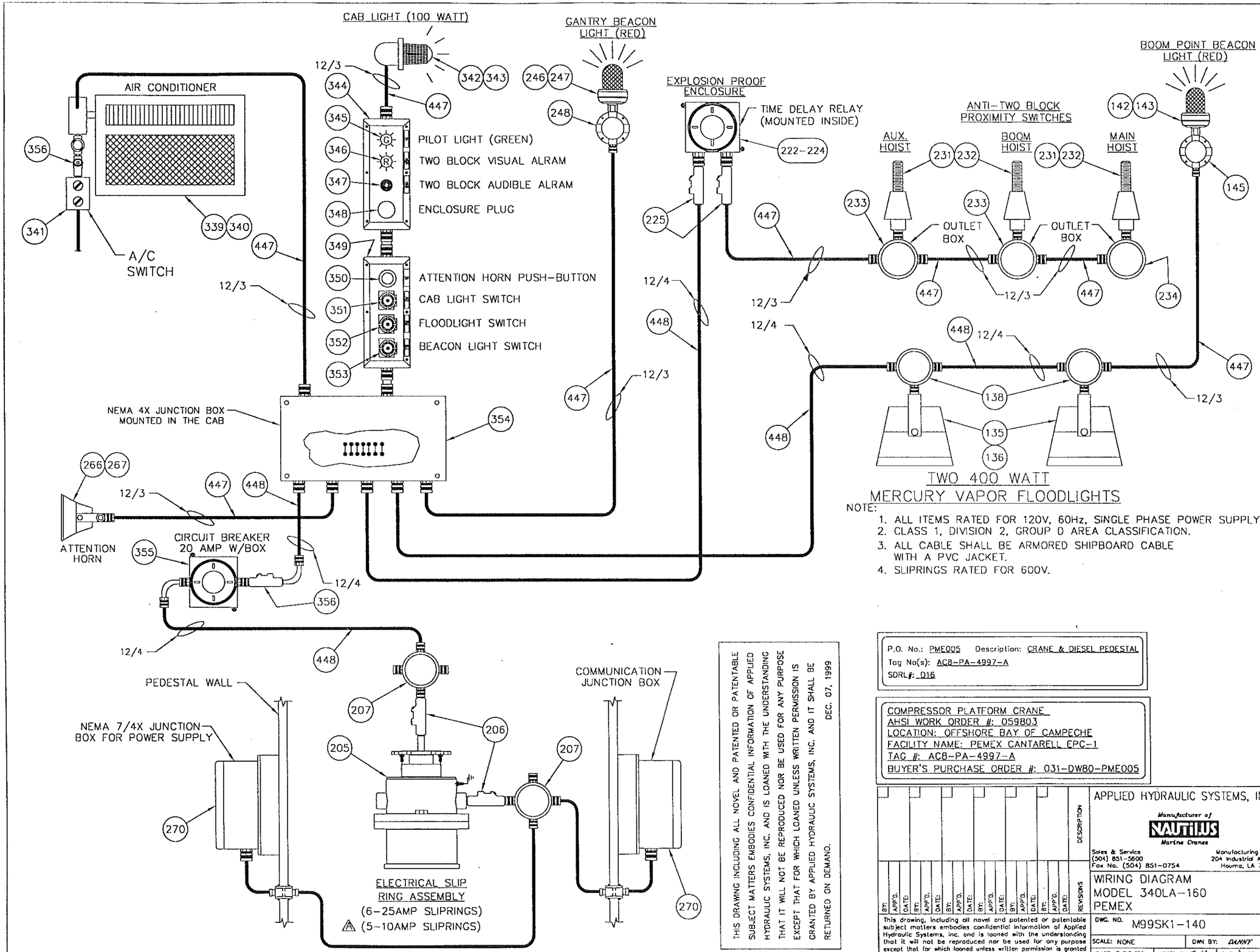
Manufacturer of NAUTILUS Marine Cranes
Sales & Service (504) 851-5600 Fax No. (504) 851-0754
Manufacturing Plant 204 Industrial Ave. C Houma, LA 70363

ELECTRICAL SCHEMATIC
MODEL 340LA-160
PEMEX

DWG. NO. M99SK1-139

SCALE: NONE | DWN BY: DANNY | DATE: 7/15/99 | APP'D BY: | SHT 1 OF 1

ELECTRICAL
WIRING DIAGRAM



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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Tag No(s): AC8-PA-4997-A
SDRL#: D16

COMPRESSOR PLATFORM CRANE
AHSI WORK ORDER #: 059803
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TAG #: AC8-PA-4997-A
BUYER'S PURCHASE ORDER #: 031-DW80-PME005

DESCRIPTION
REVISIONS
BY:
APP'D.
DATE:

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WIRING DIAGRAM
MODEL 340LA-160
PEMEX

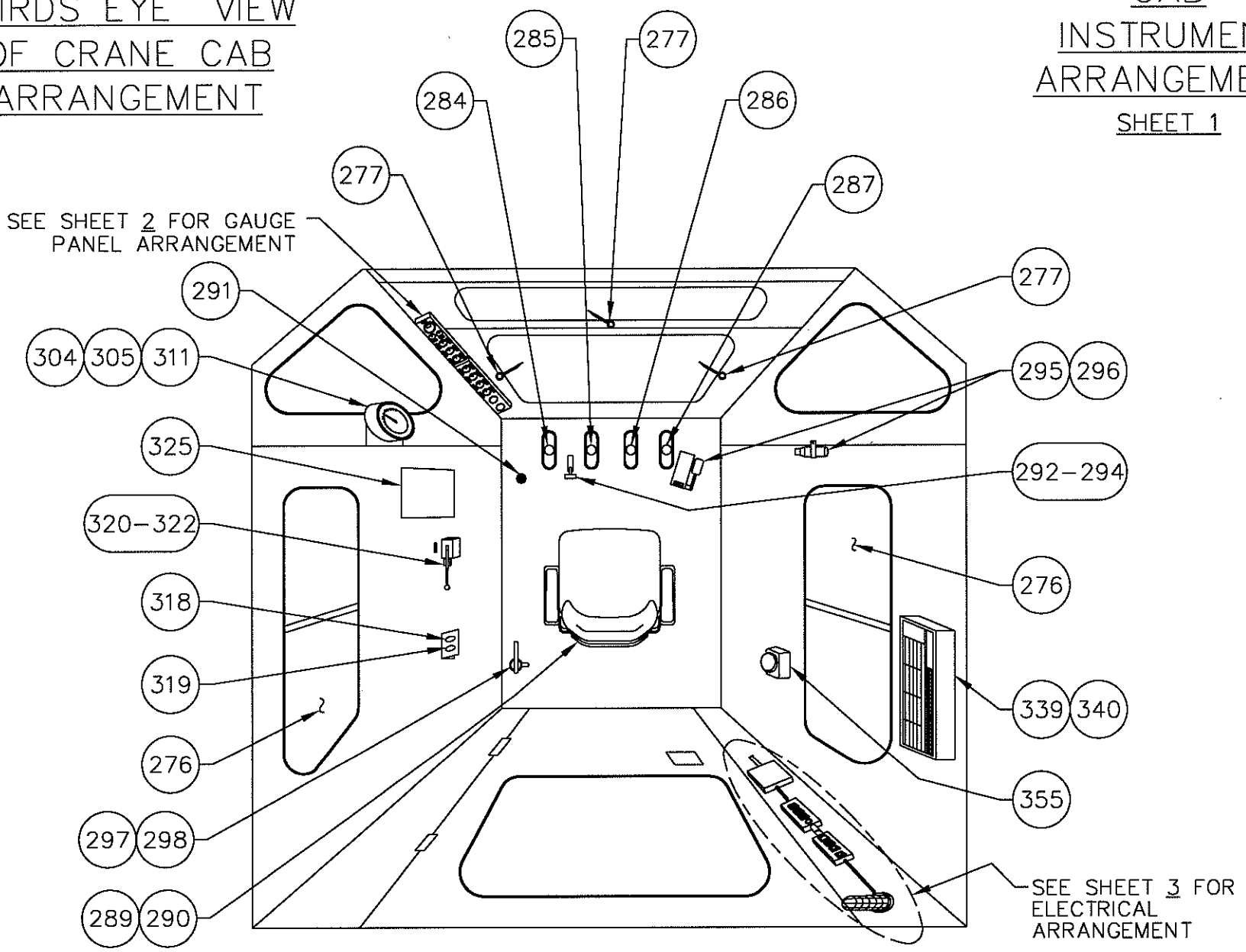
DWG. NO. M99SK1-140
SCALE: NONE
DWN BY: DANNY
DATE: 7/19/99
APP'D BY:
SHT 1 OF 1

