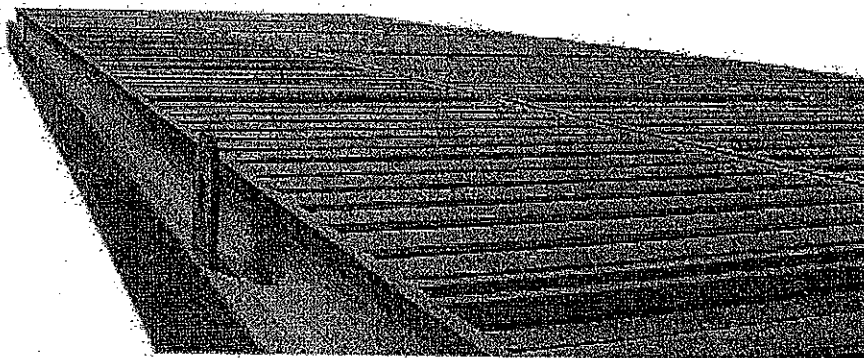
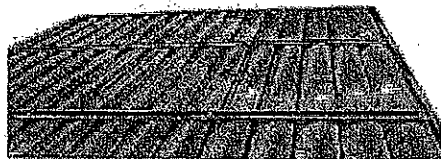


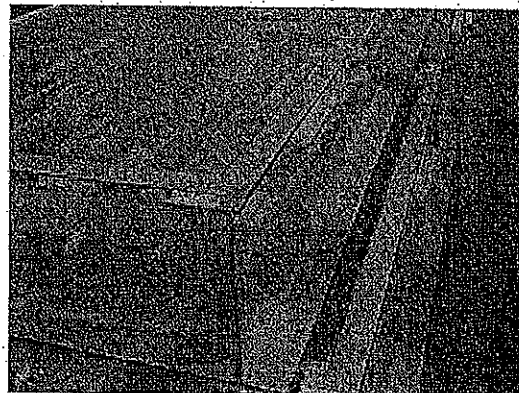


Duraflow Industrial Louvers

- Aluminum or Galvanized Steel Construction
- Built to Heavy Duty Airtech Standards
- Optional API 661 Compliance
- Bolted or Welded Construction
- Internal or External Actuation



- Bug Screens & Hail Guards
 - Wire Cloth
 - Expanded Metal
 - Vinyl
- Fan Guards
- Recirc Doors with Frames



- Short Lead Times
- Built to Customer Specifications
- Competitive Pricing
- Domestic or Export Crating

Airtech Products, Inc.
1550 S. 81st W. Avenue
Tulsa, OK 74127
Phone: 918-241-0264
Fax: 918-241-0270
Email: info@airtechproducts.com

Technical Information / Standard Configurations

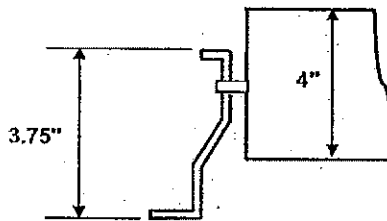
Aluminum Frame (extrusion):	6063-T6
Aluminum Frame (folded sheet):	5052-H32
Steel Frame:	A653-G90 Carbon Steel (Mech. Galv. Finish)
Aluminum Blades:	6063-T6 Aluminum
Steel Blades:	A653-G90 Carbon Steel (Mech. Galv. Finish)
Blade Pins:	Aluminum: 6061-T6 Aluminum Stainless Steel: 303 Stainless Steel
Torque Tube:	6063-T6 Aluminum or 1", Sch 40 Galv. Steel Pipe
Actuator Rod:	6063-T6 Aluminum
Actuator Lever Arm:	6061-T6 Aluminum
Clevis:	1018 Carbon Steel
Clevis to Arm Connecting Link:	6061-T6 Aluminum

Assembly Hardware:

Cap Screws:	ANSI/ASME 18.2.1 Grade 5, Zinc Plate
Nuts:	Locking nut, Performance Spec IFI/100; MIL/N/25027, Light Hex, Standard Height, Zinc Plate
Bearings:	Glass Filled Nylatron, (Per API Specification 661)