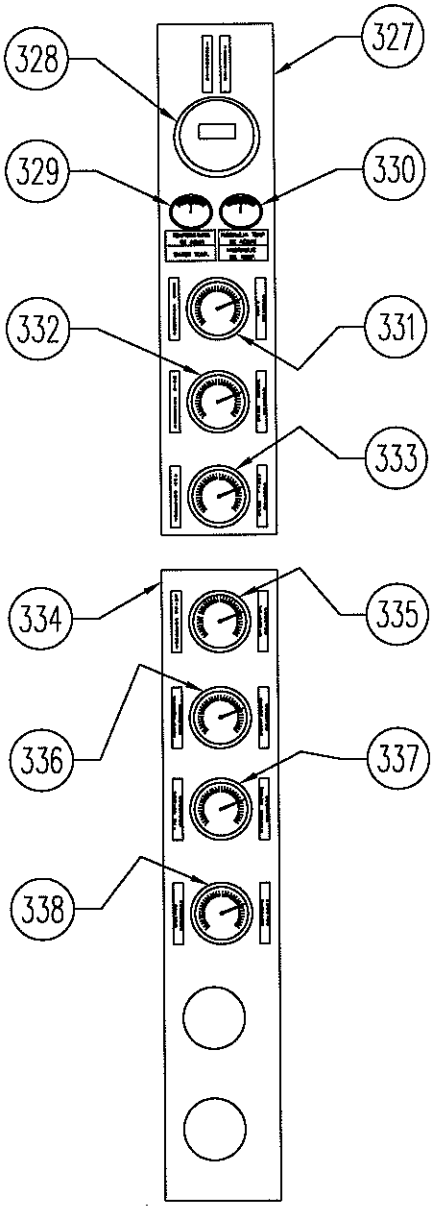
PARTS DRAWINGS

"BIRDS EYE" VIEW OF CRANE CAB ARRANGEMENT

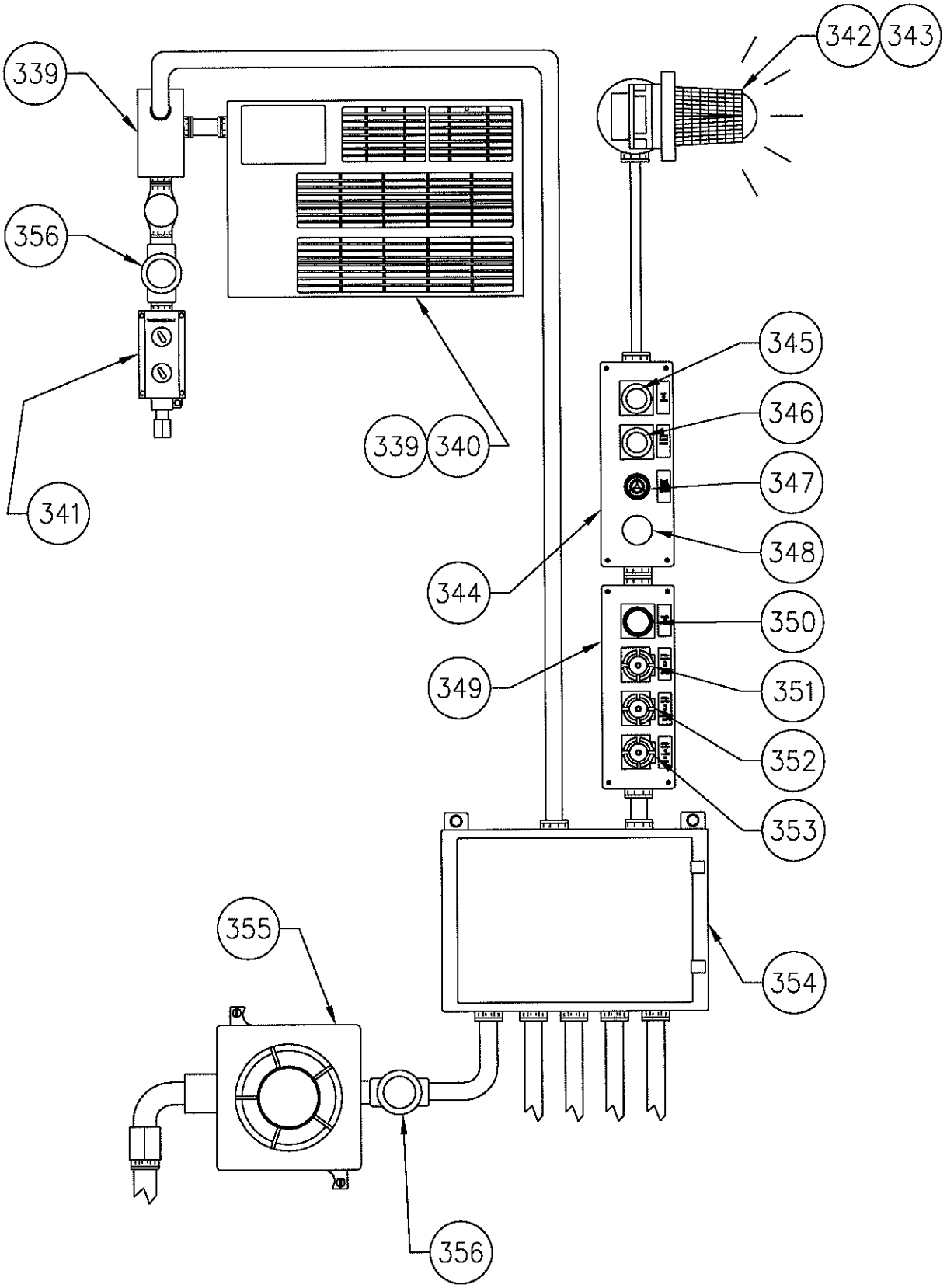
CAB INSTRUMENT ARRANGEMENT

SHEET 1



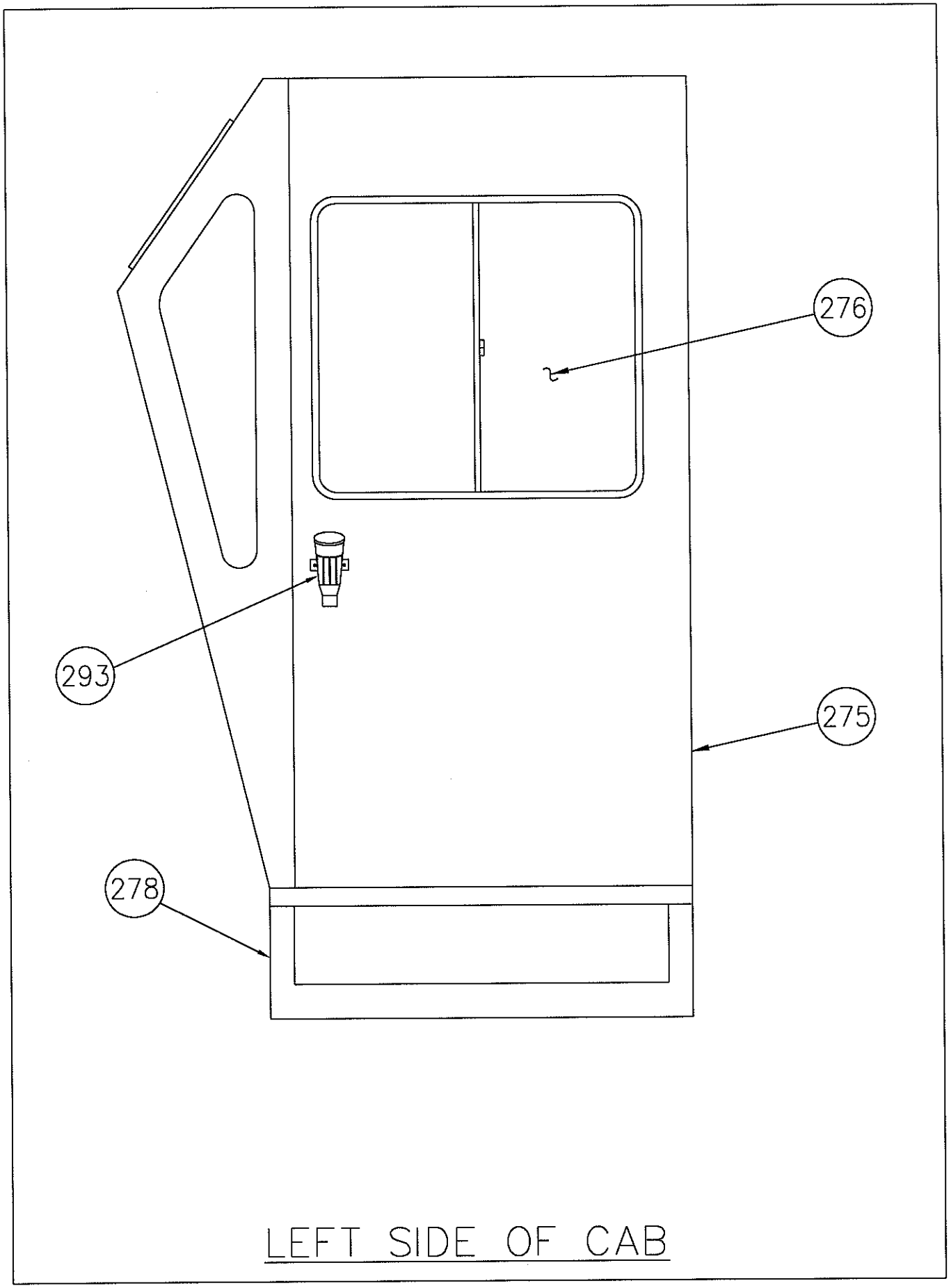


CAB GAUGE PANEL ARRANGEMENTS
SHEET 2

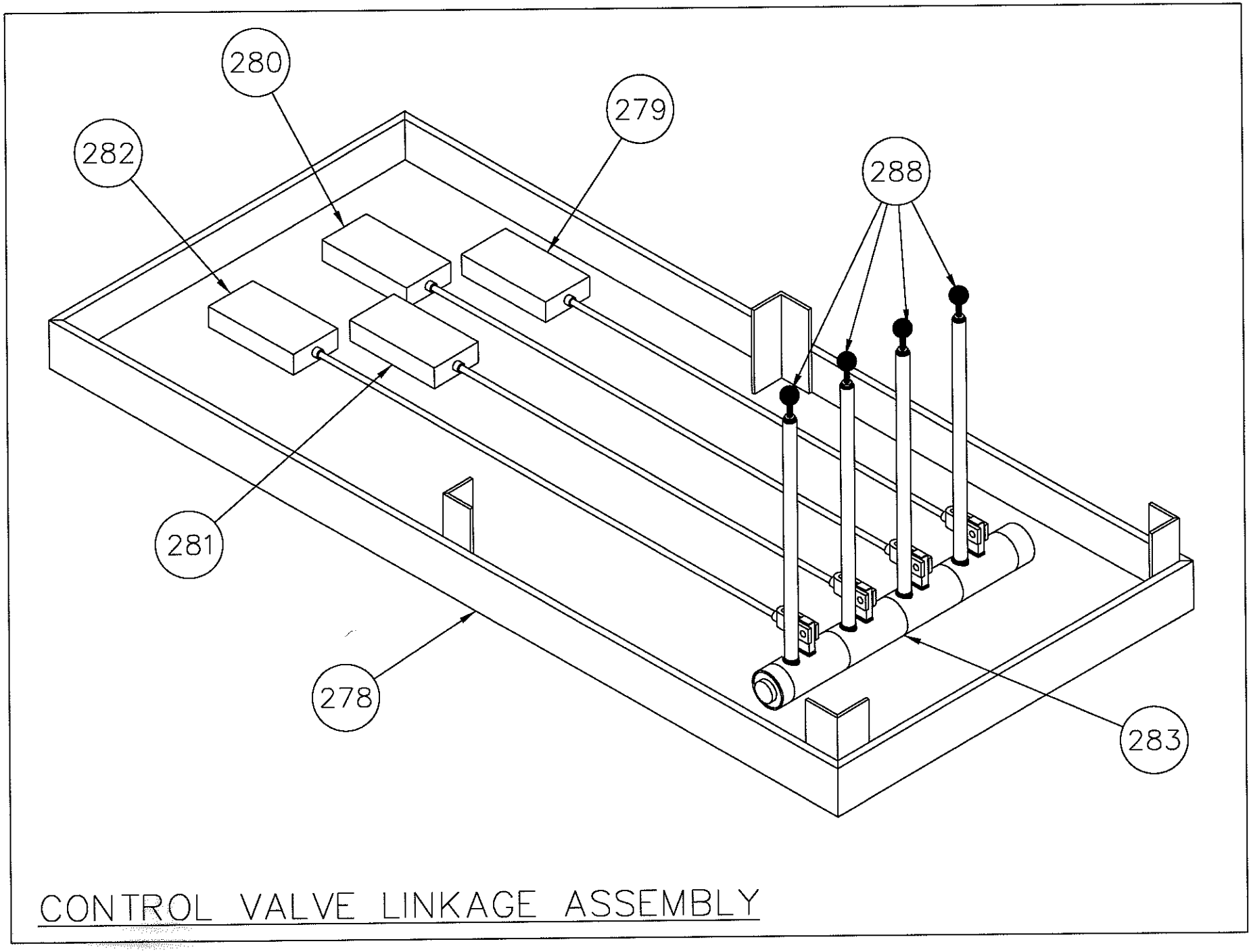


ELECTRICAL ARRANGEMENTS

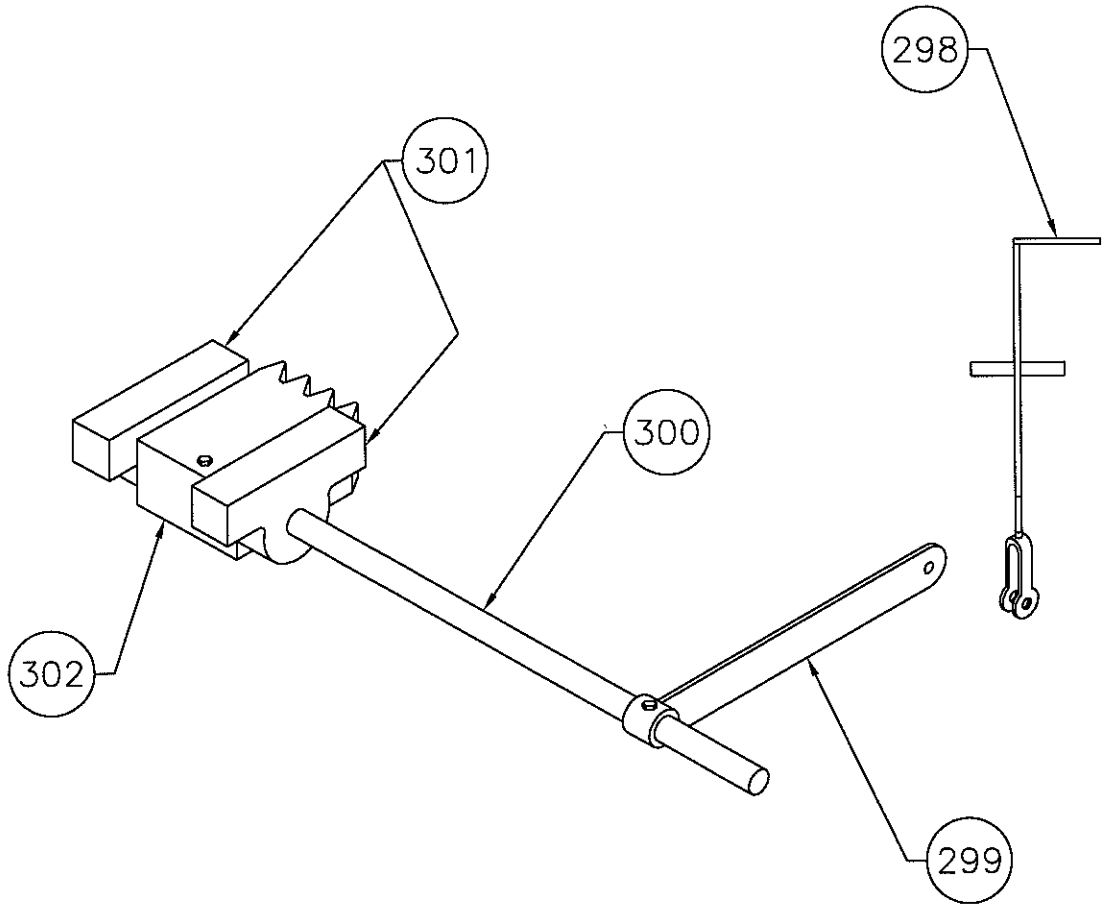
SHEET 3



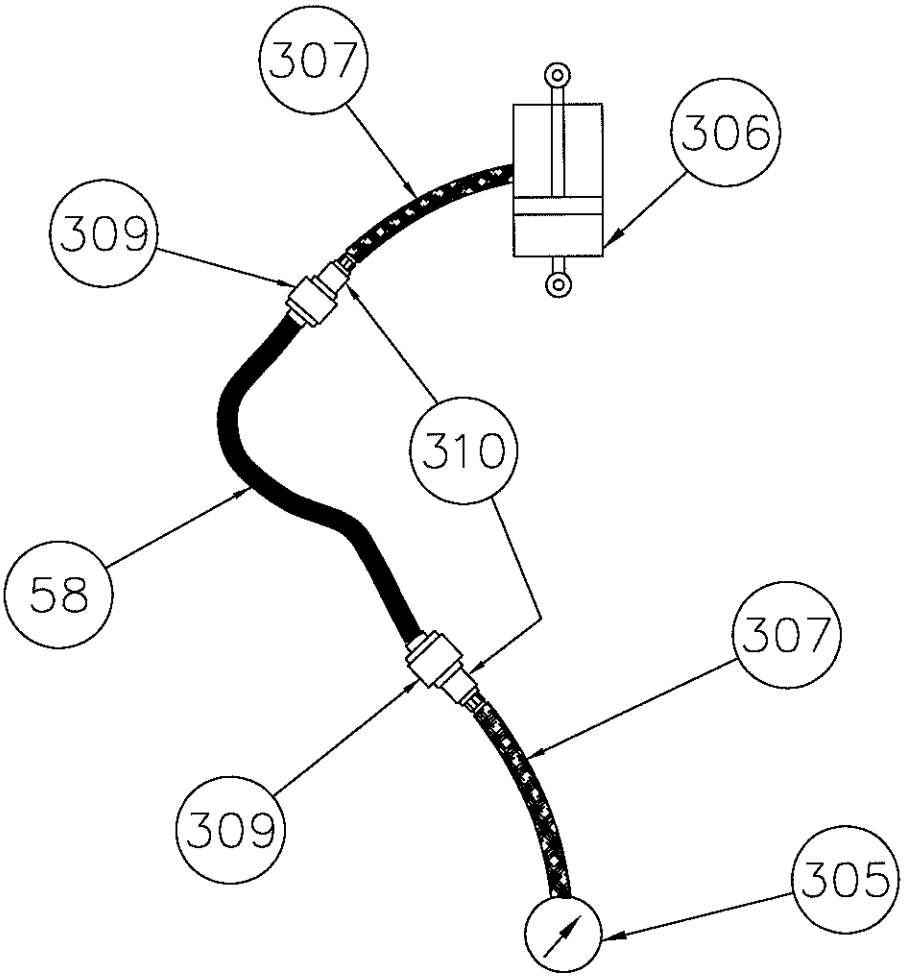
LEFT SIDE OF CAB



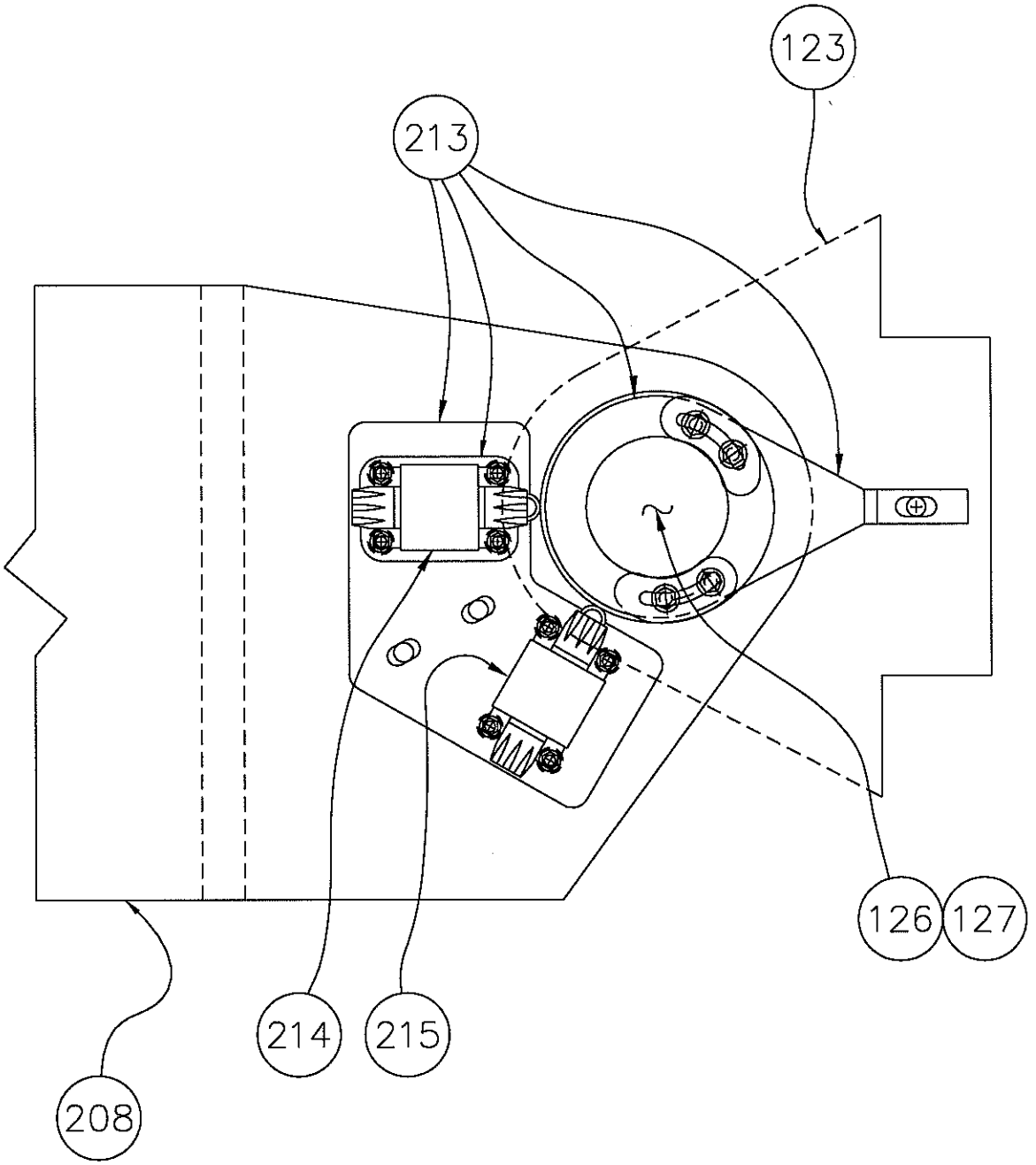
CONTROL VALVE LINKAGE ASSEMBLY



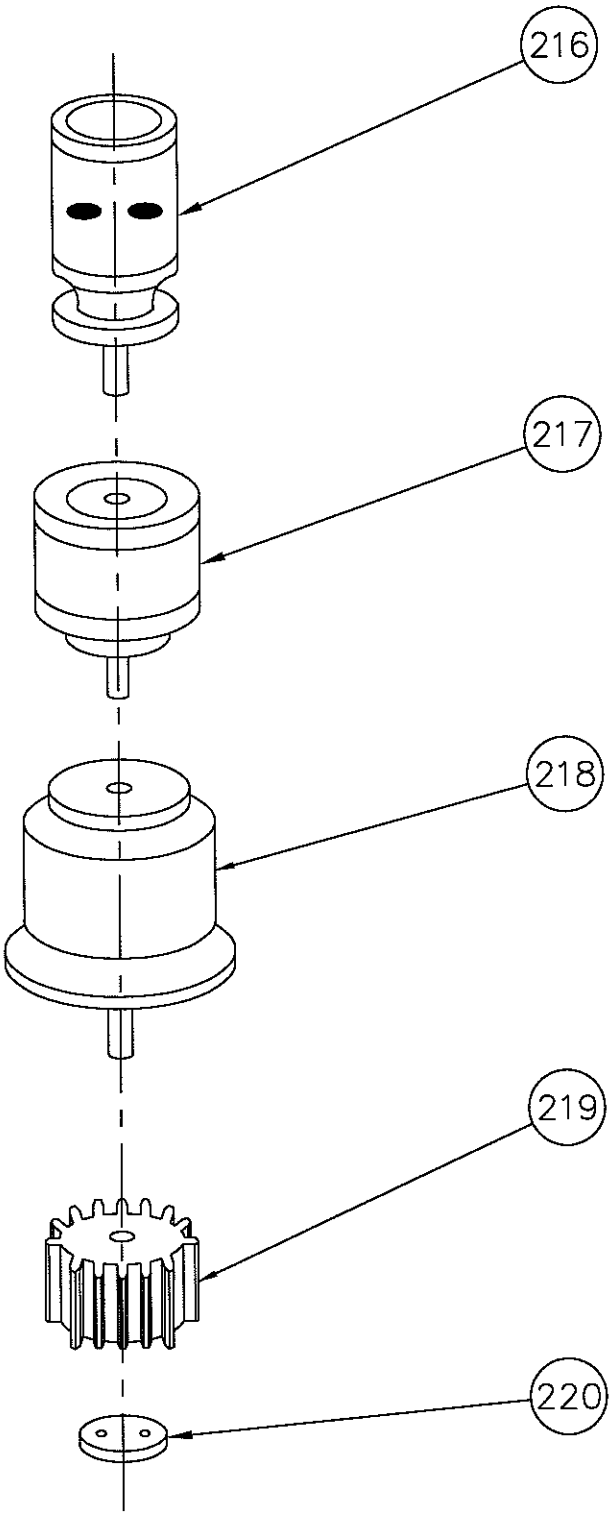
SWING LOCK ASSEMBLY



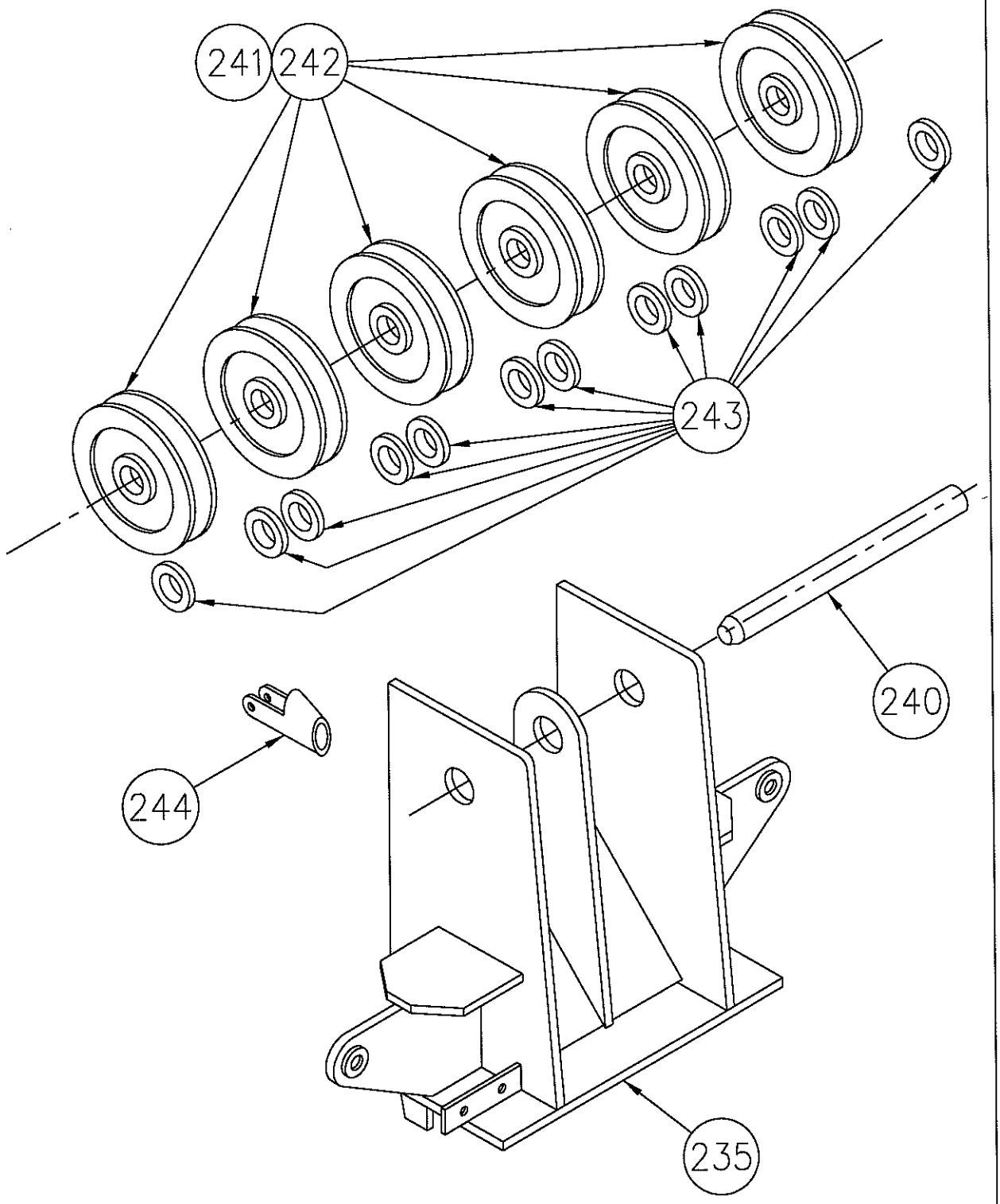
LOAD INDICATOR SYSTEM



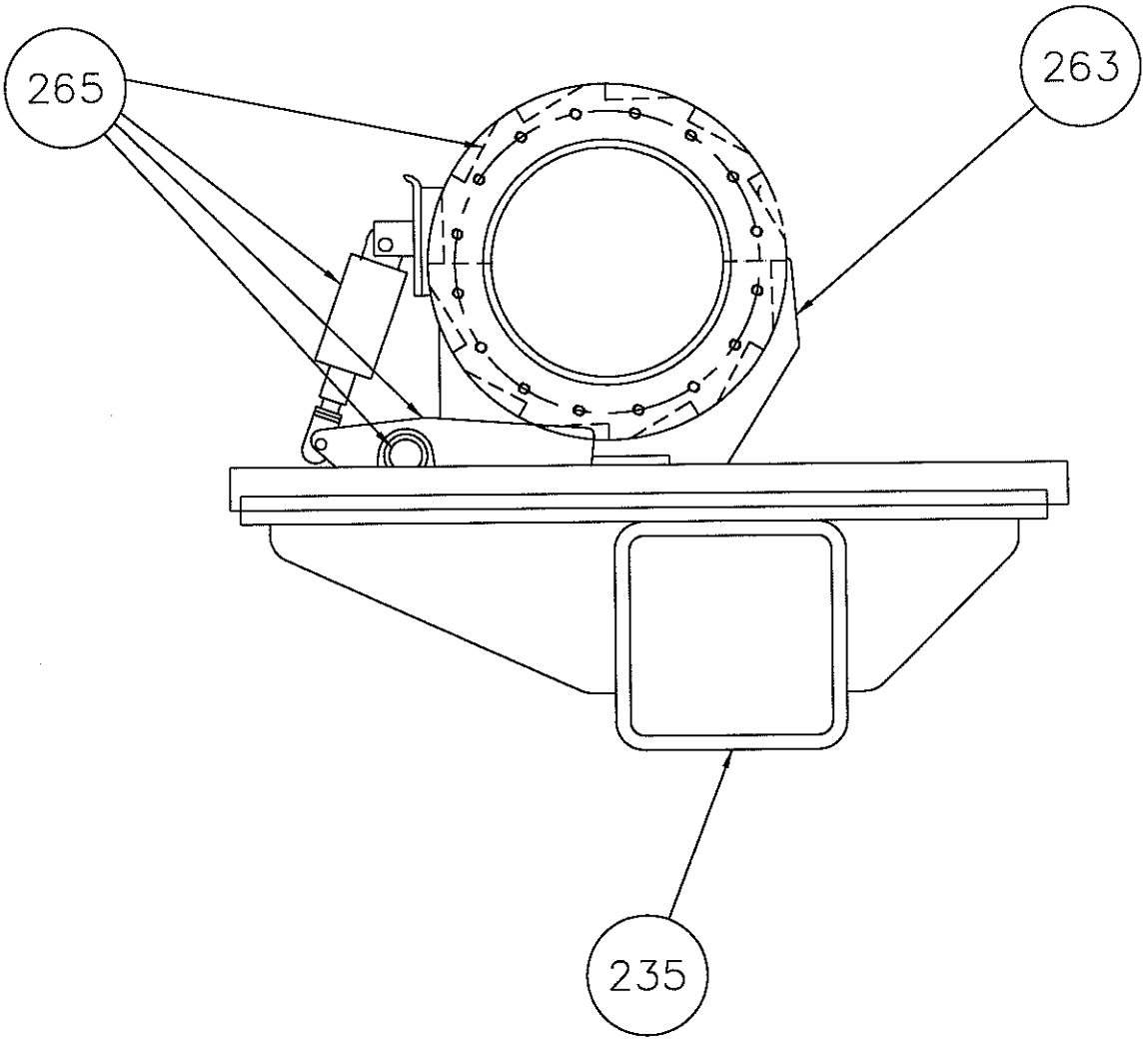
BOOM HIGH/LOW ANGLE KICKOUT ASSEMBLY



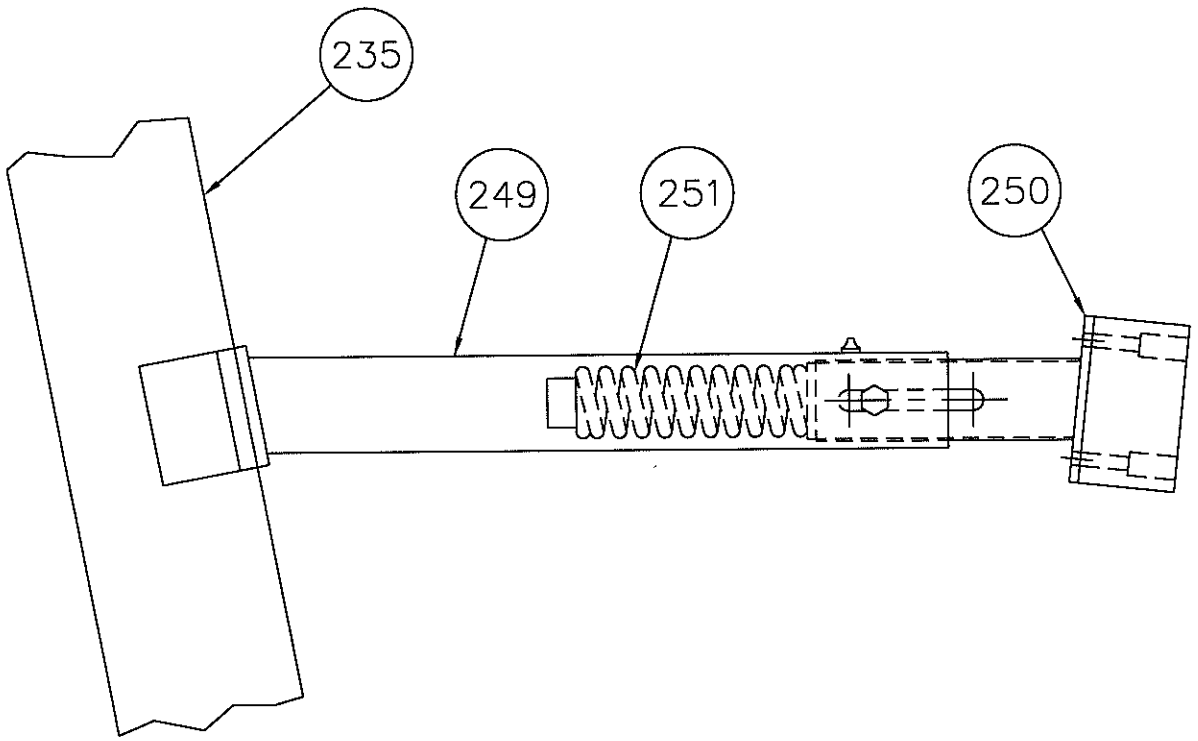
SWING DRIVE ASSEMBLY



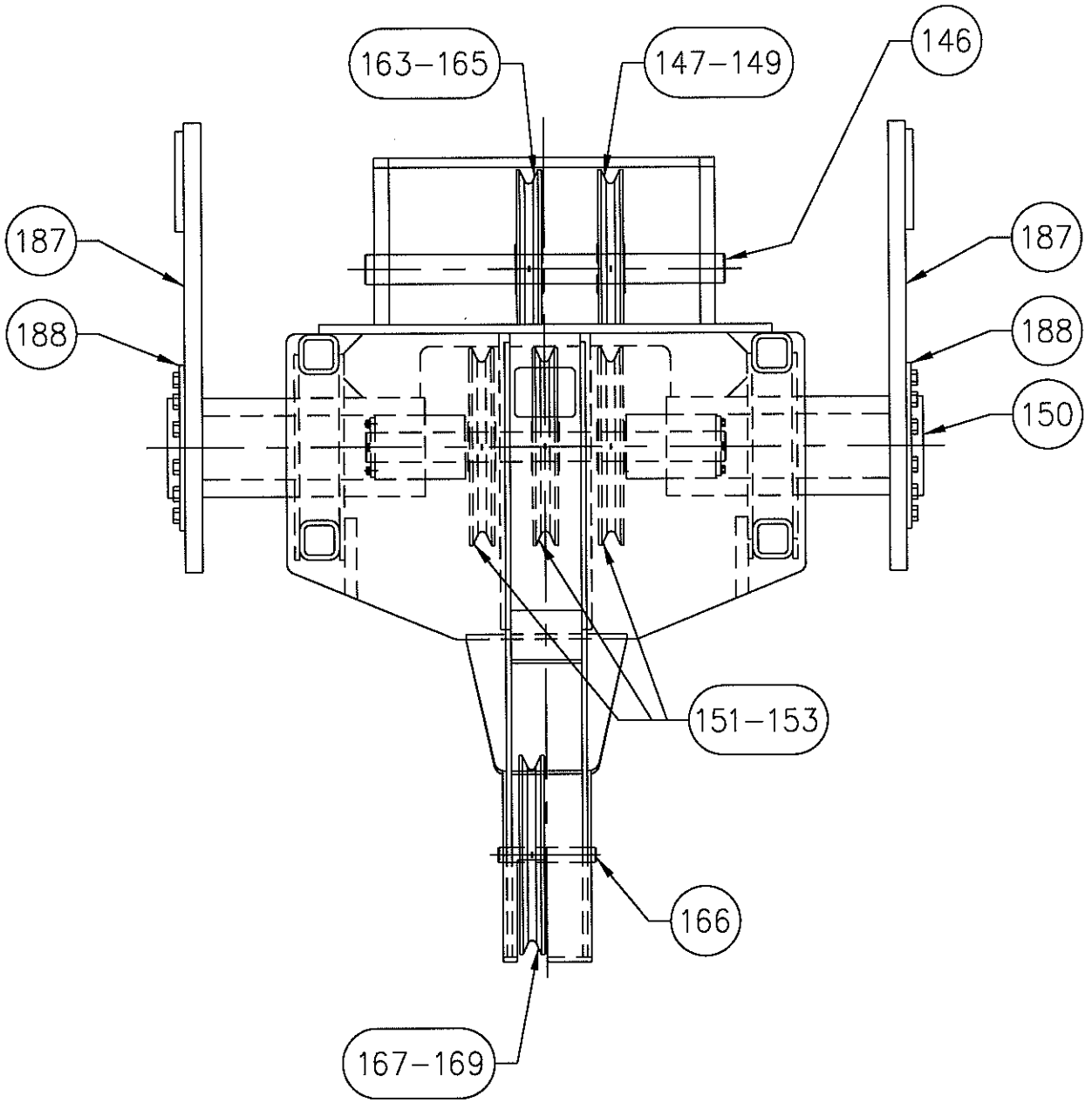
GANTRY SHEAVE CASE ASSEMBLY



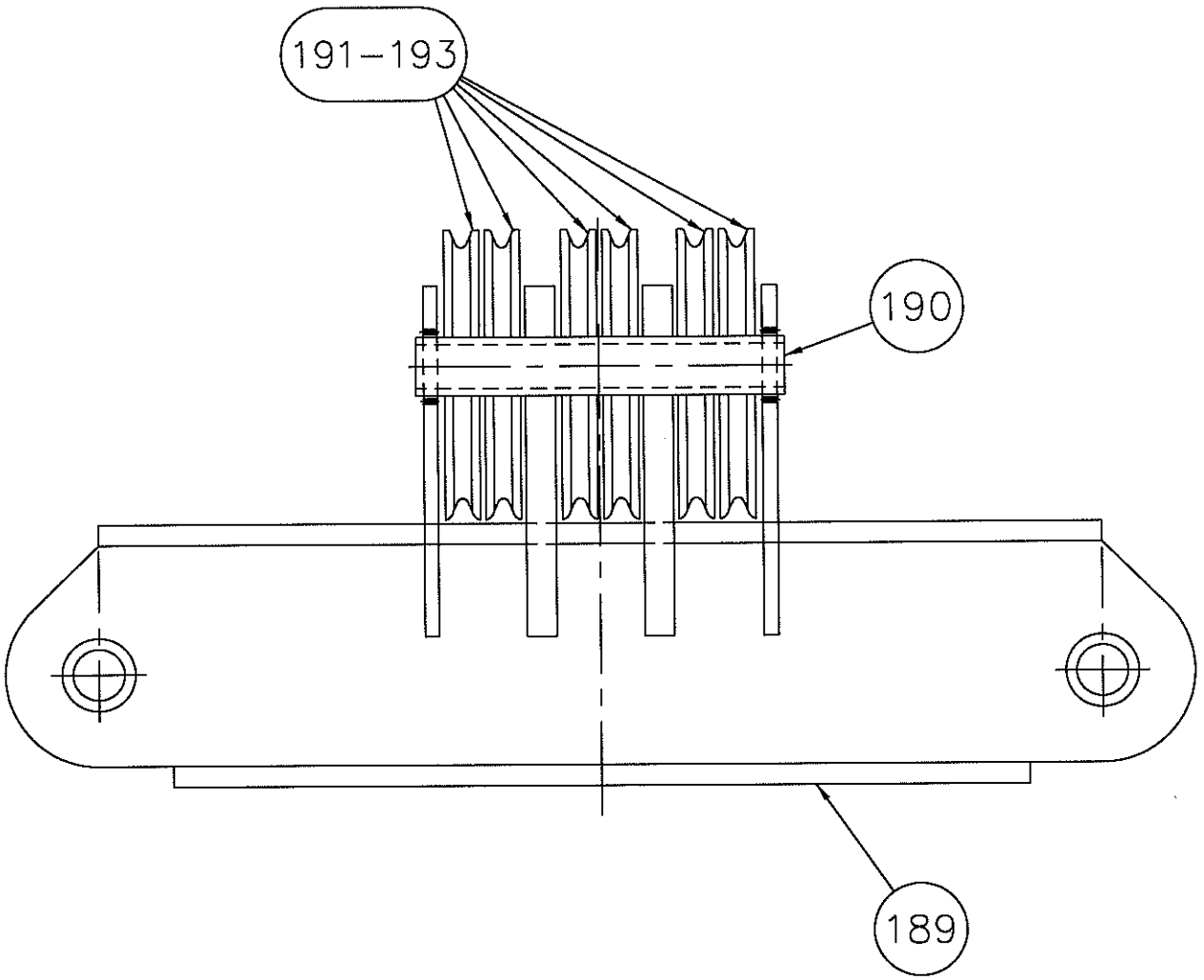
BOOM HOIST RATCHET & PAWL ASSEMBLY



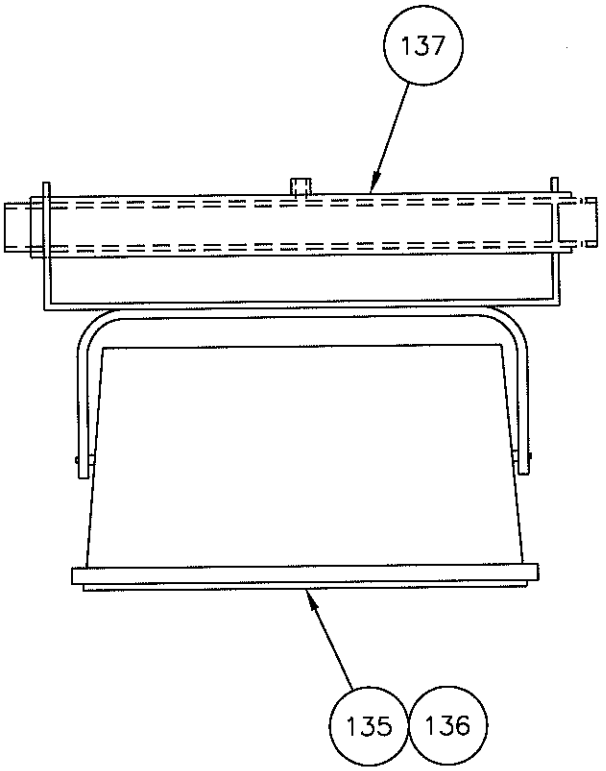
BOOM STOP ASSEMBLY



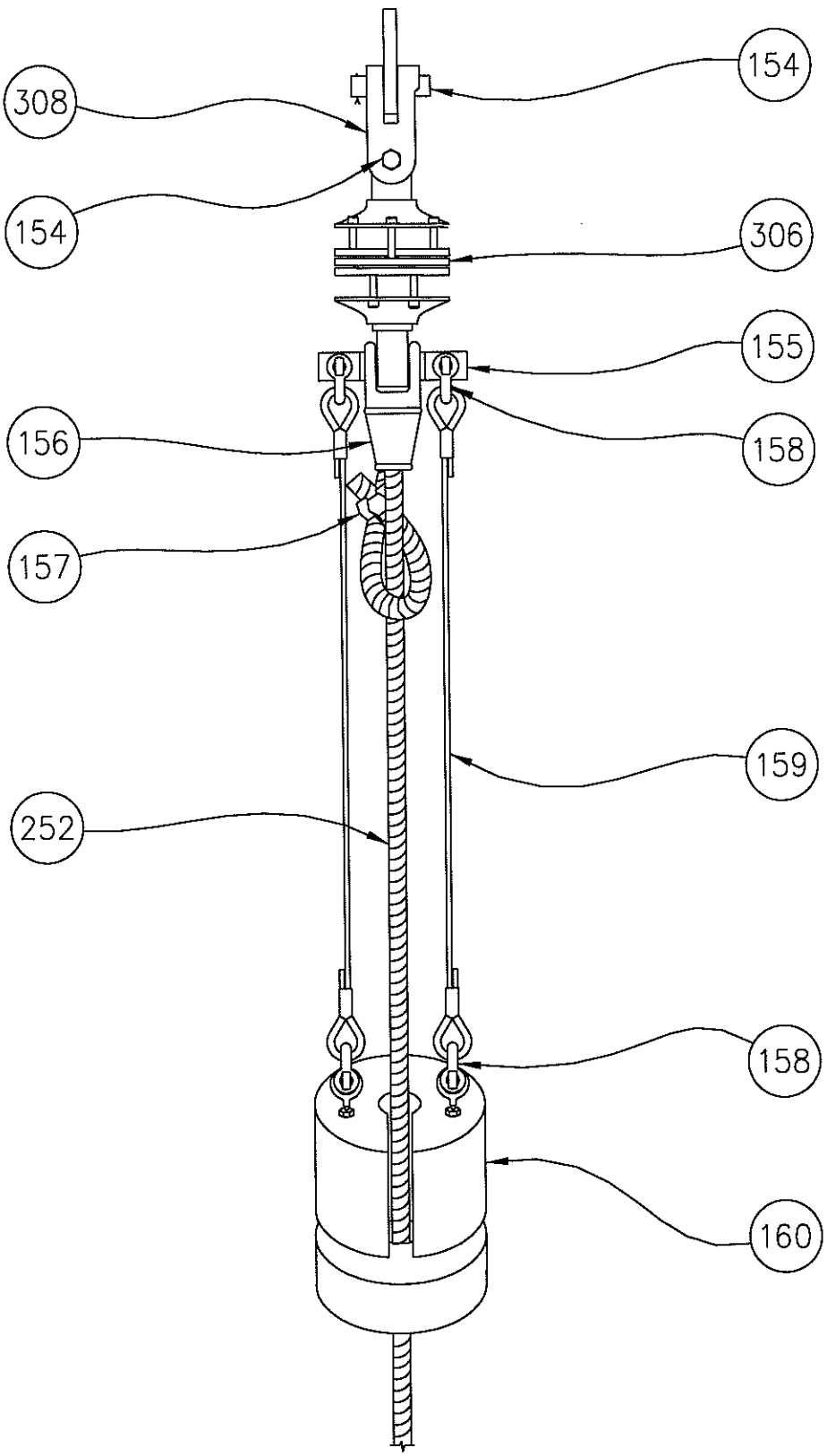
PENDANT/BOOM POINT DETAIL



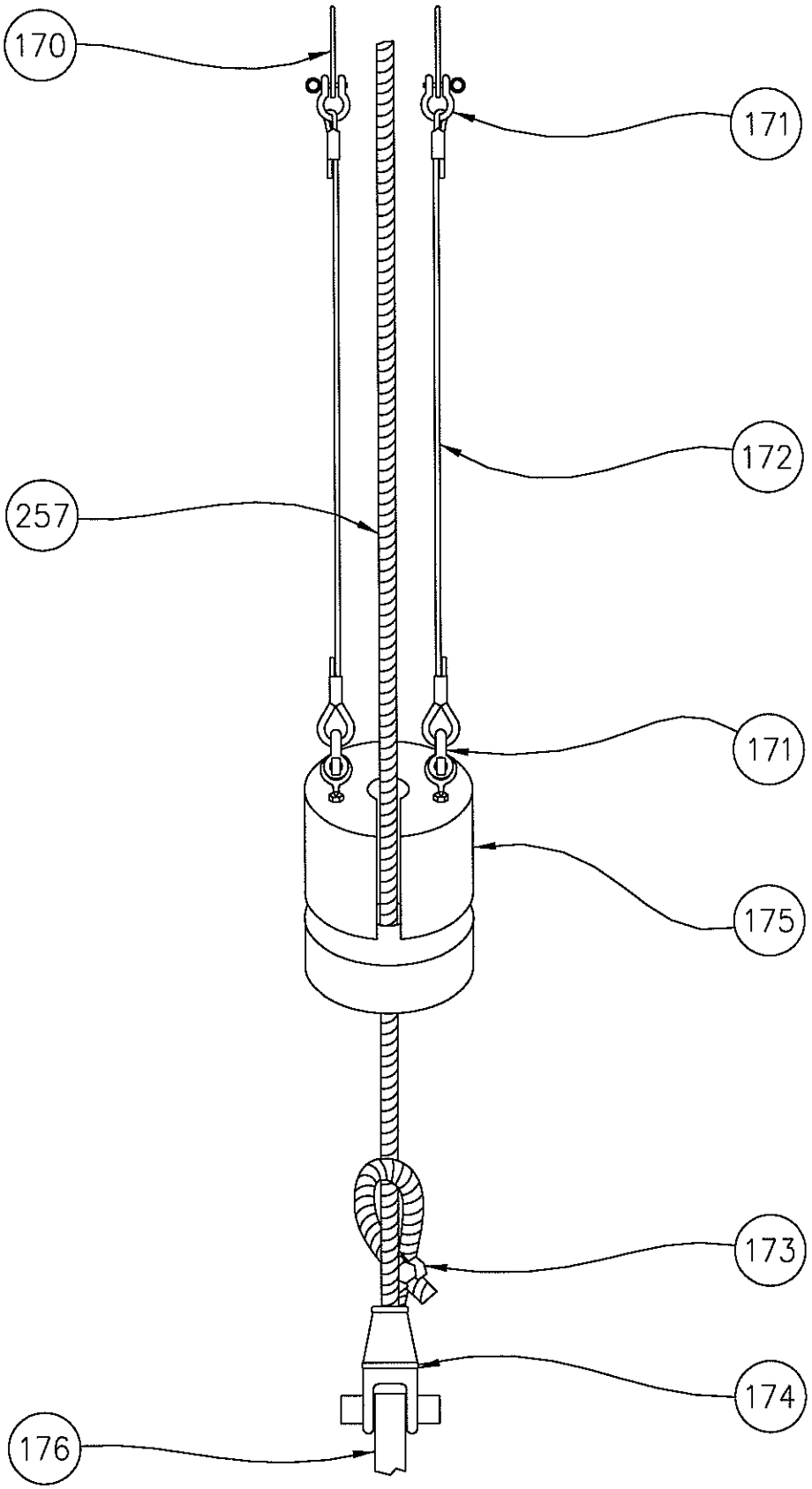
BRIDLE ASSEMBLY



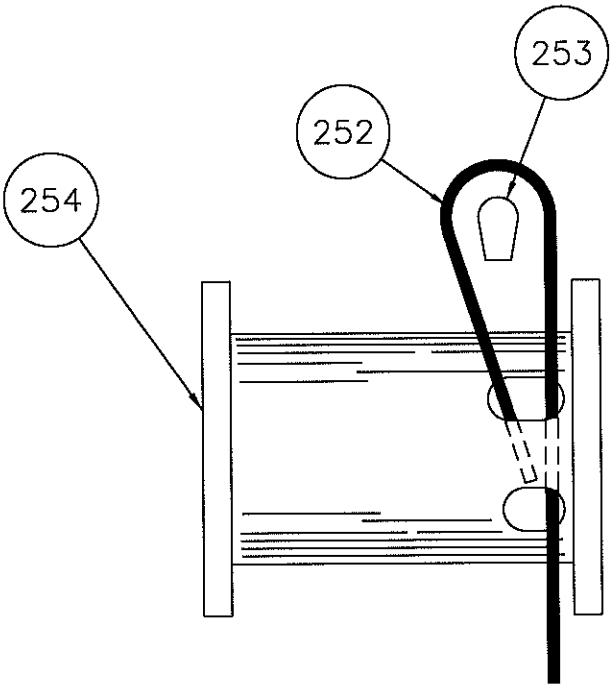
FLOODLIGHT & BRACKET



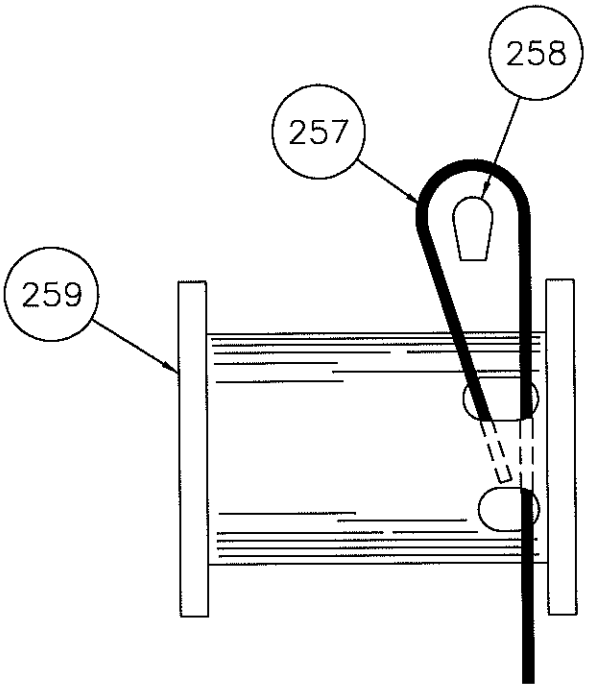
MAIN ANTI-TWO BLOCK ASSEMBLY



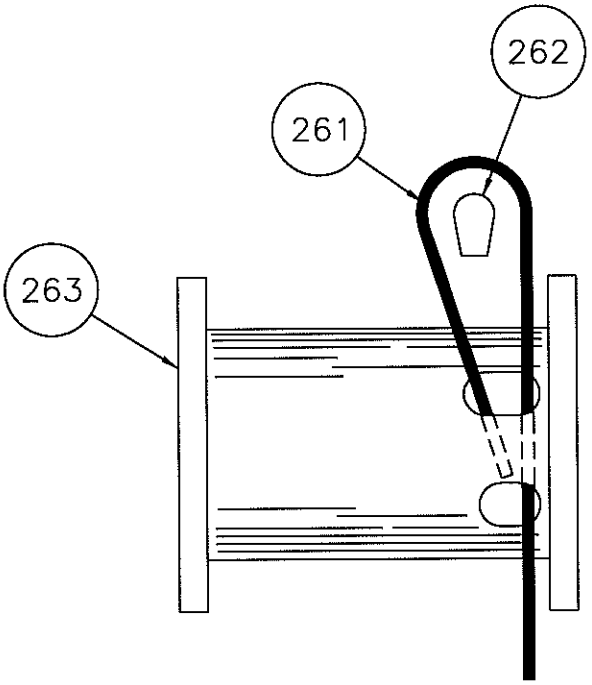
AUXILIARY ANTI-TWO BLOCK ASSEMBLY



MAIN HOIST

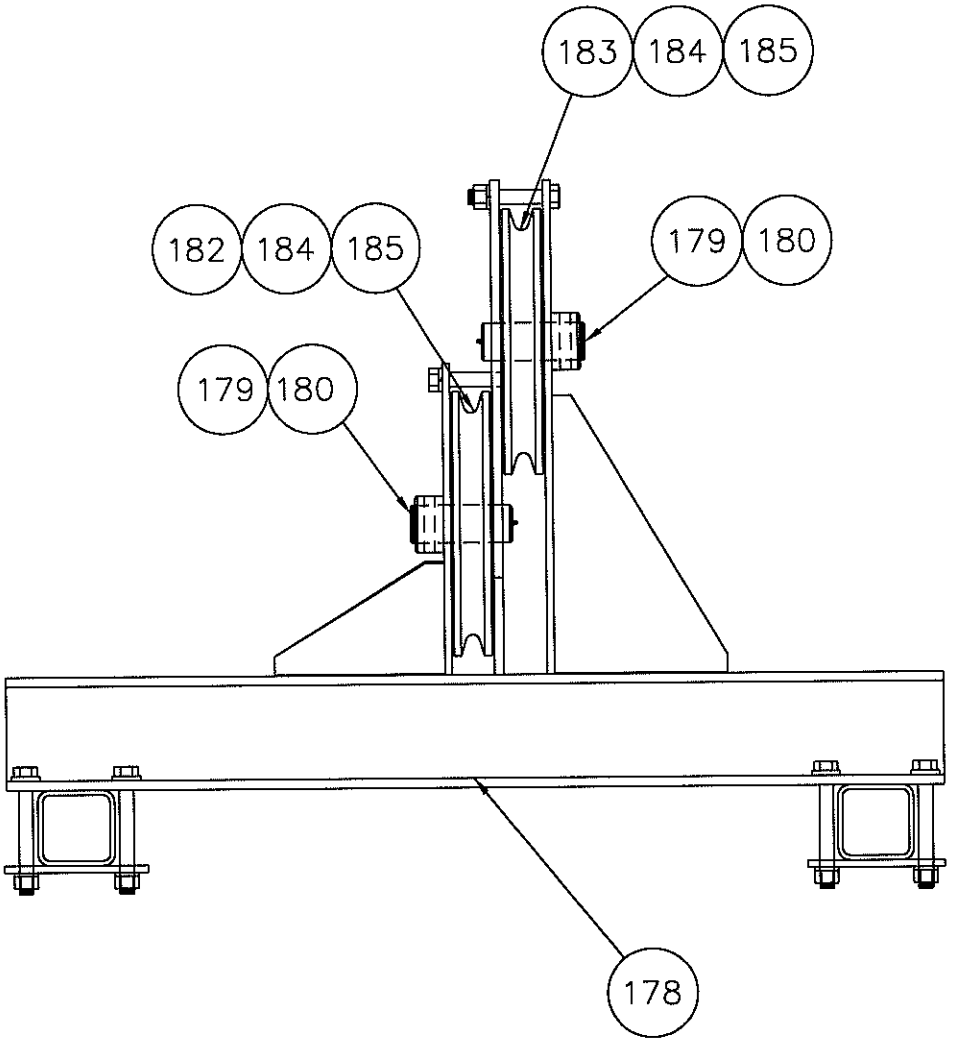


AUXILIARY HOIST

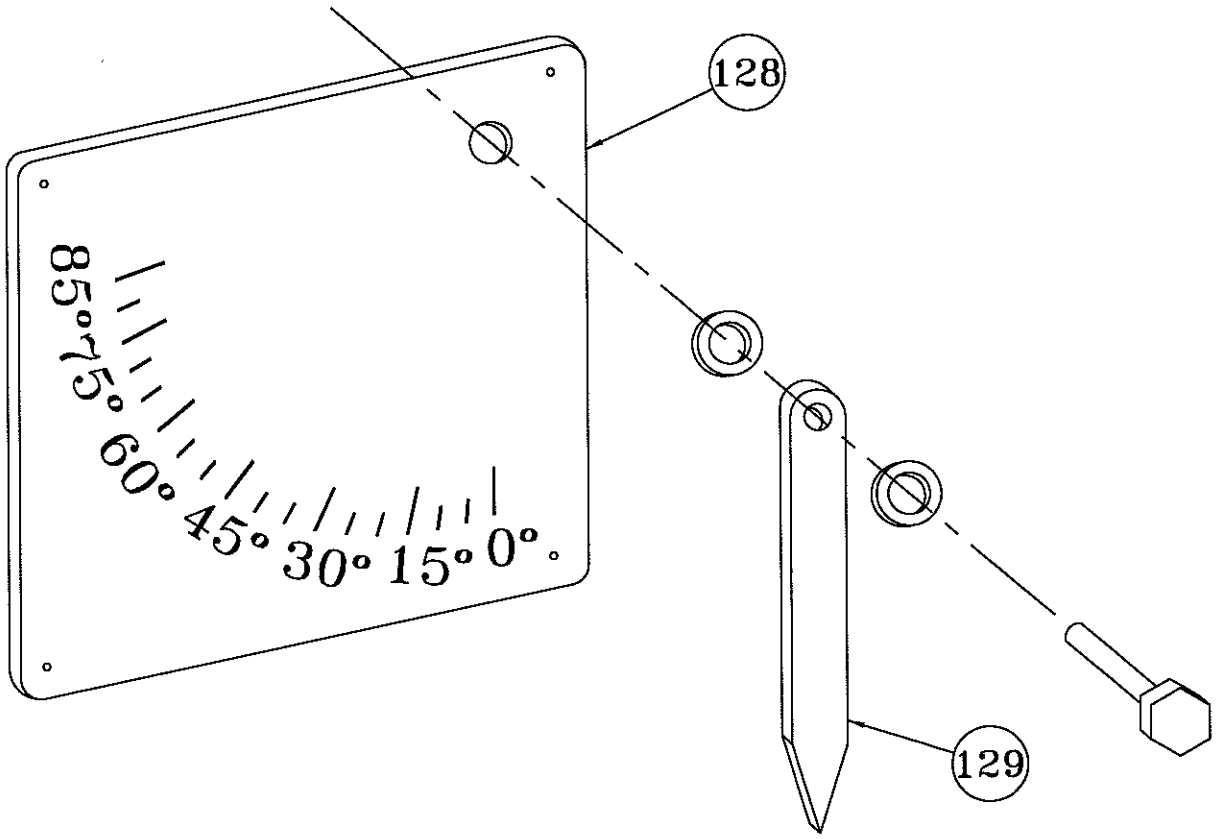


BOOM HOIST

HOIST WIRE ROPE ANCHORS

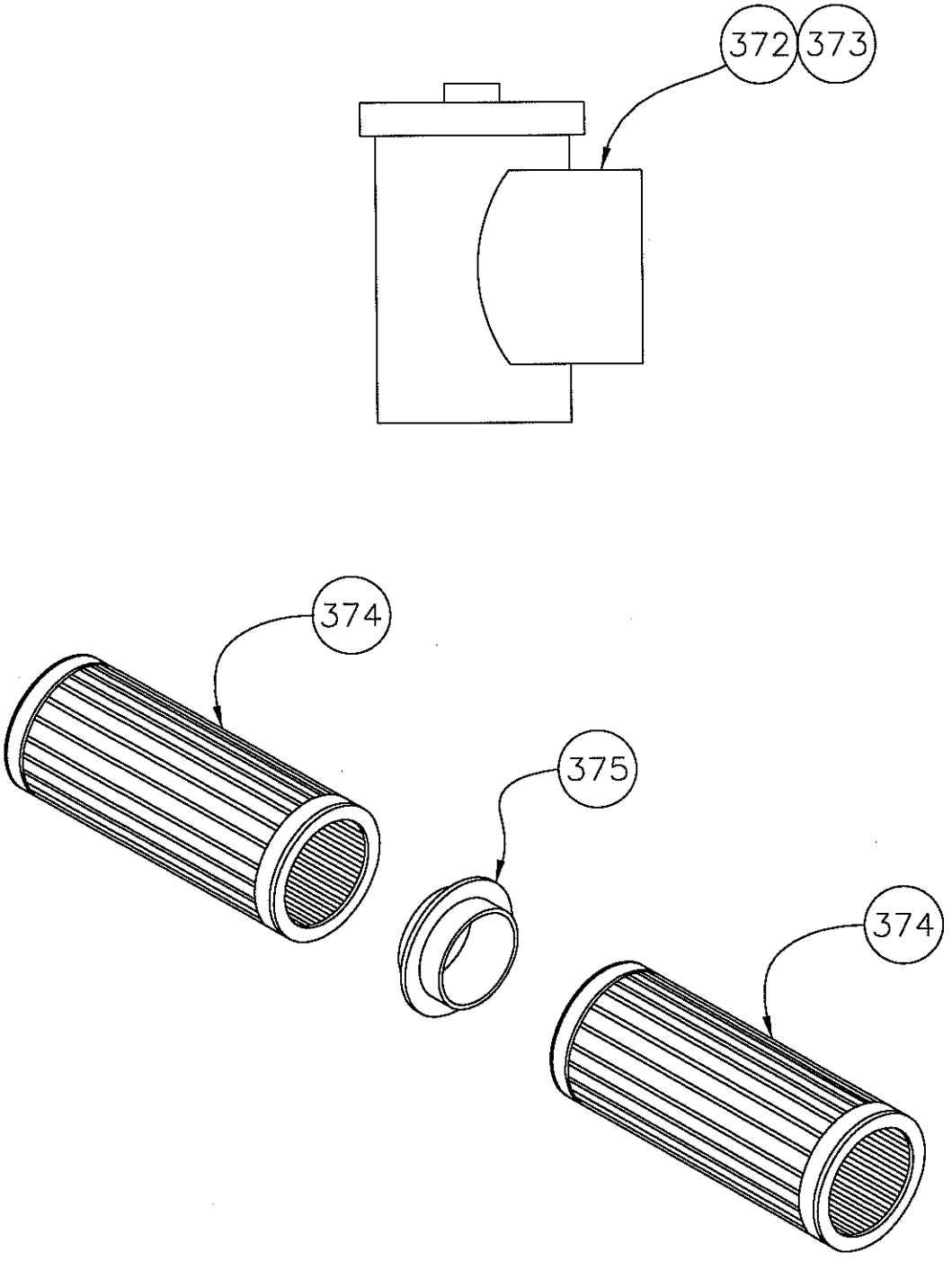


BOOM IDLER ASSEMBLY



RIGHT HAND

BOOM ANGLE INDICATOR ASSEMBLY



RETURN FILTER ASSEMBLY

PIN CERTIFICATE SHEET

Lattice Boom Style
PIN CERTIFICATE SHEET

DATE: 07-15-99 REV.: B WORK ORDER NO.: 059803C

CUSTOMER: Pemex/ Brown & Root MODEL NO.: 340LA-160

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	H6803	☒	☐	☐	☐	☐
GANRTY/UPPERSTRUCTURE	N61596-001 (2) Rev. A	P3 P4	H6803	☒	☐	☐	☐	☐
MAIN/IDLER	N61604-001 (2) Rev. A	P5 P6	H6269	☒	☐	☐	☐	☐
LOWER AUX./EXTENSION	N61605-001 (1) Rev. B	P7	H6914	☒	☐	☐	☐	☐
BOOM CONNECTIONS	N60986-004 (16) Rev. A	P8-P23	8540J	☒	☐	☐	☐	☐
BRIDLE/GANTRY	N61603-001 (2) Rev. A	P24 P25	H6914	☒	☐	☐	☐	☐
EXTENDED WEDGE SOCKET PIN/MAIN	N60645-001 (1) Rev. A	P26	4083H	☒	☐	☐	☐	☐
LOAD CELL PINS	N60646-004 (2) Rev. A	P27 P28	4083H	☒	☐	☐	☐	☐
BOOM IDLER	N95SK1-104 (2) Rev. F	P29 P30	8540J	☒	☐	☐	☐	☐
				☐	☐	☐	☐	☐

NOTES: * *Pin number to be stamped on end of pin by machinist.*

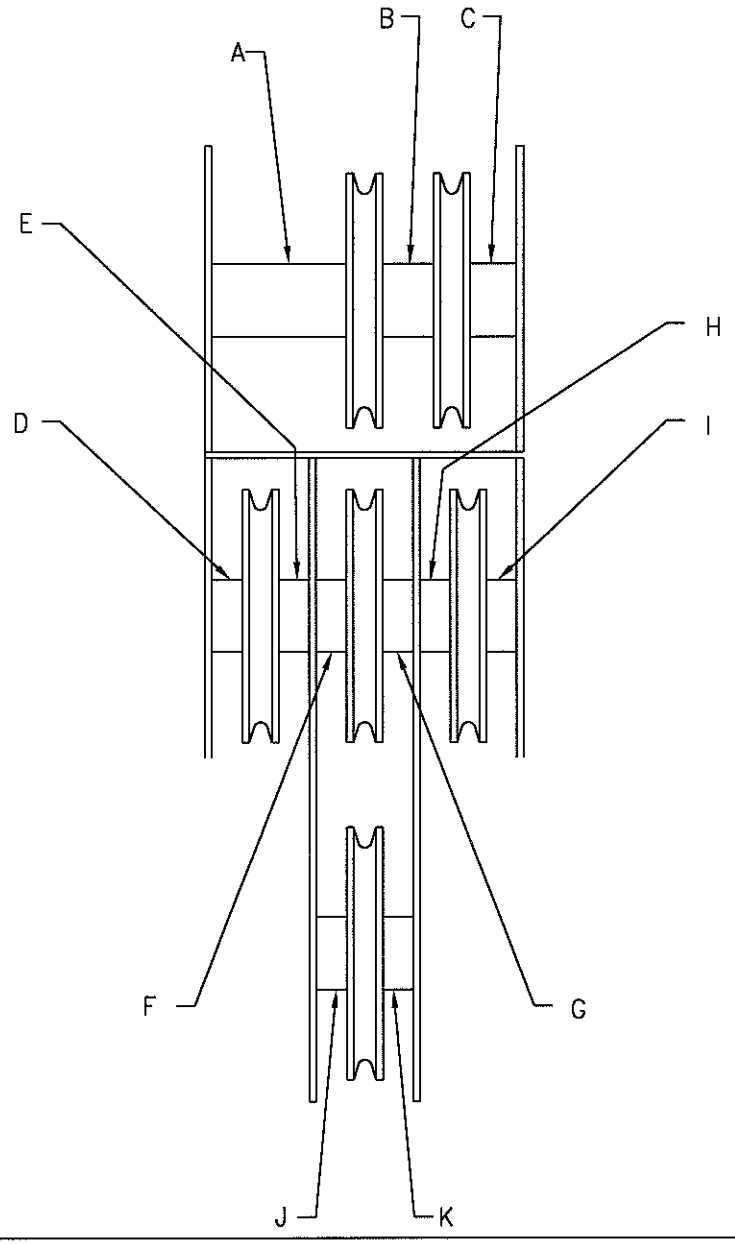
** *Heat Number to be recorded by machinist when material is pulled from inventory.*

SPECIAL COATING REQUIREMENTS: _____

SPACER KIT

SERIAL NUMBER: 059803C
CUSTOMER: BROWN & ROOT/PEMEX
CRANE MODEL: 340LA-160

SPACER KIT



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

SPACER	THICKNESS	O.D.	I.D.	MATERIAL
A	12-11/16"	5"	3"	NYLATRON
B	8-7/16"	5"	3"	NYLATRON
C	4-3/4"	5"	3"	NYLATRON
D	3-1/8"	5"	3"	NYLATRON
E	1/8"	5"	3"	NYLATRON
F	3-1/4"	5"	3"	NYLATRON
G	3/16"	5"	3"	NYLATRON
H	3-1/8"	5"	3"	NYLATRON
I	1/4"	5"	3"	NYLATRON
J	11/16"	5"	3"	NYLATRON
K	3-5/8"	5"	3"	NYLATRON

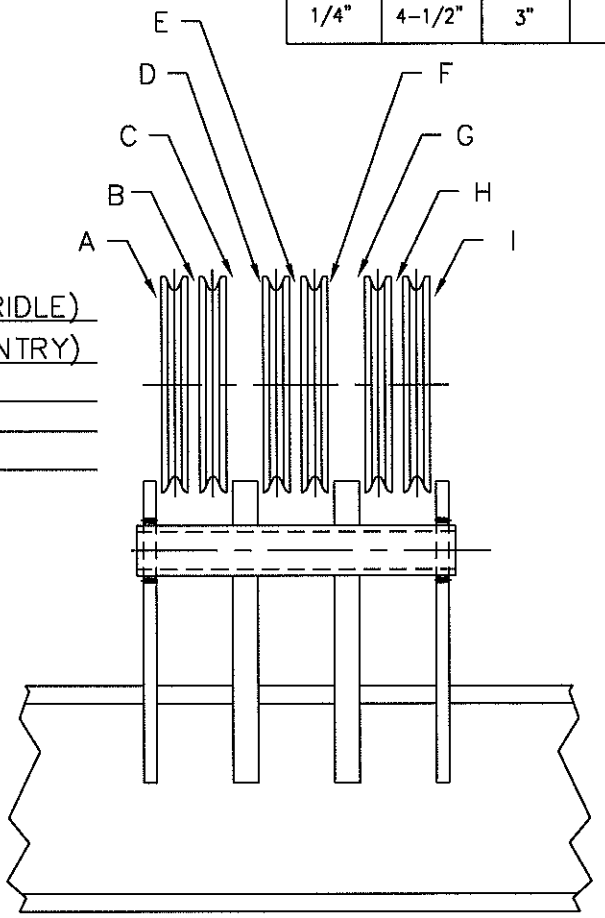
ISSUED BY: DWAYNE BOURGEOIS
DATE ISSUED: 9-2-99

COMPLETE BY: DWAYNE BOURGEOIS
DATE COMPLETED: 9-2-99

CUSTOMER : BROWN & ROOT/PEMEX
W/O# : 059803C
MODEL : 340LA-160

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

ISSUED BY :CHRIS COOK (BRIDLE)
ISSUED BY :M. THOMAS (GANTRY)
DATE ISSUED :9-2-99
COMPLETED BY :CHRIS COOK
DATE COMPLETED :9-9-99



BRIDLE/GANTRY ASSEMBLY

GANTRY SHEAVE CASE

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

BRIDLE

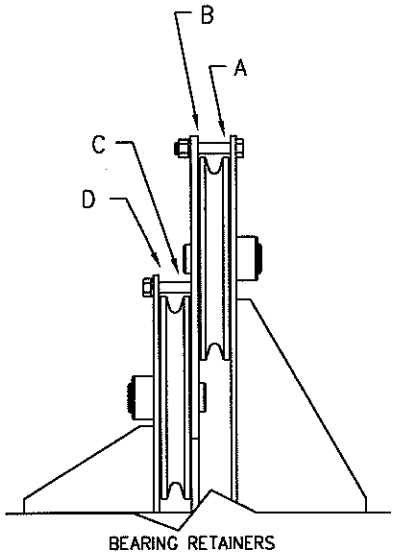
SPACER	THICKNESS	O.D.	I.D.	MATERIAL
A	3/16"	5"	3"	NYLATRON
B	1-7/16"	5"	3"	NYLATRON
C	3/16"	5"	3"	NYLATRON
D	1/4"	5"	3"	NYLATRON
E	5/16"	5"	3"	NYLATRON
F	3/16"	5"	3"	NYLATRON
G	3/16"	5"	3"	NYLATRON
H	1/2"	5"	3"	NYLATRON
I	1/16"	5"	3"	NYLATRON

SERIAL NUMBER: 059803C
CUSTOMER: BROWN & ROOT/PEMEX
CRANE MODEL: 340LA-160

SPACER KIT

BOOM MID-SECTION IDLER

VIEW FROM BOOM TIP



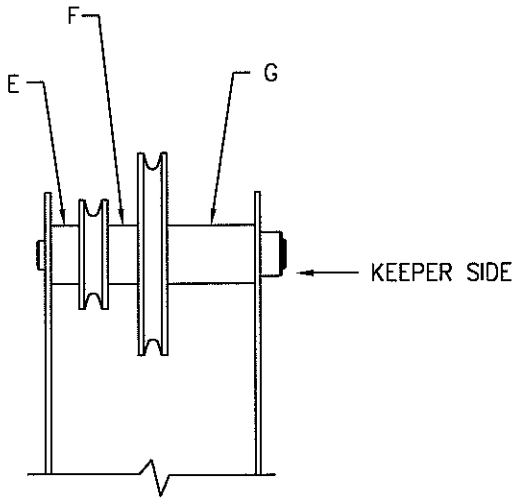
BEARING RETAINERS

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	1/8"	4-1/2"	2-1/2"	NYLATRON
B	1/16"	4-1/2"	2-1/2"	NYLATRON
C	1/16"	4-1/2"	2-1/2"	NYLATRON
D	1/8"	4-1/2"	2-1/2"	NYLATRON

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

ISSUED BY: DWAYNE BOURGEOIS COMPLETED BY: DWAYNE BOURGEOIS

DATE ISSUED: 9-2-99 DATE COMPLETED: 9-2-99

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™

A Varco Company

INSTALLATION, OPERATION, AND MAINTENANCE

CRANE LOAD INDICATING SYSTEMS

SC Series

Manufacturers of Precision Instruments

Printed in U.S.A.

March 1980

IMPORTANT SAFETY NOTICE

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 ±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.

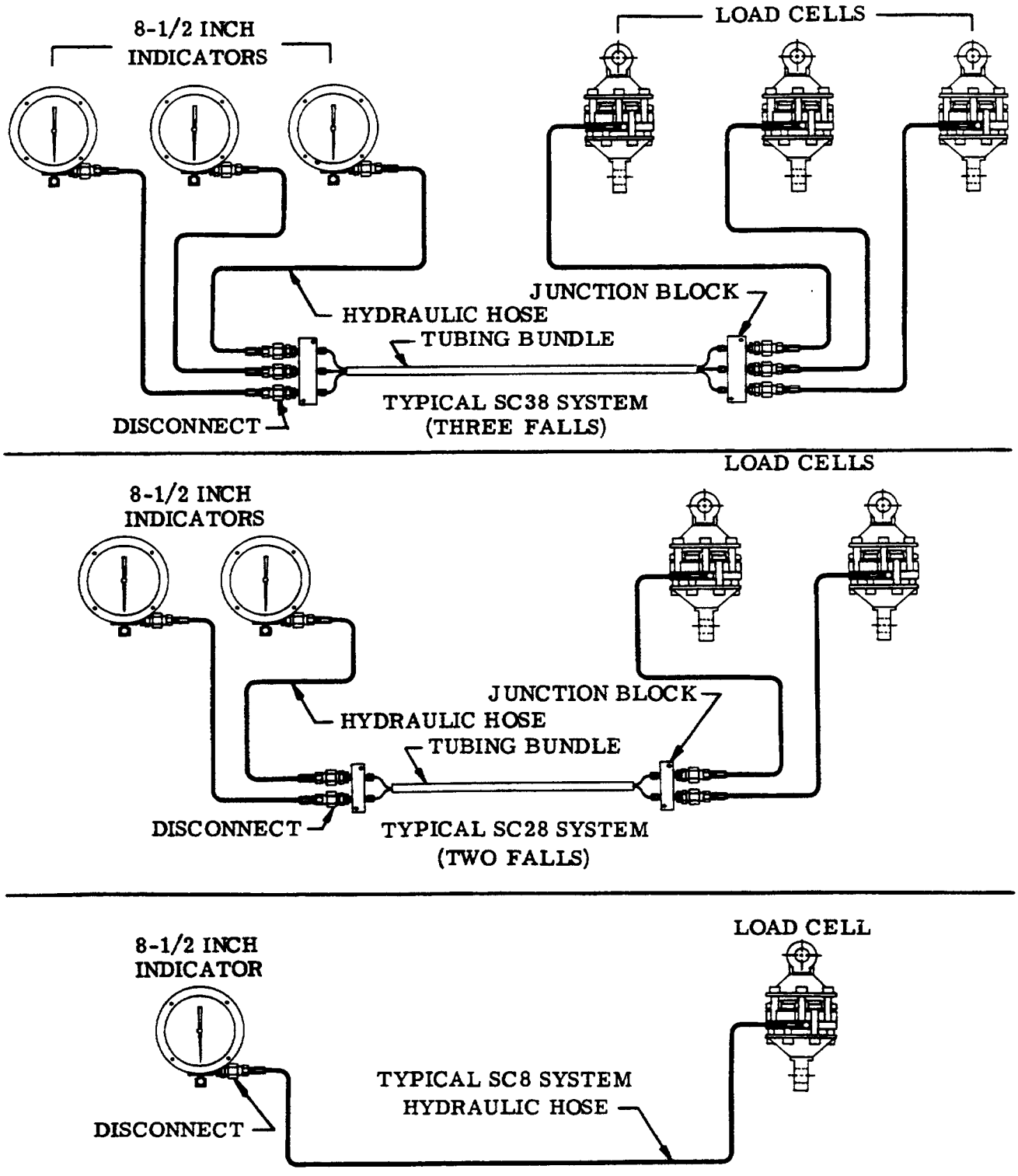


Figure 1-1. Basic SC Systems

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
			SC24	12
30,000 TO 60,000 LB	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		
	E288N-242	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
			SC25	12
60,000 TO 150,000 LB	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 reevings. 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, devide 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 adversly 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 counterclowise 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 ±1-1/2 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 ±1-1/2 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 ±1-1/2 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 ±1-1/2 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 1/4 to 1-1/2 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 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 ±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 ±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.

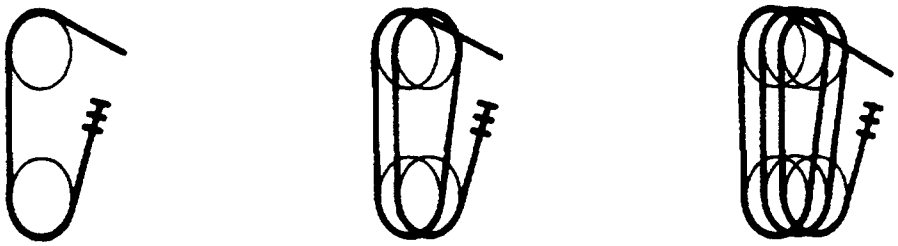
NOTE

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.

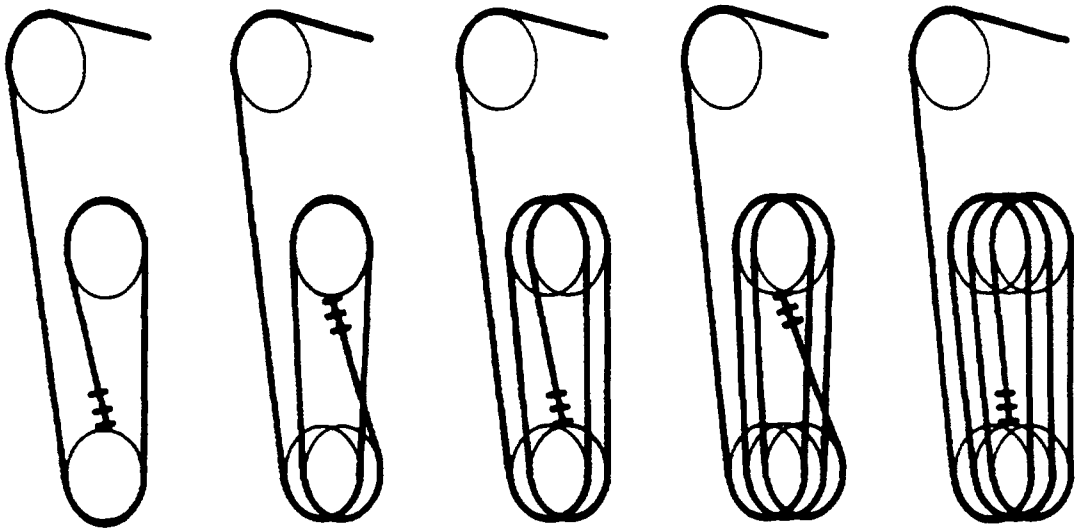
HOW TO COUNT PARTS OF LINE WHEN SHEAVES ARE LOCATED IN BOOM POINT AND TRAVELING LOAD BLOCK.



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.

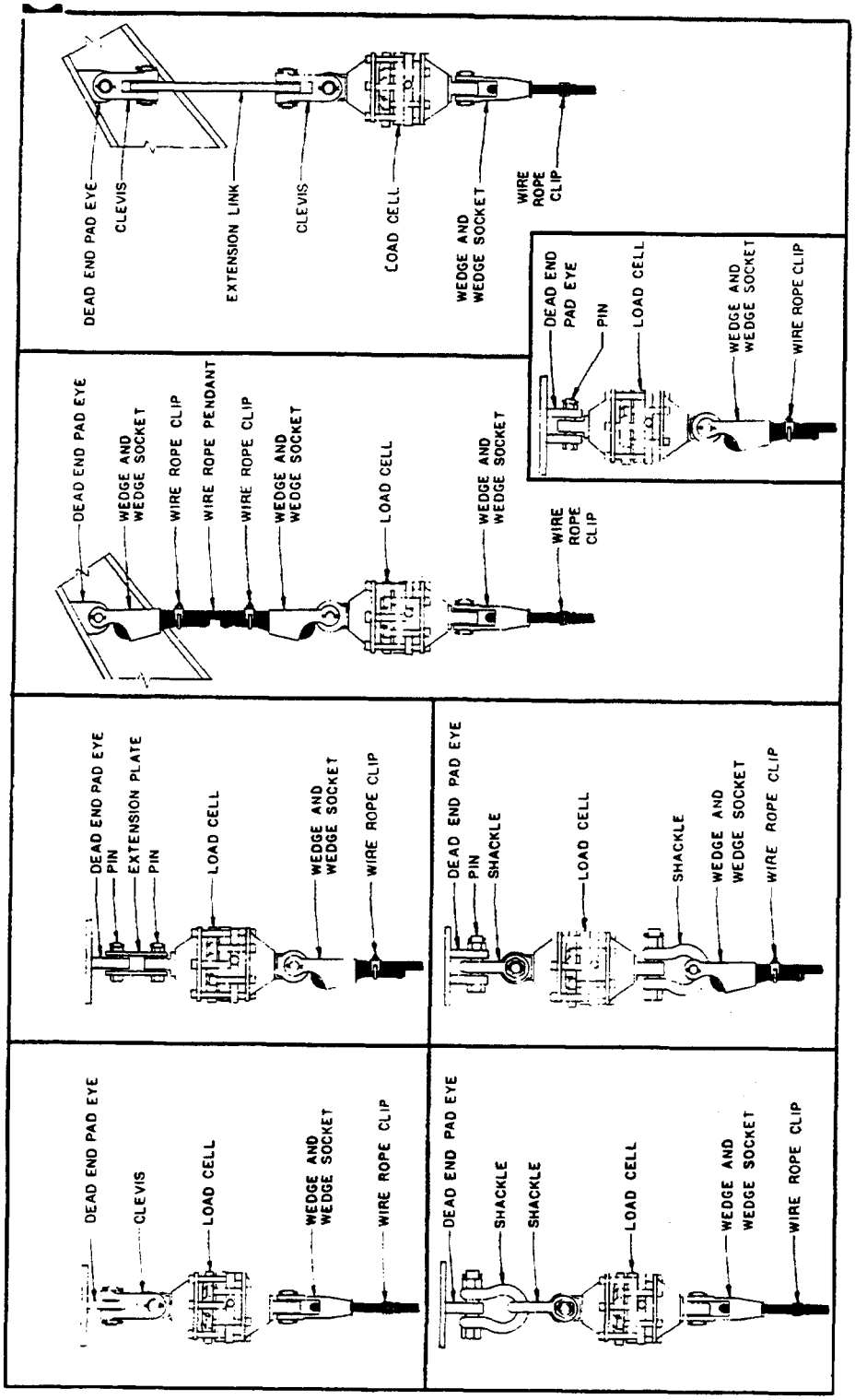


*3 PARTS **4 PARTS *5 PARTS **6 PARTS *7 PARTS

* 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



Drawing DD149

Figure 2-2. Typical Load Cell Installations

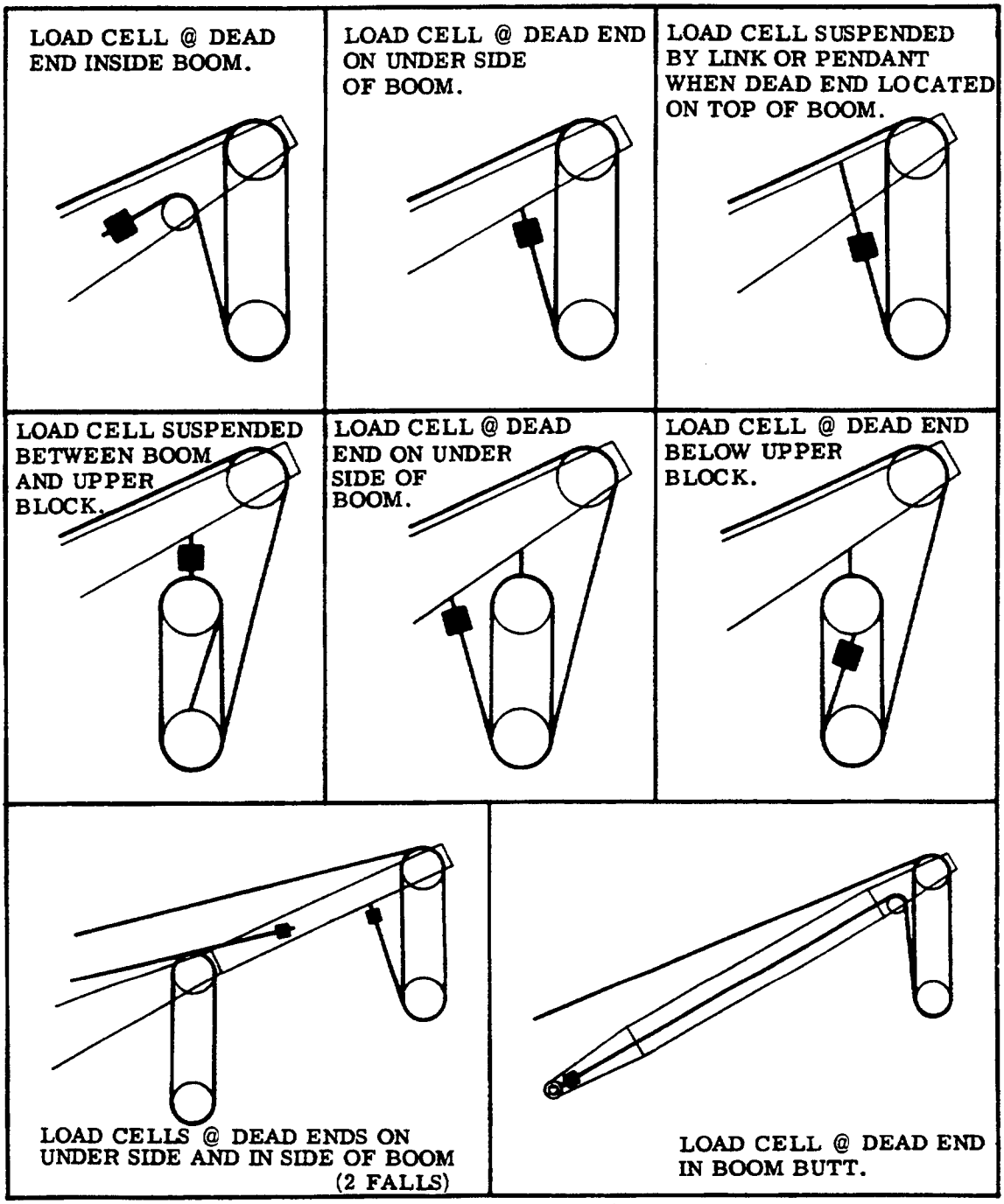


Figure 2-3. Typical Load Cell Installations

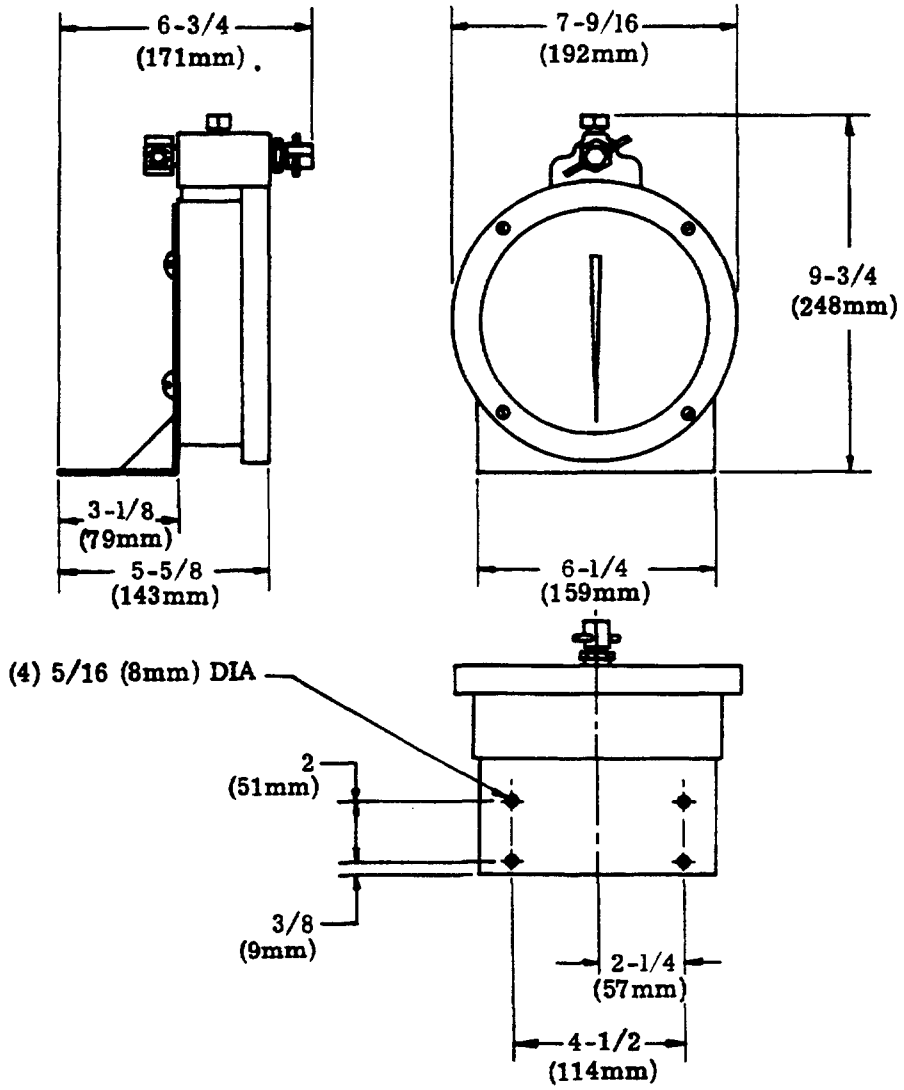


Figure 2-4. Overall Dimensions for 6 Inch Indicator and Bracket Installation

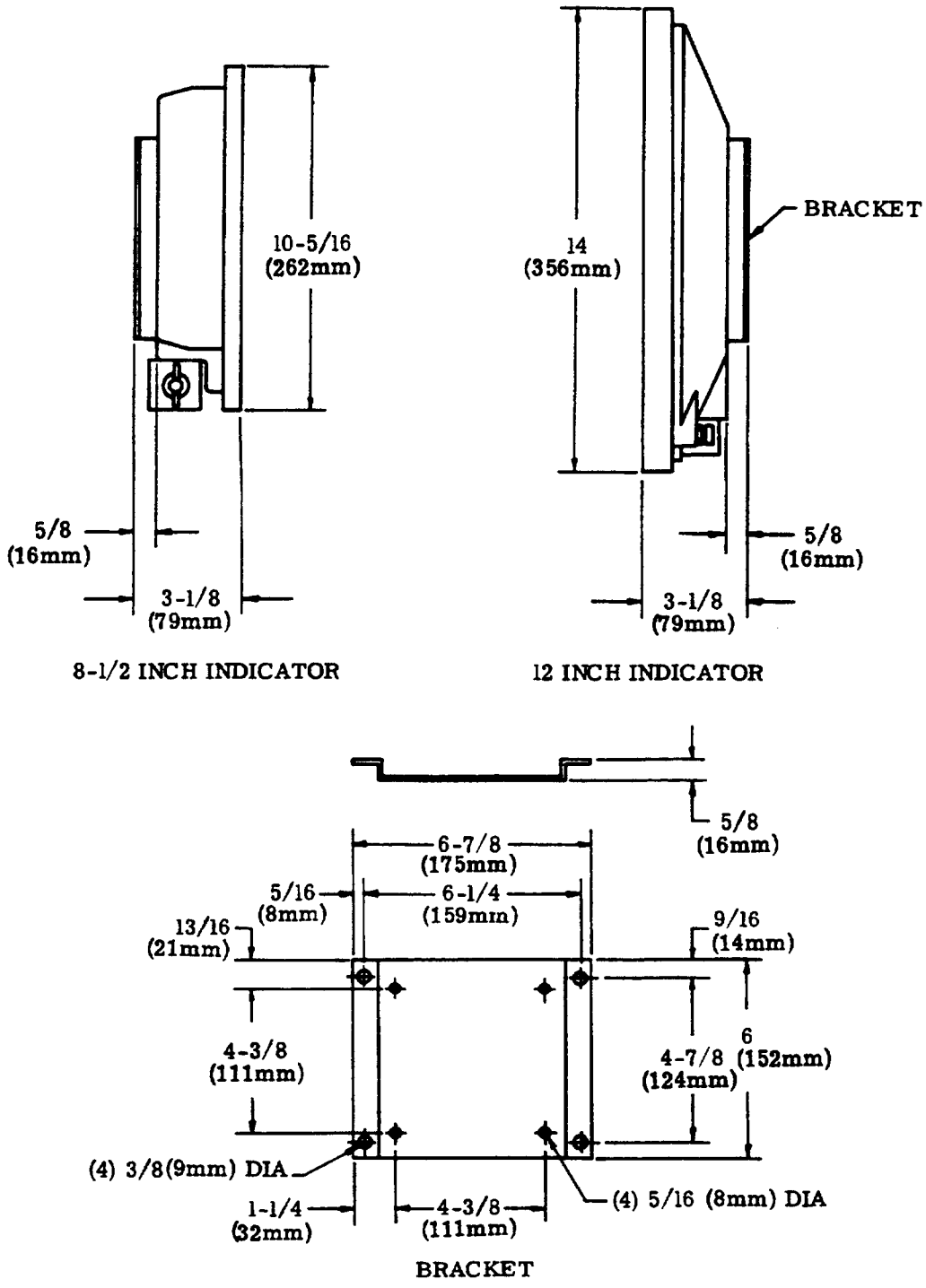


Figure 2-5. Overall Dimensions for 8-1/2 and 12 Inch Indicator and Bracket Installation

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 ±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 ±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(para4-6)
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.

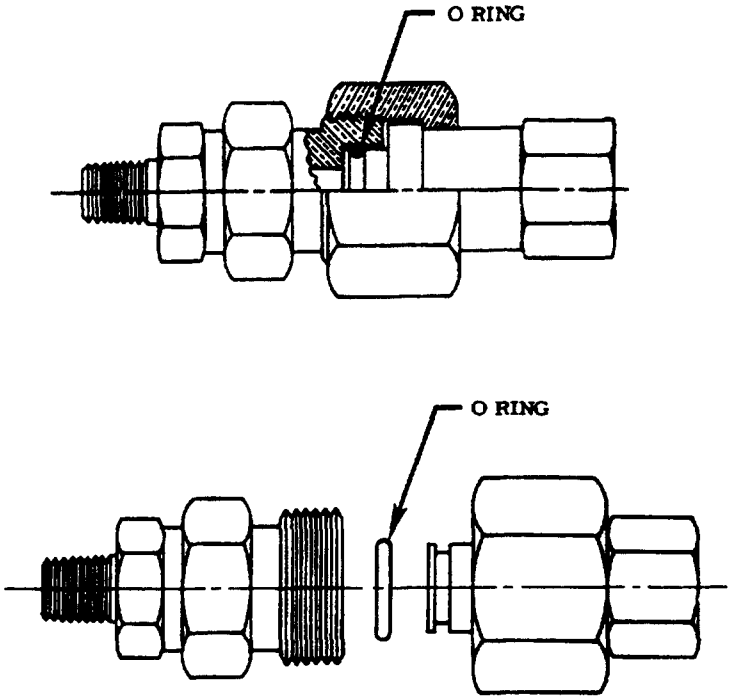


Figure 4-1. O Ring Replacement

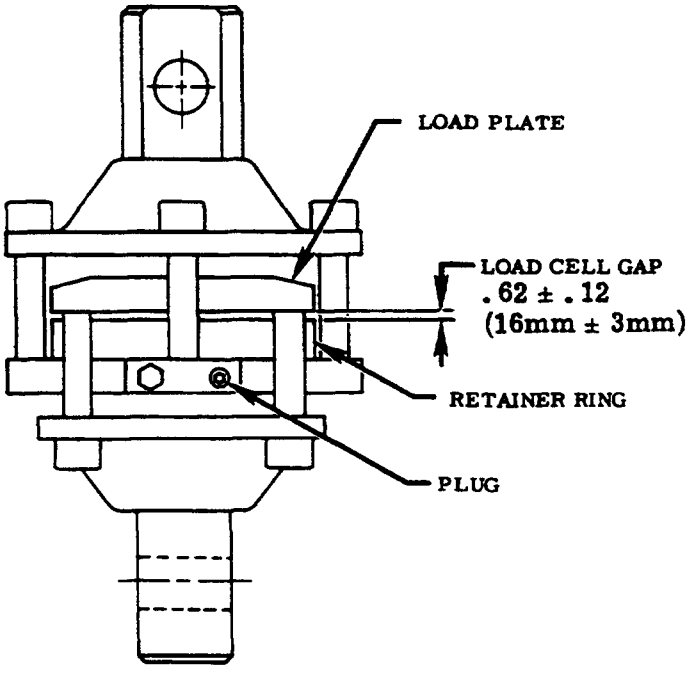


Figure 4-2. Load Cell Gap and Plug

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. INSTÀLLATION 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. Theses 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.

NEMKO

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:

6663-A1-1993-10-26

Data:

100A 660V

Rutine test:

Hver enkelt kapsling skal gjennom en rutinetrykktest på 12,45 bar iht. punkt 15 i CENELEC EN 50018.

Prøverapport:

M 70695

Oslo, 1994-01-13

NEMKO

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:

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

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

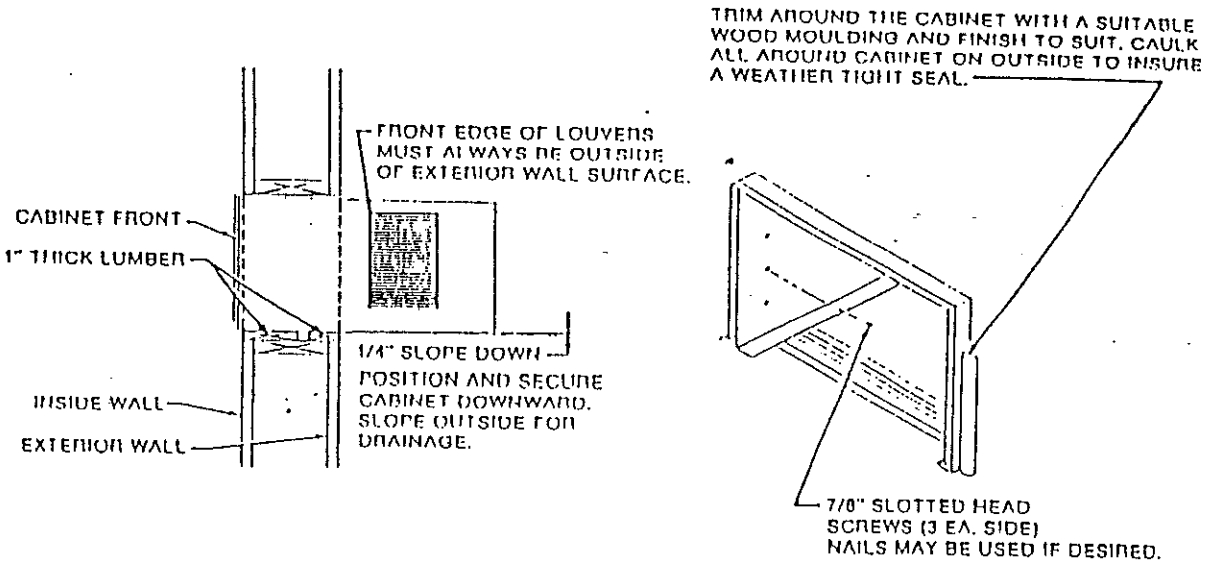
STEP 1. Remove decorative plastic front and accessory pack to a safe area away from unit.

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.

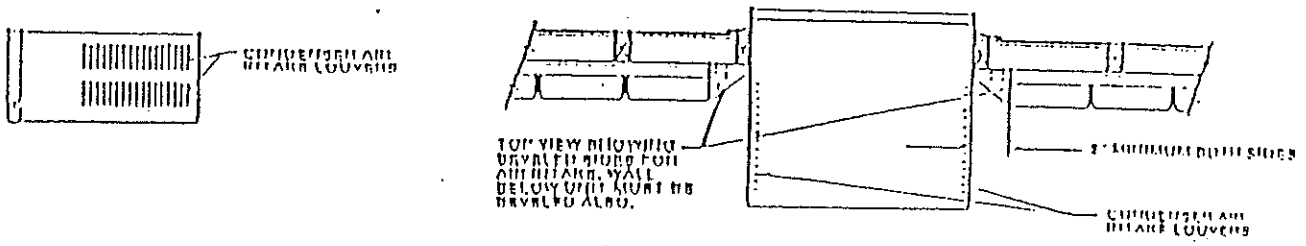
STEP 4. **WALL PREPARATION:** The maximum wall thickness permissible without special construction is 6-1/4". THE CONDENSER-AIR-INTAKE LOUVERS MUST NOT BE BLOCKED BY EXTENDING INSIDE THE WALL AREA. (See Figure A, page 2.)

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.



EXTRA THICK WALL CONSTRUCTION

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.

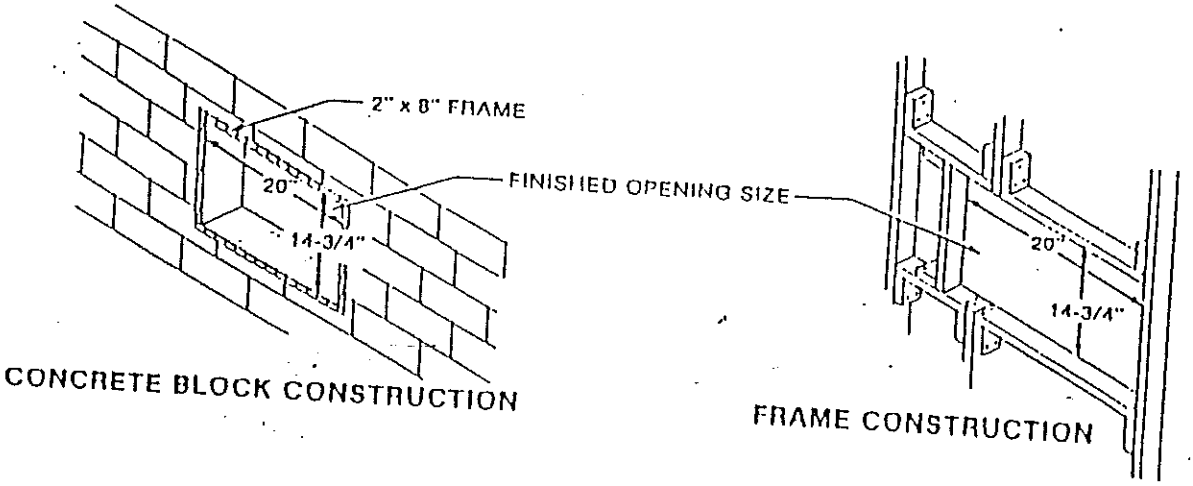
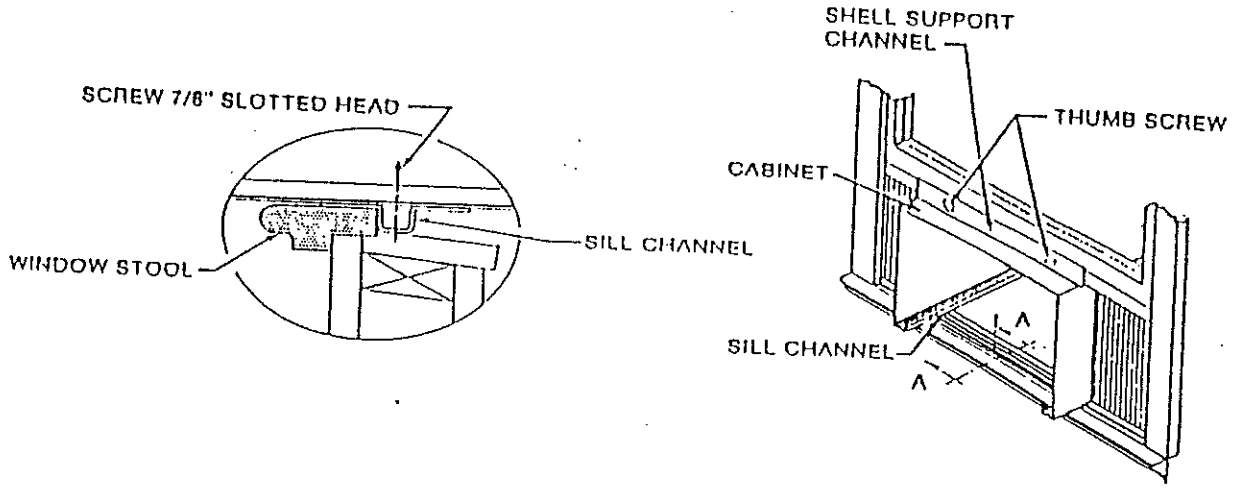


FIGURE D.



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).

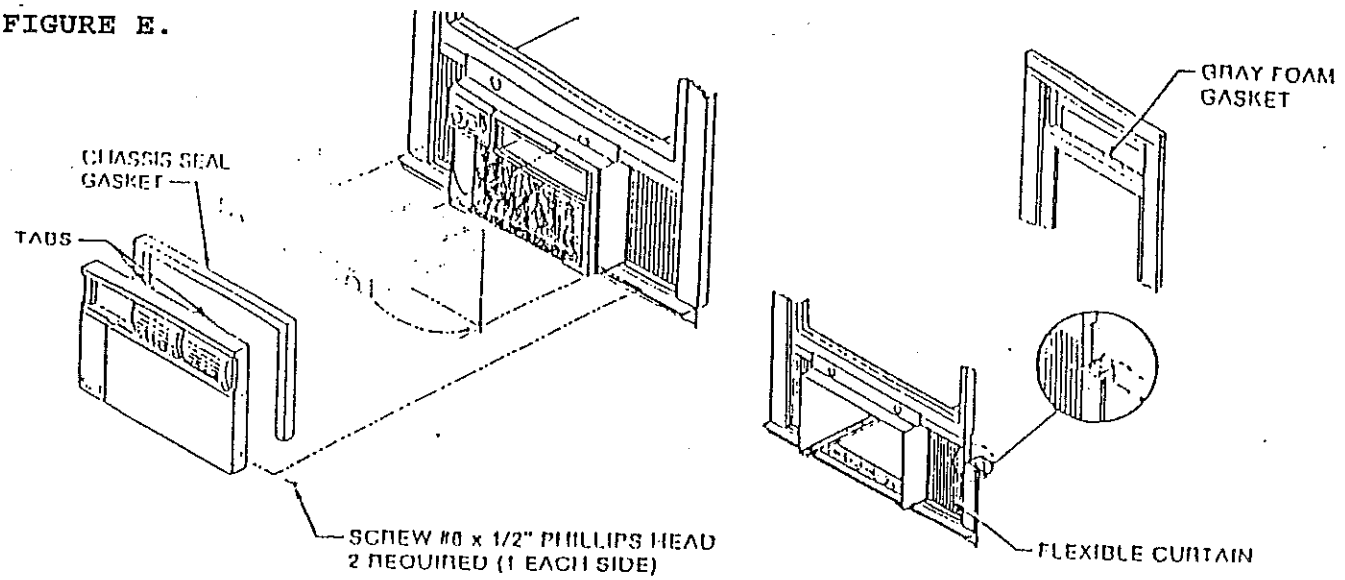
STEP 11. **INSTALL CHASSIS:** Lift chassis by the base pan and slide into cabinet full depth.

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 OR DOWEL PIN ABOVE THE WINDOW SASH 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	DECRIPTION	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.

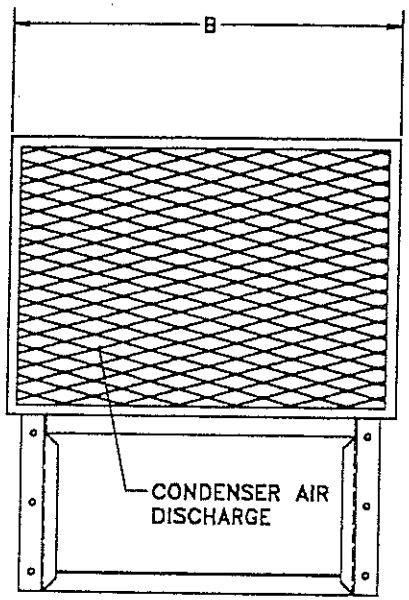
PROBLEM	POSSIBLE CAUSE	TO CORRECT
Compressor attempts to start, or runs for short periods only. Cycles on overload.	Compressor attempts to start before system pressures are equalized.	Allow a minimum of 2 minutes for pressure to equalize before attempting to restart.
	Low or fluctuating voltage.	Check 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.

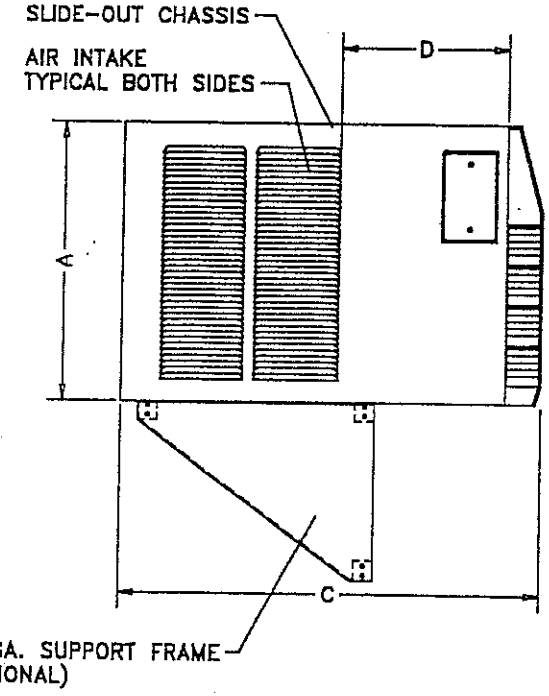
PROBLEM	POSSIBLE CAUSE	TO CORRECT
Noisy operation.	Poorly installed unit.	Refer to installation Instructions for proper installation.
	Fan blade striking chassis.	Reposition - adjust motor mount.
	Compressor vibrating.	Check that compressor grommets have not deteriorated. Check that compressor mounting 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.

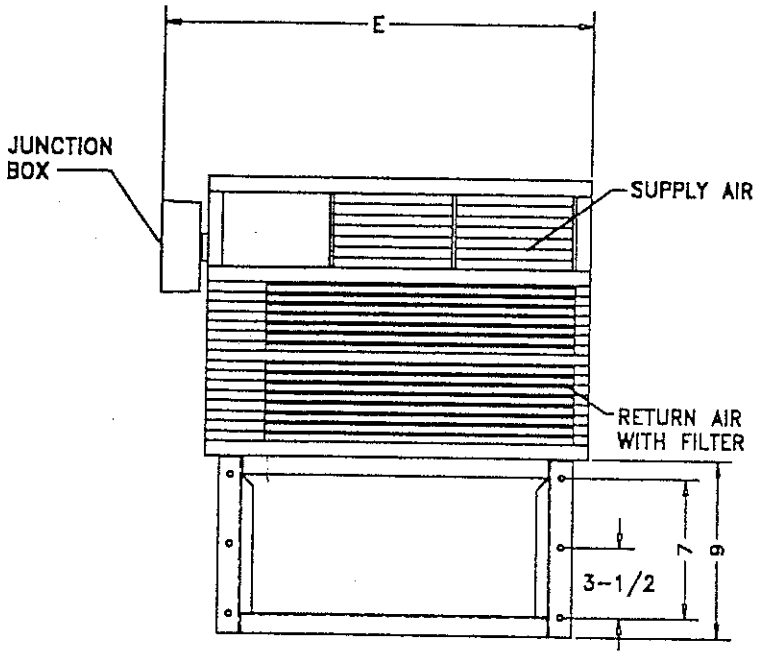
REAR VIEW



LEFT SIDE



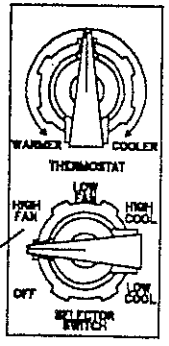
FRONT VIEW



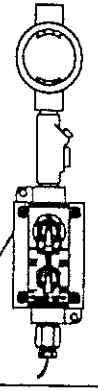
CUT OUT DIMENSIONS (IN.)	
WIDTH	HEIGHT
20	14-3/4

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 CHARGE OZ	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	8-1/2	25-7/8

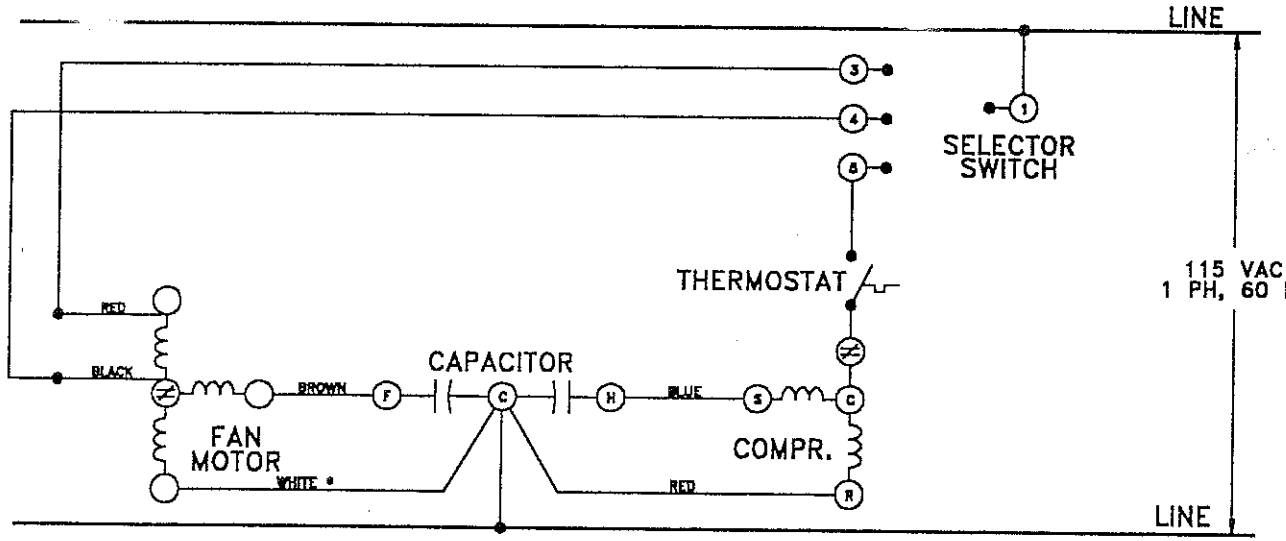
- ■ -(STANDARD) CARBON STEEL HOUSING WITH BAKED ENAMEL FINISH
- ☐ -(OPTIONAL) CARBON STEEL HOUSING AND INTERNAL METAL PARTS EPOXY FINISHED
- ■ -(STANDARD) EVAPORATOR AND CONDENSER COILS COPPER TUBES WITH ALUMINUM FINS
- ☐ -(OPTIONAL) EVAPORATOR AND CONDENSER COILS SaveCoil 101 COATED
- ☐ -(OPTIONAL) 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



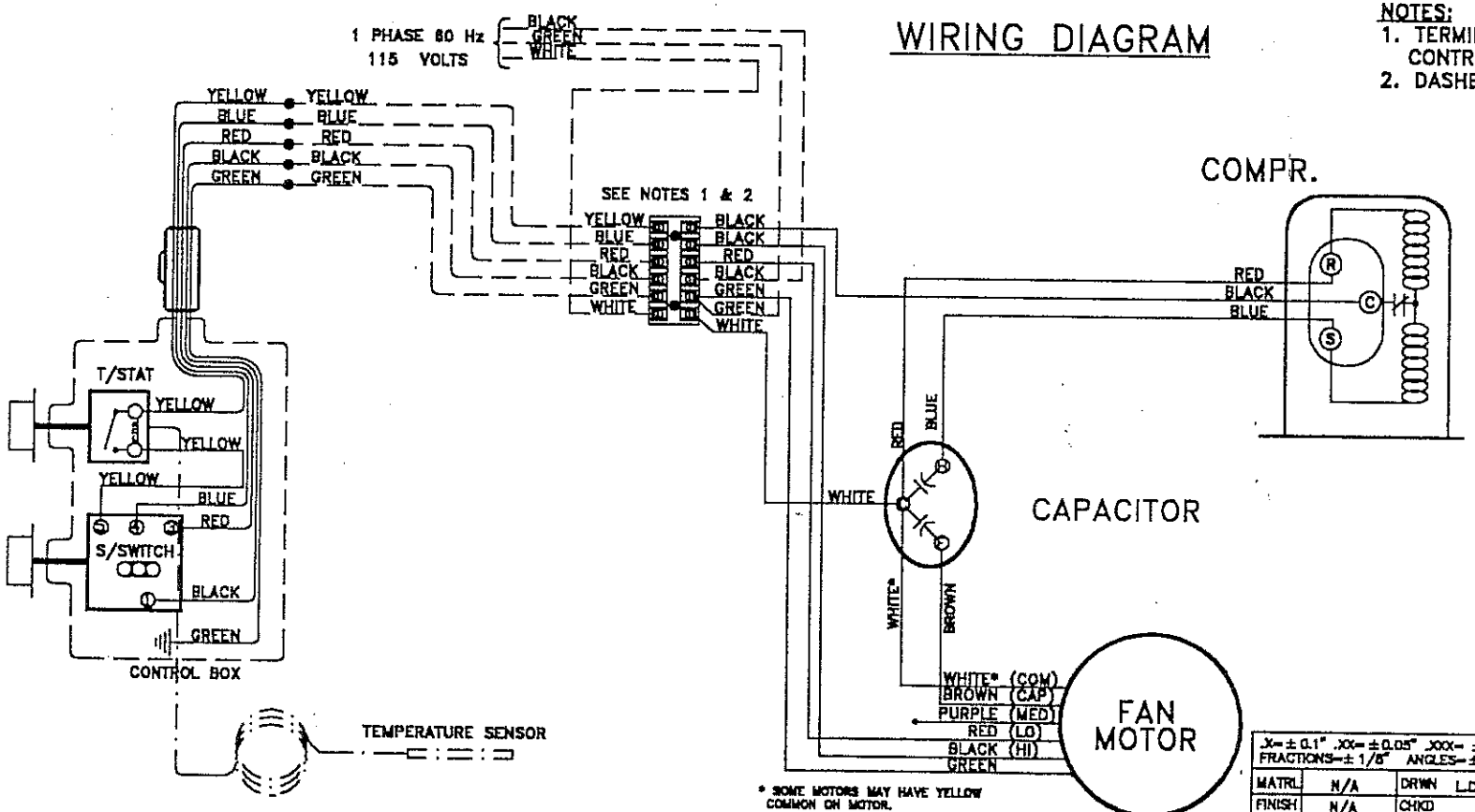
.X=±0.1" .XX=±0.05" .XXX=±0.01" FRACTIONS=±1/8" ANGLES=±1.0°			SCIENTIFIC SYSTEMS CORP	
MATRL		DRWN L.D.T.	SafetyCool AIR CONDITIONER 60 Hz SERIES REMOTE ENGINEERING DATA SHEET	JOB#
FINISH		CHKD		REV DATE 11/98
ACAD#	50740013	APVD	DWG.# 074-50-0013	SCALE SHT OF



SCHEMATIC

SELECTOR SWITCH		
SWITCH POSITION	CIRCUIT	FUNCTION
1	NONE	OFF
2	1 + 4	HI FAN
3	1 + 3	LO FAN
4	1 + 5 + 4	HI COOL
5	1 + 5 + 3	LO COOL

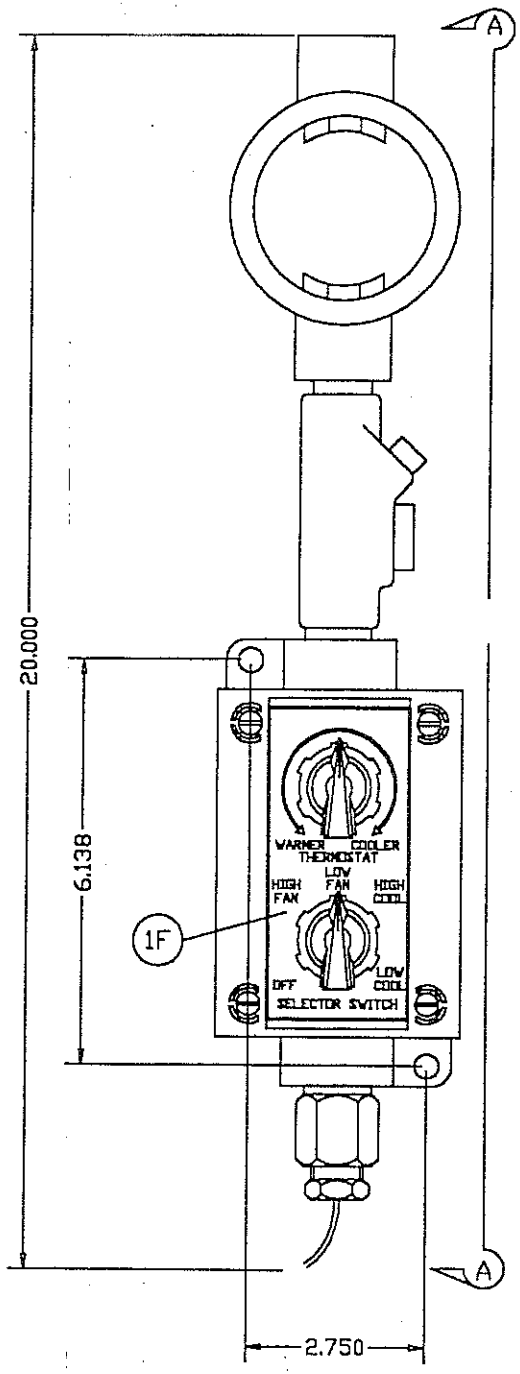
WIRING DIAGRAM



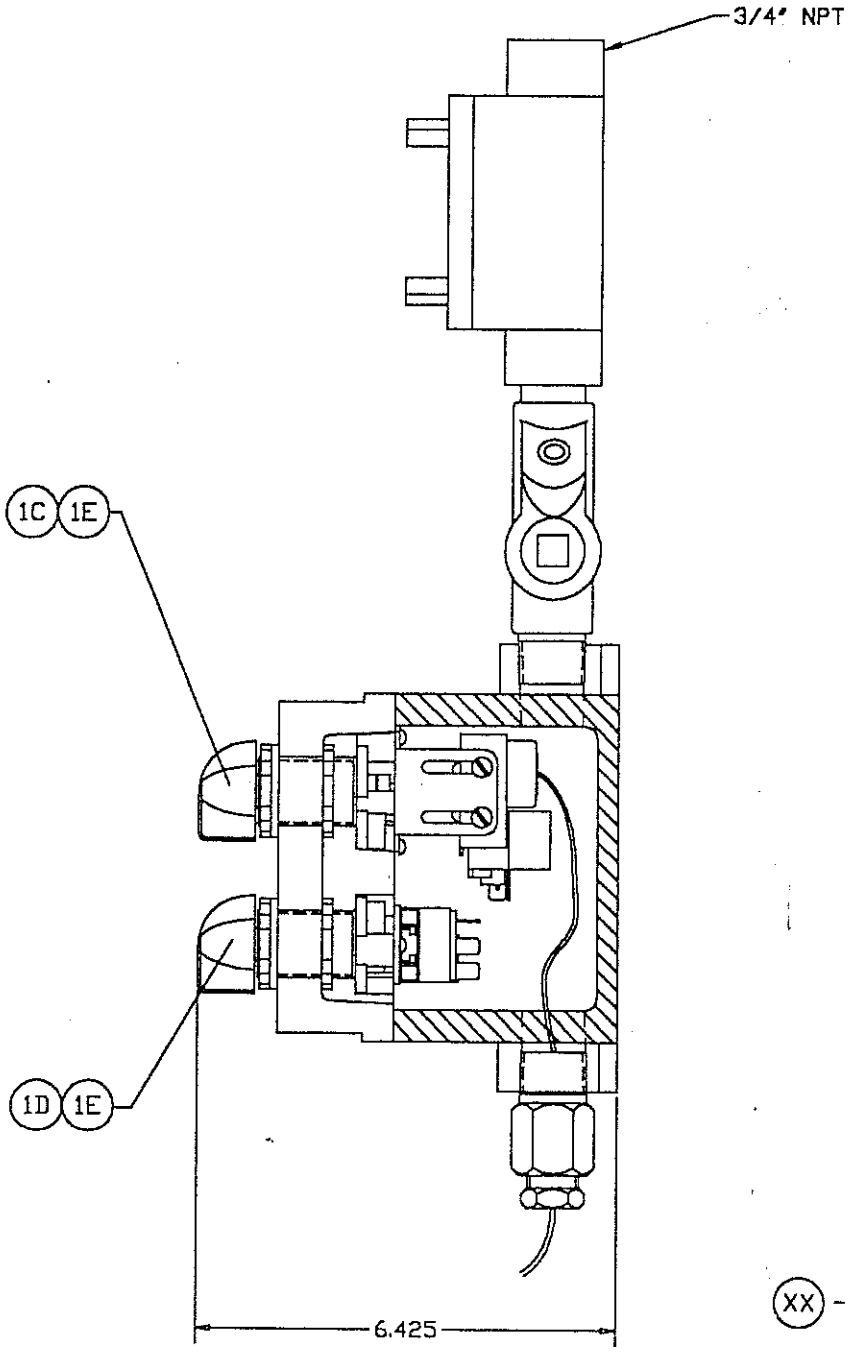
NOTES:
1. TERMINAL STRIP USED WITH REMOTE CONTROL OPTION.
2. DASHED LINE DENOTE FIELD WIRING

.X= ± 0.1" .XX= ± 0.05" .XXX= ±0.01" FRACTIONS= ± 1/8" ANGLES= ± 1.0°			SCIENTIFIC SYSTEMS CORP
MATRL	N/A	DRWN L.D.T.	ELECTRICAL SCHEMATIC AND WIRING DIAGRAM SAFETYCOOL, WACK-0803-HC 115V/1PH/60 Hz
FINISH	N/A	CHKD	
ACAD#	50740014	APVD	DWG.# 074-50-0014

JOB#
REV
DATE 11/88
SCALE
SHT OF



FRONT VIEW



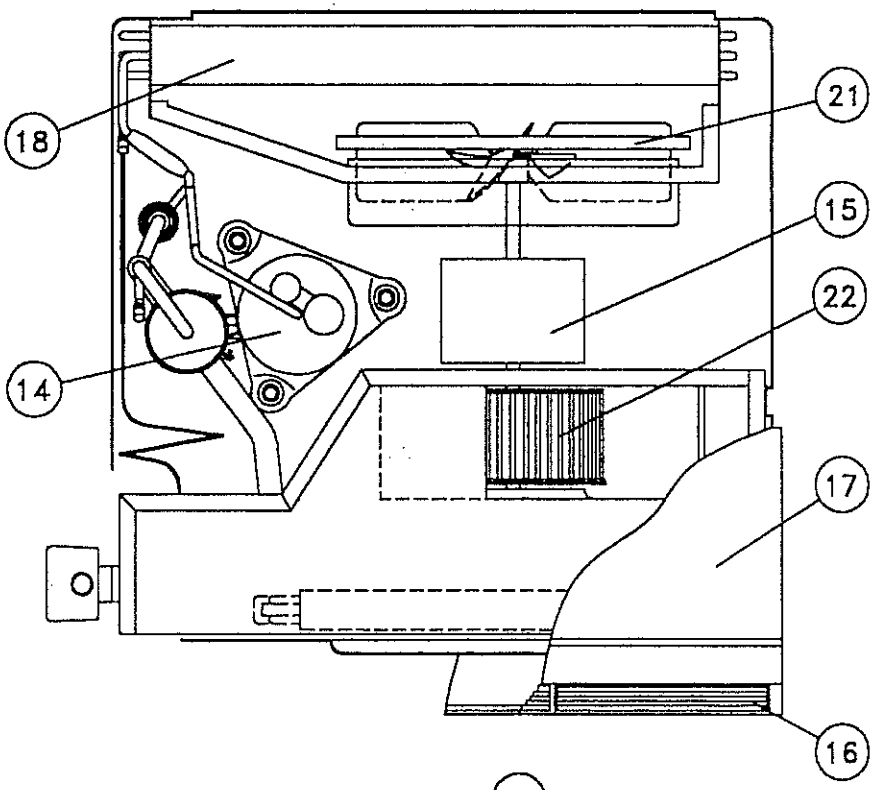
SECTION "A"-"A"

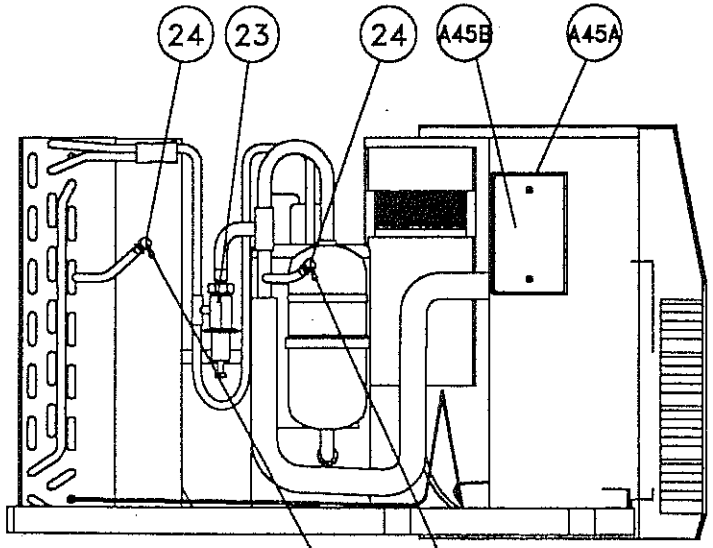
(XX) - REF. NUMBER ON MASTER PARTS LIST.

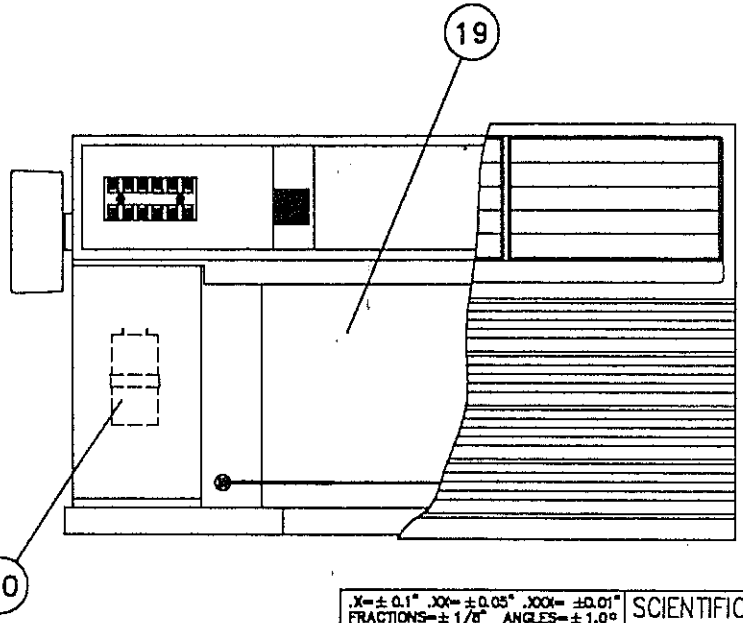
.X=± 0.1" .XX=± 0.05" .XXX= ±0.01" FRACTIONS=± 1/8" ANGLES=± 1.0°			SCIENTIFIC SYSTEMS CORP
MATRL		DRWN L.D.T.	VACX-0503-RC CLASS I GROUP C/D DIV. 2 REMOTE CONTROL ASSEMBLY — JOB#
FINISH		CHKD	REV — DATE 11/98
ACAD#	50740015	APVD	DWG.# 074-50-0015 — SCALE — SHT OF

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" FRACTIONS=±1/8" ANGLES=±1.0°			SCIENTIFIC SYSTEMS CORP	
MATRL		DRWN L.D.T.	BreezyCool AIR CONDITIONER RACK-0803-BC MAIN ASSEMBLY DRAWING	JOB#
FINISH		CHKD		REV DATE 11/88
ACAD#	50740018	APVD	DWG.# 074-50-0018	SCALE SHT OF

MATERIAL CERTIFICATES

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N99SK1-137
WELDMENT S/N: 98292-01
DESCRIPTION: Pedestal Weldment
MODEL: 340LA-160
CHECKED BY: Priscilla A. Talbot Jr.
DATE: 9.20.99

Material Description	Heat Number
Plate, A-36, fine grain w/ charpy, 1" (Item # 1)	D7149
Plate, A-36, fine grain w/ charpy, 1" (Item # 3)	7456440
Plate, A-36, fine grain w/ charpy, 1" (Item # 4)	394081
Flange, forged, A-694, 90"OD x 76"ID x 3"W	Y5369
Plate, A-36, 3/8"	2E5060
Angle, A-36, ¼" x 3" x 3"	992294
Plate, A-36, fine grain w/ charpy, 2"	393497
Plate, A-36, fine grain w/ charpy, ½"	Y67605

LUKENS

TEST CERTIFICATE

PAGE NO. 01 02
FILE NO: 028.01-11
DATE: 05/30/98
MILL ORDER NO: 10622-003

CUSTOMER P.O.: 36616
DESCRIPTION: 1 - RECTANGLE 1 -X- 120 -X- 480

03-C

SOLD TO:
AMERICAN ALLOY STEEL, INC
P. O. BOX 40469
HOUSTON TX 77240-0469

SEND TO:
AMERICAN ALLOY STEEL, INC
P. O. BOX 40469
ATTN: HOMER GARZA
HOUSTON TX 77240-0469

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
D

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
SUPPL. PARA. S5 APPLIES.

S1 S3 S4
ASME SA537 CL 1 MOD.
MATERIAL MEETS DIN 50049 3.1.B/EN 10204 3.1.B

CHEMICAL ANALYSIS

MELT/SLAB	C	MN	P	S	CU	SI	NI	CR	MO	V	TI	B	AL	CB	N
D7149 /13	.13	1.44	.007	.003	.10	.29	.08	.10	.03	.001	.003	.0004	.031	.031	.0074
D7149															

98:461355 504

PRACTICES
C.E. = 0.410
VIP FGP
GS 7-8
FINELINE

TENSILES

TYPE	YLD (PSI X 100)	TENS	% ELONG 8"	% R.A.
BZ				52.9
TZ				52.9
BX	56	76	28.0	

CHARPY V IMPACTS

FULL

TYPE	TEMP	FT LBS			MILS LATERAL EXPANSION			% SHEAR
BX	-40F	263	263	263				

OTHER TESTS PERFORMED

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

AMERICAN BUREAU OF SHIPPING
PHILADELPHIA

TEST REPORT APPROVED DATE 10-27-98
AMERICAN ALLOY STEEL BY
QUALITY ASSURANCE DEPT.

INFORMATION

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.
FINELINE MOD FOR SULPHUR
LUKENS FINELINE STEELS ARE CALCIUM ARGON TREATED
FOR SULFIDE SHAPE CONTROL.
B/L #14252 TTPX 80279
MATERIAL PRODUCED UNDER A CERTIFIED QUALITY MANAGEMENT SYSTEM
COMPLYING WITH ISO 9002 ABS-QE CERTIFICATE NO. 30130

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			0031	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

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT:

Quality Assurance Laboratory
Coatesville, PA 19320

SUPERVISOR - TEST REPORTING.

FORM NO.2221T (R 5/96)

LUKENS

TEST CERTIFICATE

CUSTOMER P.O.: 36616
DESCRIPTION : 1 - RECTANGLE 1 -X- 120 -X- 480

FILE NO: 0264-01-11
DATE: 05/30/98
MILL ORDER NO: 10622-003

SOLD TO:
AMERICAN ALLOY STEEL, INC
P. O. BOX 40469
HOUSTON TX 77240-0469

SEND TO: 03-C
AMERICAN ALLOY STEEL, INC
P. O. BOX 40469
ATTN: HOMER GARZA
HOUSTON TX 77240-0469

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

D

THIS MATERIAL HAS BEEN MANUFACTURED AND TESTED IN ACCORDANCE WITH PURCHASE ORDER REQUIREMENTS AND SPECIFICATION(S):
WITH LUKENS BEING THE APPROVED TEST AGENCY. ABS PT.2 SEC.1 YR. 94 GR. DH36 & GR. EH36

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

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

TENSILES					CHARPY V IMPACTS									OTHER TESTS PERFORMED
TYPE	YLD	TENS	% ELONG	% R.A.	TYPE	TEMP				MILS LATERAL EXPANSION			% SHEAR	

TEST REPORT APPROVED DATE 6-24-98
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 TEMP	NOM TEMP	MIN TEMP	MAX TEMP	HOLD MINS.	HEAT RATE MAX	COOL RATE MAX

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT:

Quality Assurance Laboratory
Coatesville, PA 19320

Elaine Gaffin
SUPERVISOR - TEST REPORTING.

Form No. 81A-(R 3/92)

LORENS STEEL COMPANY

Q.A. — INSPECTION DEPARTMENT

NON-DESTRUCTIVE TESTING REPORT

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. EDITION-93-50	NO. PCS.: 1	GAUGE: 1.000	WIDTH: 120	LENGTH: 480	
INSPECTOR'S NAME (LEVEL I SNT-TC-1A/MIL-STD-2132): Doug Dahl	WITNESSED BY	MELT & SLAB: D7149-13		MARK NO. PC #1 / ITEM NO. 003		

UT☐ SEP☑ ABC☐	EQUIPMENT USED: EPOCH III B 137 # DUE 7-4-98	MT☐	EQUIPMENT USED	PT☐	EQUIPMENT USED
TRANSDUCER SIZE & FREQ.: AEROTECH 1" DIA. 2¼ MHZ		TYPES OF PRODS. SPACING		METHOD	
COUPLANT METHOD: SOAP & WATER CONTACT		GRID REF. AMPERAGE			
AMPLITUDE GRID REF.: 75% 100%	TYPE OF SURFACE: AS-ROLLED	METHOD TYPE OF SURFACE	TPV☐	TYPE OF SURFACE	

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

☑ UT
☐ MT — MEETS SPECIFICATION REQUIREMENTS
☐ PT

P. Gregor 5-7-98

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

an-tech
LABORATORIES, INC.
Metallurgical Chemistry and Testing Laboratory

3204 BROADWAY (77017)
P.O. BOX 262265
HOUSTON, TEXAS 77207-2265
PHONE: (713) 644-7501
FAX: (713) 644-1400

October 30, 1998

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

Type of Specimen	Energy	Temperature	Results
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

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

OB 203S 4PT 9-97

32-9122-01

Gulf States Steel, Inc. GADSDEN, AL 35904-1935

CERTIFICATE OF TESTS

GSS ORDER NO. NUMBER	ITEM	MFG	PURCHASE ORDER DATE
53762	03	742	11 18 97

PURCHASE ORDER NO.	SHIPPED FROM
NEW 72984	ALA CITY

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 SOME 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)

SOLD TO 35129
KLOCKNER NAMASCO CORP
SOUTHWEST DIVISION
P O DRAWER 450469
HOUSTON TX 77245-0469

SHIP TO
KLOCKNER NAMASCO 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 & MFD IN USA

1.0000 X 96.0000 SHEARED EDGE X 240.0000 IN — QUANTITY SHIPPED 143748
HT 7456440 22 PCS

CN C 25MX MN 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 %ELONG 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

TOTAL WT. 143,748# PCS 22

STATE OF ALABAMA COUNTY OF ETOWAH
SWORN AND SUBSCRIBED TO BEFORE ME
THIS THE 29 DAY OF JANUARY 1998

K W Croft
Notary Public

K. W. CROFT NOTARY PUBLIC ALABAMA - STATE AT LARGE

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	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 2"	% ELONG 8"	HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS DIR	TEMP °F	1	2	AVG
7456440	M282701	53.0	68 0		27			AR	77							
7456440	M282702	50.0	67 0		26			AR	.74							

CHARPY V NOTCH

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY 1	ENERGY 2	ENERGY 3	ENERGY AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG	MILS LATERAL EXPANSION 1	MILS LATERAL EXPANSION 2	MILS LATERAL EXPANSION 3	MILS LATERAL EXPANSION AVG
7456440	M282701	AR	FUL	LT	10	54	57	60	57								
7456440	M282702	AR	FUL	LT	10	72	83	84	79								

LAST PAGE

9901291445

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
497904P	Sep 14, 1998	3

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

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

OSM ITEM NO	DESCRIPTION		HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 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											
	8 PCS 52272 LBS	+	394081		437	675	25					
					493	690	22					
									LCVN @ 10			DEG F 10.0mm 60 70 59 /63 egy
									LCVN @ 10			DEG F 10.0mm 42 57 53 /51 egy
	34 PCS 150286 LBS TOTALS											

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid, Ehn Grain Size
+392873	.05	.96	.007	.003	.26	.21	.08	<.008	.025	.024	.03	.03								
+392954	.06	.96	.006	.004	.24	.22	.11	<.008	.025	.022	.06	.05								
+394081	.15	.90	.006	.011	.27	.24	.11	<.008	<.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 McCasland ANGIE MCCASLAND Q.C. RECORDS ADMINISTRATOR

Rotek
A member of the Hoesch Group

CERTIFICATION OF TEST

CERTIFICATION NO. A10116

CUSTOMER ORDER NO.	ROTEK ORDER NO.	SPECIFICATION	DATE
33875	F71160	ASTM A694-95 Grade F	3/10/9

SOLD
APPLIED HYDRAULIC SYSTEMS
STATION 1, BOX 10155
HOUMA LA 70363

SHIP

PART NO.			PCS	ROTEK HEAT CODE
MACHINED RING	B123078S	90.000 76.000 X 3.000)	8	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	.00

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 (STR.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

GENEVA STEEL

Geneva Steel Company certifies all smelting, melting, and manufacturing processes occurring in the U.S.A.

40054

Metallurgical Test Report

PURCHASE ORDER NO.	DELIVERY NO.	MATERIAL NO.
NEW-103009/60-	80002411	100498

VENDOR:
GENEVA STEEL
P.O. BOX 2500
PROVO, UT 84603
USA

VEHICLE IDENTITY
SSW088095 60-001766

SOLD TO:
NAMASCO SOUTH CENTRAL DIV
4501 N. MIRO STREET
NEW ORLEANS, LA 70117-4439

SHIP TO:
NAMASCO
DELIVERY WAREHOUSE #1
NEW ORLEANS, LA 70117

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
DIV. MANAGER, QUALITY,
DATE: 02/26/1999

SPECIFICATION AND INSPECTION

ASTM A36-96, ASME SA36 1998 Edition, ASTM A709-97A Gr 36.

MATERIAL DESCRIPTION			QTY.	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT.	TENSILE	ELONGATION%	
THICKNESS (in)	WIDTH (in)	LENGTH (in) / BATCH		(lb)			KSI	KSI	IN 8"	IN 2"
0.3750	96.0000	240.0000	2	4900	1D4196	96421801 - 0.3750	42.5	64.6	25.0	
						96421802 - 0.3750	51.4	67.3	25.0	
						96422001 - 0.3750	44.9	66.1	20.0	
						96422002 - 0.3750	51.6	69.8	20.0	
0.3750	96.0000	240.0000	27	66150	1E0095	96542401 - 0.3750	49.2	69.3	22.0	
						96542406 - 0.3750	45.9	65.8	22.0	
						96542501 - 0.3750	50.4	69.6	21.0	
						96542506 - 0.3750	47.4	67.4	21.0	
0.3750	96.0000	240.0000	20	49000	1E0096	96541809 - 0.3750	49.7	68.0	22.0	
						96541810 - 0.3750	47.6	66.8	23.0	
						96541901 - 0.3750	49.0	69.1	18.0	
						96541906 - 0.3750	46.8	67.2	20.0	
0.3750	96.0000	240.0000	20	49000	2E5060	96499401 - 0.7500	51.8	68.2	23.0	
						96499402 - 0.7500	53.9	71.9	23.0	
						96499501 - 0.7500	56.7	72.3	22.0	

HEAT NO.	TYPE	% C	% MN	% P	% S	% SI	% CU	% NI	% CR	% MO	% SN	% AL	% N	% V	% B	% TI	% CB	% AS	% CA	H ppm	% CE
1D4196	HEAT	0.19	0.87	0.007	0.007	0.013	0.01	0.01	0.02	0.004	0.004	0.038	0.0040	0.004	0.0001	0.004	0.003	0.004	0.0001		
1E0095	HEAT	0.19	0.83	0.008	0.009	0.012	0.01	0.01	0.02	0.004	0.004	0.025	0.0050	0.004	0.0000	0.004	0.003	0.004	0.0001		
1E0096	HEAT	0.19	0.82	0.010	0.010	0.015	0.01	0.01	0.01	0.004	0.004	0.038	0.0050	0.004	0.0000	0.004	0.003	0.004	0.0001		
2E5060	HEAT	0.19	0.82	0.010	0.010	0.015	0.01	0.01	0.01	0.004	0.004	0.038	0.0050	0.004	0.0000	0.004	0.003	0.004	0.0001		

SMI Steel Inc.
P.O. Box 321188
Birmingham, AL 35232-1188
(205) 592-8981

CERTIFIED MILL TEST REPORT

For additional copies call
(205) 599-7961

We hereby certify that the test results presented here are accurate and conform to the reported grade specification.

Christine Selvin
Quality Assurance Manager

HEAT NO:	992294	SOLD TO	NAMASCO 5775-C GLENRIDGE DR ATLANTA, GA 30328-	SHIP TO	NAMASCO-SOUTHWEST 4501 NORTH MIRO NEW ORLEANS, LA 70177-	SHIP #:	100145/27
SECTION:	L 3X3X1/4 x20'0" L 76x76x6.4x6.096					BOL#:	108005
						INV.#:	
GRADE:	ASTM A36-97/CAN.CSA G40.21 44W ASTM A36M-97/CAN.CSA GR 300W					CUST PO#:	NEW115614
						CUST P/N:	

CHEMICAL ANALYSIS	
	%
C	0.12
Mn	0.71
P	0.011
S	0.015
Si	0.20
Cu	0.34
Cr	0.16
Ni	0.10
Mo	0.021
Cb	0.001
V	0.004
Sn	0.014
B	0.0001
Tl	0.002
C.Eq.	0.30
N	0.0071

PROPERTIES						
MECHANICAL	TEST 1		TEST 2		TEST 3	
	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC
Yield Strength	49.5 KSI	341.3 MPA				
Tensile Strength	68.8 KSI	474.4 MPA				
Elongation	33%	33%				
Gauge Length	8 INS	203 MM				
Reduction of Area						
Bend Test						
Diameter						
Charpy Impact						
Test Temp						
Sample Size						
Orientation						
Hardness						

JOMINY RESULTS - Rockwell C hardness at 1/16th inch increments

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	18	20	22	24	26	28	30	32

GRAIN SIZE

METHOD

RESULT

INCLUSION RATING

METHOD							
TYPE							
	T	H	T	H	T	H	T H
SIZE							

100% MELTED AND MANUFACTURED IN THE USA AND FREE OF MERCURY CONTAMINATION IN THE PROCESS

REMARKS:

Meets Specifications CAN/CSA-G40.21-98 44W, ASTM A709-97 GR 36, ABS PART 2-99 GR A, ABS PART 2 99 GRADE B, ASME SA-36-89

Wednesday 14 of Jul 1999, SMI Steel Inc. ->FAXWORKS1

38134

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
498076P	Sep 14, 1998	1

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

MILL ORDER NO.	DATE
80808	

CUSTOMER ORDER NO.: NEW-84815

JOB/REQ. NO.:

SHIPPING NO.	DATE
498076	09/14/1998

CARRIER: UNION PACIFIC

CAR/TRUCK NO.: CW6037

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

OSM ITEM NO.	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
3	1.5000 X 96.000M X 240.000										
	2 PCS 19602 LBS	A00001		440	735	25					
				495	775	26					
								LCVN @ 10			DEG F 10.0mm 50 55 48 /51 egy
								LCVN @ 10			DEG F 10.0mm 44 46 42 /44 egy
	1 PC 9801 LBS	A00003		398	700		26				
				457	730	25					
								LCVN @ 10			DEG F 10.0mm 36 39 37 /37 egy
4	2.0000 X 96.000M X 240.000										
	1 PC 13068 LBS	+ 393497		436	675		26				
				486	700	27					
								LCVN @ 10			DEG F 10.0mm 12 43 41 /32 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N₂	Ca			CE	Mo+Cu+Ni+Cr Grain Size
A00001	.20	1.13	.016	.008	.28	.02	.02	<.008	<.008	.029	.02	.00								
A00003	.20	1.10	.017	.009	.28	.03	.02	<.008	<.008	.045	.02	.00								
+393497	.14	1.08	.006	.011	.21	.30	.14	<.008	<.008	.025	.07	.03								

ALL HEATS INDICATED WITH (+) WERE MELTED AND MANUFACTURED IN THE USA.

Angie McCasland
Q.C. RECORDS ADMINISTRATOR

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

JUL. 23. 1999 12:28PM NO. 3641 P. 3

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

Metallurgical Test Report

37422

USS, USX, USX are trademarks of USX C.. USX™

REQ., JOB, CONTRACT NO.

P.O. DATE | PURCHASE ORDER NO. NEW-76549

SHIPPERS NO. H02314 07 11 98 | MILL ORDER NO. UB56015 | INVOICE NO. 154-010872

VEHICLE IDENTITY EJE 006016 H2314

VENDOR: GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO: 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

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.

BB

PREPARED BY THE OFFICE OF
S. C. PAPE GEN MGR. Q. A

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

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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
01	1/2 "	96.0000	240"	09	29403	M66073							
	STEEL-TYPE = CAST		REDUCTION RATIO = 18.2 TO 1					44.0	67.0	28.0	50.0		
								43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 128-167-168												
	-12 DEG C AVERAGE IMPACT STRENGTH +154 FT LBS												
01	1/2 "	96.0000	240"	05	16335	Y67605							
	STEEL-TYPE = CAST		REDUCTION RATIO = 18.2 TO 1					46.0	68.0	29.0	50.0		
								44.0	64.0	31.0	50.0		
	LONG FL SZ CHARPY IMPT V-NTCH +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	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			001		FINE GRAIN
Y67605	HEAT	14	095	014	008	20	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.

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

10368

DAILY NDE 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

45778

Customer APPLIED Hydraulic Sys. Contractor SAME

Address _____ Location of Job HOUMA, LA

Job No. _____ W.O. 99207 AFE _____ Other AWS D1.1

Job Specifications GAMMA RAY INSP. OF CRANE PEDESTAL

	WELD NO.	PIPE SIZE	RECOMMENDATIONS ✓ / ✗	ACCEPT / REJECT	REMARKS		WELD NO.	PIPE SIZE	RECOMMENDATIONS ✓ / ✗	ACCEPT / REJECT	REMARKS
1	LS-1	80"x1"	✓			41					
2	0		✓			42					
3	1		✓			43					
4	2		✓			44					
5						45					
6	LS-2		✓			46					
7	0		✓			47					
8	1		✓			48					
9	2		✓			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					
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27						67					
28						68					
29						69					
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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

Magnetic Particle _____ Dye Penetrant _____

No. of Welds Checked: 2

Linear Ft. Film 6pcs (4½x17) Type D-7

Hours Worked: 3

Stand-By Time: _____

Subsistence (check if applicable) _____

Customer Representative _____

Date 8-11-99

Technician: R. BERGERON

Assistant: C. POPAY

Assistant: _____

Travel Time: _____ Mileage: _____ Unit No. _____

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

0695

P.O. #45840

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

CLIENT Applied Hydraulics DATE 8/4/92

CONTRACTOR DHST JOB LOCATION Houma, La. 8-1778

JOB NO. [illegible] CLIENT'S REPRESENTATIVE [illegible]

UT TECH. Luis Ocmian REMARKS Lamination Scan

	WELD NO.	WALL THICKNESS	RECOMMENDATION ✓	RECOMMENDATION X	RECOMMENDATION REMARKS
1	UT of barrel to Ring Flange on				
2	crane pedestal:				
3		80"X1"	✓		
4					
5					
6					
7					
8	Lamination Scan of ring flange				
9	on crane pedestal:				
10		3"	✓		
11					
12					
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	WELD NO.	WALL THICKNESS	✓	X	REMARKS
51					
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EQUIPMENT

KRAUT KRAMER USM-2 31457.905

TRANSDUCER (M H Z) 2.25

ANGLE USED Straight Beam

REFERENCE STANDARD IIW Block

ASTM A578 Level II / MDSD1.1 S2.6

GXT.UT.004 Rev.2

CALIBRATION

db Gain 40 Sweep Delay 20

Zero Delay 20 Reference Level 80%

SUBSISTANCES

AUTO TRANSPORTATION MILES

WATER TRAVEL TIME HRS.

LAND TRAVEL TIME HRS.

WORK TIME HRS.

STANDBY TIME HRS.

TOTAL TIME HRS. 10

della printing

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
1615
45939

CLIENT Applied Hydraulics DATE 8-23-99

CONTRACTOR Same JOB LOCATION Houma, La.

JOB NO. 620-059803 CLIENT REPRESENTATIVE

MT TECH. Wade Mire REMARKS MT Insp.

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100%	MT		Inspection
2				
3	Of	Spill Containment, Today		
4				
5	Couplings & Jacking Pad			
6				
7	Brackets On Pedestal.			
8				
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SURFACE CONDITION
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

EQUIPMENT
MAKE Parker MODEL B-300 S/N 7308

CONTRACTS
PROD SPACING 5" CONTINUOUS ( )
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 5.75

MEDIA
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER (✓)

CALIBRATION
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )
CALIBRATION DATE:

ACCEPTANCE CRITERIA
ANSI B31.1 Sec 6

TOTAL TIME HRS. 1

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N61584-001
WELDMENT S/N: 98279-01
DESCRIPTION: Upperstructure Weldment
MODEL: 340LA-160
CHECKED BY: Russell W. Talbot Jr.
DATE: 9.20.99

Material Description	Heat Number
Plate, A-36, fine grain w/ charpy, 3"	D7677
Plate, A-36, fine grain w/ charpy, 2" (Item #'s 2, 3)	M66254
Plate, A-36, fine grain w/ charpy, 2" (Item #'s 4, 5, 6, 7)	M65937
Plate, A-36, fine grain w/ charpy, 2" (Item # 8)	393497
Plate, A-36, fine grain w/ charpy, 1"	394081

Bethlehem
Bethlehem Lukens Plate

TEST CERTIFICATE

CUSTOMER P.O.: 37136
DESCRIPTION: 1 - RECTANGLE 3 -X- 66 -X- 452

FILE NO: 02? 01-11
DATE: 08/?1/98
MILL ORDER NO: 16599-005

SOLD TO:
AMERICAN ALLOY STEEL, INC
P. O. BOX 40469
HOUSTON TX 77240-0469

SEND TO: 03-C
AMERICAN ALLOY STEEL, INC
P. O. BOX 40469
ATTN: HOMER GARZA
HOUSTON TX 77240-0469

SHIP TO:
AMERICAN ALLOY STEEL, INC.
C/O STORAGE & PROCESSORS, INC.
6500 CLINTON DR./TRACK 23-430
DELIV CARRIER-PORT TERMINAL RR
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
MATERIAL MEETS DIN 50049 3.1.B/EN 10204 3.1.B

S1 S3 S4
SUPPL. PARA. S5 APPLIES.
WITH LUKENS BEING THE APPROVED TEST AGENCY.

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

CHEMICAL ANALYSIS

MELT/SLAB	C	MN	P	S	CU	SI	NI	CR	MO	V	TI	B	AL	CB	N
D7677 /S	.16	1.42	.008	.001	.11	.29	.10	.11	.02	.001	.004	.0004	.036	.032	.0064
D7677															

98 FA61532 504

PRACTICES
C.E. = 0.440
VIP FGP
GS 7-8
FINELINE

TENSILES

TYPE	YLD (PSI X 100)	TENS X 100)	% ELONG 2"	% R.A.
BZ				68.0
TZ				69.0
BX	534	794	30.0	

CHARPY V IMPACTS — FULL

TYPE	TEMP	FT LBS			MILS LATERAL EXPANSION			% SHEAR		
BL	-4F	204	205	212						
BX	-40F	125	150	152						

TEST REPORT APPROVED DATE 9/3/98
AMERICAN ALLOY STEEL BY
QUALITY ASSURANCE DEPT

OTHER TESTS PERFORMED

AMERICAN BUREAU OF SHIPPING
PHILADELPHIA

INFORMATION

WEIGHT PER PIECE = 33072 LBS. 15033 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.
FINELINE MOD FOR SULPHUR
LUKENS FINELINE STEELS ARE CALCIUM ARGON TREATED
FOR SULFIDE SHAPE CONTROL.
B/L #22383 TTPX 82466
MATERIAL PRODUCED UNDER A CERTIFIED QUALITY MANAGEMENT SYSTEM
COMPLYING WITH ISO 9002 ABS-QE CERTIFICATE NO. 30130

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			0092	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

Elmore Spotting
SUPERVISOR - TEST REPORTING.

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT:

Quality Assurance Laboratory
Coatesville, PA 19320

Bethlehem
Bethlehem Lukens Plate

TEST CERTIFICATE

CUSTOMER P.O.: 37136
DESCRIPTION :
1 - RECTANGLE 3 -X- 86 -X- 452

FILE NO: 02. 01-11
DATE: 08/07/98
MILL ORDER NO: 16599-005

SOLD TO:	SEND TO: 03-C	SHIP TO:
AMERICAN ALLOY STEEL, INC P. O. BOX 40469 HOUSTON TX 77240-0469	AMERICAN ALLOY STEEL, INC P. O. BOX 40469 ATTN: HOMER GARZA HOUSTON TX 77240-0469	AMERICAN ALLOY STEEL, INC. C/O STORAGE & PROCESSORS, INC. 6500 CLINTON DR./TRACK 23-430 DELIV CARRIER-PORT TERMINAL RR HOUSTON TX 77240

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

ABS PT.2-SECT-1 YR. 94 GR. EH36, ABS PT.2-SECT-1 YR.94 GR. DH36, ASME SA537-95A CL. 1 MOD TO .04
MAX. NB
MATERIAL PRODUCED UNDER A CERTIFIED QUALITY MGMT SYSTEM COMPLYING WITH ISO 9002 ABS-QE CERT. NO. 30130

CHEMICAL ANALYSIS

MELT/SLAB	C	MN	P	S	CU	SI	NI	CR	MO	V	TI	B			PRACTICES
D7677 /5															

Certified a true copy of the original, retained in our file.
AMERICAN ALLOY STEEL, INC.
TEST REPORT APPROVED DATE 9-3-98
AMERICAN ALLOY STEEL BY Poutlook
QUALITY ASSURANCE DEPT.

TENSILES

TYPE	YLD	TENS	% ELONG	% R.A.

CHARPY V IMPACTS

TYPE	TEMP				MILS LATERAL EXPANSION			% SHEAR		

OTHER TESTS PERFORMED

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:

Quality Assurance Laboratory
Coatesville, PA 19320

Elinore Zapiain
SUPERVISOR - TEST REPORTING.

U. S. STEEL GROUP
A division of USX Corporation
01.000.0772 (REV. 6/97)

Metallurgical Test Report 37433

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P.O. DATE	PURCHASE ORDER NO.
	NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02314 07 11 98	UB56016	154-010873
VEHICLE IDENTITY EJE 006016		H2314

VENDOR SOLD TO
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

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, Q.A.
DATE 7-15-98

SPEC. & ISP. 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240"	01	13068	M66254	55W 2						
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 4.6 TO 1				46.0	76.0		32.3		
								52.0	74.0	32.0	30.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/ 072-069-077								
	-12 DEG C AVERAGE IMPACT STRENGTH				+73 FT LBS								
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/ 092-092-096								
	-12 DEG C AVERAGE IMPACT STRENGTH				+93 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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO
M66254	HEAT	22	096	012	006	22	03	02	03	01		024		001			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. 01257880001 01 SAM CBA 0 0 3 PAGE 1

U.S. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

37086

USS, USX, USX are trademarks of USX Corp

REQ. JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02048 06 16 98	UB56016	154-005522
VEHICLE IDENTITY EJE 006228		H2048

VENDOR
GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
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

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.

BB

PREPARED BY THE OFFICE OF:
S.C.PAPE GEN.MGR, Q.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 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240"	02	26136	M65937	57W 1						
	STEEL-TYPE	= CAST	REDUCTION RATIO	=	6.0 TO 1								
								45.0	75.0		33.0		
								47.0	76.0		32.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/ 085-077-076								
	-12 DEG C AVERAGE IMPACT STRENGTH				+79 FT LBS								
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/ 071-072-098								
	-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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M65937	HEAT	.21	1.00	.021	.013	.22	.02	.02	.05	.01		.026		.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.

980616 MV21 1014 701131020 061698 0125788001 01 SAM CBA 0 0 3 PAGE 1

39134

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
498076P	Sep 14, 1998	1

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

MILL ORDER NO.	DATE
80808	

CUSTOMER ORDER NO.: NEW-84815

JOB/REQ. NO.:

SHIPPING NO.	DATE
498076	09/14/1998

CARRIER: UNION PACIFIC

CAR/TRUCK NO.: CW6037

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

OSM ITEM NO	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
3	1.5000 X 96.000M X 240.000										
	2 PCS 19602 LBS	A00001		440	735	25					
				495	775	26					LCVN @ 10 DEG F 10.0mm 50 55 48 /51 egy
											LCVN @ 10 DEG F 10.0mm 44 46 42 /44 egy
	1 PC 9801 LBS	A00003		398	700		26				
				457	730	25					LCVN @ 10 DEG F 10.0mm 36 39 37 /37 egy
4	2.0000 X 96.000M X 240.000										
	1 PC 13068 LBS	+393497		436	675		26				
				486	700	27					LCVN @ 10 DEG F 10.0mm 12 43 41 /32 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	Ni	Ca			CE	
A00001	.20	1.13	.016	.008	.28	.02	.02	<.008	<.008	.029	.02	.00								
A00003	.20	1.10	.017	.009	.28	.03	.02	<.008	<.008	.045	.02	.00								
+393497	.14	1.08	.006	.011	.21	.30	.14	<.008	<.008	.025	.07	.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 McCasland ANGIE MCCASLAND

Q.C. RECORDS ADMINISTRATOR

JUL. 23. 1999 12:28PM NO. 3641 P. 3

38058

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
497212P	Sep 08, 1998	1

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

MILL ORDER NO.	DATE
101244	

CUSTOMER ORDER NO.: NEW-90274

JOB/REQ. NO.:

SHIPPING NO.	DATE
497212	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 NO.	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
2	0.7500 X 96.000M X 240.000										
	1 PC 4901 LBS +	392954		505	640	29					
								LCVN @ 10	DEG F 10.0mm	299	299 299/299 egy
	3 PCS 14703 LBS +	393085		497	620	30					
								LCVN @ 10	DEG F 10.0mm	266	299 296/287 egy
3	1.0000 X 96.000M X 240.000										
	3 PCS 19602 LBS +	394081		437	675	25					
				493	690	22					
								LCVN @ 10	DEG F 10.0mm	60 70	59 /63 egy
								LCVN @ 10	DEG F 10.0mm	42 57	53 /51 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+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	<.008	.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 Shamrell
COLLEEN SHAMRELL Q.C. RECORDS ADMINISTRATOR

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

0619

P.O.# 45495

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

CLIENT Applied Hydraulics DATE 7/26/89

CONTRACTOR AHSI JOB LOCATION Houma, La 70360

JOB NO. [illegible] CLIENT'S REPRESENTATIVE [illegible]

UT TECH. Terre Cormier REMARKS Lamination scan.

	WELD NO.	WALL THICKNESS	RECOMMENDATION ✓ X	ACCEPT / REJECT	REMARKS
1	Lamination scan of upper structure				
2					
3	base plate :				
4					
5	3" x 75' x 100"		✓		
6					
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EQUIPMENT

KRAUT KRAMER USK-7 3145-915

TRANSDUCER (M H Z) 2.25

ANGLE USED Straight Beam

REFERENCE STANDARD NW Blk R

ASTM A 578 Level R/ext. Ult.

CALIBRATION

db Gain 40 Sweep Delay 20

Zero Delay 10 Reference Level 80%

SUBSISTANCES

AUTO TRANSPORTATION MILES

WATER TRAVEL TIME HRS.

LAND TRAVEL TIME HRS.

WORK TIME HRS.

STANDBY TIME HRS.

TOTAL TIME HRS. 0

delta printing

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

MT WORK REPORT

Report No. M
1223
P.O.# 45818

CLIENT Applied Hydraulics DATE 8/13/99

CONTRACTOR AMSI JOB LOCATION Houma, La. 8.16.99

JOB NO. 98-05-8503 CLIENT REPRESENTATIVE

MT TECH. Wade Mh REMARKS M.T. inspection

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100%	M.T.	inspection of all	
2				
3	welds	on	spill containment,	
4				
5	saving	drive	plate, walkway supports,	
6				
7	and	Upper	structure.	
8				
9	All	welds	accepted.	
10				
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	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
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SURFACE CONDITION
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

EQUIPMENT
MAKE Parker MODEL B-30C S/N 6693

CONTRACTS
PROD SPACING 4" CONTINUOUS (✓)
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 4

MEDIA
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER ( )

CALIBRATION
10# WEIGHT LIFT ( ) FLUX IND. CHECK (✓)
CALIBRATION DATE: 8/13/99

ACCEPTANCE CRITERIA
AWS D1.1 Sect. 6 / GXT MPI WPS 001 Rev. C

TOTAL TIME HRS. 10

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N61583-001
WELDMENT S/N: 98279-02
DESCRIPTION: Gantry Weldment
MODEL: 340LA-160
CHECKED BY: Russell A. Sullivan
DATE: 9.20.99

Material Description	Heat Number
Plate, A-36, fine grain w/ charpy, 1"	394081
Plate, A-36, fine grain w/ charpy, 2" (Item # 2)	M65937
Plate, A-36, fine grain w/ charpy, 2" (Item # 5)	M66254
Plate, A-36, fine grain w/ charpy, 2" (Item # 17)	393497
Pipe, A-106 Gr b, 20" sch 80	B67635
Tube, square, A-500 , 8" x 8" x ½"	X62764
Plate, A-36, fine grain w/ charpy, ¾"	M66075
Plate, A-36, fine grain w/ charpy, ½"	Y67605
Bar, flat, A-36, 3/8" x 1½"	371-0505
Pipe, A-106 Gr b, 3" sch 40	A44433
Tube, rectangular, A-500, 5/8" x 14" x 10"	Y68084
Tube, square, A-500, 10" x 10" x ½"	D61603
Plate, A-36, 4"	M66395
Bar, flat, A-36, ½" x 6"	976768

38058

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
497212P	Sep 08, 1998	1

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

MILL ORDER NO.	DATE
101244	

CUSTOMER ORDER NO.: NEW-90274

JOB/REQ. NO.:

SHIPPING NO.	DATE
497212	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 NO	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
2	0.7500 X 96.000M X 240.000										
	1 PC 4901 LBS +	392954		505	640	29					
								LCVN @ 10			DEG F 10.0mm 299 299 299/299 egy
	3 PCS 14703 LBS +	393085		497	620	30					
								LCVN @ 10			DEG F 10.0mm 266 299 296/287 egy
3	1.0000 X 96.000M X 240.000										
	3 PCS 19602 LBS +	394081		437	675	25					
				493	690	22					
								LCVN @ 10			DEG F 10.0mm 60 70 59 /63 egy
								LCVN @ 10			DEG F 10.0mm 42 57 53 /51 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+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	<.008	.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 Shamrell COLLEEN SHAMRELL Q.C. RECORDS ADMINISTRATOR

U. S. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

37086

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REQ., JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02048 06 16 98	UB56016	154-005522
VEHICLE IDENTITY EJE 006228		H2048

VENDOR
GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
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

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.

BB

PREPARED BY THE OFFICE OF:
S.C.PAPE GEN.MGR, Q.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 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240"	02	26136	M65937	57W 1						
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 6.0 TO 1									
								45.0	75.0		33.0		
								47.0	76.0		32.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/ 085-077-076								
	-12 DEG C AVERAGE IMPACT STRENGTH				+79 FT LBS								
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/ 071-072-098								
	-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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M65937	HEAT	21	1.00	021	013	22	02	02	05	01		026		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.

980616 MV21 1014 701131020 061698 0125788001 01 SAM CBA 0 0 3 PAGE 1

U. S. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 5/93)

Metallurgical Test Report 34433

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P. JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02314 07 11 98	UB56016	154-010873
VEHICLE IDENTITY EJE 006016		H2314

VENDOR
GARY WORKS
GARY,INDIANA 46402

SOLD TO
KLOCKNER NAMASCO CORP
SOUTHWEST DIVISION
4501 N MIRO ST
NEW ORLEANS LA 70117-4439

** MELTED AND MANUFACTURED IN THE USA **

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 FULFILLS REQUIREMENTS IN SUCH RESPECT.

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

DATE 7-15-98

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

NSP: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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240"	01	13068	M66254	55W 2						
	STEEL-TYPE = CAST		REDUCTION RATIO = 4.5 TO 1					46.0	76.0		32.3		
								52.0	74.0	32.0	30.0		

LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 072-069-077
-12 DEG C AVERAGE IMPACT STRENGTH +73 FT LBS
LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 092-092-096
-12 DEG C AVERAGE IMPACT STRENGTH +93 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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M66254	HEAT	22	096	012	008	22	03	02	03	01		024		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.

38134

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
498076P	Sep 14, 1998	1

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

MILL ORDER NO.	DATE
80808	
CUSTOMER ORDER NO.	
NEW-84815	
JOB/REQ. NO.	
SHIPPING NO.	DATE
498076	09/14/1998
CARRIER	
UNION PACIFIC	
CAR/TRUCK NO.	
CW6037	

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

OSM ITEM NO.	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
3	1.5000 X 96.000M X 240.000										
	2 PCS 19602 LBS	A00001		440	735	25					
				495	775	26					
								LCVN @ 10			DEG F 10.0mm 50 55 48 /51 egy
								LCVN @ 10			DEG F 10.0mm 44 46 42 /44 egy
	1 PC 9801 LBS	A00003		398	700		26				
				457	730	25					
								LCVN @ 10			DEG F 10.0mm 36 39 37 /37 egy
4	2.0000 X 96.000M X 240.000										
	1 PC 13068 LBS	+ 393497		436	675		26				
				486	700	27					
								LCVN @ 10			DEG F 10.0mm 12 43 41 /32 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N	Ca			CE	Mc Quaid Ehn Grain Size
A00001	.20	1.13	.016	.008	.28	.02	.02	<.008	<.008	.029	.02	.00								
A00003	.20	1.10	.017	.009	.28	.03	.02	<.006	<.008	.045	.02	.00								
+393497	.14	1.08	.006	.011	.21	.30	.14	<.008	<.008	.025	.07	.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 McCasland ANGIE MCCASLAND Q.C. RECORDS ADMINISTRATOR

JUL. 23. 1999 12:28PM NO. 3641 P. 3

P 20.1.031 US B67635 530

U.S. STEEL GROUP
A DIVISION OF USX CORPORATION

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049)

DATE: 07/22/98
TIME: 12:39:48

USX™

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MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.D.
DR34695 02		10-30092	

SOLD TO ADDRESS
MARMON 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-*41ST EDITION DTD 4/1/95 ASTM A53-*97 ASTM A106-*97A GRADE B TRIPLE STENCIL ASME SA53-*1995 EDITION 1996 ADDENDUM ASME SA106-*1995 EDITION 1996 ADDENDUM GRADE B BLK REG MILL COAT PE SC MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75

MATERIAL COND: AS ROLLED

O.D.: 20.000(508.000) in (mm)

WALL: 1.031 (26.187) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)
			IN	MIN: 35000 MAX:		MIN: 60000 MAX:	MAX:	MIN:	MIN: MAX: 100.0	2170	5
B67635	STRIP/T/B	AR	1.500	48500	.50	76800	0.63	29.5 46.0	B 86.7	2170	5
		**	END OF DATA THIS SHEET **								

LEGEND: L - LONGITUDINAL, T - TRANSVERSE, U - UPSET, N - NORMALIZED, QT - QUENCHED & TEMPERED, SR - STRESS RELIEVED, AR - AS ROLLED, B - BODY, W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.*
B67635	HEAT		.24	.89	.006	.006	.26	.01	.02	.03	.01	.031		.003			.001					
B67635	PROD		.24	.88	.007	.006	.24	.01	.02	.03	.01	.029		.000			.000					
B67635	PROD		.24	.88	.007	.006	.24	.01	.02	.03	.01	.028		.000			.001					
			** END OF DATA THIS SHEET **																			

*C.E. IS BASED ON THE FOLLOWING EQUATION(S):

Q. C. REVIEWED
DATE 7/22/98 INITIAL BT

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

JUL 22 '98 11:55
PAGE.02
To:BILLIE THULL From:FAXGate/2 22-Jul-98 12:32 page 2 of 3

U.S. STEEL GROUP
A DIVISION OF USX CORPORATION

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049)

DATE: 07/22/98
TIME: 12:39:48

USX™

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MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER
DR34695 02		10-30092

MATERIAL COND: AS ROLLED

O.D.: 20.000(508.000) in (mm)

WALL: 1.031 (26.187) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING											
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
B67635	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 ____ OD/ID ____ L ____ L/T ____
FULL LENGTH MPI	X	X
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
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

JUL 22 '98 11:55
PAGE.03
TO:BILLIE HULL From:FAXGate/2 22-Jul-98 12:32 page 3 of 3

BIRMINGHAM DIVISION
1500 North 50th Street
Birmingham, AL 35212-1058
TEL. 205-599-0600

COPPERWELD

Customer Order No. 10-051774
Copperweld Order No. 204100
Invoice No. 729239
Date 06/06/98

TEST REPORT

Customer:	Specification:
MARMON KEYSTONE CORPORATION 2505 FIRST AVENUE SOUTH TEST REPORTS DEPT. IRONDALE, AL 35210	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 & MANUFACTURED IN THE U.S.A. (D)

Q. C. RELEASED
DATE 6/8/98 INITIAL BT

Paul J Anthony
PAUL J ANTHONY, METALLURGIST

Copperweld certifies that the material purchased on this order meets all chemical and physical requirements in accordance with the latest applicable ASTM standards.

5 8.8.5 RE X62764 Eng

U. S. STEEL GROUP
A d on of USX Corporation
01000.0772 (REV. 8/91)

TFTR 6/26/98 bb

Metallurgical Test Report

JUN 22 1998

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USX™

EQ. JOB, CONTRACT NO.

P.O. DATE

PURCHASE ORDER NO. NEW-76549

SHIPPERS NO. H02048 06 16 98

MILL ORDER NO. UB56015

INVOICE NO. 154-005521

VEHICLE IDENTITY EJE 006228 H2048

VENDOR: GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO: 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

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.

BB

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

DATE 6-22-98

SPEC & ISS: PLATE CARBON ASTM A36-*96 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
02	3/4 "	96.0000	240"	04	19604	M66075							
	STEEL-TYPE = CAST		REDUCTION RATIO = 12.1 TO 1										
								42.0	66.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F -12 DEG C		AVERAGE IMPACT STRENGTH +113		FT LBS/ FT LBS		102-108-130						
02	3/4 "	96.0000	240"	04	19604	M66076							
	STEEL-TYPE = CAST		REDUCTION RATIO = 12.0 TO 1										
								43.0	67.0	28.0	50.0		
								43.0	66.0	30.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F -12 DEG C		AVERAGE IMPACT STRENGTH +96		FT LBS/ FT LBS		092-095-102						
	END OF DATA												

HIS 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	
M66075	HEAT	.15	.96	.011	.009	.19	.04	.02	.03	.01		.025		.001			.001		FINE GRAIN
M66076	HEAT	.15	.96	.012	.009	.20	.02	.02	.03	.01		.024		.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.

JUN 26 '98 08:48 FR TEST REPORTS 219 888 5480 TO 915049487829 P.02

U. S. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

37432

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REQ, JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02314 07 11 98	UB56015	154-010872

VEHICLE IDENTITY EJE 006016 H2314

VENDOR: GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO: 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

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.

RB

PREPARED BY THE OFFICE OF
S. C. PAPE GEN MGR. Q. A

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

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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
01	1/2 "	96.0000	240"	09	29403	M66073							
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 18.2 TO 1									
								44.0	67.0	28.0	50.0		
								43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/	128-167-168							
	-12 DEG C	AVERAGE	IMPACT STRENGTH	+154	FT LBS								
01	1/2 "	96.0000	240"	05	16335	Y67605							
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 18.2 TO 1									
								46.0	68.0	29.0	50.0		
								44.0	64.0	31.0	50.0		
	LONG FL SZ CHARPY IMPT V-NTCH +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	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			001		FINE GRAIN
Y67605	HEAT	14	095	014	008	20	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.

980716 MV21 1137 701130010 071698 R 0125788001 01 SAM CBA 0 0 3 PAGE 1

31945

B/L# 50438

NUCOR STEEL
A Division of NUCOR Corporation
JEWETT, TEXAS 75846 PH (903) 626-4461

Date 4/28/97

CERTIFIED MILL TEST REPORT

18001

Sold To: NAMASCO
4501 NORTH MIRO STREET
NEW ORLEANS LA 70117-4439

8 INCH
SCALE

Ship TO: NAMASCO
4501 N.MIRO & INDUSTRIAL CANAL
NEW ORLEANS LA

SIZE GRADE	HEAT NUMBER	CUSTOMER PO NUMBER	TENSILE PSI	YIELD PSI	ELONG %	C	Mn	Si	S	P	V	Nb	Cu	Cr	Ni	Mo	Bend 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	55600	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	371-0965	NEW-56587	64500	45800	26	.140	.660	.230	.030	.006	.000	.000	.400	.080	.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	.160	.750	.290	.028	.007	.000	.000	.390	.090	.140	.027	

Debbie Wood

DEBBIE WOOD
Notary Public, State of Texas
My Commission Expires 10-19-00

MELTED AND MANUFACTURED IN U.S.A.

ALL MATERIAL STRAND CAST

Ben R Campo

CHIEF METALLURGIST

3 Sch 40

U.S. STEEL GROUP
A division of USX Corporation

CERTIFIED TEST REPORT

(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049)

USS, USX are trademarks of USX Corporation

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.D.	
DR19130 05		97-1569B		

SOLD TO ADDRESS	MAIL TO ADDRESS	VENDOR
PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77228-3237	PIPE DISTRIBUTORS INC P O BOX 23237 HOUSTON TX 77228-3237	USS TUBULAR PRODUCTS 1807 EAST 28TH ST. LORAIN, OH 44055

SPECIFICATION AND GRADE

PIPE CARBON SMLS STD PIPE API 5L-*41ST EDITION DTD 4/1/95 GRADE B AND GRADE X42 ASTM A53-*96 ASTM A106-*95 GRADE B QUAD STENCIL ASME SA53-*1995 EDITION 1996 ADDENDUM ASME SA106-*1995 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 | O.D.: 3.500(88.900) in (mm) | WALL: 0.216 (5.486) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)
			IN	MIN: 42000 MAX:		MIN: 60000 MAX:	MAX:	MIN: 21.5	MIN: MAX: 100.0	3000	5
A44433	STRIP/L/B	AR	0.750	52100	.50	76600	0.68	33.0	B 78.0	3000	5
B49704	STRIP/L/B	AR	0.750	50300	.50	75800	0.66	35.0	B 77.3	3000	5
		**	END OF DATA THIS SHEET **								

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	NI	CR	MO	AL	N	V	B	TI	CB	CO	C.E.*
A44433	HEAT	.18	1.06	.010	.006	.26	.01	.03	.07	.02	.034		.004					
A44433	PROD	.18	1.05	.008	.006	.26	.01	.04	.07	.02	.035		.003					
A44433	PROD	.18	1.02	.008	.006	.23	.01	.04	.07	.02	.029		.002					
B49704	HEAT	.18	1.02	.010	.007	.24	.02	.05	.06	.02	.033		.003					
B49704	PROD	.18	.99	.009	.006	.23	.02	.05	.06	.02	.031		.002					
B49704	PROD	.19	1.01	.008	.006	.24	.04	.05	.07	.02	.030		.002					
		** END OF DATA THIS SHEET **																

*C.E. IS BASED ON THE FOLLOWING EQUATION(S):

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

04/28/98 13:59 FAX 631 3791 PIPE DISTR N.C. →→→ P.D.I.HOUMA 001

U. S. STEEL GROUP
A division of USX Corporation

CERTIFIED TEST REPORT

(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049)

USS, USX. USX are trademarks of USX Corporation

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER
DR19130 05		97-15698

MATERIAL COND: AS ROLLED

O.D.: 3.500(88.900) In (mm)

WALL: 0.216 (5.486) In (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING											
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
A44433	OK																
B49704	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 ____ OD/ID ____ L ____ L/T ____
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
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 01/20/98

BULL MOOSE TUBE - ELKHART FACILITY
CERTIFICATION OF TESTS

BILL TO: MARMON-TARRANT

SHIP TO: MARMON KEYSTONE - IRONDALE
0 NON-EQUALIZED FREIGHT
105 GOODRIDGE DRIVE
TARRANT AL 35217000
000000000000

BMT BOL # 50042813

SHIP VIA: BOYD BROTHERS

10.00 X 14.00 RECT. .625 NOM 30'
254MM X 356MM 15.88 MM 9.14M
A500-93 GR-B MILL TEST REPORTS

MO# 790477-001
PO# 10M51901
PN# 1014WM

C	MN	P	S	AL	SI	YLD psi YLD N/mm2	TEN psi TEN N/mm2	ELN% ELN%
HEAT#/CAST#:		Y68085				58940	73128	38%
.070	0.790	.009	.007	.041	.018	406	504	38
HEAT#/CAST#:		Y68084				62280	77446	35%
.070	0.770	.009	.009	.040	.016	429	534	35

Q. C. REV'
DATE 9/14/98 BT

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.

CUSTOMER COPY Certform: DC-1

APPROVED BY DALE DONAT Quality Control Department Date 9/15/98

K 10.14, .625 B/M 68085 68084 1 379

S 10.10..5 WR D61603

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/D59388
RE: BOYD
06/16/1998
Shipped: 06/16/1998
Checksum: 37337

ACCOUNT NO. SOLD TO
863 MARMON/KEYSTONE CORP.
105 GOODRICH DR.

TARRANT AL 35217

ACCOUNT NO. SHIP TO
1 MARMON/KEYSTONE CORP.
105 GOODRICH DRIVE

TARRANT AL 35217

HEAT NUMBER	DESCRIPTION	Yield [0.2%] KSI/MPa	Tensile KSI/MPa	Elong. % in 2"	HEAT ANALYSIS — CHEMICAL COMPOSITION, %							
					C	Mn	P	Si	S	Al	Ni	Cr
					Mo	Cu	Ti	Cb	V	CE	N	Sn
362929	18.00x6.00x.500 BARE ASTM A500-93 GRADE B PO: 10-M-51854:	52.9 365	69.5 479	40.0	.23	.71	.008	.022	.007	.058 .348		
D61012	12.00x4.00x.250 BARE ASTM A500-93 GRADE B PO: 10-M-51854: Melted and Manufactured in USA	54.3 374	68.4 472	34.0	.20 .00	.78 .02	.012 .00	.01 .001	.011 .00	.057 .331	.00 .00	.00 .00
D61603	10.00x10.00x.500 BARE ASTM A500-93 GRADE B PO: 10-M-51854: Melted and Manufactured in USA ALSO MEETS GRADE C	58.6 404	74.5 514	39.6	.19 .00	.79 .02	.012 .00	.013 .001	.008 .00	.055 .323	.00 .00	.00 .00
T62094	10.00x10.00x.500 BARE ASTM A500-93 GRADE B PO: 10-M-51854: Melted and Manufactured in USA ALSO MEETS GRADE C	57.3 395	72.5 500	38.0	.21 .00	.76 .02	.01 .00	.018 .001	.011 .00	.051 .338	.00 .00	.00 .00
Y66400	10.00x2.00 x.250 BARE ASTM A500-93 GRADE B PO: 10-M-51854: Melted and Manufactured in USA	54.6 376	70.6 487	35.0	.21 .00	.74 .02	.009 .00	.017 .001	.012 .00	.043 .335	.00 .00	.00 .00

Q. C. REVIEWED
DATE 6/17/98 INITIAL BT

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.

TRUCK DRIVER COPY

U S STEEL GROUP
A Division of USX Corporation
01000.0772 (REV. 8/91)

Attn: Rick

Metallurgical Test Report

USS, USX, USX are trademarks of USX Corp. USX

CUST. JOB, CONTRACT NO.	PO DATE	PURCHASE ORDER NO.
	01/23/98	49632

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
T08017 06 17 98	UB55525	154-005895
VEHICLE IDENTITY 00 MS		32231

VENDOR
GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
TAYLOR MACHINE WORKS INC
HIGHWAY 15
LOUISVILLE MS 39339-3737

SHIP TO
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.

Meo

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

DATE 6-22-98

PART NO: PT#501-100--

SPEC. & DESC. PLATE CARBON ASTM A36-*96

NSP:01 MILL CERTIFIED F/R 3 T/R'S TO SOLD TO ATTN K COLLINS

ITEM NO.	MATERIAL DESCRIPTION: THICKNESS OR SECTION	WIDTH, DIA OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
01	4.0000	63.0000	240"	02	34304	M66395							
	STEEL-TYPE	= CAST	REDUCTION RATIO	=	3.0 TO 1			37.0	74.0		32.0		
	END OF DATA												

019809 SN

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
M66395	HEAT	.20	.93	.013	.008	.22	.04	.02	.04	.01		.025		.001			.001	
	END OF DATA																	

RECEIVED OCT 09 1998

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.

36310

SMI Steel Inc.
P.O. BOX 321188
BIRMINGHAM, AL 35232-1188
(205) 592-8981

CERTIFIED TEST REPORT

FOR ADDITIONAL COPIES CALL (205) 599-7961
The following tests conform to the requirements of the specifications listed.

WE HEREBY CERTIFY THAT THE FOLLOWING DATA IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

QUALITY ASSURANCE MANAGER

4/ 3/98

SOLD TO:
NAMASCO (KLOCKNER) CORP.
5775-C GLENRIDGE DR - ## 110
ATLANTA, GA. 30328

SHIP TO:
NAMASCO
4501 NORTH MIRO
NEW ORLEANS, LA. 70177

HEAT NO	SECTION	SPECIFICATION	T #	YIELD (KSI) (MPA)	TENSILE (KSI) (MPA)	ELONGATION 8" 200MM	ELONGATION 2" 50MM	R.A. %	BND TST RSL	BHN	CHARPY V-NOTCH IMPACT RESULTS SIZE (MM)	TEMP.	FT-LBS JOULES	FT-LBS JOULES	FT-LBS JOULES	O R T
976768	F 6X1/2	ABS PART 2-97 GR A	1	49.6	72.5	32.0										
	F 152X12.7	METRIC ABSA	1	342	500	32.0										
976768	F 6X1/2	ABS PART 2-97 GR A	2	49.5	72.5	33.0										
	F 152X12.7	METRIC ABSA	2	341	500	33.0										

156 pieces, 20', 31,824 lbs.

P.O.# NEW70831

ATTACHMENT TO MATERIAL REPORT

NO 24557B 15 APR 98

AMERICAN BUREAU OF SHIPPING NEW ORLEANS, LA

HEAT NO	C	Mn	P	S	Si	Cu	Cr	Ni	Mo	Cb	V	Al	Sn	CARBON EQUIV.		DATE ROLLED	
976768	.16	0.72	.014	.030	.24	.36	0.10	0.10	.020	.002	.0000	.001	.000	.33		11/21/97	

Remarks: 100% MELTED AND MANUFACTURED IN THE USA AND FREE FROM MERCURY CONTAMINATION IN THE PROCESS

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE TO THE APPLICABLE SPECIFICATIONS BY THE ELECTRIC FURNACE PROCESS AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATIONS AND IN THE PRESENCE OF A SURVEYOR FROM THE AMERICAN BUREAU OF SHIPPING WITH SATISFACTORY RESULTS.

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

MT WORK REPORT

Report No. M

1678

45778

CLIENT Applied Hydraulics DATE 8/11/97

CONTRACTOR NASI JOB LOCATION Houma, La. 6-1299

JOB NO. [illegible] CLIENT REPRESENTATIVE [illegible]

MT TECH. Felix Cormier REMARKS M.T. inspection

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100%	M.T.		inspection of all
2				
3	welds	on		gantry.
4				
5	All	welds		accepted.
6				
7				
8				
9				
10	100%	M.T.		inspection of all
11				
12	welds	on		replaced bent facing
13				
14	on	boom		mid. # 1.
15				
16	All	welds		accepted.
17				
18				
19				
20				
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	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
51				
52				
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78				
79				
80				

SURFACE CONDITION

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

EQUIPMENT

MAKE Parker MODEL B-300 S/N 4693

CONTRACTS

PROD SPACING 4" CONTINUOUS (✓)

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

AMPS 4

MEDIA

7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER ( )

CALIBRATION

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

CALIBRATION DATE: 8/11/97

ACCEPTANCE CRITERIA

AWS D1.1 Sec. 6 / EXT. MT w/ AM dtd Rev. 6

TOTAL TIME HRS. 1

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N61586-001
WELDMENT S/N: 98279-04
DESCRIPTION: Boom Base Weldment
MODEL: 340LA-160
CHECKED BY: [signature]
DATE: 9-21-99

Material Description	Heat Number
Tube, square, A-500 Gr b, 4" x ½"	ZT1528
Pipe, A-106 Gr b, 1½" sch 40	271743
Tube, rect., A-500 Gr b, ¼" x 6" x 4"	A9N0292
Plate, A-36, fine grain w/ charpy, ½"	Y67605
Plate, A-36, fine grain w/ charpy, 2"	M65937
Angle, A-36, ¼" x 2" x 2"	3823818
Angle, A-36, ¼" x 5" x 3"	980659
Plate, A-36, 4"	821U05720

3 4.4,.5 LE ZT1528 874

Leavitt Tube Company, Inc.
1717 W. 115th Street
Chicago, IL 60643

the TUBE PEOPLE
Committed to Excellence
WHERE SERVICE IS OUR OBSESSION
Manufacturers of
Electric Welded Steel Tubing

(773) 239 7700 (800) LEAVITT
FAX (773) 239 1023 (800) 532 8488

MATERIAL TEST REPORT

DATE: 11/20/98
PAGE: 1 OF 1
BILL OF LADING: 67810

CUSTOMER: MARMON KEYSTONE CORP-TARRANT

04020045 105 GOODRICH DR
TARRANT AL 35217

ITEM NO.	PIECES	TUBE SIZE & GAUGE	LENGTH	QTY. SHIPPED	CUSTOMER P.O.	MILL ORDER NUMBER	CUST. PART NUMBER	ASTM SPECIFICATION	GRADE
1 – 2	8	8X8-313H80	576.000"	384'	10M51997	609511		A500-96	B
3	16	8X8-375H80	480.000"	640'	10M51997	609512		A500-96	B
4	9	4X4-500H80	480.000"	360'	10M51997	609513		A500-96	B
5	6	3X6-500H80	480.000"	240'	10M51997	610015		A500-96	B

		1	2	3	4	5
ITEM NO.		353638	334100	333869	272724	336328
COIL NO.		B37648	831B08280	A78414	ZT1528	843C71320
HEAT NO.						
CHEMISTRY (%)		190	160	190	190	160
	CARBON	.630	1.040	.640	.760	.990
	MANGANESE	009	024	008	014	014
	PHOSPHORUS	.005	.007	.004	.006	.007
	SULFUR	030	036	038		031
	ALUMINUM	.020	.025	.030		.018
	SILICON	FLARE	FLARE	FLARE	FLARE	FLARE
TESTING	WELD TESTING	56,332	57,042	59,880	61,061	56,886
	YIELD STRENGTH (PSI)	70,921	69,014	81,437	73,008	73,053
	TENSILE STRENGTH (PSI)	31.0	34.0	29.0	32.0	27.0
	ELONGATION IN 2" (%)					

I HEREBY CERTIFY THAT THE ABOVE IS CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

Q. C. REVIEWED
DATE 11/23/98 INITIAL

Gulf States Tube
Vision Metals

ISO 9002
CERTIFIED

P.O. BOX 952
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		PAGE
098084	99-16370	06/08/99	21	00		16	20	01	00471003PDR	BP	PAW	1

SOLD TO: PIPE DISTRIBUTORS INC
P O BOX 23237
HOUSTON TX 77028

SHIP TO: 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 6-18-99
SPECIFICATION		**CMST**	**DESCRIPTION**		**PROMISE**
SEAMLESS	ASTM/ASME A/SA 106 B 97A		HF CARBON PIPE		06/18/99

SPECIAL INSTRUCTIONS:
PLAIN ENDS - UVC COAT
ACCEPTABLE PER NACE MRO 175-98 TABLE 5
CERTIFIED TO DIN 50049 3.1B
PERMISSIBLE OVERAGES ACCEPTABLE BUT CONTACT SALES W/ALL OVERAGES
MIN 21' MIN LENGTHS

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,120'	1.900 1-1/2" SCH 40		.145 AVG	RAND 17' 24'	2.718	8,480	Complete 148 Pcs. 3,524'

SHIPPING NOTE: PPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
271743	.19	.83	.005	.011	.23	.07	.04	.02	.18		V .002
	.19	.83	.005	.011	.23	.07	.04	.01	.17		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
271743	77620	50900	51.0						

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.

DAVE HUBENAK
TECHNICAL ANALYST

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____ 19 ___

NOTARY PUBLIC

HANNA

Certification 740794 3/17/99 1

Shipped From:	Hanna Steel Corporation Tuscaloosa Division 1701 Boone Blvd P O Box 428 Northport AL 35476	Cust P.O.: Date Shipped: Load Tally Invoice #	10-52110 3/17/99 3-63793 000000
Send To:	Marmon/Keystone Corp. 105 Goodrich Drive Tarrant AL 35217	Ship To:	Marmon/Keystone Corp. 105 Goodrich Drive Tarrant AL 00000

Heat #	Item Grade	Heat/Lot Grade	Yield	Tensile	Elong	Rockwell
05-7700412	4X6 RECT 1/4 HRA500 40.000FT					
2279942	A9N0292	A500 B	57,500	63,500	32.3	87
2279942	A9P0299	A500 B	55,000	64,000	33.0	882
2279943	A9N0292	A500 B	57,500	63,500	32.3	87
2279944	A9N0292	A500 B	57,500	63,500	32.3	877

Total Weight 16,848

Heat #	C	Mn	P	S	Si	Al	Cb	Cr	Cu	Mo	Ni	V
A9N0292	.050	.600	.014	.003	.040	.019	.003	.030	.090	.011	.040	.020
A9P0299	.050	.660	.014	.006	.030	.027	.002	.030	.080	.009	.030	.018

K 4.6.1.2.5 MTR A9N0292 A9P0299

Q. C. REVIEWED
DATE 3/18/99 INITIAL BT

Hanna Steel Corporation
3812 Commerce Avenue
P.O. Box 558
Fairfield, Alabama 35064
(205) 780-1111
DUNS No. 00-402-9294

SUBJECT TO TERMS AND CONDITIONS ON BACK

Randy Kirkland
Manager of QA

U. S. STEEL GROUP
A division of USX Corporation
01000772 (REV. 8/91)

Metallurgical Test Report

37422

USS, USX, USX are trademarks of USX Corporation USX™

REQ., JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02314 07 11 98	UB56015	154-010872
VEHICLE IDENTITY EJE 006016		H2314

VENDOR
GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
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

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.

BB

PREPARED BY THE OFFICE OF
S. C. PAPE GEN MGR. Q. A

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

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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
01	1/2 "	96.0000	240"	09	29403	M66073							
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 18.2 TO 1				44.0	67.0	28.0	50.0		
								43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/	128-167-168							
	-12 DEG C	AVERAGE	IMPACT STRENGTH	+154	FT LBS								
01	1/2 "	96.0000	240"	05	16335	Y67605							
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 18.2 TO 1				46.0	68.0	29.0	50.0		
								44.0	64.0	31.0	50.0		
	LONG FL SZ CHARPY IMPT V-NTCH +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	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			001		FINE GRAIN
Y67605	HEAT	14	095	014	008	20	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.

980716 MV21 1137 701130010 071698 R 0125788001 01 SAM CBA 0 0 3 PAGE 1

U STEEL GROUP
A Division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

37086

USS, USX, USX are trademarks of USX Corp. SX™

REQ., JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02048 06 16 98	UB56016	154-005522
VEHICLE IDENTITY EJE 006228		H2048

VENDOR
GARY WORKS
GARY,INDIANA 46402

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BB

PREPARED BY THE OFFICE OF:
S.C.PAPE GEN.MGR, Q.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 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240"	02	26136	M65937	57W 1						
	STEEL-TYPE	= CAST	REDUCTION RATIO	=	6.0 TO 1								
								45.0	75.0		33.0		
								47.0	76.0		32.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/		085-077-076						
	-12 DEG C AVERAGE IMPACT STRENGTH				+79 FT LBS								
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/		071-072-098						
	-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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M65937	HEAT	.21	1.00	.021	.013	.22	.02	.02	.05	.01		.026		.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.

980616 MV21 1014 701131020 061698 0125788001 01 SAM CBA 0 0 3 PAGE 1

B/L# 108939
Date 1/18/99

nucor steel

A Division of NUCOR Corporation
Post Office Box 126 • Jewett, Texas 75846

24212
CERTIFIED MILL TEST REPORT
40440

18001
Sold To: NAMASCO
4501 NORTH MIRO STREET
NEW ORLEANS LA 70117-4439

8 INCH SCALE

Ship TO: NAMASCO
4501 N.MIRO & INDUSTRIAL CANAL
NEW ORLEANS LA

SIZE / GRADE	HEAT NUMBER	CUSTOMER PO NUMBER	TENSILE PSI	YIELD PSI	ELONG %	C	Mn	Si	S	P	V	Nb	Cu	Cr	Ni	Mo	Bend Test
~~1/4 X 12~~ ~~ASTM A36-96/ASME SA36-95~~	~~[redacted]~~	~~NEW-101074~~	~~76700~~	~~54400~~	~~27~~	~~.142~~	~~.677~~	~~.236~~	~~.030~~	~~.007~~	~~.003~~	~~.002~~	~~.302~~	~~.043~~	~~.151~~	~~.004~~	
~~3/8 X 10~~ ~~ASTM A36-96/ASME SA36-95~~	~~[redacted]~~	~~NEW-101074~~	~~76300~~	~~51400~~	~~24~~	~~.161~~	~~.636~~	~~.212~~	~~.027~~	~~.015~~	~~.003~~	~~.003~~	~~.300~~	~~.091~~	~~.004~~	~~.018~~	
~~3/8 X 12~~ ~~ASTM A36-96/ASME SA36-95~~	~~[redacted]~~	~~NEW-101074~~	~~76500~~	~~52800~~	~~28~~	~~.163~~	~~.739~~	~~.270~~	~~.000~~	~~.012~~	~~.003~~	~~.005~~	~~.354~~	~~.004~~	~~.102~~	~~.007~~	
~~3/8 X 6~~ ~~ASTM A36-96/ASME SA36-95~~	~~[redacted]~~	~~NEW-101074~~	~~69500~~	~~49700~~	~~29~~	~~.125~~	~~.699~~	~~.194~~	~~.027~~	~~.011~~	~~.003~~	~~.004~~	~~.317~~	~~.103~~	~~.003~~	~~.002~~	
2 X 2 X 1/4 ASTM A36-96/ASME SA36-95	382-3818	NEW-101074	72100	55200	27	.158	.699	.231	.021	.008	.003	.005	.298	.110	.121	.039	
2 X 2 X 1/4 ASTM A36-96/ASME SA36-95	381-3512	NEW-101074	74700	52500	23	.157	.641	.215	.027	.007	.003	.002	.368	.087	.220	.061	
~~7 X 9.6~~ ~~ASTM A36-96/ASME SA36-95~~	~~[redacted]~~	~~NEW-101074~~	~~65400~~	~~48800~~	~~27~~	~~.137~~	~~.689~~	~~.240~~	~~.016~~	~~.005~~	~~.003~~	~~.003~~	~~.161~~	~~.097~~	~~.145~~	~~.052~~	

100 pcs
12760 lbs

ATTACHMENT TO MATERIAL REC. . .

NO 27934 13 APR '99

AMERICAN BUREAU OF SHIPPING NEW ORLEANS, LA

ABS
A

MELTED AND MANUFACTURED IN U.S.A.

ALL MATERIAL STRAND CAST

Ben R Camp
CHIEF METALLURGIST

SMI Steel Inc.
P.O. BOX 321188
BIRMINGHAM, AL 35232-1188
(205) 592-8981

CERTIFIED TEST REPORT

FOR ADDITIONAL COPIES CALL (205) 599-7961
The following tests conform to the requirements of the specifications listed.

WE HEREBY CERTIFY THAT THE FOLLOWING DATA IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

QUALITY ASSURANCE MANAGER

55199
W/ Stamp

4/ 2/98

SOLD TO:
NAMASCO (KLOCKNER) CORP.
5775-C GLENRIDGE DR - ## 110
ATLANTA, GA. 30328

SHIP TO:
NAMASCO
4501 NORTH MIRO
NEW ORLEANS, LA. 70177

HEAT NO	SECTION	SPECIFICATION	T #	YIELD (KSI) (MPA)	TENSILE (KSI) (MPA)	ELONGATION 8" 200MM	ELONGATION 2" 50MM	R.A. %	BND TST RSL	BHN	CHARPY V-NOTCH IMPACT RESULTS SIZE (MM)	TEMP.	FT.-LBS. JOULES	FT.-LBS. JOULES	FT.-LBS. JOULES	O R T
980659	L 5X3X1/4	ABS PART 2-97 GR A	1	49.4	69.5	38.0										
980659	L 5X3X1/4	ABS PART 2-97 GR A	2	49.9	70.5	38.0										

80 pieces, 40', 21,120 lbs.

P.O.# NEW70884

ATTACHMENT TO MATERIAL REPORT
NO 245574 13 APR '98
AMERICAN BUREAU OF SHIPPING NEW ORLEANS, LA

HEAT NO	C	Mn	P	S	Si	Cu	Cr	Ni	Mo	Cb	V	Al	Sn	CARBON EQUIV.	DATE ROLLED
980659	.14	0.72	.008	.031	.21	.39	0.09	0.13	.037	.002	.0030	.001	.014	.32	2/07/98

Remarks: 100% MELTED AND MANUFACTURED IN THE USA AND FREE FROM MERCURY CONTAMINATION IN THE PROCESS

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE TO THE APPLICABLE SPECIFICATIONS BY THE ELECTRIC FURNACE PROCESS AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATIONS AND IN THE PRESENCE OF A SURVEYOR FROM THE AMERICAN BUREAU OF SHIPPING WITH SATISFACTORY RESULTS.

F4859700 (REV 03-94) ID# 5270

BETHLEHEM STEEL CORPORATION
QUALITY ASSURANCE DEPARTMENT
REPORT OF TESTS AND ANALYSES

BURNS HARBOR DIVISION

SHIPMENT NO.	DATE SHIPPED	CAR OR VEHICLE NO.	PAGE
803-13536	3-17-96	CR-ESTL-SSW-SP IHB 2057 ~~ESE 995770~~	

SOLD TO

SHIP TO

NOTE	SERIAL NUMBER	PAT. NO.	HEAT NUMBER	SIZE AND QUANTITY: NO. PCS.	THICKNESS INCHES	WIDTH OR DIA. INCHES	LENGTH INCHES	WEIGHT POUNDS	YIELD POINT PSI	TENSILE STRENGTH PSI	ELONG. IN	ELONG. %
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
(M55)MFST		821U05720	5	4	96	240	130685	40800 40600	67700 67900	2 2	29 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
(M55)MFST		803U61750	2	3/16	120	480	6126	64500	74400	8	17

Q—QUENCH TEMPERATURE T—TEMPER TEMPERATURE N—NORMALIZE TEMPERATURE

SERIAL NUMBER	PAT. NO.	HEAT NUMBER	HARD	BEND	THICKNESS INCHES	CHARPY IMPACT: TYPE	SIZE	DIR.	TEST TEMP.	ENERGY FT. LBS. 1	2	3	SHEAR (%) 1	2	3	LAT. EXP 1	2	MIL
		—/—/— TEXAS PLATE PROCESSORS																
		CUSTOMER NAME ARMCO Avd																
		CUSTOMER PO # 41685																
		THK 4"																
		HT & SL 821U05720,																
		TPP PO# & PL # 98-01041/036157																

HEAT NUMBER	CHEMICAL ANALYSIS: C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	Al	B	Cb	N
801T16270	.21	.90	.009	.010	.153	.005	.01	.01	.005	.001				.003	
821U05720	.16	1.05	.022	.009	.205	.016	.01	.04	.006	.003				.004	
803U60920	.14	.70	.025	.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 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

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

MT WORK REPORT

Report No. M

35791
45541

CLIENT Applied Hydraulics DATE 7-29-99

CONTRACTOR Same JOB LOCATION Houma, La. 7309

JOB NO. 4108-05-2803 CLIENT REPRESENTATIVE Eddie Talley

MT TECH. Wade Mills REMARKS MT Insp.

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100%	MT	Insp. AF	
2	Boom Base, Wells			
3	Straight.			
4				
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	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
51				
52				
53				
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62				
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79				
80				

SURFACE CONDITION

GOOD (✓) FAIR ( ) PAINTED ( ) WELD (—)

EQUIPMENT

MAKE Parker MODEL D-300 S/N 7308

CONTRACTS

PROD SPACING 3"/05" CONTINUOUS ( )

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

AMPS 6.25

MEDIA

7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER (—)

CALIBRATION

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

CALIBRATION DATE: _____

ACCEPTANCE CRITERIA

AWS A1.1 Sec. 6

TOTAL TIME HRS. 1

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N61587-040
WELDMENT S/N: 98279-05
DESCRIPTION: Boom Insert Mid # 1
MODEL: 340LA-160
CHECKED BY: Russell W. Talbert Jr.
DATE: 9-21-99

Material Description	Heat Number
Pipe, A-106 Gr. b, 1½" sch 40	271743
Plate, A-36, fine grain w/ charpy, ½"	Y67605
Plate, A-36, fine grain w/ charpy, 2"	M65937
Plate, A-36, fine grain w/ charpy, 1"	393285
Tube, square, A-500 Gr. b, 4" x 4" x ½" (Right Side)	U60638
Tube, square, A-500 Gr. b, 4" x 4" x ½" (Left Top)	U60626
Tube, square, A-500 Gr. b, 4" x 4" x ½" (Left Bottom)	C67371

Gulf States Tube
Vision Metals

ISO 9002
CERTIFIED

P.O. BOX 952
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		PAGE
098084	99-16370	06/08/99	21	00		16	20	01	00471003PDR	BP	PAW	1

PIPE DISTRIBUTORS INC
P O BOX 23237

HOUSTON TX 77028

SHIP TO: PIPE DISTRIBUTORS, INC
GRAND CALLIOU & INDL BLVD.
HOUMA LA 70360

SN
TR
INV

ROUTING
COL CUST TRK - TR W/SHPT

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 6-18-99
SPECIFICATION	**CMST**	**DESCRIPTION**			**PROMISE**
SEAMLESS ASTM/ASME A/SA 106 B 97A		HF CARBON PIPE			06/18/99

SPECIAL INSTRUCTIONS:
PLAIN ENDS - UVC COAT
ACCEPTABLE PER NACE MRO 175-98 TABLE 5
CERTIFIED TO DIN 50049 3.1B
PERMISSIBLE OVERAGES ACCEPTABLE BUT CONTACT SALES W/ALL OVERAGES
MIN 21' MIN LENGTHS

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,120'	1.900 1-1/2"	SCH 40	.145 AVG	RAND 17' 24'	2.718	8,480	Complete 148 Pcs. 3,524'

SHIPPING NOTE: PPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
271743	.19	.83	.005	.011	.23	.07	.04	.02	.18		V .002
	.19	.83	.005	.011	.23	.07	.04	.01	.17		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
271743	77620	50900	51.0						

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.

Dave Hubenak
DAVE HUBENAK
TECHNICAL ANALYST

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____ 19 ___

_____ NOTARY PUBLIC

U. S. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

37433

USS, USX, USX are trademarks of USX Co. JSX™

REQ. JOB. CONTRACT NO.

P.O. DATE | PURCHASE ORDER NO. NEW-76549

SHIPPERS NO. H02314 07 11 98 | MILL ORDER NO. UB56015 | INVOICE NO. 154-010872

VEHICLE IDENTITY EJE 006016 H2314

VENDOR
GARY WORKS
GARY, INDIANA 46402
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BB

PREPARED BY THE OFFICE OF
S. C. PAPE GEN MGR. Q. A

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

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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
01	1/2 "	96.0000	240"	09	29403	M66073							
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 18.2 TO 1									
								44.0	67.0	28.0	50.0		
								43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/	128-167-168							
	-12 DEG C	AVERAGE	IMPACT STRENGTH	+154	FT LBS								
01	1/2 "	96.0000	240"	05	16335	Y67605							
	STEEL-TYPE	= CAST	REDUCTION RATIO	= 18.2 TO 1									
								46.0	68.0	29.0	50.0		
								44.0	64.0	31.0	50.0		
	LONG FL SZ CHARPY IMPT V-NTCH +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	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			001		FINE GRAIN
Y67605	HEAT	14	095	014	008	20	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.

980716 MU21 1137 701130010 071698 R 0125788001 01 SAM CBA 0 0 3 PAGE 1

U. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

37086

USS, USX, USX are trademarks of USX Corp.

REQ., JOB, CONTRACT NO.

P.O. DATE | PURCHASE ORDER NO. NEW-76549

SHIPPERS NO. H02048 06 16 98 | MILL ORDER NO. UB56016 | INVOICE NO. 154-005522

VEHICLE IDENTITY EJE 006228 H2048

VENDOR
GARY WORKS
GARY,INDIANA 46402

** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
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

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.

BB

PREPARED BY THE OFFICE OF:
S.C.PAPE GEN.MGR, Q.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 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240*	02	26136	M65937	57W 1						
	STEEL-TYPE	= CAST	REDUCTION RATIO	=	6.0 TO 1								
								45.0	75.0		33.0		
								47.0	76.0		32.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/		085-077-076						
	-12 DEG C AVERAGE IMPACT STRENGTH				+79 FT LBS								
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/		071-072-098						
	-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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M65937	HEAT	21	100	021	013	22	02	02	05	01		026		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.

980616 MV21 1014 701131020 061698 0125788001 01 SAM CBA 0 0 3 PAGE 1

37745

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

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

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

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

OSM ITEM NO	DESCRIPTION		HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
1	0.5000 X 96.000M X 240.000											
	1 PC 3267 LBS	+	392730		465	680	28					
					461	675	28					
									LCVN @ 10			DEG F 10.0mm 55 105 95 /85 egy
2	1.0000 X 96.000M X 240.000											
	2 PCS 13068 LBS	+	393200		453	665	26					
					481	695	28					
									LCVN @ 10			DEG F 10.0mm 99 119 91 /103 egy
	2 PCS 13068 LBS	+	393285		476	705	27					
					478	700	26					
									LCVN @ 10			DEG F 10.0mm 84 44 106/78 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+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 Shamrell COLLEEN SHAMRELL Q.C. RECORDS ADMINISTRATOR

COPPERWELD

BIRMINGHAM DIVISION
1500 North 50th Street
Birmingham, AL 35212-1058
TEL. 205-599-0600

Customer Order No. 10-052122
Copperweld Order No. 266068
Invoice No. 734247
Date 03/05/99

TEST REPORT

Customer:	Specification:
MARMON KEYSTONE CORPORATION 2505 FIRST AVENUE SOUTH TEST REPORTS DEPT. IRONDALE, AL 35210	4 IN, SQ, 1/2 40 Ft ASTM A500 GRB 98 PART # 4.4..5

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL	CB	V	CU	NI	CR
U61176 C.E. .30	.18	.76	.007	.010	.01	.047					
U60638 C.E. .31	.18	.78	.007	.010	.01	.039	.001	.00	.029	.012	.014

MECHANICAL PROPERTIES

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
U61176	8925	58800	68200	25	80
U60638	8924	64000	69200	25	83

Q. C. REVIEWED
DATE 3/8/99 INITIAL

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
PAUL J ANTHONY, METALLURGIST

COPPERWELD

BIRMINGHAM DIVISION
1500 North 50th Street
Birmingham, AL 35212-1058
TEL. 205-599-0600

Customer Order No. 10-052122
Copperweld Order No. 266069
Invoice No. 734247
Date 03/05/99

TEST REPORT

Customer:	Specification:
MARMON KEYSTONE CORPORATION 2505 FIRST AVENUE SOUTH TEST REPORTS DEPT. IRONDALE, AL 35210	4 IN, SQ, 1/2 42 Ft ASTM A500 GRB 98 PART # 4.4..5

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL					
U60626 C.E. .36	.22	.88	.008	.009	.01	.040					

MECHANICAL PROPERTIES

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
U60626	CB007029	66200	74300	23	88

Q. C. REVIEWED
DATE 3/8/99 INITIAL

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
PAUL J ANTHONY, METALLURGIST

COPPERWELD

BIRMINGHAM DIVISION
1500 North 50th Street
Birmingham, AL 35212-1058
TEL. 205-599-0600

Customer Order No. 10-051933
Copperweld Order No. 233047
Invoice No. 732323
Date 11/03/98

TEST REPORT

Customer:

MARMON KEYSTONE CORPORATION
2505 FIRST AVENUE SOUTH
TEST REPORTS DEPT.
IRONDALE, AL 35210

Specification:

4 IN, SQ, 1/2
40 Ft
ASTM A500 GRB 96
PART # 4.4..5

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL	CB	V	CU	NI	CR
C67371 C.E. .31	.18	.74	.009	.011	.01	.049	.001	.00	.031	.014	.025

MECHANICAL PROPERTIES

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
C67371	CB008568	54900	69000	27	82

Q. C. REVIEWED
DATE 11/4/98 INITIAL BT

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 licable ASTM standards.

Paul J Anthony
PAUL J ANTHONY, METALLURGIST

G 4.4..5 RE C67371

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
1630
P.O.#45694

CLIENT Applied Hydraulics DATE 8-6-99

CONTRACTOR Same JOB LOCATION Houma, La. 8-799

JOB NO. 20th 05-2003 CLIENT REPRESENTATIVE Ronnie Talley

MT TECH. Wade Nix REMARKS mt-7 mg.

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100 % mt Inspection			
2	of Boom Rib #1 & #2			
3	Welds Acceptable.			
4				
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80				

SURFACE CONDITION
GOOD (~~✓~~) FAIR ( ) PAINTED ( ) WELD (~~✓~~)

EQUIPMENT
MAKE Parker MODEL D-300 S/N 7308

CONTRACTS
PROD SPACING 3"&6" CONTINUOUS (~~✓~~)
AC (~~✓~~) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 6, 25

MEDIA
7C-BLACK WET (~~✓~~) 8A-DRY ( ) WHITE HIGHLITER (~~✓~~)

CALIBRATION
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )
CALIBRATION DATE: _____

ACCEPTANCE CRITERIA
AWS D1.1 Sec

TOTAL TIME HRS. 1

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

MT WORK REPORT

Report No. M

1678

45778

CLIENT Applied Hydraulics DATE 3/11/97

CONTRACTOR AMSI JOB LOCATION Houma, La. 8-1799

JOB NO. 20" 97303 CLIENT REPRESENTATIVE Robbie Talley

MT TECH. Dave Cormier REMARKS MT inspection

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100% M.T.			inspection of all
2				
3	welds on gantry.			
4				
5	All welds accepted.			
6				
7				
8				
9				
10	100% M.T.			inspection of all
11				
12	welds on replaced bent lacing			
13				
14	on boom mod. # 1.			
15				
16	All welds accepted.			
17				
18				
19				
20				
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50				

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
51				
52				
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SURFACE CONDITION

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

EQUIPMENT

MAKE Parker MODEL B-300 S/N 6693

CONTRACTS

PROD SPACING 4" CONTINUOUS (4)

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

AMPS 4

MEDIA

7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER ( )

CALIBRATION

10# WEIGHT LIFT ( ) FLUX IND. CHECK (4)

CALIBRATION DATE: 3/11/97

ACCEPTANCE CRITERIA

AWS D1.1 Sect. 6 / 6XT. MPI W.M. ext Para. 6

TOTAL TIME HRS. 0

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N61587-040
WELDMENT S/N: 98279-06
DESCRIPTION: Boom Insert Mid # 2
MODEL: 340LA-160
CHECKED BY: Russell A. Talbot Jr.
DATE: 9.21.99

Material Description	Heat Number
Pipe, A-106 Gr. b, 1½" sch 40	271743
Plate, A-36, fine grain w/ charpy, ½"	Y67605
Plate, A-36, fine grain w/ charpy, 2"	M65937
Plate, A-36, fine grain w/ charpy, 1"	393285
Tube, square, A-500 Gr. b, 4" x 4" x ½"	U61176

Gulf States Tube
Vision Metals

ISO 9002
CERTIFIED

P.O. BOX 952
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		PAGE
098084	99-16370	06/08/99	21	00		16	20	01	00471003PDR	BP	PAW	1

PIPE DISTRIBUTORS INC
P O BOX 23237

HOUSTON TX 77028

SHIP TO: PIPE DISTRIBUTORS, INC
GRAND CALLIOU & INDL BLVD.
HOUMA LA 70360

SN
TR
INV

ROUTING
COL CUST TRK - TR W/SHPT

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 6-18-99
SEAMLESS	SPECIFICATION: ASTM/ASME A/SA 106 B 97A	CMST	DESCRIPTION: HF CARBON PIPE		PROMISE: 06/18/99

SPECIAL INSTRUCTIONS:
PLAIN ENDS - UVC COAT
ACCEPTABLE PER NACE MRO 175-98 TABLE 5
CERTIFIED TO DIN 50049 3.1B
PERMISSIBLE OVERAGES ACCEPTABLE BUT CONTACT SALES W/ALL OVERAGES
MIN 21' MIN LENGTHS

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,120'	1.900 1-1/2" SCH 40		.145 AVG	RAND 17' 24'	2.718	8,480	Complete 148 Pcs. 3,524'

SHIPPING NOTE: PPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
271743	.19	.83	.005	.011	.23	.07	.04	.02	.18		V .002
	.19	.83	.005	.011	.23	.07	.04	.01	.17		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
271743	77620	50900	51.0						

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.

DAVE HUBENAK
TECHNICAL ANALYST

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____ 19 ____

_____ NOTARY PUBLIC

U. S. STEEL GROUP
A division of USX Corporation
01000772 (REV. 8/91)

Metallurgical Test Report

37432

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REQ., JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02314 07 11 98	UB56015	154-010872
VEHICLE IDENTITY EJE 006016		H2314

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.

BB

PREPARED BY THE OFFICE OF
S. C. PAPE GEN MGR. Q. A

DATE 7-16-98

VENDOR
GARY WORKS
GARY, INDIANA 46402
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NEW ORLEANS LA 70117-4439

SPEC. & INSP. PLATE CARBON ASTM A36-*96 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
01	1/2 "	96.0000	240"	09	29403	M66073							
	STEEL-TYPE = CAST		REDUCTION RATIO = 18.2 TO 1										
								44.0	67.0	28.0	50.0		
								43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F				FT LBS/ 128-167-168								
	-12 DEG C AVERAGE IMPACT STRENGTH +154 FT LBS												
01	1/2 "	96.0000	240"	05	16335	Y67605							
	STEEL-TYPE = CAST		REDUCTION RATIO = 18.2 TO 1										
								46.0	68.0	29.0	50.0		
								44.0	64.0	31.0	50.0		
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	-12 DEG C AVERAGE IMPACT STRENGTH +118 FT LBS												
	END OF DATA												

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M66073	HEAT	14	098	014	006	21	02	02	03	01		027		001			001		FINE GRAIN
Y67605	HEAT	14	095	014	008	20	02	02	05	01		031		001			001		FINE GRAIN
	END OF DATA																		

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980716 MU21 1137 701130010 071698 R 0125788001 01 SAM CBA 0 0 3 PAGE 1

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Metallurgical Test Report

37086

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REQ., JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02048 06 16 98	UB56016	154-005522
VEHICLE IDENTITY EJE 006228		H2048

VENDOR
GARY WORKS
GARY,INDIANA 46402

** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
KLOCKNER NAMASCO CORP
SOUTHWEST DIVISION
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BB

PREPARED BY THE OFFICE OF:
S.C.PAPE GEN.MGR, Q.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 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240"	02	26136	M65937	57W 1						
	STEEL-TYPE = CAST		REDUCTION RATIO = 6.0 TO 1										
								45.0	75.0		33.0		
								47.0	76.0		32.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 085-077-076												
	-12 DEG C AVERAGE IMPACT STRENGTH +79 FT LBS												
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 071-072-098												
	-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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M65937	HEAT	.21	1.00	.021	.013	.22	.02	.02	.05	.01		.026		.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.

980616 MV21 1014 701131020 061698 0125788001 01 SAM CBA 0 0 3 PAGE 1

37745

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

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

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

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

OSM ITEM NO	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
1	0.5000 X 96.000M X 240.000										
	1 PC 3267 LBS +	392730		465	680	28					
				461	675	28					
								LCVN @ 10			DEG F 10.0mm 55 105 95 /85 egy
2	1.0000 X 96.000M X 240.000										
	2 PCS 13068 LBS +	393200		453	665	26					
				481	695	28					
								LCVN @ 10			DEG F 10.0mm 99 119 91 /103 egy
	2 PCS 13068 LBS +	393285		476	705	27					
				478	700	26					
								LCVN @ 10			DEG F 10.0mm 84 44 106/78 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+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 Shamrell COLLEEN SHAMRELL Q.C. RECORDS ADMINISTRATOR

COPPERWELD

BIRMINGHAM DIVISION
1500 North 50th Street
Birmingham, AL 35212-1058
TEL. 205-599-0600

Customer Order No. 10-052122
Copperweld Order No. 266068
Invoice No. 734247
Date 03/05/99

TEST REPORT

Customer:

MARMON KEYSTONE CORPORATION
2505 FIRST AVENUE SOUTH
TEST REPORTS DEPT.
IRONDALE, AL 35210

Specification:

4 IN, SQ, 1/2
40 Ft
ASTM A500 GRB 98
PART # 4.4..5

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL	CB	V	CU	NI	CR
U61176 C.E. .30	.18	.76	.007	.010	.01	.047					
U60638 C.E. .31	.18	.78	.007	.010	.01	.039	.001	.00	.029	.012	.014

MECHANICAL PROPERTIES

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
U61176	8925	58800	68200	25	80
U60638	8924	64000	69200	25	83

Q. C. REVIEWED
DATE 3/8/99 INITIAL

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
PAUL J ANTHONY, METALLURGIST

U60638

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
1630
P.O.#45694

CLIENT Applied Hydraulics DATE 8-6-99

CONTRACTOR Same JOB LOCATION Houma La. 8-9-99

JOB NO. 030805-2005 CLIENT REPRESENTATIVE Randall Talbot

MT TECH. Wade Mills REMARKS MT-Insp.

	WELD NO.	WALL THICKNESS	✓ ACCEPT ✗ REJECT	REMARKS
1	100 % MT Inspection			
2	of Boom Rib #1 & #2			
3	Welds Acceptable.			
4				
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	WELD NO.	WALL THICKNESS	✓ ACCEPT ✗ REJECT	REMARKS
51				
52				
53				
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80				

SURFACE CONDITION
GOOD (✓) FAIR ( ) PAINTED ( ) WELD ( )

EQUIPMENT
MAKE Parker MODEL D-300 S/N 7308

CONTRACTS
PROD SPACING 3"&6" CONTINUOUS (✓)
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 6,75

MEDIA
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER ( )

CALIBRATION
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )
CALIBRATION DATE: _____

ACCEPTANCE CRITERIA
AWS D1.1 Sec

TOTAL TIME HRS. 1

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N61587-040
WELDMENT S/N: 98279-07
DESCRIPTION: Boom Insert Mid # 3
MODEL: 340LA-160
CHECKED BY: Russell W. Lollatt Jr.
DATE: 9.22-99

Material Description	Heat Number
Pipe, A-106 Gr. b, 1½" sch 40	271743
Plate, A-36, fine grain w/ charpy, ½"	Y67605
Plate, A-36, fine grain w/ charpy, 2"	M65937
Plate, A-36, fine grain w/ charpy, 1"	393285
Tube, square, A-500 Gr. b, 4" x 4" x ½" (Left Side)	U61176
Tube, square, A-500 Gr. b, 4" x 4" x ½" (Right Side)	U60626

Gulf States Tube
Vision Metals

ISO 9002
CERTIFIED

P.O. BOX 952
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		PAGE
098084	99-16370	06/08/99	21	00		16	20	01	00471003PDR	BP	PAW	1

PIPE DISTRIBUTORS INC
P O BOX 23237

HOUSTON TX 77026

SHIP TO: PIPE DISTRIBUTORS, INC
GRAND CALLIOU & INDL BLVD.
HOUMA LA 70360

SN
TR
INV

ROUTING
COL CUST TRK - TR W/SHPT

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 6-18-99
SEAMLESS	SPECIFICATION: ASTM/ASME A/SA 106 B 97A	CMST	DESCRIPTION: HF CARBON PIPE		PROMISE: 06/18/99

SPECIAL INSTRUCTIONS:
PLAIN ENDS - UVC COAT
ACCEPTABLE PER NACE MRO 175-98 TABLE 5
CERTIFIED TO DIN 50049 3.1B
PERMISSIBLE OVERAGES ACCEPTABLE BUT CONTACT SALES W/ALL OVERAGES
MIN 21' MIN LENGTHS

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,120'	1.900 1-1/2" SCH 40		.145 AVG	RAND 17' 24'	2.718	8,480	Complete 148 Pcs. 3,524'

SHIPPING NOTE: PPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
271743	.19	.83	.005	.011	.23	.07	.04	.02	.18		V .002
	.19	.83	.005	.011	.23	.07	.04	.01	.17		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
271743	77620	50900	51.0						

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.

DAVE HUBENAK
TECHNICAL ANALYST

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____ 19 ____

_____ NOTARY PUBLIC

U. S. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report 37422

USS, USX, USX are trademarks of USX C. USX™

REQ. JOB, CONTRACT NO. | P.O. DATE | PURCHASE ORDER NO. NEW-76549

VENDOR: GARY WORKS
GARY, INDIANA 46402

SHIPPERS NO. H02314 07 11 98 | MILL ORDER NO. UB56015 | INVOICE NO. 154-010872
VEHICLE IDENTITY EJE 006016 H2314

** MELTED AND MANUFACTURED IN THE USA **

SOLD TO:
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

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.

BB

PREPARED BY THE OFFICE OF
S. C. PAPE GEN MGR. Q. A

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

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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
01	1/2 "	96.0000	240"	09	29403	M66073							
	STEEL-TYPE = CAST		REDUCTION RATIO = 18.2 TO 1										
								44.0	67.0	28.0	50.0		
								43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F -12 DEG C AVERAGE IMPACT STRENGTH				FT LBS/ 128-167-168 +154 FT LBS								
01	1/2 "	96.0000	240"	05	16335	Y67605							
	STEEL-TYPE = CAST		REDUCTION RATIO = 18.2 TO 1										
								46.0	68.0	29.0	50.0		
								44.0	64.0	31.0	50.0		
	LONG FL SZ CHARPY IMPT V-NTCH +010 DEG F -12 DEG C AVERAGE IMPACT STRENGTH				FT LBS/ 105-129-121 +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	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			001		FINE GRAIN
Y67605	HEAT	14	095	014	008	20	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.

980716 MU21 1137 701130010 071698 R 0125788001 01 SAM CBA 0 0 3 PAGE 1

U. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

37086

USS, USX, USX are trademarks of USX Corp.

REQ. JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02048 06 16 98	UB56016	154-005522
VEHICLE IDENTITY EJE 006228		H2048

VENDOR: GARY WORKS
GARY,INDIANA 46402

** MELTED AND MANUFACTURED IN THE USA **

SOLD TO: 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

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.

BB

PREPARED BY THE OFFICE OF:
S.C.PAPE GEN.MGR, Q.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 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240"	02	26136	M65937	57W 1						
	STEEL-TYPE = CAST		REDUCTION RATIO = 6.0 TO 1										
								45.0	75.0		33.0		
								47.0	76.0		32.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 085-077-076												
	-12 DEG C AVERAGE IMPACT STRENGTH +79 FT LBS												
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 071-072-098												
	-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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M65937	HEAT	21	100	021	013	22	02	02	05	01		026		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.

980616 MV21 1014 701131020 061698 0125788001 01 SAM CBA 0 0 3 PAGE 1

37745

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

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

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

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

OSM ITEM NO	DESCRIPTION		HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
1	0.5000 X 96.000M X 240.000											
	1 PC 3267 LBS	+	392730		465	680	28					
					461	675	28					
									LCVN @ 10			DEG F 10.0mm 55 105 95 /85 egy
2	1.0000 X 96.000M X 240.000											
	2 PCS 13068 LBS	+	393200		453	665	26					
					481	695	28					
									LCVN @ 10			DEG F 10.0mm 99 119 91 /103 egy
	2 PCS 13068 LBS	+	393285		476	705	27					
					478	700	26					
									LCVN @ 10			DEG F 10.0mm 84 44 106/78 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+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 Shamrell COLLEEN SHAMRELL Q.C. RECORDS ADMINISTRATOR

COPPERWELD

BIRMINGHAM DIVISION
1500 North 50th Street
Birmingham, AL 35212-1058
TEL. 205-599-0600

Customer Order No. 10-052122
Copperweld Order No. 266068
Invoice No. 734247
Date 03/05/99

TEST REPORT

Customer:

MARMON KEYSTONE CORPORATION
2505 FIRST AVENUE SOUTH
TEST REPORTS DEPT.
IRONDALE, AL 35210

Specification:

4 IN, SQ, 1/2
40 Ft
ASTM A500 GRB 98
PART # 4.4..5

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL	CB	V	CU	NI	CR
U61176 C.E. .30	.18	.76	.007	.010	.01	.047					
U60638 C.E. .31	.18	.78	.007	.010	.01	.039	.001	.00	.029	.012	.014

MECHANICAL PROPERTIES

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
U61176	8925	58800	68200	25	80
U60638	8924	64000	69200	25	83

Q. C. REVIEWED
DATE 3/8/99 INITIAL BT

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
PAUL J ANTHONY, METALLURGIST

U60638

COPPERWELD

BIRMINGHAM DIVISION
1500 North 50th Street
Birmingham, AL 35212-1058
TEL. 205-599-0600

Customer Order No. 10-052122
Copperweld Order No. 266069
Invoice No. 734247
Date 03/05/99

TEST REPORT

Customer:	Specification:
MARMON KEYSTONE CORPORATION 2505 FIRST AVENUE SOUTH TEST REPORTS DEPT. IRONDALE, AL 35210	4 IN, SQ, 1/2 42 Ft ASTM A500 GRB 98 PART # 4.4..5

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL					
U60626 C.E. .36	.22	.88	.008	.009	.01	.040					

MECHANICAL PROPERTIES

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
U60626	CB007029	66200	74300	23	88

Q. C. REVIEWED
DATE 3/8/99 INITIAL

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
PAUL J ANTHONY, METALLURGIST

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
1610
45885

CLIENT Applied Hydraulics DATE 8-16-99

CONTRACTOR Same JOB LOCATION Houma, La. 8999

JOB NO. HOU 052803 CLIENT REPRESENTATIVE Ronnie Tullos

MT TECH. Wade Nik REMARKS MT Eye

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100% MT Inspection			
2				
3	Of Boom Mid # 3.			
4				
5	Acceptable			
6				
7				
8				
9				
10				
11				
12				
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14				
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16				
17				
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	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
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SURFACE CONDITION
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

EQUIPMENT
MAKE Parker MODEL B-300 S/N 7308

CONTRACTS
PROD SPACING 3"406" CONTINUOUS (✓)
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 6.25

MEDIA
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER ( )

CALIBRATION
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )
CALIBRATION DATE: _____

ACCEPTANCE CRITERIA
AWS D1.1 Sec 6

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

1232

P.O.# 46060

CLIENT Applied Hydraulics DATE 8/26/99

CONTRACTOR AHSI JOB LOCATION Houma, La. 8307

JOB NO. DO# 03 2803 CLIENT REPRESENTATIVE [signature]

MT TECH. Louie Cormier REMARKS M.T. inspection

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100% M.T. inspection of all welds			
2				
3	on rewelded flange and replaced			
4				
5	lacing on boom mid section			
6				
7	# 3.			
8				
9	All welds accepted.			
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	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
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SURFACE CONDITION
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

EQUIPMENT
MAKE Parker MODEL B-300 S/N 6693

CONTRACTS
PROD SPACING 4" CONTINUOUS (✓)
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 4

MEDIA
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER (✓)

CALIBRATION
10# WEIGHT LIFT ( ) FLUX IND/CHECK (✓)
CALIBRATION DATE: 8/26/99

ACCEPTANCE CRITERIA
AWS D1.1 Sect. 6 / GXT. MTVWM-001 Rev 6

TOTAL TIME HRS. 0

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
1273
46320

CLIENT Applied Hydraulics DATE 9/10/99

CONTRACTOR AHSI JOB LOCATION Houma, La. 9-13-99

JOB NO. 99-05-7803 CLIENT REPRESENTATIVE

MT TECH. Louie Cormier REMARKS M.T. inspection

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100%	M.T.		inspection of all welds on
2				
3	on	replaced		casing for
4				
5	boom	mid # 3.		
6				
7	All	welds		accepted.
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	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
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SURFACE CONDITION
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

EQUIPMENT
MAKE Parker MODEL B-300 S/N 6693

CONTRACTS
PROD SPACING 4" CONTINUOUS (✓)
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 4

MEDIA
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER (✓)

CALIBRATION
10# WEIGHT LIFT ( ) FLUX IND. CHECK (✓)
CALIBRATION DATE: 9/10/99

ACCEPTANCE CRITERIA
AWS D1.1 Sec 9.6 / GXT-MPI-WPS-001 Rev. 6

TOTAL TIME HRS. 1

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N61588-001
WELDMENT S/N: 98279-08
DESCRIPTION: Boom Point Weldment
MODEL: 340LA-160
CHECKED BY:
DATE: 9-22-99

Material Description	Heat Number
Tube, square, A-500 Gr b, 4" x ½"	C67371
Tube, square, A-500 Gr b, 3" x ¼"	A9P0303
Pipe, A-106 Gr b, 1½" sch 40	271743
Plate, A-36, fine grain w/ charpy, 1" (Tip Plate)	394081
Plate, A-36, fine grain w/ charpy, 1" (Tangs)	393285
Plate, A-36, fine grain w/ charpy, ½"	Y67605
Plate, A-36, fine grain w/ charpy, ¾"	M66075
Plate, A-36, fine grain w/ charpy, 1½"	394081
Tube, round, 1026, 10" x 6½"	J1360
Tube, round, 1026, 6½" x 2½"	J2215
Plate, A-36, fine grain w/ charpy, 1¼"	1D1487
Bar, flat, A-36, 1" x 2"	374-0490

COPPERWELD

BIRMINGHAM DIVISION
1500 North 50th Street
Birmingham, AL 35212-1058
TEL. 205-599-0600

Customer Order No. 10-051933
Copperweld Order No. 233047
Invoice No. 732323
Date 11/03/98

TEST REPORT

Customer:

MARMON KEYSTONE CORPORATION
2505 FIRST AVENUE SOUTH
TEST REPORTS DEPT.
IRONDALE, AL 35210

Specification:

4 IN, SQ, 1/2
40 Ft
ASTM A500 GRB 96
PART # 4.4..5

HEAT NO.	CHEMICAL ANALYSIS, %										
	C	Mn	P	S	SI	AL	CB	V	CU	NI	CR
C67371 C.E. .31	.18	.74	.009	.011	.01	.049	.001	.00	.031	.014	.025

MECHANICAL PROPERTIES

HEAT NO.	LAB NO.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	HARDNESS Rb
C67371	CB008568	54900	69000	27	82

Q. C. REVIEWED
DATE 11/4/98 INITIAL BT

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
PAUL J ANTHONY, METALLURGIST

G 4.4.5 RE C67371

5/4/0

HANNA

Certification 743608 4/19/99 2

Shipped From: Hanna Steel Corporation
Tuscaloosa Division
1701 Boone Blvd
P O Box 428
Northport AL 35476

Cust P.O.: NEW108220
Date Shipped: 4/16/99
Load Tally 5-33942
Invoice # S60434

Send To: Klockner Namasco Corp
Attn: Tara
5775 C Glenridge Dr #110
Atlanta GA 30328

Ship To: Namasco
4501 North Miro
New Orleans LA 70117

Item	Heat #	ASTM Grade	Description	Qty	Tensile	Yield	Elong	Bend
03 1920412M CONTINUED			6"SCH 40 UN-HYDRO	42.000FT	P/N 1920412M			
890658			.070 .460 .010 .003 .060 .027 .001 .008 .100 .010 .047 .002 N .0090 Ti .0030 B					
04 4251414			1 1/2 SQ 14GA HRA513	20.000FT				
2282614	N04734		Produced according to ASTM A-513					
			Total Weight	3,140				

Heat #	C	Mn	P	S	Si	Al	Cb	Cr	Cu	Mo	Ni	V
N04734	.060	.420	.007	.006	.020	.032		.030	.070	.010	.030	.001

Item	Heat #	ASTM Grade	Description	Qty	Tensile	Yield	Elong	Bend
05 4301112			2 SQ 11GA HRA500	20.000FT				
2271125	790500	A500 B			64,000	67,500	29.0	B81
			Total Weight	3,050				

Heat #	C	Mn	P	S	Si	Al	Cb	Cr	Cu	Mo	Ni	V
790500	.060	.490	.011	.004	.060	.024	.002	.026	.104	.014	.047	.003
	N .0100 Ti .0030 B											

Item	Heat #	ASTM Grade	Description	Qty	Tensile	Yield	Elong	Bend
06 4450412			3 SQ 1/4 HRA500	40.000FT				
2291741	A9P0303	A500 B			62,000	66,500	24.6	B80
			Total Weight	5,280				

Heat #	C	Mn	P	S	Si	Al	Cb	Cr	Cu	Mo	Ni	V

Hanna Steel Corporation
3812 Commerce Avenue
P.O. Box 668
Fairfield, Alabama 35064
205 780 1111
DUNS No. 00-402-9294

Gulf States Tube
Vision Metals

ISO 9002
CERTIFIED

P.O. BOX 952
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		PAGE
098084	99-16370	06/08/99	21	00		16	20	01	00471003PDR	BP	PAW	1

PIPE DISTRIBUTORS INC
P O BOX 23237

HOUSTON TX 77028

SHIP TO: PIPE DISTRIBUTORS, INC
GRAND CALLIOU & INDL BLVD.
HOUMA LA 70360

SN
TR
INV

ROUTING
COL CUST TRK - TR W/SHPT

ANALYSIS	SHAPE	PRODUCT	FC	HEAT TREATMENT	REQUESTED
PER SPEC	ROUND	HOT FINISH		PER SPEC	WK 6-18-99
SPECIFICATION	**CMST**	**DESCRIPTION**			**PROMISE**
SEAMLESS ASTM/ASME A/SA 106 B 97A		HF CARBON PIPE			06/18/99

SPECIAL INSTRUCTIONS:
PLAIN ENDS - UVC COAT
ACCEPTABLE PER NACE MRO 175-98 TABLE 5
CERTIFIED TO DIN 50049 3.1B
PERMISSIBLE OVERAGES ACCEPTABLE BUT CONTACT SALES W/ALL OVERAGES
AIM 21' MIN LENGTHS

ITEM	QUANTITY	O.D.	I.D.	WALL	LENGTH	WT/FT	WEIGHT	
1	3,120'	1.900 1-1/2" SCH 40		.145 AVG	RAND 17' 24'	2.718	8,480	Complete 148 Pcs. 3,524'

SHIPPING NOTE: PPD.TRUCK-ONE PER DAY- NO RECEIVING AFTER 2PM.

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Pb	REMARKS
271743	.19	.83	.005	.011	.23	.07	.04	.02	.18		V .002
	.19	.83	.005	.011	.23	.07	.04	.01	.17		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
271743	77620	50900	51.0						

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.

DAVE HUBENAK
TECHNICAL ANALYST

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____ 19 ___

NOTARY PUBLIC

38058

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
497212P	Sep 08, 1998	1

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

MILL ORDER NO.	DATE
101244	

CUSTOMER ORDER NO.: NEW-90274

JOB/REQ. NO.:

SHIPPING NO.	DATE
497212	09/08/1998

CARRIER: UNION PACIFIC

CAR/TRUCK NO.: CIRN501238

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"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
2	0.7500 X 96.000M X 240.000										
	1 PC 4901 LBS +	392954		505	640	29					
								LCVN @ 10	DEG F 10.0mm		299 299 299/299 egy
	3 PCS 14703 LBS +	393085		497	620	30					
								LCVN @ 10	DEG F 10.0mm		266 299 296/287 egy
3	1.0000 X 96.000M X 240.000										
	3 PCS 19602 LBS +	394081		437	675	25					
				493	690	22					
								LCVN @ 10	DEG F 10.0mm		60 70 59 /63 egy
								LCVN @ 10	DEG F 10.0mm		42 57 53 /51 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+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	<.008	.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 Shamrell
COLLEEN SHAMRELL Q.C. RECORDS ADMINISTRATOR

37745

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

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

SOLD TO

KLOCKNER NAMASCO CORPORATION
ATIN:MELANIE ELLIOTT
5775-C GLENRIDGE DRIVE
SUITE 110
ATLANTA, GA 30328

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

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	

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

OSM ITEM NO	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
1	0.5000 X 96.000M X 240.000										
	1 PC 3267 LBS +	392730		465	680	28					
				461	675	28					
								LCVN @ 10			DEG F 10.0mm 55 105 95 /85 egy
2	1.0000 X 96.000M X 240.000										
	2 PCS 13068 LBS +	393200		453	665	26					
				481	695	28					
								LCVN @ 10			DEG F 10.0mm 99 119 91 /103 egy
	2 PCS 13068 LBS +	393285		476	705	27					
				478	700	26					
								LCVN @ 10			DEG F 10.0mm 84 44 106/78 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+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 Shamrell COLLEEN SHAMRELL Q.C. RECORDS ADMINISTRATOR

U. S. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

37432

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REQ., JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02314 07 11 98	UB56015	154-010872
VEHICLE IDENTITY EJE 006016		H2314

VENDOR
GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
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

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.

BB

PREPARED BY THE OFFICE OF
S. C. PAPE GEN MGR. Q. A

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

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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
01	1/2 "	96.0000	240"	09	29403	M66073							
	STEEL-TYPE = CAST		REDUCTION RATIO = 18.2 TO 1										
								44.0	67.0	28.0	50.0		
								43.0	65.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 128-167-168												
	-12 DEG C AVERAGE IMPACT STRENGTH +154 FT LBS												
01	1/2 "	96.0000	240"	05	16335	Y67605							
	STEEL-TYPE = CAST		REDUCTION RATIO = 18.2 TO 1										
								46.0	68.0	29.0	50.0		
								44.0	64.0	31.0	50.0		
	LONG FL SZ CHARPY IMPT V-NTCH +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	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			001		FINE GRAIN
Y67605	HEAT	14	095	014	008	20	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.

U. S. STEEL GROUP
A division of USX Corporation
01.000-0772 (REV. 8/91)

TFTR 6/26/98 bb

Metallurgical Test Report

JUN 22 1998

USS, USX, USx are trademarks of USX Corp. USX TM

37075

EQ. JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02048 06 16 98	UB56015	154-005521
VEHICLE IDENTITY EJE 006228		H2048

VENDOR
GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
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

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, Q.A.
DATE 6-22-98

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

:NSP: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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
02	3/4 "	96.0000	240"	04	19604	M66075							
	STEEL-TYPE = CAST		REDUCTION RATIO	= 12.1 TO 1				42.0	66.0	29.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F			FT LBS/ 102-108-130									
	-12 DEG C AVERAGE IMPACT STRENGTH			+113 FT LBS									
02	3/4 "	96.0000	240"	04	19604	M66076							
	STEEL-TYPE = CAST		REDUCTION RATIO	= 12.0 TO 1				43.0	67.0	28.0	50.0		
								43.0	66.0	30.0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F			FT LBS/ 092-095-102									
	-12 DEG C AVERAGE IMPACT STRENGTH			+96 FT LBS									
	END OF DATA												

HIS 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	
M66075	HEAT	15	096	011	009	19	04	02	03	01		025		001			001		FINE GRAIN
M66076	HEAT	15	096	012	009	20	02	02	03	01		024		001			001		FINE GRAIN
	END OF DATA																		

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

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

JUN 26 '98 08:48 FR TEST REPORTS 219 888 5480 TO 9150494687829 P.02

3817

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
498078P	Sep 14, 1998	1

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

MILL ORDER NO.	DATE
101244	

CUSTOMER ORDER NO.: NEW-90274

JOB/REQ. NO.:

SHIPPING NO.	DATE
498078	09/14/1998

CARRIER: UNION PACIFIC

CAR/TRUCK NO.: CW6037

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"	% ELONG 2"	% RA	HARDNESS BHN	BEND TEST	IMPACTS
2	0.7500 X 96.000M X 240.000										
	2 PCS 9802 LBS +	392702		451	695		32				
				505	710	26					
											LCVN @ 10 DEG F 10.0mm 92 111 85 /96 egy
	2 PCS 9802 LBS +	394189		424	620	30					
				432	615	31					
											LCVN @ 10 DEG F 10.0mm 268 275 274/272 egy
4	1.5000 X 96.000M X 240.000										
	7 PCS 68607 LBS +	394081		437	675	25					
				493	690	22					
											LCVN @ 10 DEG F 10.0mm 60 70 59 /63 egy
											LCVN @ 10 DEG F 10.0mm 42 57 53 /51 egy

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+392702	.14	1.02	.006	.003	.25	.23	.09	<.008	<.008	.033	.05	.03								
+394189	.10	.83	.006	.007	.20	.21	.13	<.008	<.008	.032	.05	.02								
+394081	.15	.90	.006	.011	.27	.24	.11	<.008	<.008	.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 Angie McCasland ANGIE MCCASLAND Q.C. RECORDS ADMINISTRATOR

STEEL OPERATIONS **CERTIFICATE OF TEST** **TIMKEN**

1835 DUEBER AVE. S.W. CANTON, OHIO 44706 WORLDWIDE LEADER IN BEARINGS AND STEEL

APRIL 20, 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 OF MATERIAL: 1026 - HOT ROLLED - SCALE FREE
SPEC: ASTM-A519-94

TIMKEN ORDER 46293 RELEASE 1 CUSTOMER ORDER 60-27173-001 1
SIZE OD 10.000" WALL 1.750"

CHEMICAL ANALYSIS

HEAT	C	MN	P	S	SI	CR	NI	MO	CU	PIECE NO.	CV NO.
J1360 LADLE	.24	.80	.012	.023	.26	.10	.13	.04	.24		

LONGITUDINAL TENSILE TEST

HEAT	PIECE NO.	.20% YIELD STRENGTH P.S.I.	TENSILE STRENGTH P.S.I.	ELONG IN	ELONG %	% RED	TEMP C	SPECIMEN
J1360		49,303	81,780	2.0	29.0	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.

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

Materials - Order Processing

5-21-98

STEEL OPERATIONS
1835 DUEBER AVE. S.W.
CANTON, OHIO 44706

CERTIFICATE OF TEST

TIMKEN
WORLDWIDE LEADER IN BEARINGS AND STEEL

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 OF MATERIAL: 1026 - HOT ROLLED - SCALE FREE
SPEC: ASTM-A519-94

TIMKEN ORDER 46272 RELEASE 1 CUSTOMER ORDER 60-27146-004 2QD COMBO
SIZE OD 6.500" WALL 2.000"

CHEMICAL ANALYSIS

HEAT	C	MN	P	S	SI	CR	NI	MO	CU	PIECE NO.	CV NO.
J2215 LADLE	.24	.80	.011	.004	.21	.08	.12	.03	.29		

LONGITUDINAL TENSILE TEST

HEAT	PIECE NO.	.20% YIELD STRENGTH P.S.I.	TENSILE STRENGTH P.S.I.	ELONG IN %	% RED	TEMP C	SPECIMEN
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
Jeff Jepson
Supervisor-Mgr. Order Processing

U. S. STEEL GROUP
A division of USX Corporation
01000.0772 (REV. 8/91)

Metallurgical Test Report

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REQ. JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
H02314 07 11 98	UB56015	154-010872

VEHICLE IDENTITY EJE 006016 H2314

VENDOR
GARY WORKS
GARY, INDIANA 46402
** MELTED AND MANUFACTURED IN THE USA **

SOLD TO
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

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.

BB

PREPARED BY THE OFFICE OF
S C PAPE GEN MGR. G A

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

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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
04	1- 1/4 "	96.0000	240"	01	8168	1D1487							
	STEEL-TYPE = INGOT							47.0	67.0	30.0	50.0		
								45.0	67.0	30 0	50.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 074-090-095												
	-12 DEG C AVERAGE IMPACT STRENGTH +86 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	
1D1487	HEAT	17	091	005	010	20	01	01	02	00		035		004			003		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.

38381 - 38382

10/20/98 14:43:49 903-626-6262-> 504 948 7662 NUCOR STEEL - TEXAS Page 001

NUCOR STEEL
A Division of NUCOR Corporation
JEWETT, TEXAS 75846 PH (903) 626-4461

B/L#

Date 10/20/98

ATTENTION: ELAINE

FROM: LORI

CERTIFIED MILL TEST REPORT

18001
NAMASCO
4501 NORTH MIRO STREET

NEW ORLEANS LA 70117-4439

8 INCH
SCALE

SIZE / GRADE	HEAT # / PO #	TENSILE PSI	YIELD PSI	ELONG %	C	Mn	Si	S	P	V	Nb	Cu	Cr	Ni	Mo	Bend Test
3/4 ROUNDS ASTM A36-96/ASME SA36-95	371-0657 NEV-54702	68600	49300	27	.160	.720	.320	.033	.013	.000	.000	.340	.120	.100	.024	
1/2 ROUNDS ASTM A36-96/ASME SA36-95	372-0690 NEV-54702	71400	56100	23	.160	.770	.250	.023	.007	.000	.000	.290	.160	.120	.028	
1 x 2 ASTM A36-96/ASME SA36-95	374-0490 NEV-55926	68000	45200	21	.180	.680	.260	.030	.004	.000	.000	.370	.110	.210	.041	

MELTED AND MANUFACTURED IN U.S.A.

ALL MATERIAL STRAND CAST

Ben R Cave

CHIEF METALLURGIST
Ben Cave
By LORI

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

MT WORK REPORT

Report No. M
1675

P.O.#45758

CLIENT Applied Hydraulics DATE 8/10/99

CONTRACTOR AHSI JOB LOCATION Houma, La. Bldg.

JOB NO. AH" 059803 CLIENT REPRESENTATIVE [illegible]

MT TECH. Wade Nish REMARKS M.T. inspection

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100% M.T. inspection of all welds			
2				
3	on 340.L boom tip.			
4				
5	All welds accepted.			
6				
7				
8				
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50				

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
51				
52				
53				
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61				
62				
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78				
79				
80				

SURFACE CONDITION
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

EQUIPMENT
MAKE Parker MODEL B-30C S/N 6693

CONTRACTS
PROD SPACING 4 CONTINUOUS (✓)
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 4

MEDIA
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER (✓)

CALIBRATION
10# WEIGHT LIFT ( ) / FLUX IND. CHECK (✓)
CALIBRATION DATE: 8/10/99

ACCEPTANCE CRITERIA
AWS D1.1 Sect. 6 / GXT-MPW-001 Rev. 6

TOTAL TIME HRS. 1

Material Traceability Log

CRANE WO. NO.: 059803
CUSTOMER: BROWN & ROOT/ PEMEX
WELDMENT PART NO.: N61591-001
WELDMENT S/N: 98279-09
DESCRIPTION: Bridle Weldment
MODEL: 340LA-160
CHECKED BY: Ronald W. Talbot Jr.
DATE: 9.22.99

Material Description	Heat Number
Beam, A-36, S18 x 70#	69780
Tubing, mechanical, A-519, 1026, 5" OD	430995
Plate, A-36, fine grain w/ charpy, 1"	394081
Plate, A-36, fine grain w/ charpy, 2"	M66254
Bar, flat, A-36, 4" x ½"	977239

11/09/1998 11:15 (815)825 0440 LEVINSON METALS USA PAGE 01
08/05/97 09:29 Northwestern Steel p3./3

NORTHWESTERN™
STEEL AND WIRE COMPANY
SINCE 1879

CERTIFIED MILL TEST REPORT

100% MELTED AND MANUFACTURED IN U.S.A.

NSW NUMBER	SHIP DATE	BILL NO.	CUSTOMER P.O. NO.	SHIP METHOD	CAR/TRUCK NUMBERS	SHIP LOC.	NO. OF COPIES	COA	MTR	CONF.	PAGE
21417	08-05-97	49623	LOAD124	WILL CALL	WILL CALL 102	48	1		X	64	3

SHIP TO

SOLD TO

HOUSTON, TEXAS

LINE NO.	SECTION	SPEC/ LENGTH	PIECES/ WEIGHT	HEAT #	YIELD POINT KSI	TENSILE STRENGTH KSI	ELONG. 8"	CHEMICAL COMPOSITION (%) C X100	Mn X100	Si X100	P X1000	S X1000	Cu X100	Ni X100	Cr X100	Mo X100	V X1000	Nb X1000
				Y/T	MPa	MPa		CE										Sn
4	S 18 X 70	ASTM A36-94	2	69780	39.5	58.7	31.3	07	66	19	10	12	23	09	13	23	1	1
	S 460 X 104	35'	4900		39.3	58.6	29.7	26										12
		10.67 METERS		.67	272	405												
	ANSI/AWS D1.1 PROCEDURES FOR MICRO ALLOYED STEEL SHOULD BE FOLLOWED.			.67	271	404												

	HEAT	VALUE	O	HEAT	VALUE	O	HEAT	VALUE	O
IMPACT TEST									

REMARKS:

I, Notary Public in HARRIS County,
State of TEXAS hereby certify this affidavit was sworn to by
ROBERT C. OLSON an agent of Northwestern Steel and Wire Company
under my Notarial Seal this 5 day of AUGUST 19 97

Notary Public My Commission Expires

WE HEREBY CERTIFY THAT THE STEELS HAVE BEEN TESTED IN ACCORDANCE WITH SPECIFICATIONS

STATE OF TEXAS
My Comm. Exp. 11-29-97

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. 072237

CUSTOMER	SPECIFICATION	CUSTOMER ORDER
MARMON KEYSTONE CORPORATION 10700 MARMON DRIVE BOLINGBROOK IL 60440 ATTN: TEST RPT CLERK	ASTM A519 96 FAX: (630)739-6783	60-030031

GRADE	SIZE(O.D x WALL)	QUANTITY	SHIPPED	DATE
1026	5.000 X .750	10892 LB 320.00 FT	06/11/98	06/11/9

CONDITION	PART NO.	S# 0006441
SMLS HF LACQUER COATED UNANNEALED	5..75130	50000383

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Ni	Cr	Mo	Cu	V	Al	OTHER	GRAIN SIZE
430995	.23	.73	.006	.021	.240	.070	.090	.020	.150	.002	.016	CA .0014	7

MECHANICAL PROPERTIES

HEAT NO.	LOAD NO.	YIELD PSI	TENSILE PSI	ELONG %	RED AREA %	HARDNESS BHN	HARDNESS ROCKWELL	IMPACT FT.-LBS
				2.0"				

MAGNAFLUX

FREQ.	SEVERITY

JOMINY HARDENABILITY (EXPRESSED IN 16THS)

HEAT NO.	1	2	3	4	5	6	7	8	10	12	14	16	20	24	28	32

J-K RATING

HEAT NO.	A	B	C	D

SLAG-OXIDE RATING

INGOT	OXIDE	SLAG

MELT SOURCE

OTHER INSPECTION MACRO ETCH: S1 R1 C2
MANUFACTURED & MELTED IN USA

THIS TEST REPORT NOTARIZED WHEN REQUIRED
SWORN AND SUBSCRIBED BEFORE ME
THIS _____ DAY OF _____

NOTARY PUBLIC

William R. McKnight

MATERIAL PRODUCED TO THE SPECIFICATION(S) SHOWN ABOVE. NO ADDITIONAL SPECIFICATION(S) IS IMPLIED OR WARRANTED

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
497904P	Sep 14, 1998	3

THE FIRST ISO9002 REGISTERED U.S. PLATE PRODUCER

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

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

OSM ITEM NO	DESCRIPTION	HEAT NO.	SLAB	YIELD PSI X 100	TENSILE PSI X 100	% ELONG 8"	% ELONG 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										
	8 PCS 52272 LBS	+ 394081		437	675	25					
				493	690	22					
								LCVN @ 10			DEG F 10.0mm 60 70 59 /63 egy
								LCVN @ 10			DEG F 10.0mm 42 57 53 /51 egy
	34 PCS 150286 LBS TOTALS										

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	V	Cb	Al	Cr	Mo	Ti	B	N_2	Ca			CE	McQuaid Ehn Grain Size
+392873	.05	.96	.007	.003	.26	.21	.08	<.008	.025	.024	.03	.03								
+392954	.06	.96	.006	.004	.24	.22	.11	<.008	.025	.022	.06	.05								
+394081	.15	.90	.006	.011	.27	.24	.11	<.008	<.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 McCasland ANGIE MCCASLAND Q.C. RECORDS ADMINISTRATOR

U. S. STEEL GROUP
A division of USX Corporation
01.0000772 (REV. 5/97)

Metallurgical Test Report

31433

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Q. JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		NEW-76549

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
M02314 07 11 98	UB56016	154-010873
VEHICLE IDENTITY EJE 006016		M2314

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, Q.A.

DATE 7-15-98

VENDOR SOLD TO
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

SPEC. & ISP. 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: THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	QUANTITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD PT. KSI	TENSILE STR. KSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
06	2.0000	96.0000	240"	01	13068	M66254	55W 2						
	STEEL-TYPE = CAST		REDUCTION RATIO = 4.6 TO 1					46.0	76.0		32.3		
								52.0	74.0	32.0	30.0		
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 072-069-077												
	-12 DEG C AVERAGE IMPACT STRENGTH +73 FT LBS												
	LONG. FL SZ CHARPY IMPT V-NTCH +010 DEG F FT LBS/ 092-092-096												
	-12 DEG C AVERAGE IMPACT STRENGTH +93 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	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
M66254	HEAT	22	096	012	008	22	03	02	03	01		024		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.

P. 21/22 FAX NO. 504 948 7662 JUL-24-98 FRI 09:33 AM NAMASCO

36312

SMI Steel Inc.
P.O. BOX 321188
BIRMINGHAM, AL 35232-1188
(205) 592-8981

CERTIFIED TEST REPORT

FOR ADDITIONAL COPIES CALL (205) 599-7961
The following tests conform to the requirements of the specifications listed.

WE HEREBY CERTIFY THAT THE FOLLOWING DATA IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

QUALITY ASSURANCE MANAGER

4/ 3/98

SOLD TO:
NAMASCO (KLOCKNER) CORP.
5775-C GLENRIDGE DR - ## 110
ATLANTA, GA. 30328

SHIP TO:
NAMASCO
4501 NORTH MIRO
NEW ORLEANS, LA. 70177

HEAT NO	SECTION	SPECIFICATION	T #	YIELD (KSI) (MPA)	TENSILE (KSI) (MPA)	ELONGATION 5" 200MM	ELONGATION 2" 50MM	R.A. %	BND TST RSL	BHN	CHARPY V NOTCH EXPECT RESULTS SIZE (MM)	TEMP.	FT-LBS JOULES	FT-LBS JOULES	FT-LBS JOULES	O R T
977239	F 4X1/2	ABS PART 2-97 GR A	1	47.1	68.0	26.0										
977239	F 4X1/2	ABS PART 2-97 GR A	2	46.9	68.0	25.0										

160 pieces, 20', 21,760 lbs.

P.O.# NEW70831

ATTACHMENT TO MATERIAL REPORT
NO 24558B 23 APR 98
AMERICAN BUREAU OF SHIPPING NEW ORLEANS, LA

HEAT NO	C	Mn	P	S	Si	Cu	Cr	Ni	Mo	Cb	V	Al	Sn	CARBON EQLIV	DATE ROLLED
977239	.13	0.66	.009	.023	.23	.31	0.06	0.11	.027	.001	.0020	.001	.013	.28	12/19/97

Remarks: 100% MELTED AND MANUFACTURED IN THE USA AND FREE FROM MERCURY CONTAMINATION IN THE PROCESS

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE TO THE APPLICABLE SPECIFICATIONS BY THE ELECTRIC FURNACE PROCESS AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATIONS AND IN THE PRESENCE OF A SURVEYOR FROM THE AMERICAN BUREAU OF SHIPPING WITH SATISFACTORY RESULTS

MAR-05-99 FRI 11:34 AM NAMASCO FAX NO. 504 948 7662 P. 13/13

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

35742
P.O.# 45947

CLIENT Applied Hydraulics DATE 8-17-99

CONTRACTOR Same JOB LOCATION Houma, La. 8489

JOB NO. Con 05 9803 CLIENT REPRESENTATIVE [illegible]

MT TECH. Clade Mike REMARKS MT Insp.

	WELD NO.	WALL THICKNESS	RECOMMENDATIONS ✓ ACCEPT ✗ REJECT	REMARKS
1	100%	MT		Inspection
2				
3	of	Buckle		Acceptable
4				
5				
6				
7	100%	MT		Inspection
8				
9	of	Idler		Acceptable
10				
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SURFACE CONDITION
GOOD (✓) FAIR ( ) PAINTED ( ) WELD (✓)

EQUIPMENT
MAKE Parker MODEL B-300 S/N 7308

CONTRACTS
PROD SPACING 3"/05" CONTINUOUS (✓)
AC (✓) DC ( ) HALF WAVE ( ) FULL WAVE ( )
AMPS 625

MEDIA
7C-BLACK WET (✓) 8A-DRY ( ) WHITE HIGHLITER (✓)

CALIBRATION
10# WEIGHT LIFT ( ) FLUX IND. CHECK ( )
CALIBRATION DATE: _____

ACCEPTANCE CRITERIA
AWS D1.1 Sec 6

TOTAL TIME HRS. 1

PIN CERTIFICATES

Lattice Boom Style
PIN CERTIFICATE SHEET

DATE: 07-15-99 REV.: B WORK ORDER NO.: 059803C

CUSTOMER: Pemex/ Brown & Root MODEL NO.: 340LA-160

MATERIAL: SS = Stainless Steel with 100,000 PSI Minimum Yield **4140** = **4140** with 100,000 PSI Minimum Yield

COATING: U = Uncoated **F** = **F**luorocarbon 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	H6803	☒	☐	☐	☐	☐
GANRTY/UPPERSTRUCTURE	N61596-001 (2) Rev. A	P3 P4	H6803	☒	☐	☐	☐	☐
MAIN/IDLER	N61604-001 (2) Rev. A	P5 P6	H6269	☒	☐	☐	☐	☐
LOWER AUX./EXTENSION	N61605-001 (1) Rev. B	P7	H6914	☒	☐	☐	☐	☐
BOOM CONNECTIONS	N60986-004 (16) Rev. A	P8-P23	8540J	☒	☐	☐	☐	☐
BRIDLE/GANTRY	N61603-001 (2) Rev. A	P24 P25	H6914	☒	☐	☐	☐	☐
EXTENDED WEDGE SOCKET PIN/MAIN	N60645-001 (1) Rev. A	P26	4083H	☒	☐	☐	☐	☐
LOAD CELL PINS	N60646-004 (2) Rev. A	P27 P28	4083H	☒	☐	☐	☐	☐
BOOM IDLER	N95SK1-104 (2) Rev. F	P29 P30	8540J	☒	☐	☐	☐	☐
				☐	☐	☐	☐	☐

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: _____

MILL TEST REPORTS FURNISHED BY
INDUSTRIAL METALS OF THE SOUTH, INC.
P.O. BOX 19567
NEW ORLEANS, LA 70179

CUSTOMER Applied Hyd
YOUR P.O. 44831
DATE 6.22.99
ITEM NO. 1
OUR INV. NO. 61255

Atlas SPECIALTY STEELS

Atlas Specialty Steels
One Centre Street, P.O.Box 1000
Welland, Ontario, Canada L3B 5R7

CERTIFIED TEST REPORT

TÜV CERT ISO 9002

Customer:
GULF GLOBAL INC.
P.O. BOX 10158
NEW ORLEANS, LA 70181

Customer P/O: 30179-IMS
Sales Order: N9L00171
B/L No.: LA9525064
P.O.C.: BR28450000
Date: MAY/26/1999

Description

Grade: S17400/H1150
Heat No: H6803
Size: 4.0000 in
Shape: RD
Length: 20'2" -20'8"
No. of PCS: 3
Weight: 2638 lb
Heat Treatment: SOLN ANN/AGED
Finish Condition: CG/POL (RMS >20/30)
Product Quality: BOAT SHAFT QLTY
Melting Process: AOD

Specifications

AQUATECH 17 SPEC ASTM A564-97 (COND H1150) STR .0015"/FT TIR (RMS 30 MAX)

Chemical Analysis

C	Mn	P	S	Si	Cr	Ni	Nb	Cu	Mo	Ta	Co
0.024	0.800	.024	.019	0.340	15.22	4.600	0.224	3.500	0.312	.009	0.081

Mechanical and Physical Properties of Material

Specimen Position	Specimen Size	Dir	Yield Strength KSI Offset 0.2%	Tensile Strength KSI	Elongation %	Elongation Size	Reduction %	Hardness HRC	Hardness	Impact Tests Type	Impact Tests Size	Impact Tests Temp	Impact Tests FT.LB			Ferrite
R/2	.5000	L	107.8	139.6	22.5	2IN	61.0	30.0		CVN	10X10	RT	106.0	96.0	108.0	0.0%

Special Testing

Statements and Remarks

HEAT TREATMENT: SOLUTION ANNEAL - 1900 DEG.F.
AGED - 1150 DEG.F.
MACRO STRUCTURE :SATISFACTORY
TORSIONAL YIELD STRENGTH: 72,226 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 Barb Valeriote

Form: F0011 Rev 0 May 26, 1999 14:31

Atlas SPECIALTY STEELS

Atlas Specialty Steels
One Centre Street, P.O.Box 1000
Welland, Ontario, Canada L3B 5R7

CERTIFIED TEST REPORT

TÜV CERT ISO 9002

AUG 25 1998

Customer:
GULF GLOBAL INC.
P.O. BOX 10158

NEW ORLEANS, LA 70181

Customer P/O: 24642-IMS
Sales Order: N7L37291

B/L No.: LA8804031
P.O.C.: BR24806000

Date: AUG/04/1998

Description

Grade: S17400/H1150
Heat No: H6269
Size: 3.0000 in
Shape: RD
Length: 22'2" -22'8"
No. of Pcs: 4
Weight: 2140 lb

Heat Treatment: SOLN ANN/AGED
Finish Condition: CG/POL (RMS >20/30)
Product Quality: BOAT SHAFT QLTY
Melting Process: VOD

Specifications

RMS 30 MX ASTM A564-95 CHEM ONLY COND H1150 AQUATECH 17 SPEC STR .0015/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

Specimen Position	Specimen Size	Specimen Dir	Yield Strength Offset 0.2% KSI	Tensile Strength KSI	Elongation %	Elongation Size	Reduction %	Hardness HRC	Impact Tests Type	Impact Tests Size	Impact Tests Temp	Impact Tests FT.LB			Ferrite
R/2	.5000	L	127.4	141.7	20.0	2IN	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 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 Barb Valeriote

Form: FQ011 Rev 0 Aug 04, 1998 13:59

Atlas Specialty Steels
One Centre Street, P.O.Box 1400
Welland, Ontario, Canada L3B 5R7

CERTIFIED TEST REPORT

Customer:
GULF GLOBAL INC.
P.O. BOX 10158
NEW ORLEANS, LA 70181

Customer P/O: 30687-IMS
Sales Order: N9L04701
B/L No.: LA9720013
P.O.C.: BR28912000
Date: JUL/20/1999

Description

Grade: S17400/H1150
Heat No: H6914
Size: 3.0000 in
Shape: RD
Length: 20'2" -20'8"
No. of Pcs: 2
Weight: 980 lb
Heat Treatment: SOLN ANN/AGED
Finish Condition: CG/POL (RMS >20/30)
Product Quality: BOAT SHAFT QLTY
Melting Process: AOD

Specifications

AQUATECH 17 SPEC ASTM A564-95 (COND H1150) STR .0015"/FT TIR (RMS 30 MAX)

Chemical Analysis

C	Mn	P	S	Si	Cr	Ni	Nb	Cu	Mo	Ta	Co
0.028	0.780	.021	.021	0.425	15.22	4.560	0.213	3.440	0.205	.010	0.055

Mechanical and Physical Properties of Material

Specimen Position	Specimen Size	Specimen Dir	Yield Strength Offset 0.2% KSI	Tensile Strength KSI	Elongation %	Elongation Size	Reduction %	Hardness HRC	Hardness	Impact Tests Type	Impact Tests Size	Impact Tests Temp	Impact Tests FT.LB	Impact Tests FT.LB	Impact Tests FT.LB	Ferrite 0.1%
R/2	.5000	L	123.1	141.6	20.0	2IN	63.5	31.0		CVN	10X10	RT	99.0	93.0	100.0	

Special Testing

Statements and Remarks

HEAT TREATMENT: SOLUTION ANNEAL - 1900 DEG. F.
AGED - 1150 DEG. F.
MACRO STRUCTURE :SATISFACTORY
TORSIONAL YIELD STRENGTH : 82,477 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

RHONDA LASCALA
SENIOR TEST REPORT CLERK

Rhonda LaScala

MILL TEST REPORTS FURNISHED BY
INDUSTRIAL METALS OF THE SOUTH, INC.
P.O. BOX 19567
NEW ORLEANS, LA 70179

CUSTOMER Applied Mgt.
YOUR P.O. 45414
DATE P 7-26-99
ITEM NO. # 1
OUR INV. NO. 63560

7-26-1999 3:06PM FROM GULF GLOBAL INC 504 367 8557
07/26/99 MON 15:04 [TX/RX NO 8365] 001

MILL TEST REPORTS FURNISHED BY
INDUSTRIAL METALS OF THE SOUTH, INC.
P.O. BOX 19567
NEW ORLEANS, LA 70179

CUSTOMER Applied Hyd.

YOUR P.O. 45062

DATE 7.07.99

ITEM NO. 1

OUR INV. NO. 62139

FROM GULF GLOBAL INC 504 367 8557

7-07-1999 1:55PM

Atlas SPECIALTY STEELS

Atlas Specialty Steels
One Centre Street, P.O.Box 1000
Welland, Ontario, Canada L3B 5R7

CERTIFIED TEST REPORT

TÜV QUALITÄT ISO 9002

Customer:
GULF GLOBAL INC.
P.O. BOX 10158
NEW ORLEANS, LA 70181

Customer P/O: 30179-IMS
Sales Order: N9L00121
B/L No.: LA9608038
P.O.C.: BR28458000
Date: JUN/08/1999

Description

Grade: S17400/H1150
Heat No: 8540J
Size: 2.5000 in
Shape: RD
Length: 18'2" -18'8"
No. of Pcs: 8
Weight: 2464 lb
Heat Treatment: SOLN ANN/AGED
Finish Condition: CG/POL (RMS >20/30)
Product Quality: BOAT SHAFT QLTY
Melting Process: VOD

Specifications

AQUATECH 17 SPEC | ASTM A564-97 | (COND H1150) | STR .0015"/FT TIR | (RMS 30 MAX)

Chemical Analysis

C	Mn	P	S	Si	Cr	Ni	Nb	Cu	Mo	Ta	Co
0.025	0.890	.020	.022	0.431	15.05	4.570	0.218	3.460	0.233	.009	0.058

Mechanical and Physical Properties of Material

Specimen Position	Specimen Size	Dir	Yield Strength Offset 0.2% KSI	Tensile Strength KSI	Elongation %	Elongation Size	Reduction %	Hardness HRC	Impact Tests Type	Impact Tests Size	Impact Tests Temp	Impact Tests FT.LB			Ferrite
R/2	.5000	L	126.8	141.9	19.0	2IN	64.4	33.0	CVN	10X10	RT	82.0	78.0	84.0	2.5%

Special Testing

Statements and Remarks

HEAT TREATMENT: SOLUTION ANNEAL - 1900 DEG.F.
AGED - 1150 DEG.F.
MACRO STRUCTURE :SATISFACTORY
TORSIONAL YIELD STRENGTH: 84,956 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 Bart Valeriote

Form F0011 Rev.0 Jan 05, 1999 13:46

07/07/99 WED 13:54 [TX/RX NO 7726] 001

MILL TEST REPORTS FURNISHED BY
INDUSTRIAL METALS OF THE SOUTH, INC.
P.O. BOX 19567
NEW ORLEANS, LA 70179

CUSTOMER Applied Hyd
YOUR P.O. 42272
DATE 2.11.97
ITEM NO. #1
OUR INV. NO. 53195

SAMMI-AL TECH INC.
WILLOWBROOK AVENUE
DUNKIRK, N.Y. 14048

Supplied by:
Atlas Specialty Steels
A division of Sammi Atlas Inc
One Centre Street, P.O.Box 1000
Welland, Ontario, Canada L3B 5R7.

CERTIFIED TEST REPORT

SAMMI

Customer:
GULF GLOBAL INC.
700 PETERS ROAD
HARVEY, LA 70053

Customer P/O: 19983-IMS
Sales Order: N6L23851
B/L No.: LA6B26070
P.O.C.: BR16586000
Date: NOV/26/1996

Description

Grade: S17400/H1150
Heat No: 4083H
Size: 1.2500 in
Shape: RD
Length: 12'2" -12'8"
No. of Pcs: 37
Weight: 1926 lb
Heat Treatment: SOLN ANN/AGED
Finish Condition: CG/P (20 RMS MAX)
Product Quality: BSQ
Melting Process: VOD

Specifications

RMS 20 MAX ASTM A564-95 (CHEM ONLY) AQUATECH 17 SPEC COND H1150 .0015" TIR/FT

Chemical Analysis

C	Mn	P	S	Si	Cr	Ni	Nb	Cu	Mo	Ta
0.011	0.550	.019	.019	0.356	15.22	4.260	0.214	3.180	0.242	.009

Mechanical and Physical Properties of Material

Specimen Position	Specimen Size	Specimen Dir	Yield Strength KSI Offset 0.2%	Tensile Strength KSI	Elongation %	Elongation Size	Reduction	Hardness HRC	Hardness	Impact Tests Type	Impact Tests Size	Impact Tests Temp	Impact Tests FT.LB			Ferrite
R/2	.5000	L	131.0	142.5	19.0	2IN	59.7	30.0		CVN	10X10	RT	99.0	99.0	100.0	0.1%

Special Testing

Statements and Remarks

MACRO STRUCTURE :SATISFACTORY
TORSIONAL YIELD STRENGTH: 87,770 PSI.
HEAT TREATMENT: SOLUTION ANNEAL - 1900 DEG.F.
AGED - 1150 DEG.F.

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

Form: FQ012 Rev:0 Nov 26, 1996 15:36

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: 5417 MRR ITEM NO: 1

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: 3080A1 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. LBS.	% SHEAR	MLE	DIR.	TEST TEMP. DEG. F
6237	68- 71- 74	100-100-100	42- 38- 43	L1/4T	-4F

TEST BAR PER BES-2-1-101
JOMINY HARDENABILITY: J1=58, J4=58, J8=56, J16=55, J32=55
BHN:
#1 = 321,321,302,321
#2 = 302,302,321,321
#3 = 321,321,321,321

QUALITY CONTROL REPRESENTATIVE

DATE: 09/25/98

AVON BEARINGS
11/30/1998 17:08 4408712503

PAGE 03
AVON BEARINGS
11/30/1998 17:08 4408712503

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 BHN 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	0.7600	0.0080	0.0170	0.2800	0.2800	0.8600	1.7700

V NOTCH CHARPY IMPACTS

CHARGE NO.	FT. LBS.	% SHEAR	MLE	TEST TEMP. DIR.	DEG. F
6237	68- 71- 74	100-100-100	42- 38- 43	L1/4T	-4F

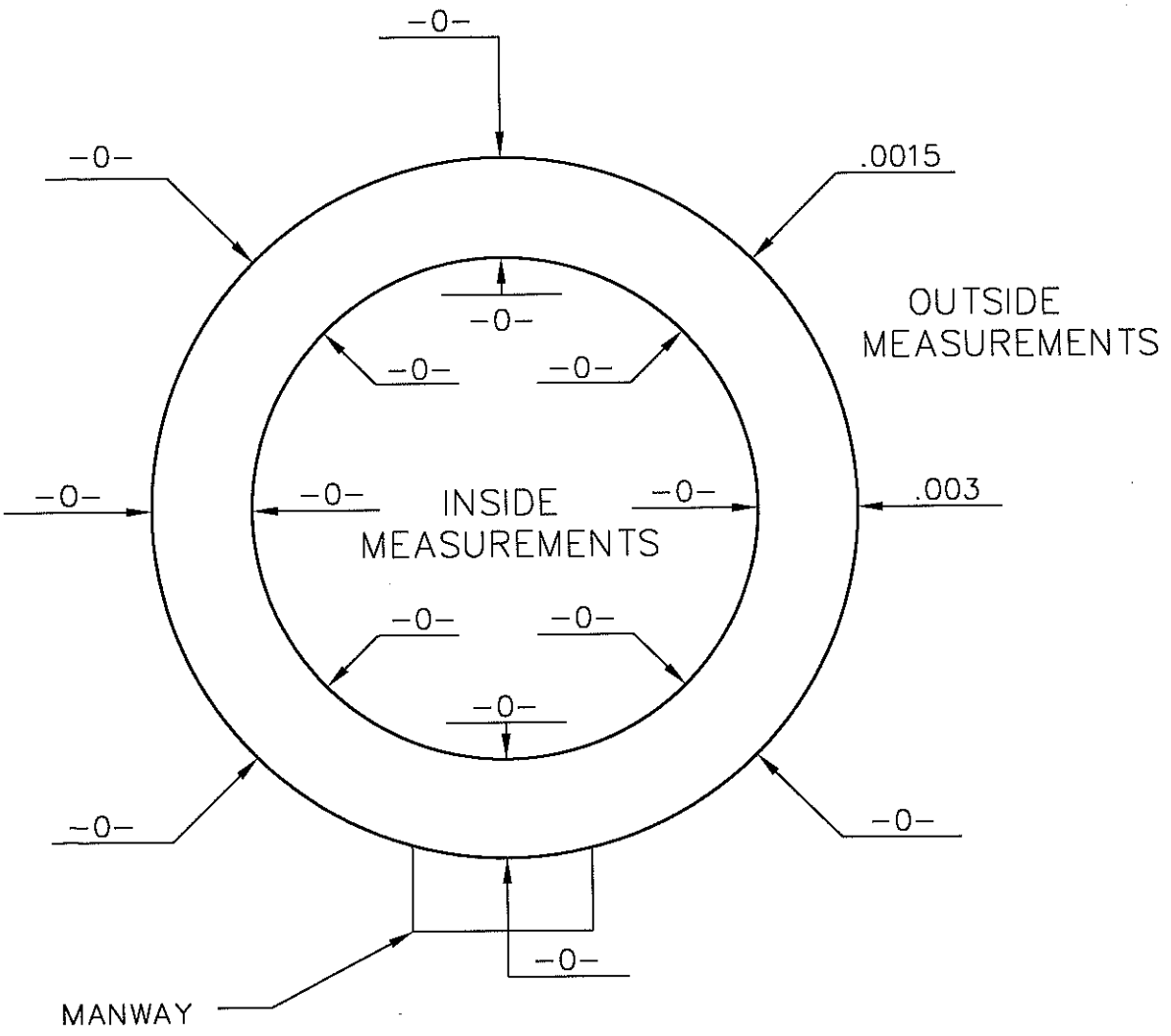
TEST BAR PER BES-2-1-101
JOMINY HARDENABILITY: J1=58, J4=58, J8=56, J16=55, J32=55
BHN:
#1 = 321,321,302,302
#2 = 302,302,293,302
#3 = 302,321,321,293

QUALITY CONTROL REPRESENTATIVE

DATE: 09/25/98

BALLRING CLEARANCE REPORTS

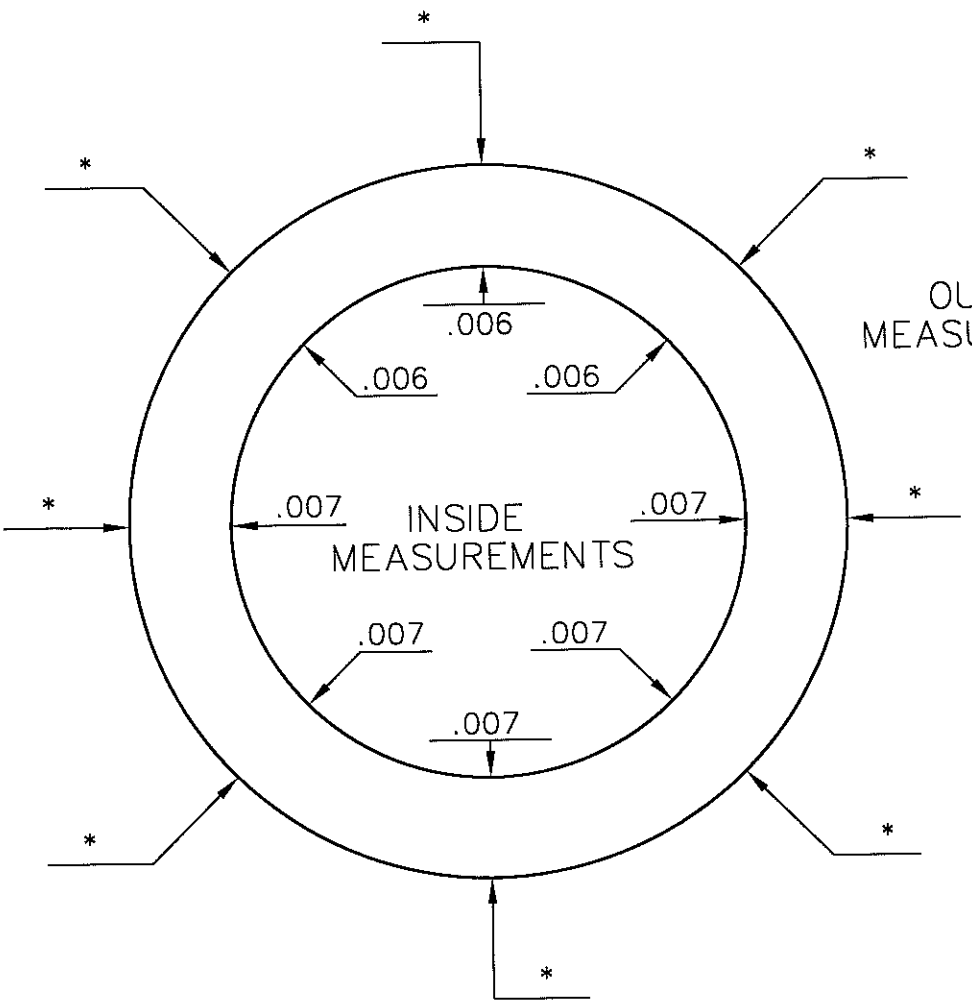
BALLRING TO PEDESTAL CLEARANCE REPORT



TOP VIEW

WELDMENT SERIAL NUMBER	: 98292-01
WELDMENT PART NUMBER	: N98SK1-238
CRANE MODEL NUMBER	: 340LA-160
CRANE SERIAL NUMBER	: 059803C
CUSTOMER	: PEMEX
REMARKS	: ALL BOLTS FIT, TOP OF FLANGE PARALLEL WITH BOTTOM

BALLRING TO UPPERSTRUCTURE CLEARANCE REPORT



* INDICATES LESS THAN .003

TOP VIEW

WELDMENT SERIAL NUMBER	: 98279-01
WELDMENT PART NUMBER	: N61584-001
CRANE MODEL NUMBER	: 340LA-160
CRANE SERIAL NUMBER	: 059803C
CUSTOMER	: BROWN & ROOT/PEMEX
REMARKS	: ALL BOLTS FIT
	ALL MACHINED HOLES
	WITHIN TOLERANCE.

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

PFC 4 QA

**********CERTIFIED MATERIAL TEST REPORT**********

MANUFACTURER ID: n

PART NO.	QUANTITY	LOT NO.	DESCRIPTION
123350	280	97190C	1 1/4-7 X 4 1/2 GR 8 HX CAP SCREW PLAIN

MATERIAL GRADE -4135M

--CHEMISTRY **CHEMISTRY COMPOSITION (WT% HEAT ANALYSIS) BY MATERIAL SUPPLIER

MATERIAL NUMBER	HEAT NUMBER	C	MN	P	S	SI	CR	MO	V
RM012834	BT 680B185	.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		164074	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

ACCREDITED

JOHN R. HARDEN
QUALITY CONTROL SUPERVISOR

4 of 4 PAGES Ver 101 # 235-12759-HO 8/19/98 PFC

INFASCO

BOLTS, NUTS AND FASTENER PRODUCTS

LOT NO.: 9707-58284

FASTENER TEST REPORT

(THIS DOCUMENT MAY BE REPRODUCED, BUT ONLY IN ITS ENTIRETY)

10655
QUALITY BOLT & SCREW
9454 S. CHOCTAW DRIVE
BATON ROUGE, LA 70815
U.S.A.

PART NO.:	DATE: 1998-06-23
CUSTOMER P.O. NO.:	REFERENCE NO.:
INVOICE DATE:	INVOICE NO.:

DESCRIPTION AND MARKING: HEX HD CAP SCREW GR8 UNC
SOLID TRIANGLE & 6 RADIAL LINES

SIZE:	GRADE:	QUANTITY
1 1/4-7 X 4	ALLOY-4042	20,500

HEAT CHEMICAL ANALYSIS

	C %	Mn %	P %	S %	Si %	Mo %			
C11511	0.410	0.840	0.006	0.012	0.270	0.210			

MECHANICAL PROPERTIES (TESTED ACCORDING TO ASTM F606/606M) CORROSION RESISTANCE (ASTM B117)

	PROOF LOAD (PSI)	WEDGE TENSILE STRENGTH (PSI)	SHEAR STRENGTH	HARDNESS (HRB)	CORE HARDNESS (HRC)
SPECIFIED	120,000	150,000			C 33.0
				58.6	C 39.0
SAMPLE NO.1-	120,000	154,000		50.3	C 34.4
NO.2-	120,000	156,000		50.5	C 34.6
NO.3-	120,000	152,000		50.8	C 34.1
NO.4-	120,000	158,000		50.6	C 34.1
NO.5-	120,000	155,000		50.7	C 34.5

THE ABOVE TESTED SAMPLES COMPLY IN ALL RESPECTS WITH THE FOLLOWING SPECS:
SAE J-429 ANSI/ASME B18.2.1 THREADS PER ANSI B1.1 CLASS 2A UNLESS OTHERWISE SPECIFIED.THESE FASTENERS WERE OIL QUENCHED AND TEMPERED AT A TEMP.ABOVE 800 F

Raw material used by Infasco to manufacture fasteners is mercury and asbestos-free.

Original test report signed :
by MARCEL JEAN, Quality assurance manager
Copy of this test report signed

Manufactured by: CANADA, INFASCO

By: Francine Demers

FRANCINE DEMERS

700 Ouellette, Marieville (Quebec) Canada J3M 1P6
Tel. : (514) 658-8741 Fax : (514) 460-5498
Division of IFASTGROUPE and Company, Limited
Partnership (Ifastgroupe Inc., General partner)

Mar Lot # LLVAAF P/O # 045-01455-1

NUCOR FASTENER

A Division of Nucor Corporation

Post Office Box 6100 • Saint Joe, Indiana 46785 • Telephone 219/337-1600

CUSTOMER NUMBER 267 DATE SHIPPED 3/07/98
CUSTOMER NAME PORTEOUS FASTENER CO.
CUSTOMER P.O. # 17090930-CALIF NUCOR ORDER # 247482
CUSTOMER PART # 00080-4261-020 DATE TESTED 11/03/97

PFC 4 QA

**********CERTIFIED MATERIAL TEST REPORT**********

MANUFACTURER ID: n

PART NO.	QUANTITY	LOT NO.	DESCRIPTION
123390	144	82974A	1 1/4-7 X 6 1/2 GR 8 HX CAP SCREW PLAIN

--CHEMISTRY MATERIAL GRADE -4135MLV

MATERIAL NUMBER	HEAT NUMBER	**CHEMISTRY COMPOSITION (WT% HEAT ANALYSIS) BY MATERIAL SUPPLIER						
		C	MN	P	S	SI	CR	MO	V
RH011991	NU 251633	.38	.90	.008	.010	.27	.82	.16	.027

--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)
52.3	35.0	PASS	161008	166159
51.9	34.6	PASS	160922	166070
55.3	34.7	PASS	164069	169318
55.3	35.6	PASS	163942	169187
55.8	35.3	PASS	163419	168647
AVERAGE VALUES FROM 5 TESTS		PRODUCTION LOT SIZE 2900 PCS		
54.1	35.0		162672	167876

--SURFACE QUALITY WITHIN LIMITS PRESCRIBED IN SAE J1061A

--MICROHARDNESS TEST RESULT IN ACCORDANCE WITH SAE J121(HKN)
POSITION 1. 356 2. 371 3. 384
HEAT TREATMENT - AUSTENITIZED, OIL QUENCHED & TEMPERED (MIN 800 DEG F)

CERTIFICATE OF INSPECTION
PROVIDED BY
PORTEOUS FASTENER CO.
TO: A & B BOLT
ORDER NO. 300904ABBOLT

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.
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NUCOR FASTENER
A DIVISION OF NUCOR CORPORATION

John R. Harden

WALKER BOLT Manufacturing Co.
P.O. Box 38502
Houston, TX 77238-8502
(281)-448-4321

Customer : A & B BOLT
Customer PO # : 301513ABBOLT
Sales Order # : 57841
Date : 10/16/1998

Item	Quantity	Description
A	87	1-1/2" (6) X 5" HEX CAP SCREW W/CADMIUM PLATE W/COLORLES CHROMATE

Customer Part # :
Lot # : 57841-A1 Heat Code : 796
Specification : SAE J429 JULY 1997 GR. 8 W/CHARPY PER API2-C
Additional Req's : 100% VISUAL EXAMINATION

Heat #	C	Mn	P	S	Si	Ni	Cr	Mo
8067980	.40	.75	.009	.022	.24	1.84	.88	.22

Tensile

Lab #	Tensile PSI	Yield PSI	% Elong.	R.A. %
TR26249	164,110	151,329	16.4	56.7
TR26250	160,406	146,322	16.1	57.2

Hardness
321/352 HBS

Charpy Impact

Lab #	Specimen Size	Value	Temperature
C3510	10MM X 10MM	51.5/48.5/48.0 FT/LBF	0 F
C3511	10MM X 10MM	50.5/57.0/46.0 FT/LBF	0 F

Item	Quantity	Description
A	316	1-1/2" (6) X 5" HEX CAP SCREW W/CADMIUM PLATE W/COLORLESS CHROMATE

Customer Part # :
Lot # : 57841-A2 Heat Code : 797
Specification : SAE J429 JULY 1997 GR. 8 W/CHARPY PER API2-C
Additional Req's : 100% VISUAL EXAMINATION

Heat #	C	Mn	P	S	Si	Ni	Cr	Mo
8090646	.40	.75	.010	.016	.23	1.69	.80	.21

Tensile

Lab #	Tensile PSI	Yield PSI	% Elong.	R.A. %
TR26251	177,018	168,219	13.5	53.2
TR26252	174,537	166,581	15.2	55.8

Hardness
340/362 HBS

Charpy Impact

Lab #	Specimen Size	Value	Temperature
C3512	10MM X 10MM	35.5/37.0/41.0 FT/LBF	0 F
C3513	10MM X 10MM	42.5/40.0/40.0 FT/LBF	0 F

RICHARD W. SIVLEY
MY COMMISSION EXPIRES
November 27, 2000

STATE OF TEXAS
COUNTY OF HARRIS

Subscribed and sworn to before me this ___ day of October, 19 98

Richard W Sivley
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.

Brenda D Janczak
Brenda D. Janczak — Senior Quality Coordinator

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 # :
Lot # : 56815-A Heat Code : 687
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

BRENDA D. JANCZAK
MY COMMISSION EXPIRES
September 1, 1999

STATE OF TEXAS
COUNTY OF HARRIS
Subscribed and sworn to before me this 7th day of August, 19 98
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.
Tommie D. Holmes
Tommie D. Holmes QA/QC Manager

WIRE ROPE CERTIFICATES

P.O. #45292

2,175

BRIDON
AMERICAN

CERTIFICATE OF EXAMINATION OR TEST OF WIRE ROPE

MATERIAL SUPPLIED

WIRE ROPE DESCRIPTION: 7/8" 18X19 DY18 RREG HPTP

CUSTOMER: CERTEX GULF COAST

CUSTOMER ORDER NO.: 600493

BRIDON AMERICAN ORDER NO.: 20868

DATE TESTED: 4/28/99

REEL NUMBER: 030248C00

NOMINAL BREAKING LOAD (LBS.): 87,600

ACTUAL TEST LOAD (LBS.): 101,100

DATE: 7/26/99

SIGNED: David W. Sleightholm TECHNICAL DIRECTOR

NOTE: ACCEPTANCE STRENGTH IS NOMINAL BREAKING STRENGTH LESS 2-½% PER FED. SPEC. RR-W-410.D.

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, or Bridon American Corporation before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. Warning!

BRIDON American Corporation
280 New Commerce Boulevard Wilkes-Barre Pennsylvania 18706 570 822 0349 Fax 570 822 9180

PO# 45292

628 ft

BRIDON

AMERICAN

CERTIFICATE OF EXAMINATION OR TEST OF WIRE ROPE

MATERIAL SUPPLIED

WIRE ROPE DESCRIPTION: 3/4" 18X19 DY18 RREG DPTP

CUSTOMER: CERTEX GULF COAST

CUSTOMER ORDER NO.: 400665

BRIDON AMERICAN ORDER NO.: 19912

DATE TESTED: 4/29/99

REEL NUMBER: 030682A00

NOMINAL BREAKING LOAD (LBS.): 66,600

ACTUAL TEST LOAD (LBS.): 76,600

DATE: 4/30/99

SIGNED: David M. Sleightholm TECHNICAL DIRECTOR

NOTE: ACCEPTANCE STRENGTH IS NOMINAL BREAKING STRENGTH LESS 2-½% PER FED. SPEC. RR-W-410.D.

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, or Bridon American Corporation before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. Warning!

BRIDON American Corporation
250 New Commerce Boulevard Wilkes-Barre Pennsylvania 18706 570 822 3340 Fax 570 822 9180

PO # 45292
840

BRIDON
AMERICAN

CERTIFICATE OF EXAMINATION OR TEST OF WIRE ROPE

MATERIAL SUPPLIED

WIRE ROPE DESCRIPTION: 3/4" 6X25 EIP IW RREG BRZ

CUSTOMER: CERTEX GULF COAST

CUSTOMER ORDER NO.: 400935-PT

BRIDON AMERICAN ORDER NO.: 20612

DATE TESTED: 5/24/99

REEL NUMBER: 030608B00

NOMINAL BREAKING LOAD (LBS.): 58,800

ACTUAL TEST LOAD (LBS.): 60,100

DATE: 6/16/99

SIGNED: David W. Sleightholm TECHNICAL DIRECTOR

NOTE: ACCEPTANCE STRENGTH IS NOMINAL BREAKING STRENGTH LESS 2-½% PER FED. SPEC. RR-W-410.D.

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, or Bridon American Corporation before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. Warning!

LLOYD'S REGISTER QUALITY COMPANY ISO9002

BRIDON American Corporation
280 New Commerce Boulevard Wilkes-Barre Pennsylvania 18706 570 822 3349 Fax 570 822 9180

LOAD BLOCK CERTIFICATES

McKISSICK® P.O. BOX 3128 TULSA, OK. 74101

the Crosby® group, inc.

TELEPHONE 918/834-4611
TELEX 262569 CRSBY UR
FAX 918/834-9447

ISO 9001 REGISTERED FIRM

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

McKISSICK® P.O. BOX 3128 TULSA, OK. 74101

the Crosby® group, inc.

TELEPHONE 918/834-4611
TELEX 262569 CRSBY UR
FAX 918/834-9447

INDEX

- ORDER
- CERTIFICATE OF CONFORMANCE
- MATERIAL CERTIFICATION
- MAGNETIC CERTIFICATION
- PERSONNEL CERTIFICATION
- MACHINE CERTIFICATION

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

Priority: 1

Line #	Qty Ordered	Qty Allocat.	Prod. #	WH	U	Sts	Ctlg and Description	Invoice 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
SERIAL NO **98-165-85** **98-165-86** **98-165-87** **ART NO** 8014680	**M050T18EH 18" 45.5 METRIC TON** **API 2C CRANE BLOCK** **JOB#: 59801-100298** **JOB#: 59802-100298** **JOB#: 59803-100298**	**3**	**09-22-98**	**45.5 (MT) METRIC TON**

(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 T E S T C E R T I F I C A T E No: 1 105

P/O No P49077
Rel
S/O No 1 11695-001
B/L No 1 989-001 Shp 29Oct97
Inv No 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 Pcs Wgt
5.6250 X 17' 21,406

KREHER CERTS WITH SHIPMENT
HOLD FOR CUSTOMER RELEASE
F[illegible] #0092960
[illegible] 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.

[signature]

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

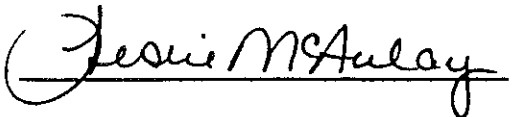
SPECIFICATIONS: ASTM CLASS AD (521-76(92) OR J (668-93)

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
Metlab Testing Services, Inc.

68[illegible] 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- 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

Parameter	Result
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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SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

68[illegible]st 38th Street
T[illegible]K 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- 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: A. Zubillaga
Aurelio Zubillaga, Supervisor
Metallurgical/Mechanical Testing

This document shall not be reproduced, except in full, without the written approval of Sherry Laboratories/Oklahoma. A2LA Certification # 785.01 & 785-02. The recording of false, fictitious, or fraudulent statements or entries on this document may be a punishable offense under federal and state law.

Det Danske Stålvalseværk A/S

DK 7500 Frederikshavn · Telefon 42 77 23 33 · Telefax 42 12 46 66 · Telex 40191

Seite/Page (2)

Nr./No. 86064

Typ/Type DIN 50049/3.1B

Ihre Auftrag/Your order: MUS-29385

Unser Auftrag/Our order: 28257

Datum/Date: 23.05.1997

9110 SAS167 00

CHARLEROI (USA)
FABRIQUE DE FER DE CHARLEROI
88 DANBURY ROAD
WILTON, CONNECTICUT
06897-4409 U.S.A.

Lieferanschrift/Delivery address:
NEW ORLEANS
USA
FOR FURTHER TRANSPORTATION BY BAR
MUSKOGEE, OKLAHOMA

Vorschrift/Specification:
SA 515-70, ASME SEC II PART A (95)
CVN : -46'C

Lieferung/Delivery: M/S ELISABETH G

Toleranz/Tolerance: ASME SA20

Pos.	Zeichen/Marking	Abmessungen/Dimensions				Stk./Pcs.	Gewicht/Weight	Schmelze/Heat	Stab	Walzen./Millno.	
16	3 MUS-29385	12192	2438	25,4		1	5927	38527	X8	8890V 1	N
17	3 MUS-29385	12192	2438	25,4	96 X	1	5927	38527	X5	8891V 1	N
18	3 MUS-29385 1"	12192	2438	25,4	480	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	120	1	2771	38938	A2	3200A 1	N
23	4 MUS-29385 3/8	12192	3048	9,5	X	1	2771	38938	D2	3206A 1	N
24	4 MUS-29385	12192	3048	9,5	480	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

Gewicht durch nominale Abmessungen berechnet / Calculated weight based on nominal dimensions — 26 99670

	C	Mn	Si	P	S	Cr	Cu	Ni	Mo	Sn	Al	Nb	Ti	V	B	N	Ceq - Carbon-Equivalent (IIW - formula)
16	17	111	30	16	8	9	27	8	1		26	0		1			40
17	17	111	30	16	8	9	27	8	1		26	0		1			40
18	17	111	30	16	8	9	27	8	1		26	0		1			40
19	17	111	30	16	8	9	27	8	1		26	0		1			40
20	18	109	27	26	15	13	22	8	2		35	0		2			41
21	19	115	26	18	3	11	30	9	1		50	13		2			43
22	19	115	26	18	3	11	30	9	1		50	13		2			43
23	19	115	26	18	3	11	30	9	1		50	13		2			43
24	19	118	26	23	15	12	31	10	1		54	14		1			43
25	19	118	26	23	15	12	31	10	1		54	14		1			43
26	19	120	27	24	7	11	31	9	1		41	14		2			44
	% x 100		% x 100		% x 100		% x 100				% x 100				% x 10000	% x 100	

Lieferzustand/Condition of Delivery
N = Normalisierend/Normalized 900°C
Dicke/Thickness :
- 25 mm min. 3 Minuten/Minute
25,1 - mm min. 5 Minuten/Minuten
W = Wasservergütet/quenched
Maßabweichung, Beschichtung / Dimension data, inspection
Ohne Beanstandung/Without complaint

Kennzeichnung/Marking

Standard/Quality
SA516-70
Sachverständigen/Quality - inspector
Schmelz-Nr. / Heat no.
1.10.999 Elektro-Ofen/Electric-furnace
Im Pfanne raffiniert/Ladle refined
10.000-19.999 Konverter-verfahren/Oxygen converter

	Zugversuch quer/Tensile test transverse						Kerbschlagbiegeversuch/Impact test KVA = ASTM - V										Warmzugversuch/Hot tensile test	
	Re	Rm	A	Re	Rm	A	1	2	3	Mittel/Average	Temp	1	2	3	Mittel/Average	Temp	*	$R_{t,2}$	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						1X		
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		
	N/mm²		%	N/mm²		%	Joule				°C	Joule				°C		N/mm²	°C

Bemerkungen/Remarks: A20 REPORTS FURNISHED

DATE 12-17-97

CUSTOMER McKissick Div.

CUSTOMER P.O. # M-9708292

CUSTOMER PART # 2008045

HEAT # 38527 PCS 1

HEAT # _____ PCS ____

* Probelage und Zustand / Testpiece location and condition

Probelage / Location	Lage/Position
1	10.0 Oberfläche/Surface
2	10.0 Mitte/Center
3	10.0 1/3 von Oberfläche/from surface
4	10.0 1/4 von Oberfläche/from surface
5	5.0
7	7.5
9	Blechdicke/Plate thickness

Zustand/Condition
X=KVA-LONG

Prüfvorschrift/Test No. --

Wir bestätigen, 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 specification.

26 MAI 1997

Z. Greisen

Z. Greisen
Chief Metallurgist
Det Danske Stålvalseværk A/S

SIDE PLATE P/N 8014681 PIC - WHCB

12/17

Det Danske Stålvalseværk A/S

DK-3300 Frederiksværk · Telefon 47 77 03 33 · Telefax 42 12 46 44 · Telex 40191

Bleche / Plate
Seite/Page: Nr./No. 86064
Type: DIN 50049/3.1B (2)

Ihrer Auftrag/Your order: MUS-29385
Unser Auftrag/Our order: 28257
Datum/Date: 23.05.1997

811C SAS'67 00

CHARLEROI (USA)
FABRIQUE DE FER DE CHARLEROI
88 DANBURY ROAD
WILTON. CONNECTICUT
06897-4409 U.S.A.

Lieferstelle/Delivery address:
NEW ORLEANS
USA
FOR FURTHER TRANSPORTATION BY BAR
MUSKOGEE, OKLAHOMA

Lieferung/Spezifikation
SA 516-70, ASME SEC II PART A (95)
CVN.: -46'C

Lieferung/Delivery: M/S ELISABETH G

Telemail/Telegramm: ASME SA20

Pos.		Zeichen/Marking	Abmessungen/Dimensions				Stk./Pcs.	Gewicht/Weight	Schmelze/Heat	Stab	Walzer./Millno.	
46	7	MUS-29385 3/4	12192	3048	19,1	150X 480	1	5572	38527	B2	8899V 1	N
*47	8	MUS-29385	12192	3048	25,4		1	7410	38529	X6	7295V 1	N
48	8	MUS-29385	12192	3048	25,4	120 X 480	1	7410	38529	X5	7296V 1	N
49	8	MUS-29385 1"	12192	3048	25,4		1	7410	38529	X7	7299V 1	N
50	8	MUS-29385	12192	3048	25,4		1	7410	38529	B5	7304V 1	N
51	9	MUS-29385	12192	2438	9,5		1	2217	38370	B1	9434V 1	N
52	9	MUS-29385	12192	2438	9,5		1	2217	38370	A2	9437V 1	N
53	9	MUS-29385	12192	2438	9,5	96X	1	2217	38370	D3	9438V 1	N
54	9	MUS-29385 3/8	12192	2438	9,5	480	1	2217	38370	B3	9439V 1	N
55	9	MUS-29385	12192	2438	9,5		1	2217	38370	B2	9440V 1	N
56	9	MUS-29385	12192	2438	9,5		1	2217	38370	C2	9442V 1	N

Gewichte durch nominelle Abmessungen berechnet
Calculated weight based on nominal dimensions: 56 227910

	C	Mn	Si	P	S	Cr	Cu	Ni	Mo	Sn	Al	Nb	Ti	V	B	N	Ceq - Carbon-Equivalent (IIW - formula)
46	17	111	30	16	8	9	27	8	1		26	0		1			40
*47	17	111	27	16	9	9	26	7	1		29	0		1			40
48	17	111	27	16	9	9	26	7	1		29	0		1			40
49	17	111	27	16	9	9	26	7	1		29	0		1			40
50	17	111	27	16	9	9	26	7	1		29	0		1			40
51	19	120	27	24	7	11	31	9	1		41	14		2			44
	19	120	27	24	7	11	31	9	1		41	14		2			44
	19	120	27	24	7	11	31	9	1		41	14		2			44
54	19	120	27	24	7	11	31	9	1		41	14		2			44
55	19	120	27	24	7	11	31	9	1		41	14		2			44
56	19	120	27	24	7	11	31	9	1		41	14		2			44
	¼ x 100		¼ x 1000			¼ x 100			¼ x 1000					¼ x 10000		¼ x 1000	

Lieferart/Condition of Delivery
N = Normalglüht/Normalized 900°C
Dicke/Thickness:
- 24 mm min. 3 Minuten/Minutes
25,1 - mm min. 5 Minuten/Minutes
W = Walzzustand/as rolled
Maschinelle Bearbeitung / Dimension durch Ingenieur
Ohne Reparaturschweißung/Without completion

Kennzeichnung/Marking

Stahlsorte/Quality: SA516-70
Schmelz-Nr./ Heat no.
1-25.999 Elektro-Ofen/Electric furnace
Im Pfanne raffiniert/Ladle refined
Kennzeichnungsverfahren/ Oxygen stamped

	Zugversuch quer/Tensile test transverse						Kerbschlagbiegeversuch/Impact test: KVA = ASTM - V											Warmzugversuch/ Hot tensile test	
	Re	Rm	A	Re	Rm	A	1	2	3	Mittel/ Average	Temp	1	2	3	Mittel/ Average	Temp	*	R0,2	Temp
46	364	526	26				124	88	70	94	-46						1X		
*47	359	521	31				142	120	133	132	-46						1X		
48	361	521	32				111	93	119	108	-46						1X		
49	362	522	28				122	113	126	121	-46						1X		
50	361	520	26				110	135	139	128	-46						1X		
51	423	576	19				89	144	129	121	-46						7X		
52	425	581	20				85	83	108	92	-46						7X		
53	421	573	18				126	113	163	134	-46						7X		
54	429	581	22				107	113	110	110	-46						7X		
55	429	582	20				15	64	79	53	-46						7X		
56	423	581	20				67	82	17	55	-46						7X		
	N/mm²		%	N/mm²		%	Joule				°C	Joule				°C		N/mm²	°C

Oberfläche/Plate condition: A200

* Probelage und Zustand
Test piece location and condition

Probenbreite / Width of test piece	Lage/Location
1 18,8	Oberflächenfehler
2 18,8	Mitte/Center
3 18,8	1/4 von Oberfl./from surface
4 18,8	1/4 von Oberfl./from surface
5 8,8	
7 7,5	
9 Blechdicke/Plate thickness	

Zustand/Condition: X=KVA-LONG

Prüfvorschrift/Test Spec. --

Wir bestätigen, daß die Lieferung den Anforderungen der abgenommenen Lieferbedingungen entspricht.
We hereby certify, that the material has been made and tested in accordance with the mentioned specification.

26 MAI 1997
Z. Greisen

Z. Greisen
Chief Metallurgist
Det Danske Stålvalseværk A/S

INSPECTED
2-19-98
McKissick Div.
P.O.# M-980124/1
F.F.# 2008045
38529 POS 3
POS

SIDE PLATE P/N 8014681
PIC - XHBD

HIGHVELD
WORKS & ADMINISTRATION
P.O. BOX 111 WITBANK 1035
TELEPHONE
National (01351) 909911
International 27 +35 909911
TELEX 3 38903 SA
FACSIMILE (01351) 97561

METALLURGICAL DIVISION

TEST CERTIFICATE

Test Certificate No P 25986

Sales Order No 200137/ 7

Account No -DREP 01

TO WHOM IT MAY CONCERN

Customer Order 2596P/5

Product PRIME HOT ROLLED MILD STEEL PLATE

Quality ASTM A516 GRADE 70 - 90
ASTM A515 GRADE 70 - 90
ASME SA516 GRADE 70 - 90
ASME SA515 GRADE 70 - 90

Dimensions 1 1/4" X 96" X 607.641 KG/M

Length 480"

Cast No	Slab No	C %	SI %	S %	P %	MN %	V %	NI %	CR %	CU %	AL %	MO %	NB %	PIECES	AREA SQ IN	GL INCH	YP KSI	UTS KSI	ELG %	C1 J	C2 J	C3 J	AVG
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	102	93	100	
R2743	257517 A													1	0,193	2	53	80	34	71	18	64	
R2743	257518 A													1	0,192	2	52	77	36	66	59	60	
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	1	0,191	2	50	74	38	40	43	42	
													TOTAL	4									

REMARKS GL = GAUGE LENGTH, YP = YIELD POINT, UTS = ULTIMATE TENSILE STRENGTH, ELG = ELONGATION
YESSEL SEA STAR
SLAB 257516/A WAS NORMALISED AT 910°C FOR 0 HR 50 MIN SLAB 257517/A WAS NORMALISED AT 931°C FOR 0 HR 45 MIN SLAB 257518/A WAS NORMALISED AT 916°C FOR 0 HR 45 MIN SLAB 257515/A WAS NORMALISED AT 896°C FOR 0 HR 45 MIN
MATERIAL TESTED AND SUPPLIED IN THE NORMALISED CONDITION
ROLLING TOLERANCE CONFORMS TO ASTM/ASME A/SA 20 - 92
CHARPY DIMENSION:10MM X 10MM X 55MM TESTED AT -40°C

METALLURGIST
DATE : 1996-10-16

MILL TEST REPORTS FURNISHED
BY UNI-STEEL, INC.
DATE 10-3-97
CUSTOMER McKissick Div.
CUSTOMER P.O. # M-9706526
CUSTOMER PART # 2008032
HEAT # R2743 PCS 1
HEAT # _____ PCS ____

PLATE ADAPT P/N 8008806
PIC - WHBV

CERTIFICATE OF TEST

Certification Date
13-FEB-1998

C OMER ORDER NUMBER
M9800974

7311 EAST PINE STREET
TULSA OK 74115

Invoice Number
S365909

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

[illegible]	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

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

FMI-917

CERTIFICATE OF TEST

Certification Date
13-FEB-1998

CUSTOMER ORDER NUMBER
M9800974

7311 EAST PINE STREET
TULSA OK 74115

Invoice Number
S365909

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

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® ☐ HY-ALLOY 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)	CUST. ORDER NO.	CUST. REQUISITION NO.
REPUBLIC ENGINEERED STEELS	M-9802774	

IAC	HEAT NO.	ORDER NO.	LINE NO.	SHIP QTY.	SHIP DATE
13738	8990870	185549	1	914.0	

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
CAST = 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

A.M. CASTLE & CO.

5/4/98

END

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

6825 East 38th 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: 1998050151- 1
Date Received: 05/11/98
Date Reported: 05/12/98

Attn: Steve Kendrick

P.O. No: M9803133

Sample Description: 3¾" 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

Parameter	Result
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

This document shall not be reproduced, except in full, without the written approval of Sherry Laboratories/Oklahoma. A2LA Certification # 785.01 & 785-02. The recording of false, fictitious, or fraudulent statements or entries on this document may be a punishable offense under federal and state law.

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

6 1st 38th 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: 1998050151- 1
Date Received: 05/11/98
Date Reported: 05/12/98

Attn: Steve Kendrick

P.O. No: M9803133

Sample Description: 3¾" 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

This document shall not be reproduced, except in full, without the written approval of Sherry Laboratories/Oklahoma. A2LA Certification # 785.01 & 785-02. The recording of false, fictitious, or fraudulent statements or entries on this document may be a punishable offense under federal and state law.

Gulf States Steel, Inc.

GADSDEN, AL 35904-1936

CERTIFICATE OF TESTS

ACCOUNT NUMBER	PAGE NO.	INVOICE NUMBER
76200002	1	742-78932

DATE SHIPPED	VEHICLE IDENTIFICATION
11 25 97	SOU 152055

12-M817-01	
32807 02 [illegible]	
PURCHASE ORDER NO.	SHIPPED FROM
MUS 12602	ADA CITY
PURCHASE ORDER DATE	10 01 97

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

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

SOLD TO:
UNI - STEEL INC
P O BOX 3928
ENID OK 73702

SHIP TO:
UNI - STEEL INC
YAFFE DIVISION
MUSKOGEE OK

MATERIAL DESCRIPTION:
PLATE CARBON SAE-1035 NOD KILLED PHYSICAL PROPERTIES INTO ONLY DIN 50049PAR 3.1B
MELTED & MFG IN USA

.6750 X 96 0000 SHEARED EDGE X 240.0000 IN
HT 7261797 1 PCS
HT 7461797 3 PCS

CH C 31/38 MN 60/90 P 040MX S 050MX SI 15/30 AL RPT

MR YLD RPT TEN RPT %ELONG MIN 8 IN 1

II 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-98038050
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	GRAIN	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E
7261797		.36	0.81	.007	012	220							042					
7461797		36	0.81	.007	012	.220							042					

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG 2"	% ELONG 8"	HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS 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	83.0		23			AR	.53							

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY 1	ENERGY 2	ENERGY 3	ENERGY AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG	MILS LATERAL EXPANSION 1	MILS LATERAL EXPANSION 2	MILS LATERAL EXPANSION 3	MILS LATERAL EXPANSION AVG

SHEAVE P/N 2004369
PIC-WEB-XEBG

11/5/98

P.02 02 UNI-STEEL,INC 07:57 SEAT-FT-NOT

Gulf States Steel, Inc. GADSDEN AL 35904-1935

12-M744-01

CERTIFICATE OF TESTS

SALES ORDER NO. LIST	NUMBER	ITEM	MFG	PURCHASE ORDER DATE
6	52051	01	742	08 15 97

ACCOUNT NUMBER	PAGE NO	INVOICE NUMBER
76200005	1	742-77104

PURCHASE ORDER NO	SHIPPED FROM	DATE SHIPPED	BOL TE/VEHICLE IDENTIFICATION
US 31814	ALA CITY	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

SOLD TO
UNI - STEEL INC
P O BOX 3528
ENID OK 73702

UNI - STEEL INC
JOHNSTON TERMINAL TRACK#747
4901 HAROLD STOGGINS DR
MUSKOGEE OK 74402

MATERIAL DESCRIPTION

PLATE CARBON SAE-1035 MOD KILLED PHYSICAL PROPERTIES INFO ONLY DIN 50049PAR 3 1B
MELTED & MFG IN USA

6250 X 96.0000 SHEARED EDGE X 252.0000 IN
HT 7461585 4 PCS

CH C 31/38 MN 60/90 P 040MX S 050MX SI 15/30 AL RPT

MR YLD RPT TEN RPT %ELONG MIN 8 IN 1

TI 3 TR CA SIGNED COPIES REQUIRED

TOTAL WT 17,152# PCS 4

QUANTITY SHIPPED 17152

MILL TEST REPORTS FURNISHED BY UNI-STEEL, INC.
DATE 2-3-98
CUSTOMER McKissick
CUSTOMER P.O. # M-980020
CUSTOMER PART # 94090
HEAT # 7461585 PCS 3
HEAT # PCS

TEST CERTIFICATES ARE PREPARED IN ACCORDANCE WITH PROCEDURE OUTLINED IN DIN 50049 PARA 3 1B

SHEAVE P/N 2004369
PIC-WEB-XEBR

C. F Bearden, Jr.

HEAT NUMBER	GRAIN	C	Mn	P	S	SI	Cu	Ni	Cr	Mo	CD	V	AL	N	B	Ca	Ti	CE
7461585		34	0.71	013	008	219							035					

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG 2"	% ELONG 8"	HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS 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 1	2	3	AVG	% SHEAR 1	2	3	AVG	MILS LATERAL EXPANSION 1	2	3	AVG

2/3/98
KP

STEEL OPERATIONS **CERTIFICATE OF TEST** **TIMKEN**

1836 DUEBER AVE. S.W. CANTON, OHIO 44706 WORLDWIDE LEADER IN BEARINGS AND STEEL

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"

CHEMICAL ANALYSIS

HEAT	C	MN	P	S	SI	CR	NI	MO	CU	PIECE NO.	CV NO.
25054 LADLE	.27	.86	.012	.030	.26	.12	.11	.02	.15		

LONGITUDINAL TENSILE TEST

HEAT	PIECE NO.	.20% YIELD STRENGTH P.S.I.	TENSILE STRENGTH P.S.I.	ELONG IN	ELONG %	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 _____ BY

NOTARY PUBLIC

Jeff Jacoby
Supervisor-Met. Order Processing

1/24/96 4D

A4-I760-01

Gulf States Steel, Inc.

GADSDEN AL 35904-1935

CERTIFICATE OF TESTS

DIST	SALES ORDER NO. NUMBER	ITEM	MFG
6	30440 03	142	

PURCHASE ORDER DATE: 05 22 97

PURCHASE ORDER NO.: 30678

SHIPPED FROM: ALA CITY

ACCOUNT NUMBER	PAGE NO.	INVOICE NUMBER
76200005	2	742-69430

DATE SHIPPED: 06 25 97

ROUTE/VEHICLE IDENTIFICATION: TTPX 80834

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

SOLD TO:
UNI - STEEL INC
P O BOX 3528
ENID OK 73702

UNI - STEEL INC
DECOIL WAREHOUSE
4901 HAROLD STOGGINS DRIVE
MUSKOGEE OK 74402

MATERIAL DESCRIPTION

PLATE CARBON SAE-1035 ROD KILLED PHYSICAL PROPERTIES INFO ONLY DIN 50049PAR 3.1B
MELTED & MFG IN USA

.6250 X 96.0000 SHEARED EDGE X 252.0000 IN — QUANTITY SHIPPED
HT 7249739 2 PCS 8576

CH C 31/38 MN 60/90 P 040MX S 050MX SI 15/30 AL RPT

MR YLD RPT TEN RPT %ELONG MIN 8 IN 1

TI 3 TR CA SIGNED COPIES REQUIRED

TOTAL WT. 76,202# PCS 11

MILL TEST REPORTS FURNISHED BY UNI-STEEL, INC.
DATE 4-24-98
CUSTOMER McClissick
CUSTOMER P.O. # M-980702
CUSTOMER PART # 94090
HEAT # 7249739 PCS 2
HEAT # PCS

SHEAVE P/N 2004369
PIC-WEB-XECF

C. F. Bearden, Jr.

CHEMICAL ANALYSIS

HEAT NUMBER	GRAIN	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C E
7249739		.35	0 75	.008	.013	.250							066					

MECHANICAL TESTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG 2"	% ELONG 8"	HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS 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 1	ENERGY 2	ENERGY 3	ENERGY AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG	MILS LATERAL EXPANSION 1	MILS LATERAL EXPANSION 2	MILS LATERAL EXPANSION 3	MILS LATERAL EXPANSION AVG

4/27/98
KB

Dalmine

PLANT:
ARCORE

INSPECTION CERTIFICATE

(UNI EN 10204 3.1.B)

N. 97/04886

CU OMER'S ORDER D1175 - tubular steel 1247H
CUSTOMER'S REFER. TSI/1247H
MILL ORDER / ITEM 3901139/006
EXP REFERENCE c/6177C HOUSTON SH8030

SIDERCA CORPORATION
4511 BRITTMOORE RD.
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 PHISICALS, 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 DIAM. 12,5 SECTION 122,7 mm2

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	
(%):	requir.min 19,5		result 33,0
REDUCTION (%):	requir min		result 60,0

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

HE 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 01/04/1997

DALMINE S.p.A

CHIEF OF INSPECTION DPT
Marco BRAMBILLA

10/14/97

Follows

Cod225

Dalmine
PLANT:
ARCORE

INSPECTION CERTIFICATE

(UNI EN 10204 3.1.B)

N. 97/06694

Page 1

CUSTOMER'S ORDER D1476 - tubular steel 2849T — SIDERCA CORPORATION
CUSTOMER'S REFER. TSI/2849 - 123
MILL ORDER / ITEM 3901371/009 MORELOS SH80[illegible]1 — 2121 BRITTMOORE 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 PHISICALS, 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 DIAM. 12,5 SECTION 122,7 mm2

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		
(%):	requir.min 19,5	result	34,6
REDUCTION (%):	requir min	result	60,0

HARDNESS HB requ. max 187,0 result from 170,0 to 172,0
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 % TEST N. 00001

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 DEGASSED --- GRAIN SIZE FINE
THE MATERIAL WAS PRODUCED ACCORDING TO ASTM A519/93 AND ASTM / ASME

SHEAVE P/N 2004369
PIC-HUB-WFGL

DATE 18/04/1997

DALMINE S.p.A

CHIEF OF INSPECTION DPT
Marco BRAMBILLA

19/2d 97

Follows

Cod225

CERTIFICATE OF TEST

EMJ

Certification Da
13-MAY-1997

CUSTOMER ORDER NUMBER
M9703037

7311 EAST PINE STREET
TULSA OK 74115

Invoice Number
T330403

CUSTOMER PART NUMBER
91411

SOLD TO: MCKISSICK PRODUCTS CO

P O BOX 3128
TULSA OK 741013128

SHIP TO: MCKISSICK PRODUCTS CO

2801 DAWSON RD GATE 1
TULSA OK 74110

Description: CARBON HFS 1026 MECH A519
6.500 OD X 1 1/4ID X 20 R/L
HEAT: N3371

Quantity: 22.75 FT

ITEM: 113464

Specifications:
ASTM A519 94

CHEMICAL ANALYSIS

C	MN	P	S	SI	CR	NI	MO	CU
0.27	0.85	0.008	0.031	0.26	0.1	0.28	0.04	.25

RCPT: R 56516
MILL : TIMKEN COMPANY

COUNTRY OF ORIGIN : USA

dw 5-14-97

SHEAVE P/N 2004369
PIC-HUB-WFEH

The above data were transcribed from the manufacturer's Certificate of Test after verification for co teness and specification requirements of the information on the certificate. All test results ren a 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

32-M634-02

Gulf States Steel, Inc.

GADSDEN AL 35904-1935

CERTIFICATE OF TESTS

GSS ORDER NO. DIST	NUMBER	ITEM	MFG	PURCHASE ORDER DATE
6	49359	01	742	03 11 97

ACCOUNT NUMBER	PAGE NO	INVOICE NUMBER
76200005	1	742-67226

PURCHASE ORDER NO	SHIPPED FROM	DATE SHIPPED	ROUTE/VEHICLE IDENTIFICATION
29815	ALA CITY	05 20 97	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

SOLD TO
UNI - STEEL INC
P O BOX 3528
ENID OK 73702

SHIP TO (SAME AS SOLD TO UNLESS OTHERWISE INDICATED)
UNI - STEEL INC
DECOIL WAREHOUSE
4901 HAROLD STOGGINS DRIVE
MUSKOGEE OK 74402

MATERIAL DESCRIPTION

PLATE CARBON SAE-1035 MOD KILLED PHYSICAL PROPERTIES INFO ONLY DIM 50049PAR 3.1B
MELTED & MFG IN USA
CUST ID: 1

.6250 X 96.0000 SHEARED EDGE X 252.0000 IN
HT 7454197 8 PCS

CH C 31/38 MN 60/90 P 040MX S 050MX SI 15/30 AL RPT

MR YLD RPT TEN RPT %ELONG MIN 8 IN 1

TI 3 TR CR SIGNED COPIES REQUIRED

TOTAL WT 34,304# PCS 8

QUANTITY SHIPPED

MILL TEST REPORTS FURNISHED 34304
BY UNI-STEEL, INC.
DATE 8-25-97
CUSTOMER McKissick
CUSTOMER P.O. # M-9705585
CUSTOMER PART # 94090
HEAT # 7454197 PCS 2
HEAT # _____ PCS ____

SHEAVE P/N 2004369
PIC-WEB-WECV

C. F. Bearden, Jr.

ANALYSIS

HEAT NUMBER	GRAIN	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Cb	V	Al	N	B	Ca	Ti	C.E
7454197		.37	0.87	.008	.016	.236							.005					

TEST RESULTS

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	YIELD KSI	TENSILE KSI	% ELONG 2"	% ELONG 8"	HARDNESS	BEND TEST	HEAT TREAT	YS/TS RATIO	% RED. AREA	GALV COATING	DROP WEIGHT TEAR TESTS DIR	TEMP °F	1	2	AVG
7454197	R213901	53.0	86.0		22			AR	.61							
7454197	R213902	54.0	86.0		23			AR	.62							

HEAT NUMBER	TEST OR PIECE IDENTITY NO.	HEAT TREAT	SIZE	DIR	TEMP °F	ENERGY 1	ENERGY 2	ENERGY 3	ENERGY AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG	MILS LATERAL EXPANSION 1	MILS LATERAL EXPANSION 2	MILS LATERAL EXPANSION 3	MILS LATERAL EXPANSION AVG

8/26/97
80

McKISSICK® P.O. BOX 3128 TULSA, OK. 74101

the Crosby® group, inc.

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

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

5 East 38th 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: 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

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CERTIFICATE OF TEST

Certification Date
8-JUL-1998

CUSTOMER ORDER NUMBER
M-9804274-3

CUSTOMER PART NUMBER
92884

3116 E. 31ST STREET NORTH
TULSA OK 74110

Invoice Number
T355736

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

L	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 JM-1231
JOHN D. EDWARDS, P.E.

Concentra Medical Centers
1541 North Sheridan Road Tulsa, OK 74115
Phone: (918) 836-5408 Fax: (918) 832-8818

Service Date: 04/27/98

Vision Examination Record

Patient:	Dout, Dion	Address:	4103 W Pipestem Drive	Employer:	McKlasick Products
SSN	445-76-6517			Address:	PO Box 3128
DOB.	02/06/65		SKIATOOK, OK 74070		Tulsa, OK 74101
Gender:	M	Phone:	(918) 396-1944	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) If Yes, please explain: _____
Alguna vez ha tenido una enfermedad o lesion 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)
Ninqún miembro de su familia sufre de una enfermedad de los ojos? (glaucoma, perdida de vision, 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 ultima examinacion de vista::

Have you ever had disease of, or injury to: (Ha tenido o padecido alguna vez de:)

Back/Spine (Espalda-Espinazo)	Yes (No)	Back Pain (Dolor de espalda)	Yes (No)	Nervous Breakdown (Ataque nervioso)	Yes (No)
Head (Cabeza)	Yes (No)	Rheumatism (Reumatismo)	Yes (No)	Excessive Drinking (Tomar exceso)	Yes (No)
Bones (Huesos)	Yes (No)	Diabetes (Diabetes)	Yes (No)	Drug Habits (Habito de drogas)	Yes (No)
Joints (Articulaciónes)	Yes (No)	Seizures (Ataque repentino)	Yes (No)	Cancer (Cancer)	Yes (No)
Heart (Corazón)	Yes (No)	Dizziness (Desvanecimiento)	Yes (No)	Varicose Veins (Venas varicosas)	Yes (No)
[illegible] ulmones)	Yes (No)	Asthma (Asma)	Yes (No)	Encephalitis (Encefalitis)	Yes (No)
Kidneys (Riñones)	Yes (No)	TB (Tuberculosis)	Yes (No)	Stomach Ulcer (Ulceras)	Yes (No)
Intestines (Intestinos)	Yes (No)	High Blood Pressure (Presion alta)	Yes (No)	Incurable Disease (Enfermedad Incurable)	Yes (No)

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 ACCUITY

	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:	____	____

M.D.
Physician's Signature

Revision Date: 07/15/97

Baker Electronic Services, Inc.

P.O. Box 742228
Houston, Texas 77274-2228
(713) 774-7132

MAGNETIC PARTICLE UNIT CERTIFICATION

INSTRUMENT: MAGNAFLUX CA6/0 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 ±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

AMP and Time Meter Model ATS-203
S/N 2929233

The above instrument was tested at Test Systems International, Inc., Sante 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 # 990424431

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
ADDRESS: 5918 GRAPE ST.
CITY: HOUSTON,
STATE: TX ZIP: 77074
PHONE NUMBER: (713) 774-7132

INSTRUMENT: AMMETER STANDARD
MANUFACTURE: TEST SYSTEMS INT'L.
MODEL NUMBER: ATS-20B
SERIAL NO.: 2929233
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 DATE	CALIBRATION DUE	CONTROL ACCURACY
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%
DVM 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 Z540-1

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 AVG FWDC	AVG AC	AVG HWDC	TRMS FWDC	TRMS AC	TRMS HWDC	PEAK
500	.500	.500	.500	.500	.500	.500	—
1,000	1.000	1.000	1.001	1.002	1.000	1.000	1.010
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	—
10,000	10.02	10.01	10.03	10.02	10.00	10.00	10.12
15,000	15.02	15.01	15.04	15.02	15.00	15.00	—

DURATION METER SECONDS REF. INPUT	METER
2.016	2.02
10.03	10.01

Performed By: Dmy Approved By: Tom Mulvaney EE

OVERHAUL BALL CERTIFICATES

McKISSICK® P.O. BOX 3128 TULSA, OK. 74101

the Crosby® group, inc.

TELEPHONE 918/834-4611
TELEX 262569 CRSBY UR
FAX 918/834-9447

DNV Certification, Inc. USA — ACCREDITED REGISTRAR — ANSI-RAB — DNV — DNV MSC The Netherlands Accredited by the RvA

ISO 9001 REGISTERED FIRM

APPLIED HYDRAULIC SYSTEMS, INC.

SERIAL NO:

98-169-29

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#)

McKISSICK® P.O. BOX 3128 TULSA, OK. 74101

the Crosby® group, inc.

TELEPHONE 918/834-4611
TELEX 262569 CRSBY UR
FAX 918/834-9447

INDEX

- **ORDER**
- **CERTIFICATE OF CONFORMANCE**
- **MATERIAL CERTIFICATION**

ducts 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

PART OF THE FKI GROUP OF COMPANIES

OB0005.03 1 Order Inquiry 9:16:16 CROSBY

Regular Order Discounted Order- 4 % Entered By DOUG 7/23/98

Customer No. 2980 Order Number 932288 Last maintained by MEB 7/17/98

PLIED 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

Certificate Form No. 932288

Customer Purchase Order No. 38140

Crosby Group Order No. 932288

the Crosby group, inc.

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 **98-169-29**	**MB10T285E 10 TON** **UB500** **API 2C OVERHAUL BALL** **(365#)**	**1**	**10-09-98**	**20,000LBS**
PART NO 8014742	**JOB# 059801-100298** **JOB# 059802-100298** **JOB# 059803-100298**			

(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

Joanne Nutter

Die # 1034

Bill To:
LEBUS MANUFACTURING
SUB CROSBY GROUP
P.O. BOX 271
LONGVIEW TX
75606 US

Ship To: 2
LEBUS MANUFACTURING
900 FISHER ROAD
LONGVIEW TX
75604 US

Order Date:12/11/1997
PO No:49896*
Mill Order No:1737568
Load No:443543
Manifest No:1215412

CERTIFIED MATERIAL TEST REPORT

[redacted]
300 Ward Rd.
Midlothian, TX
76065-9651
(972) 775-8241

SPECIFICATIONS	SIZE	GRADE	LENGTH	PRODUCT
~~ASTM A29-93a, A322-91~~	2 1/8 ROUNDS	4130R I	19 FT 7 IN	ROUNDS

HEAT NO: 11375160

98-64
N20-A-11-X5B

CHEMICAL ANALYSIS

C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Al	Nb	Ti	CE
.29	.51	.008	.009	.21	.29	.11	.90	.170	.017	.004	.028	.001	.001	.47

Grain Size Practice: FINE GRAIN

PHYSICAL PROPERTIES

JOMINY RESULTS: Normalize temp: 1650°F 899°C Quench temp: 1600°F 871°C

J2	J6
49	34

SOUNDNESS	CLEANLINESS		TURNDOWN	
S R C	SILICATE	OXIDE	FREQUENCY	SEVERITY
1 1 1	0	1	0	0

SPECIMEN TYPE

All manufacturing processes of this product, including melting and casting, occurred in the U.S.A.

"I hereby certify that the contents of this report are correct and accurate. All tests and operations performed by this material manufacturer or its sub-contractors, when applicable, are in compliance with the requirements of the material specifications and applicable purchaser designated requirements."

Signed: [signature] Date: Feb. 05, 1998
Tom L. Harrington: Quality Assurance Manager

Signed: _____ Date: _____
Notary Public (if applicable)

P.O.# 980271

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

0825 East 38th 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: 1998040497- 2
Date Received: 04/29/98
Date Reported: 05/05/98

Attn: Steve Kendrick

P.O. No: M9802890

Sample Description: 320-AN 11 Ton eye hook API 2C.
PIC Code: X5B
WO#: 196315 - P/N: 8010401.
Specimen removed from 4/5 radius.

Test Report (ASTM E 8-96) RT, Longitudinal Tensile

Parameter	Result
Diameter, in.	.502
Tensile Strength, psi	129,000
Yield Strength, psi by 0.2% offset	110,000
Elongation in 4D, %	19
Reduction of Area, %	59

Hardness Test

Testing Specification:	ASTM E18-94
Hardness Scale:	ROCKWELL "C"
Acceptance Criteria:	N.A.
Actual Coupon Hardness:	26.0, 27.0, 26.0

Approved By: A. Zubillaga
Aurelio Zubillaga, Supervisor
Metallurgical/Mechanical Testing

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INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

6825 East 38th 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

Attn: Steve Kendrick

Report No: 1998040497- 2
Date Received: 04/29/98
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P.O. No: M9802890

Sample Description: 320-AN 11 Ton eye hook API 2C.
PIC Code: X5B
WO#: 196315 - 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.):	74, 63, 70
Lateral Expansion(Mils):	16, 14, 19
Shear(%):	70, 65, 70

Approved By: _____
Aurelio Zubillaga, Supervisor
Metallurgical/Mechanical Testing

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McKISSICK® P.O. BOX 3128 TULSA, OK. 74101

the Crosby® group, inc.

TELEPHONE 918/834-4611
TELEX 262569 CRSBY UR
FAX 918/834-9447

CROSBY/McKISSICK PRODUCT NUMBER: 2009243

DATE: 10/09/98

DESCRIPTION/SPECIFICATIONS:
SWIVEL EYE BARREL **PIC: CG**

CHEMICAL ANALYSIS

HEAT NO: B374S-CG	**C.** .230	**Mn.** .760	**P** .016	**S** .007	**Si** .450
	Cr .450	**Mo** .190	**Ni** .520	**Cu** .100	**V** .012
	W .020				

PHYSICAL PROPERTIES
(P S I)

YIELD STRENGTH	TENSILE STRENGTH
111,400	124,900

ELON %	RED OF AREA %	HRC
18	53	24

CHARPY "V" NOTCH
-25° F (FT-LBS)
57-60-60

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.

Joanne Nutter

QUALITY ASSURANCE CLERK
JOANNE NUTTER

McKISSICK® P.O. BOX 3128 TULSA, OK. 74101

the Crosby® group, inc.

TELEPHONE 918/834-4611
TELEX 262569 CRSBY UR
FAX 918/834-9447

MATERIAL DATA

CROSBY/McKISSICK PRODUCT NUMBER: 2009245

DATE: 10/09/98

DESCRIPTION/SPECIFICATIONS:
SWIVEL LOWER EYE **PIC:**H30

CHEMICAL ANALYSIS

HEAT NO:	C.	Mn.	P	S	Si
H30	.1665	.8627	.0211	.0190	.4724
	Cr	**Mo**	**Ni**	**Cu**	**Al**
	.4838	.2524	.6994	.1035	.0194
	V				
	.0014				

PHYSICAL PROPERTIES (P S I)

YIELD STRENGTH	TENSILE STRENGTH
90,300	107,800

ELON %	RED OF AREA %	BHN
21	55	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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Joanne Nutter

QUALITY ASSURANCE CLERK
JOANNE NUTTER

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)	CUST. ORDER NO.	CUST. REQUISITION NO.
BARTECH INC.	M-9804550	

IAC	HEAT NO.	ORDER NO.	LINE NO.	SHIP QTY.	SHIP DATE
3243	680W019 H186	206997	2	873.0	

DESCRIPTION

3 RD A4140 CF HT A193-87 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 * * *

NSILE 139000 PSI, YIELD 122000 PSI, ELONG 17.1, R.A. 53.5
RDNS BHN 298/ 298, GRAIN = FINE, GRAIN 7/ 7, MACRO - C1 R1 S1, R.R. 6.2
CAST = STRAND, MERCURY FREE, WELD FREE, MEETS NAFTA = N

JOMINY

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-BC (1/4" THROUGH 4" ONLY), UNS#-G41400
OI=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

7/27/98

A.M. CASTLE & CO.

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metallab Testing Services, Inc.

Fax 918-627-3062
800-324-8378

LABORATORY REPORT

teve Kendrick
osby Group, Inc.
ox 3128
OK, 74101

Report No: 1998070487- 1
Date Received: 07/30/98
Date Reported: 08/06/98

P.O. No: M9804996

le Description: 3.00", Bar, API 2C
al: 4140
lo: 680W019H186
ode: XBDY
199582 - P/N: 2015014.
nen removed from 4/5 radius.

Room Temperature Tensile Test (ASTM E 8-96), Longitudinal

Parameter	Result
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

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SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Welch Testing Services, Inc.

Fax 918-627-3062
800-324-8378

LABORATORY REPORT

Steve Kendrick
rosby Group, Inc.
lox 3128
OK, 74101

Report No: 1998070487-1
Date Received: 07/30/98
Date Reported: 08/06/98

P.O. No: M9804996

le Description: 3.00", Bar, API 2C
rial: 4140
No: 680W019H186
ode: XBDY
199582 - P/N: 2015014.
imen removed from 4/5 radius.

Room Temperature Tensile Test (ASTM E 8-96), Longitudinal

Parameter	Result
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

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false, fictitious, or fraudulent statements or entries on this document may be a punishable offense under federal and state law.

CLEAR TOPPER

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Materials Testing Services, Inc.

682 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: 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

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Stålvalseværk A/S

[illegible] · Telefon 47 17 01 11 · Telefax 42 12 46 44 · Telex 43191

[illegible] SAS167 00

CHARLEROI (USA)
FABRIQUE DE FER DE CHARLEROI
88 DANBURY ROAD
WILTON, CONNECTICUT
06897-4409 U.S.A.

[illegible]/Specification:
SA 515-70, ASME SEC II PART A (95)
CVN - -46°C

Seite/Page [illegible] Nr./No. 86064
Type DIN 50049-3.1B (2)

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

Toleranz/Tolerance: ASME SA20

Pos.	Zeichen/Marking	Abmessungen/Dimensions				Stk./Pcs.	Gewicht/Weight	Schmelze/Heat	Stab	Walzer./Mill no.	
3	MUS-29385	12192	2438	25.4		1	5927	38527	X8	8890V 1	N
3	MUS-29385	12192	2438	25.4	96x	1	5927	38527	X5	8891V 1	N
3	MUS-29385 1"	12192	2438	25.4	480	1	5927	38527	X6	8892V 1	N
3	MUS-29385	12192	2438	25.4		1	5927	38527	X7	8895V 1	N
3	MUS-29385	12192	2438	25.4		1	5927	38159	A3	9209V 1	N
4	MUS-29385	12192	3048	9.5		1	2771	38938	D3	3199A 1	N
4	MUS-29385	12192	3048	9.5	120	1	2771	38938	A2	3200A 1	N
4	MUS-29385 3/8	12192	3048	9.5	X	1	2771	38938	D2	3206A 1	N
4	MUS-29385	12192	3048	9.5	480	1	2771	38940	X8	7839A 1	N
4	MUS-29385	12192	3048	9.5		1	2771	38940	D1	7843A 1	N
4	MUS-29385	12192	3048	9.5		1	2771	38370	C3	9365V 1	N

Gewicht durch approx. Abmessungen berechnet
Calculated weight based on nominal dimensions — 26 99670

	C	Mn	Si	P	S	Cr	Cu	Ni	Mo	Sn	Al	Nb	Ti	V	B	N	Ceq - Carbon-Equivalent (IIW - formula)
1	17	111	30	16	8	9	27	8	1		26	0		1			40
2	17	111	30	16	8	9	27	8	1		26	0		1			40
3	17	111	30	16	8	9	27	8	1		26	0		1			40
9	17	11	30	16	8	9	27	8	1		26	0		1			40
10	16	.09	27	26	15	13	22	8	2		35	0		2			41
11	19	115	26	18	3	11	30	9	1		50	13		2			43
12	19	115	26	18	3	11	30	9	1		50	13		2			43
13	19	115	26	18	3	11	30	9	1		50	13		2			43
14	19	118	26	23	15	12	31	10	1		54	14		1			43
15	19	118	26	23	15	12	31	10	1		54	14		1			43
16	19	120	27	24	7	11	31	9	1		41	14		2			44
	%x100			%x1000			%x100				%x1000					%x10000	

Lieferzustand/Condition of Delivery
N = Normalglühen/Normalized 900°C
Dicke/Thickness:
- 25 mm min. 3 Minuten/Minutes
25.1 - max. 5 Minuten/Minutes
+ = Wärmebehandelt nach/Heat treated acc. to
Mechanische Prüfungen/Mechanical tests
Chem. Analyse/Chemical analysis

Kennzeichnung/Marking:

Standard/Quality
SA516-70
Schmelzanalysen/Quality inspection:
Schmidt u. / Kent co.
1.st.99 Electric Ofen/Electric furnace
im Pfanne raffiniert/Ladle refined
99.000-99.999 Konverter-verfahren/Oxygen converter

	Zugversuch quer/Tensile test transverse						Kerbschlagbiegeversuch/Impact test . KVA = ASTM - V										Wärmebehandlung/Heat treatment	
	Re	Rm	A	Re	Rm	A	1	2	3	Mittel/Average	Temp	1	2	3	Mittel/Average	Temp	a	$R_{0,2}$	Temp
6	347	514	28				100	70	99	90	-46						1X		
7	352	515	28				108	91	66	88	-46						1X		
8	348	515	27				93	88	124	102	-46						1X		
9	356	518	28				140	87	130	119	-46						1X		
10	350	523	28				78	50	63	64	-46						1X		
11	420	574	23				80	117	74	90	-46						7X		
12	426	579	23				35	120	108	88	-46						7X		
13	429	584	21				129	176	179	161	-46						7X		
14	419	578	22				56	57	32	48	-46						7X		
15	419	576	26				70	64	61	65	-46						7X		
16	432	573	20				123	107	136	122	-46						7X		
	N/mm²	%		N/mm²		%	Joule				°C	Joule				°C		N/mm²	°C

Oberfläche/Surface: A200 [illegible] REPORTS FURNISHED
[illegible]
DATE 12-17-97
CUSTOMER McKissick Div.
CUSTOMER P.O. # M-9708292
CUSTOMER PART # 2008045
HEAT # 38527 PCS 1
HEAT # _____ PCS ____

Probenlage und Zustand / Test piece location and condition

Probenlage Place of sample	Lage/Location
1	1/4 Oberfläche/Surface
2	1/4 Mitte/Center
3	1/4 1/2 von Oberfläche zur Mitte / between surface and center
4	1/4 1/2 von Oberfläche zur Mitte / between surface and center
5	1/4
6	1/4
7	1/4 Breitseite/Flat side

Zustand/Condition
X=KVA-LONG

Prüfbescheinigung/Test Cert. --

Wir bestätigen, 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 specification.

26 MAJ 1997

Z. Greisen
Chief Metallurgist
Det Danske Stålvalseværk A/S

PLATE ADAPT P/N 2009242
PIC - WHCB

12/18/97 EG

CERTIFICATE OF MATERIAL TEST REPORTS

☐ Castle Metals® ☐ HY-ALLOY 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)	CUST. ORDER NO.	CUST. REQUISITION NO.
NORTH STAR STEEL COMPANY	M-9804149	3

IAC	HEAT NO.	ORDER NO.	LINE NO.	SHIP QTY.	SHIP DATE
2148	M68505 H256	202812	1	337.0	07/08/98

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
HARDNS BHN 304/ 304, 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	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
1.625 X 6.656

P/N 2009240
PIC - XBDZ

7/9/98 SD

A.M. CASTLE & CO.

Sue Shanty

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

3825 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: 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

Parameter	Result
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

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SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

o825 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: 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

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CERTIFICATE OF MATERIAL TEST REPORTS

☐ Castle Metals® · ☐ HY-ALLOY 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)	CUST. ORDER NO.	CUST. REQUISITION NO.
NORTH STAR STEEL COMPANY	M-9803470	

IAC	HEAT NO.	ORDER NO.	LINE NO.	SHIP QTY.	SHIP DATE
2148	M69430 H167	195474	1	332.0	

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
HARDNS 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-87, 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 95ED 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

A.M. CASTLE & CO.
Authorized Signature

END

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

6___ 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.

Test Report (ASTM E 8-96) RT, Longitudinal Tensile

Parameter	Result
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
Metlab Testing Services, Inc.

6825 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: A. Zubillaga
Aurelio Zubillaga, Supervisor
Metallurgical/Mechanical Testing

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CERTIFICATE OF TEST

Certification Date
8-JUL-1998

CUSTOMER ORDER NUMBER
M-9804274-3

CUSTOMER PART NUMBER
92884

3116 E. 31ST STREET NORTH
TULSA OK 74110

Invoice Number
T355736

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

Line Total: 2740 LB

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

AL	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

SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab Testing Services, Inc.

.3 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- 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

Parameter	Result
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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SHERRY LABORATORIES
INDIANA LOUISIANA OKLAHOMA
Metlab 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- 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: A. Zubillaga
Aurelio Zubillaga, Supervisor
Metallurgical/Mechanical Testing

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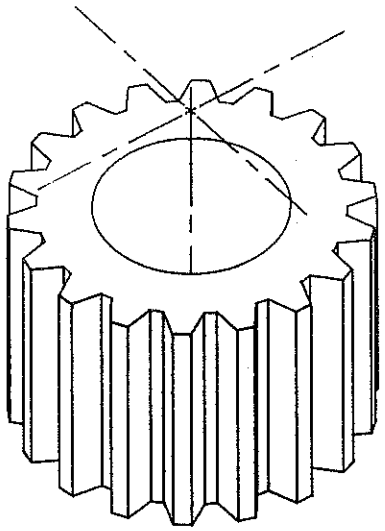
BACKLASH CERTIFICATES



BACKLASH REPORT

PINION/BALLRING

left

SERIAL NUMBER 059803

BACKLASH TOP .027 BOTTOM .027

ALLIGNMENT X1 2 14/32", X2 2 14/32" L 11¼" SLOPE $X=\frac{X2-X1}{L}=$ ____

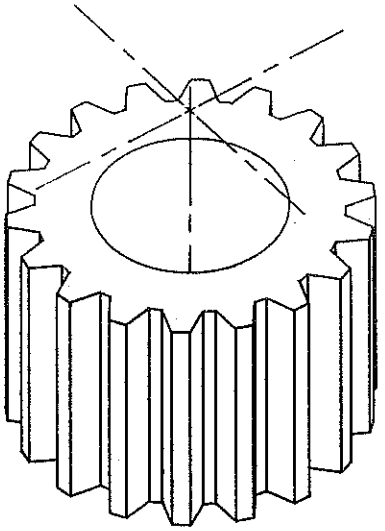
Y1 2 14/32", Y2 2 14/32" L 11¼" SLOPE $X=\frac{X2-X1}{L}=$ ____

ARE ALL BOLTS (TURRET/BALLRING) IN PLACE? ✓ YES ____ NO

DATE 8/5/99

ACCEPTABLE Terrill J. Mollere

NOT ACCEPTABLE ____



BACKLASH REPORT

PINION/BALLRING
right

SERIAL NUMBER 059803

BACKLASH TOP .027 BOTTOM .027

ALLIGNMENT X1 2 14/32", X2 2 14/32" L 11¼" SLOPE $X=\frac{X2-X1}{L}=$ 0

Y1 2 14/32", Y2 2 14/32" L 11¼" SLOPE $X=\frac{X2-X1}{L}=$ 0

ARE ALL BOLTS (TURRET/BALLRING) IN PLACE? ✓ YES _____ NO

DATE 8/5/99

ACCEPTABLE Terrill J. Mollere

NOT ACCEPTABLE _____

MISCELLANEOUS

Certificate of Leak Test

Vessel Description	Power Unit
Applied Hydraulic Systems, Inc., Work Order Number	059893
Test Pressure (PSIG)	2 1/2 lbs.
Test Date	8-13-99

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

Quality Agent

8-13-99

Certificate of Leak Test

Vessel Description : Return Manifold (60")
Applied Hydraulic Systems, Inc., Work Order Number : 059803
Test Pressure (PSIG) : 45 lbs.
Test Date : 8-18-99

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.*

Terrell J. Molere
Quality Agent

Applied Hydraulic Systems, Inc.
Houma, Louisiana
NAUTILUS

Certificate of Leak Test

Vessel Description: Return Manifold (32")
Applied Hydraulic Systems, Inc., Work Order Number: 059893
Test Pressure (PSIG): 45 lbs.
Test Date: 8-18-99

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

Darrell J. Molere
Quality Agent

Certificate of Leak Test

Vessel Description: Suction lines (5-3") (1-1½")
Applied Hydraulic Systems, Inc., Work Order Number: 05 9803
Test Pressure (PSIG): 2½ lbs.
Test Date: 8-6-99

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

Terrell J. Mollere
Quality Agent

Certificate of Leak Test

Vessel Description: Return piping
Applied Hydraulic Systems, Inc., Work Order Number: 059803
Test Pressure (PSIG): 45 lbs.
Test Date: 8-18-99

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

Terrill J. Mollere
Quality Agent

Certificate of Leak Test

Vessel Description: Return piping (36 3/4")
Applied Hydraulic Systems, Inc., Work Order Number: 059803
Test Pressure (PSIG): 45 lbs.
Test Date: 8-18-99

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

Terrell J. Mollere
Quality Agent

Certificate of Leak Test

Vessel Description: Hydraulic start recharge tank
Applied Hydraulic Systems, Inc., Work Order Number: 059803
Test Pressure (PSIG): 2½ Hrs.
Test Date: 8-18-99

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.*

Jeriff Mollere
Quality Agent

Applied Hydraulic Systems, Inc.
Houma, Louisiana
NAUTILUS

NES1r 51
REV.
APPROVED BY:
DATE: 21 Jul 94

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.

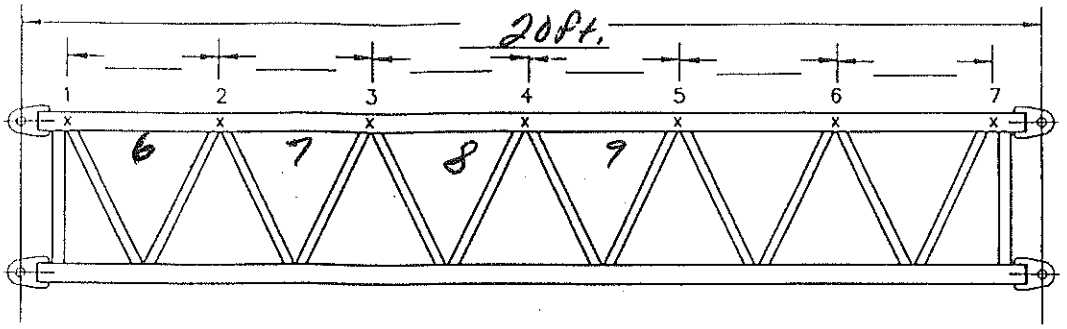
5. When vessel is proven to be air tight:

   - Obtain Quality witness and signature.
   - Quality to maintain record of test and certificate.
   - Remove test equipment and reseal tank.

FORM: 0069
REV. :
DATE:

WORK ORDER #: 059803

MAIN CHORD STRAIGHTNESS CHECK



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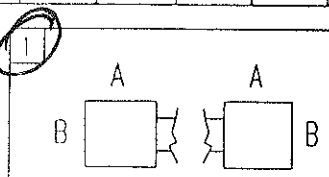
	B	0	0	1/64	0	0	1/64	1/64	0	0							
TOP LEFT	A	0	1/64	0	0		1/64	0	0	0							
	B	0	1/32	1/32	1/64		1/64	1/32	1/32	0							
BOTTOM RIGHT	A	0	0	0	0		0	0	1/64	0							
	B	0	1/64	1/32	1/64		0	1/64	1/64	0							
BOTTOM LEFT	A	0	1/64	1/64	1/64	0	1/32	1/32	1/64	1/32							
	B	0	1/32	1/32	1/32	0	1/64	1/32	1/32	1/32							

BOOM CONSTRUCTION

1 (circled)



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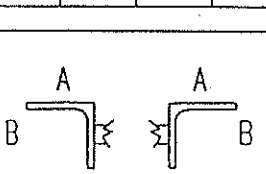

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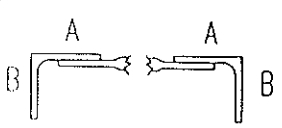


4 OTHER:

BOOM TYPE: Boom Point (340 L)

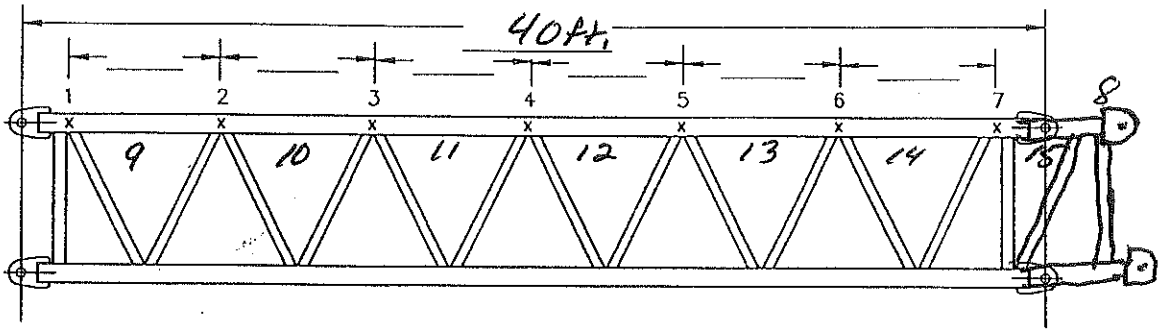
Q C BY: Terrell J. Mollere

DATE: 8/10/99

FORM: 0069
REV. :
DATE:

WORK ORDER #: 059803

MAIN CHORD STRAIGHTNESS CHECK



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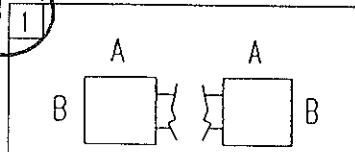
	B	0	3/64	1/32	1/64	1/64	1/32	0	0	1/32	1/32	0	1/64	1/32	0	1/32	
TOP LEFT	A	0	1/32	1/32	1/32	1/32	1/32	1/32	0	1/64	1/32	1/64	0	1/64	1/32	1/32	
	B	0	1/64	1/64	1/64	1/64	1/32	1/64	0	0	0	1/64	1/32	0	0	0	
BOTTOM RIGHT	A	0	3/64	1/32	1/64	1/32	1/16	1/32	0	1/64	1/32	1/64	0	1/32	3/64	1/64	
	B	0	3/64	3/64	1/64	0	1/16	3/64	0	1/32	1/32	1/64	1/32	1/32	3/64	0	
BOTTOM LEFT	A	0	1/64	1/64	0	0	0	0	0	1/64	0	0	1/32	1/64	1/32	1/64	
	B	0	1/64	1/32	0	0	1/64	0	0	1/64	0	0	1/64	1/32	1/32	1/32	

BOOM CONSTRUCTION

1 (circled)



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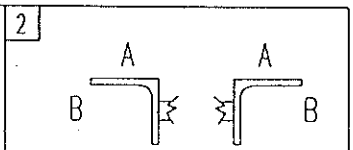

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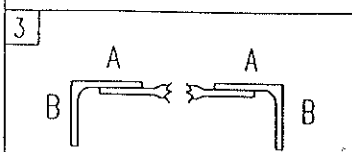


4 OTHER:

BOOM TYPE: Boom Mid # 1 (340L)

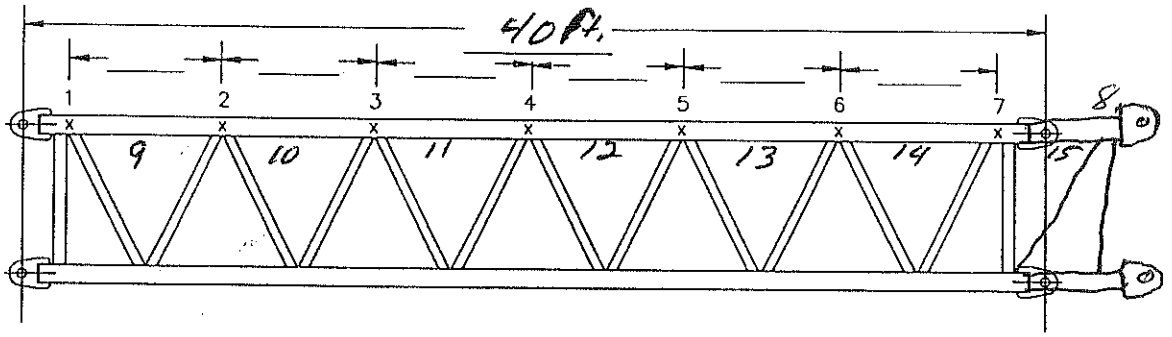
Q C BY: Jerry J. Molere

DATE: 8/6/99

FORM: 0069
REV. :
DATE:

WORK ORDER #: 059803

MAIN CHORD STRAIGHTNESS CHECK



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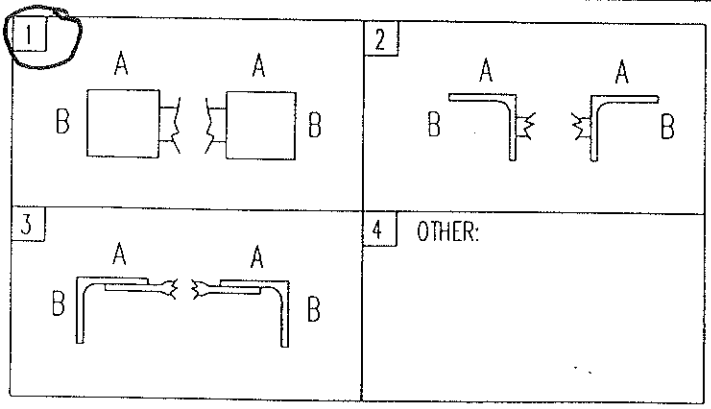
	B	0	0	1/64	1/64	1/64	0	1/32	0	1/64	1/64	0	1/32	1/64	3/64	3/64	
TOP LEFT	A	0	3/64	1/32	1/32	1/32	3/32	1/32	0	1/32	1/32	1/32	0	3/64	1/16	1/64	
	B	0	1/32	1/32	3/64	1/32	1/64	1/64	0	1/64	0	0	0	1/64	0	0	
BOTTOM RIGHT	A	0	1/32	1/32	1/64	1/32	3/32	1/64	0	1/32	1/64	1/64	1/32	1/32	1/16	1/32	
	B	0	1/32	5/64	1/32	0	1/32	1/16	0	1/16	1/32	1/64	1/32	1/32	1/32	1/32	
BOTTOM LEFT	A	0	1/32	1/32	0	1/64	5/64	3/64	0	1/16	1/32	1/64	0	1/16	1/16	1/64	
	B	0	1/32	0	0	0	1/64	1/64	0	0	1/64	0	1/32	1/64	1/32	1/64	

BOOM CONSTRUCTION



BOOM TYPE: Boom Mod #2 (3404)

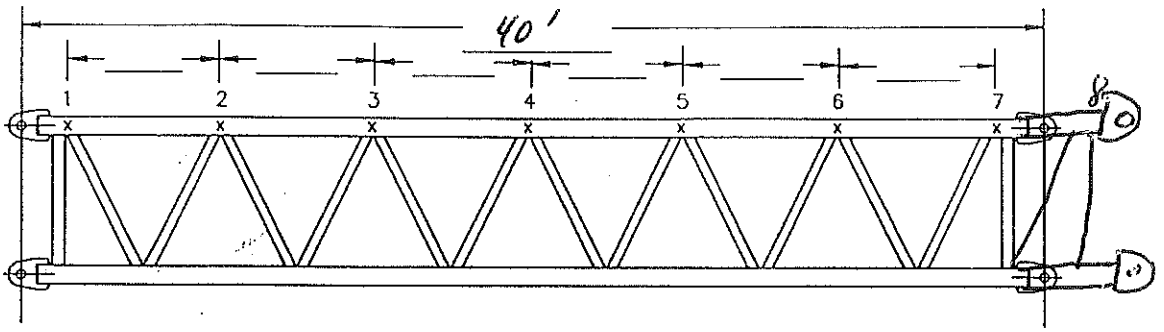
Q C BY: Emil J. Mollere

DATE: 8/5/99

FORM: 0069
REV. :
DATE:

WORK ORDER #: 059803

MAIN CHORD STRAIGHTNESS CHECK



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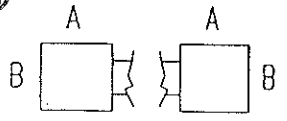
	B	0	1/64	0	0	1/64	0	1/32	0	0	1/64	0	1/32	0	1/32	1/32	
TOP LEFT	A	0	1/32	1/32	1/32	1/32	3/32	1/64	0	1/64	1/32	1/64	1/64	1/16	3/64	0	
	B	0	1/32	1/64	1/64	1/64	1/32	1/64	0	0	0	0	0	1/64	1/64	0	
BOTTOM RIGHT	A	0	1/32	1/32	1/32	1/64	1/32	1/32	0	0	1/64	0	1/64	0	1/64	1/64	
	B	0	1/32	3/64	1/32	1/64	1/32	1/32	0	1/64	1/32	1/32	0	1/64	1/32	1/32	
BOTTOM LEFT	A	0	1/64	1/32	1/64	1/64	1/16	1/64	0	0	1/32	1/64	0	1/16	1/16	1/64	
	B	0	1/64	1/32	0	0	1/32	0	0	0	0	1/64	1/64	1/64	0	0	

BOOM CONSTRUCTION

1 (circled)



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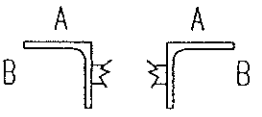

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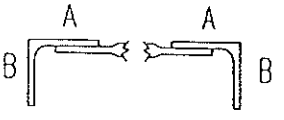


4 OTHER:

(340C)

BOOM TYPE: ~~Boom~~ Mid # 3

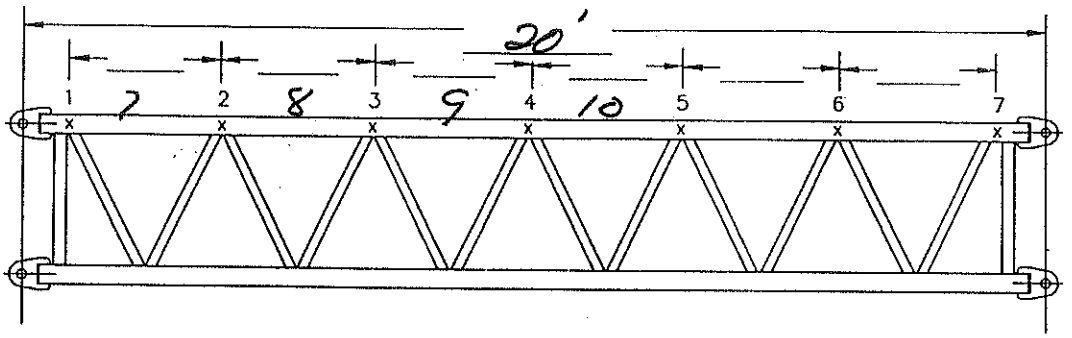
Q C BY: Terrill Malone

DATE: 8/18/99

FORM: 0069
REV. :
DATE:

WORK ORDER #: 059803

MAIN CHORD STRAIGHTNESS CHECK



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TOP RIGHT	A	0	1/32	1/32	1/32	0	0	1/32	1/32	1/32	1/32						
	B	0	0	0	0	0	0	0	0	0	0						
TOP LEFT	A	0	0	1/32	0	0	0	0	0	1/32	1/32						
	B	0	1/64	0	1/64	0	0	0	1/32	1/32	1/32						
BOTTOM RIGHT	A	0	0	1/16	1/32	1/32	0	0	1/32	3/32	1/32						
	B	0	1/64	1/32	1/32	0	0	1/32	1/32	1/32	1/32						
BOTTOM LEFT	A	0	1/32	1/16	1/32	1/32	0	1/32	1/32	1/32	1/32						
	B	0	1/32	0	0	0	0	0	0	0	0						

BOOM CONSTRUCTION

(1) A A B B

2 A A B B

3 A A B B

4 OTHER:

BOOM TYPE: 340CA BOOM BASE

Q C BY: Brenda Tillett

DATE: 7.29.99

PRESS-O-FILM™ Boom Base
No. 059803 Reading 2.5 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ Gantry
No. 059803 Reading 2.0
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

Paint Inspection Log

NO : NES184-058
REV : D
APPRV. Tony H.
DATE : 07/11/96

APPROVED:

059803 PEMEX 340CA-160

Weldment	BLAST Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	Profile	FIRST COAT Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	DFT
Boom Base	8-9	12:30	83	82	76	76	2.4	8-9	12:30	83	82	76	76	2.3
Boom Mid #1	8-9	12:30	83	82	76	76	2.7	8-9	12:30	83	82	76	76	2.4
Boom Mid #2	8-10	10:15	86	87	79	81	2.7	8-10	10:15	86	87	79	81	2.4
Boom Mid #3	8-18	9:00	84	83	77	84	2.5	8-18	9:00	84	83	77	84	2.4
Boom Tip	8-11	9:30	85	86	79	81	2.8	8-11	1:15	85	84	77	84	2.4
Upper Struct.	8-16	2:30	84	83	74	83	2.4	8-16	2:30	84	83	74	83	2.4
Gantry	8-11	1:15	85	84	77	84	3.0	8-11	1:15	85	84	77	84	2.3
Power Unit	8-13	9:30	84	83	77	80	2.6	8-13	9:30	84	83	77	80	2.3
Cab	8-16	2:30	84	83	74	83	2.4	8-16	2:30	84	83	74	83	2.3½
Control Stat	8-11	9:30	85	86	79	81	2.7	8-11	1:15	85	84	77	84	2.3½
Pedestal	9-1	9:40	86	86	79	81	2.6	9-1	9:40	86	86	79	81	2½-4

TYPE 1 D-9 ZINC — 2.5-3.5 MILS

TYPE 2 385 WHITE — 5 MILS

TYPE 3 385-YE 314 OFFSHORE YELLOW — 5 MILS

TYPE ☐ _____

PER AHSI AMERON PAINT SYSTEM NES184-019 REV.-h
SYSTEM NO. 1

TOTAL MILLAGE: 12.5 - 13.5

PRESS-O-FILM™ Base
No. 059803 Reading 2.4 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ Mid #2
No. 059803 Reading 2.7 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ Tip
No. 059803 Reading 2.8 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ Mid #1
No. 059803 Reading 2.4 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ C.S.
No. 059803 Reading 2.4 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ Mid #3
No. 059803 Reading 2.5 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ Cab
No. 059803 Reading 2.4 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ Ped
No. 059803 Reading 2.6 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

PRESS-O-FILM™ #4
No. 059803 Reading 2.4 Gage less 2.0 mils or 50 microns
TESTEX NEWARK, DE 19715 USA
X COARSE (1.5 to 4.5 mils) or (40 to 115 microns)

NO : NES184-058
REV : D
APPRV. T. H.
DATE : 07/11/96

APPROVED:

Paint Inspection Log

059803 DEMEX 340LA-160

	SECOND COAT							THIRD COAT						
Weldment	Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	DFT	Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	DFT
Boom Base	8-13	9:30	84	83	77	80	7-10	8-16	2:30	84	83	74	83	11-15
Boom Mid #1	8-17	11:00	88	86	79	74	6-10	8-18	9:00	84	83	77	84	10-14
Boom Mid #2	8-17	11:00	88	86	79	74	7-9	8-18	9:00	84	83	77	84	10-15
Boom Mid #3	8-30	9:30	86	85	77	84	6-10	9-07	12:45	88	90	77	70	10-13
Boom Tip	8-12	9:30	85	85	78	77	6-9	8-16	2:30	84	83	74	83	10-13
Upper Structure	8-17	11:00	88	86	79	74	6-16	8-18	9:00	84	83	77	84	10-15
Gantry	8-12	9:30	85	85	78	77	6-8	8-16	2:30	84	83	74	83	10-13
Power Unit	8-16	9:30	87	85	79	81	6-10	8-18	9:00	84	83	77	84	10-15
Cab	8-17	11:00	88	86	79	74	7-9	8-18	9:00	84	83	77	84	10-14
Control Stat	8-12	9:30	85	85	78	77	7-10	8-18	9:00	84	83	77	84	11-15
Pedestal	9-3	12:30	88	87	78	77	7-10	9-07	12:45	88	90	77	70	11-15

TYPE 1 D-9 ZINC 2.5-3.5 MILS

TYPE 2 385 WHITE 5 MILS

TYPE 3 385-YE 314 OFFSHORE YELLOW 5 MILS

TYPE ☐ _____

TOTAL MILLAGE 12.5-13.5

BATCH NUMBERS:

PER AHSI AMERON PAINT
SYSTEM NES184-019 REV.-H
SYSTEM NO. 1

NO : NES184-058
REV : D
APPRV. TJH
DATE : 07/11/96

APPROVED:

Purchased Component Paint Inspection Log

059803 PEMEX 340LA-160

Component	Primer	FIRST COAT Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	DFT	SECOND COAT Date	Time	Air Temp	Surf Temp	Dew Pt	Hum	DFT
PALLET PARTS		8-12	9:30	85	85	78	77	TM.	8-16	2:30	84	83	74	83	TM.
CONTROL VALVES		8-12	9:30	85	85	78	77	TM.	8-16	2:30	84	83	74	83	TM.
SWING DRIVES		8-12	9:30	85	85	78	77	TM.	8-16	2:30	84	83	74	83	TM.
HOISTS		8-18	9:00	84	83	77	84	TM.							
ENGINE		8-13	9:30	84	83	77	80	TM.	8-18	9:00	84	83	77	84	TM.

TYPE [1] 400AL
4-6 MILS

TYPE [2] 385-YE314
OFFSHORE YELLOW
2-3 MILS

TYPE ☐ _____

TYPE ☐ _____

Per AHSI Ameron Paint
System NES184-019 Rev-H
System No. 2

TOTAL MILLAGE: 6-9

QUALITY PLAN

PLAN IDENTIFIER: 059803

ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Miscellaneous				
	Pretest	Anti-two block system	Creep of less than 1 foot per 15 seconds	100%	Test	R.T. 9-22-99
	Pretest	Boom angle limit system	Stops boom luffing completely	100%	Test	R.T. 9-21-99
	Pretest	Hoist speeds: ☑ Main ☐ Auxillary	Hoist speeds meet minimum spec requirements and requirements as per performance charts	100%	Test	R.T. 9-27-99
	Pretest	Load Chart: · Model Number Correct · Serial Number Correct	Verify numbers with crane serial number and model number	100%	Visual	R.T. 9-21-99
	Pretest	Slewing speeds	Slewing speeds meet minimum spec. requirements	As required by contract	Test	R.T. 9-27-99
	Pretest	Luffing speeds	Luffing speeds meet minimum spec. requirements	As required by contract	Test	R.T. 9-27-99
	Pretest	Boom angle indicator	Indicated radius -3'/+0' from actual radius with no load	Check 1 radius at random	Test	R.T. 9-21-99
	During assembly	Boom foot pin shims	1/32" to 1/8" gap	100%	Visual	R.T. 9-27-99
	Pretest	Slewing Ring - Material toughness for critical components for design temperatures below 15°.	Meets charpy impact requirements per API Spec. 2C, 5th Edition, 8.3.2.c	100%	Review Document	R.T. 9-23-99
	Pretest	Slewing Ring - Slewing ring race material	Limits as specified in API Spec. 2C, 5th Edition, 8.3.2.a	100%	ASTM E45 Method A	R.T. 9-23-99

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PLAN IDENTIFIER: 059803

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Sheave Case (☐ Boom, ☐ Gantry, ☑ Bridle)				
	During assembly	Rope Guard	+3/32" to +1/4"	100%	Measure clearance between sheave and guard	R.T. 9.22.99
	During assembly	Sheave lateral backlash	Min: turns freely Max: 1/8"	25%	Visual	R.T. 9.22.99
	Pretest	Pin restraint	Proper	100%	Visual	R.T. 9.22.99

QUALITY PLAN

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Slewing Mechanism				
	Pretest	Performance	Capable of smooth stops and starts with controllable rates of acceleration and deceleration	100%	Function test	R.T. 9.21.99
	During assembly	Gearbox fastener locking and grade	Min. SAE J429 Grade 5 NES184-036	100%	Visual	R.T. 9.21.99
	During assembly	Brake Fastener	Min. SAE J429 Grade 8	100%	Visual	R.T. 9.21.99
	During assembly	Pinion Backlash	.010-.032 across face at high point with a maximum misalignment of .004 (in/in)	100%	Visual	R.T. 9.25.99
	During assembly	Pinion installation	Locking bolts safety wired and/or lock tight	100%	Visual	R.T. 9.21.99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Boom wire rope hoist				
	During assembly	Mounting bolt grade with proper bolt size and washer	SAE J429 Gr. 8 markings. Largest bolt that can fit, with hardened washer of same size	100%	Visual	R.T. 9.21-99
	During assembly	Lubrication Level	¼ to ½ of sight glass or oil is visible in oil level fill plug	100%	Visual	R.T. 9.21-99
	During assembly	Ratchet and Pawl mounting and workmanship	Bolt minimum SAE J429 Gr. 5, all pins secured	100%	Visual	R.T. 9.21-99
	Pretest	Rope length	Min. 5 wraps with boom at -10°	100%	Visual	R.T. 9.21-99
	Pretest	Ratchet and Pawl operation	Pawl fully engages ratchet wheel with control lever in neutral or raise position. Pawl fully disengages ratchet wheel with	100%	Visual/Function	R.T. 9.21-99
	Pretest	Operation	Capable of smooth starts and stops	100%	Function test	R.T. 9.21-99
	Pretest	High angle limiter	Stops boom up function at max angle on load chart or approx. 6 inches from stops	100%	Visual/Function	R.T. 9.21-99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Engine/Tanks				
	Pre-Assembly	Engine oil level	Level is between high and low marks of dipstick	100%	Visual	R.T. 9-21-99
	Pre-Assembly	Engine coolant level	Level is filled to the top with 50/50 mixture of water and antifreeze	100%	Visual	R.T. 9-21-99
	Pretest	Emergency air intake shutdown	Verify engine kills upon actuation	100%	Test	R.T. 9-21-99
	Pretest	Hydraulic Oil reservoir	Filled to minimum of 3/4 of a tank (cold) 7/8 of a tank (hot)	100%	Visual	R.T. 9-21-99
	Pretest	Diesel fuel tank	Filled to minimum of 3/4 of a tank	100%	Visual	R.T. 9-21-99
	Pretest	Engine RPM	Maintain minimum RPM at maximum rated load at maximum hoist speed.	100%	Test	R.T. 9-21-99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Hoists ☑ Main ☑ Auxillary				
	During assembly	Lubrication level	1/4 to 1/2 of sight glass or oil is visible in oil level fill plug	100%	Visual	R.T. 9.21.99
	During assembly	Mounting bolt grade with proper bolt size & washer	SAE J429 Gr. 8 markings Largest bolt that can fit with hardened washers of same size	100%	Visual	R.T. 9-21-99
	Pretest	Operation	Capable of smooth starts and stops	100%	Function test	R.T. 9-21-99
	Pretest	Brake valve	Safety wired open	100%	Visual	R.T. 9-21-99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Aux. Ball / Block				
	Pretest	Capacity/Identification	Equals or exceeds requirement of load chart.	100%	Compare capacity to load chart	R.T. 9.22.99
	Pretest	Hook latch	Present and functioning	100%	Visual	R.T. 9.22.99
	Pretest	Hook turns freely	Turns freely and lubrication is present	100%	Turn by hand	R.T. 9.22.99
	Pretest	Sheaves turns freely	Turns freely and lubrication is present	100%	Turn by hand	N/A
	Pretest	Identification	Blockor Ball, tagged with weight and capacity	100%	Visual	R.T. 9.22.99
	Pretest	Rope groove	NES184-046	100%	Sheave Gage	N/A
	Pretest	Block or Ball weight	Adequate to allow full speed hoisting with no load without unraveling	100%	Test	R.T. 9.22.99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Load Block				
	Pretest	Capacity/Identification	Equals or exceeds requirement of load chart.	100%	Compare capacity to load chart	R.T. 9.22.99
	Pretest	Hook latch	Present and functioning	100%	Visual	R.T. 9.22.99
	Pretest	Hook and sheaves turn freely	Turns freely and lubrication is present	100%	Turn by hand	R.T. 9.22.99
	Pretest	Identification	Block tagged with weight and capacity	100%	Visual	R.T. 9.22.99
	Pretest	Rope groove	NES184-046	100%	Sheave Gage	R.T. 9.22.99
	Pretest	Block weight	Adequate to allow full speed hoisting with no load without unraveling	100%	Test	R.T. 9.22.99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Assembly Checks- Lattice Boom				
	Pre-assembly	**Sheave Groove-** ☐ Boom Tip ☐Gantry ☐Bridle	NES184-046	100%	Sheave gage	9-2-99
	Pre-assembly	**Swing Drive lubrication-** ☑ Gearbox ☐Lower bearing	¾"-1" below top plate. Fill plug accessible without removing parts. Grease if applicable	100%	Visual	Reggie 8-6-99
	Pre-assembly	**Hydraulic Oil Tank to Pump Supply Lines Leak Test**	NES184-107	100%	Test	Buttke 9-10-99
	Assembly	**Load Block-** Lubrication	Each sheave accepts grease independently	100%	Test	Bryan 9-17-99
	Assembly	**Overhaul Ball-** Lubrication	Swivel accepts grease	100%	Test	Bryan 9-17-99
	Assembly	**Sheave Lubrication-** ☑ Boom Tip ☑ Gantry ☑ Bridle	Each sheave accepts grease independently	100%	Test	9-10-99
	Assembly	**Slewing Ring-** Fastener preload Torque Wrench S/N Hytorc	Bolt tensile stress-Min. 70% of min. yield and max 70% of min. tensile	100%	Test per NES184-021	Dane 08-25-99
	Assembly	**Slewing Ring-** Orientation	Loading plug 90° +/- 15° from axis of boom	100%	Visual	8-25-99
	Assembly	**Slewing Ring-** Lubrication	Volume filled to capacity	100%	Visual	8-29-99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Assembly Checks- Lattice Boom				
	Assembly	**Hydraulic system-** Relief pressures	Set at 300 psi over maximum working pressure. Record final settings on hydraulic schematic.	100%	Test	9-15-99
	Assembly	**Pins-** Lubrication	Anti-seize compound in pin holes and accepts grease.	100%	Test	9-10-99
	Assembly	**Hoist Mounting surface-** ☐ Main ☐ Auxiliary ☑ Boom	NES184-035 Coplanar within +/- .020"	100%	Feeler gauge check before tightening fasteners.	9-15-99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Upperstructure Base				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM 7-12-99
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	R.T. 8-13-99 #1223
		Plates of critical components which transfer loads through the thickness	ASTM A578 Level II	100% within 3" laterally of welds	UT: ASTM A578 Section 5	R.T. 7-26-99 #065
		Filiet weld size	Underrun of 1/16" allowed up to 10% of weld length	10 spots	Weld Gauge	TM. 8/13/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98 Table 6.1 NES184-043	100%	Visual	TM. 8/13/99
		Slewing ring to Upperstructure mounting surface	Upperstructure machining drawing	HOLD	Measure gap between ring and mounting surface at eight equal spaces on inside and outside of ring	TM. 8/5/99
		Serial number welded onto upperstructure	Verify correct serial number	100%	Visual	TM. 8/13/99
		Upperstructure permanently identified	Serial number stamped in location as per drawing	100%	Visual	TM. 8/5/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Gantry				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM. 8/9/99
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	R.T. 8-11-99 #1678
		Fillet weld size	Underrun of 1/16" allowed up to 10% of weld length	15 spots	Weld Gauge Pin and bolt connection and sheave case	TM. 8/11/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/11/99
		Gantry permanently identified	Serial Number Stamped in Location as per Drawing	100%	Visual	TM. 8/11/99
		Crows Nest and Ladder Barrel				
		Fit check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	R.T. 8-9-99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	cw TM. 8/11/99 LE TM. 8/11/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Pedestal				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM. 8/17/99
		Full penetration welds for material of thickness greater than ⅜"	AWS D1.1-98, Section 6	100%	UT: AWS D1.1-98, Table 6.3 RT: ASTM E94	R.T. 8-11-99 # 10368 R.T. 8-16-99 # 0695
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	R.T. 8-23-99 # 1615
		Plates of critical components which transfer loads through the thickness	ASTM A578 Level II	100% within 3" laterally of welds	UT: ASTM A578 Section 5	R.T. 8-16-99 # 0695
		Fillet weld size	Underrun of 1/16" allowed up to 10% of weld length	5 spots	Weld Gauge	TM. 8/23/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98 Table 6.1 NES184-043	100%	Visual	TM. 8/23/99
		Slewing ring to Pedestal mounting surface	Pedestal machining drawing	Hold	Measure gap between ring and mounting surface at eight equal spaces on inside and outside of ring.	TM. 8/31/99
		Pedestal permanently identified	Serial number stamped in location as per drawing	100%	Visual	TM. 8/31/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Power Unit				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM. 8/9/99
		Pressure test	NES184-051	100%	Visual	TM. 8/13/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/13/99
		Check sealing of tanks prior to shipment to paint yard	All fittings capped and hatch covers sealed with all bolts installed.	100%	Visual	TM. 8/13/99
		Cleanliness of tanks	Free of contaminants	100%	Visual	TM. 8/13/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Walkways				
		Fit Check	Controlling drawing +/- 1/2"	Tail swing	Visual	R.T. 7/30/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/13/99
		Supports				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM. 8/9/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/13/99
		Fillet welds and partial penetration welds to critical components	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	R14-3##1223

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Boom Tip				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM. 7/20/99
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	P.T. 8-10-99 #1675
		Fillet weld size	Underrun of 1/16" allowed up to 10% of weld length	10 spots	Weld Gauge	TM. 8/10/99
		Straightness Inspection	Per NES184-041	100%	Visual/String line	TM. 8/10/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/10/99
		Tip permanently identified	Serial number stamped in location as per drawing	100%	Visual	TM. 8/10/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Boom Base				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM. 7/21/99
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	R.T. 7.29.99 #35791
		Fillet weld size	Underrun of 1/16" allowed up to 10% of weld length	5 spots	Weld Gauge	R.T. 7/29/99
		Straightness Inspection	Per NES184-041	100%	Visual/ String line	R.T. 7/29/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	R.T. 7/29/99
		Base permanently identified	Serial number stamped in location as per drawing	100%	Visual	R.T. 7/29/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Boom Mid Section				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	R.T. 7/30/99
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	R.T. 8-6-99 # 1630 R.T. 8-11-99 # 1678
		Fillet weld size	Underrun of 1/16" allowed up to 10% of weld length	5 spots	Weld Gauge	TM. 8/6/99
		Straightness Inspection	Per NES184-041	100%	Visual/ String line	TM. 8/6/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/6/99
		Boom permanently identified	Serial number stamped in location as per drawing	100%	Visual	TM. 8/6/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Boom Mid Section 2				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	R.T. 7/29/99
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	R.T. 8-6-99 #1630
		Fillet weld size	Underrun of 1/16" allowed up to 10% of weld length	5 spots	Weld Gauge	TM. 8/5/99
		Straightness Inspection	Per NES184-041	100%	Visual/ String line	TM. 8/5/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/5/99
		Boom permanently identified	Serial number stamped in location as per drawing	100%	Visual	TM. 8/5/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Boom Mid Section				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM. 8/2/99
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709 R.T. 4-26-99 #1232 R.T. 9-10-99 #1273 #1610	~~TM. R.T. 8-18-99~~ ~~8/17/99~~
		Fillet weld size	Underrun of 1/16" allowed up to 10% of weld length	5 spots	Weld Gauge	TM. 8/17/99
		Straightness Inspection	Per NES184-041	100%	Visual/ String line	TM. 8/17/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/17/99
		Boom permanently identified	Serial number stamped in location as per drawing	100%	Visual	TM. 8/17/99

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ELEM ID	SEQUENCE INSTR.	QUALITY FEATURE	ACCEPTANCE CRITERIA	SURVEILLANCE LEVEL	VERIFICATION	
					METHOD	CONFORMANCE CONFIRMED BY
		Bridle				
		Fit Check	Controlling drawing +/- 1/8"	Critical dimensions	Visual	TM. 8/4/99
		Fillet welds and partial penetration welds	AWS D1.1-98, Table 6.1	100%	MT: ASTM E709	RT. 8-17-99 #35742
		Fillet weld size	Underrun of 1/16" allowed; up to 10% of weld length	5 spots	Weld Gauge	TM. 8/17/99
		Visual: Surface preparation for coating	SSPC-SPCOM; AWS-D1.1-98, Table 6.1 NES184-043	100%	Visual	TM. 8/17/99
		Bridle permanently identified	Serial Number Stamped in Location as per Drawing	100%	Visual	TM. 8/17/99