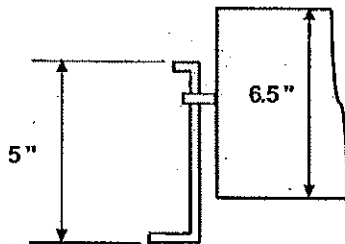
Series 300

- 3.75" Frame
- 4" Blade



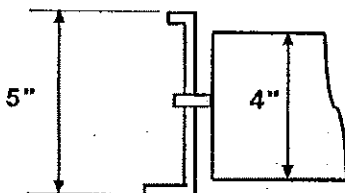
Series 500

- 5" Frame
- 6.5" Blade



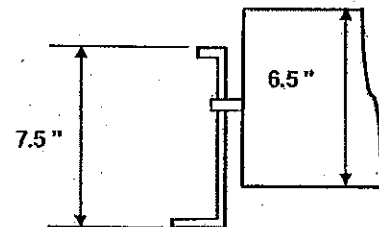
Series 540

- 5" Frame
- 4" Blade



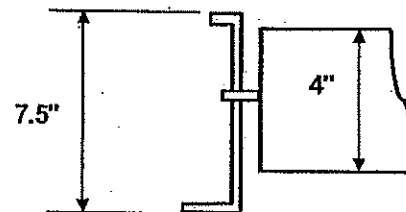
Series 700

- 7.5" Frame
- 6.5" Blade



Series 740

- 7.5" Frame
- 4" Blade



Airtech Products, Inc., 1550 S. 81st W. Avenue, Tulsa, OK 74127

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Email: info@airtechproducts.com



Duraflow Industrial Louvers

Installation and Maintenance Instructions

PRE-INSTALLATION ACTIVITIES:

1. With the louver crate resting firmly on either saw horses or a smooth and level area at grade, remove packing crate top and sides.
2. Make a visual inspection of the louver frame, blades and all linkages/drive mechanisms to ensure there was no shipping damage.
3. Various small parts needed to connect the drive linkages are shipped in a separate and smaller cardboard box. Keep this box at hand but out of the way and in a safe place.
4. Inspect the mounting surface of the cooler giving particular attention to ensure it provides uniform support of the louver perimeter and that it is structurally adequate to support all static and dynamic loadings.
 - a. If the louver is to be mounted in a horizontal configuration, it is **CRITICALLY IMPORTANT** to ensure the mounting surface is uniform and level to $\pm .25"$ over 20'. Airtech louvers are manufactured to precise tolerances and bolting to an off-level surface will cause binding in the moving parts. This will result in inconsistent operation, shorten product life and can cause permanent damage that voids the manufacturers warranty.
 - b. If the louver is to be mounted in a vertical configuration, the installer must confirm there will be uniform support / attachment to the mounting surface at spacing not greater than 18" centers on the louver perimeter flange. Failure to do so may result in bending of the louver frame and inconsistent operation, a shortened product life and can cause damage that voids the manufacturers warranty.
5. Take a moment to visualize the installation and plan the placement of individual louver sub-assemblies. Although all louver installations involve essentially the same procedure, any given application will have some unique characteristics. Some projects will require louver sections to link together at the side via torque tube connectors while others may link together at the ends via end links on the actuator rod. Small projects may require neither type of connection while large projects will require both.
6. Open the cardboard box of small parts and confirm all the necessary pieces are at hand. Depending on the application, this could be torque tube couplings, actuator rod end links, grade level operator components, devises, etc. Please note, unless the louvers are to be attached via angle clips, the actual attachment hardware won't be included in the louver shipment.
7. Most of the time, louver installation is easiest done using self-drilling speed screws, $\frac{1}{4}" \times 1\frac{1}{4}"$ long, fine thread. Ensure a screw is in place on all corners and not greater than 18" centers around the louver perimeter. Simply drill through the louver flange into the host structure making sure the screw is completely pulled down tight. If retaining clips is your preferred method of attachment, please review to "Reference A" for instructions on use and installation.

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MOUNTING & ATTACHMENT

1. Hoist the louver (or first louver sub-section) into place making sure the lift is well supported around the perimeter. **DO NOT ALLOW THE LOUVER TO RACK** or excessively bend during the lifting process.
 - a. **For horizontal applications**, set the louver onto the mounting surface and visually confirm 100% of the perimeter is supported and resting flat upon the top of the cooler. Make sure the operating mechanism travels freely through the entire range of motion and there is no interference from complete shut to complete open. If the louver is supplied in multiple sections, install the section with the operator first and perform the motion/operation test noted above. Square the louver to the cooler as best you can but above all, be sure the louver remains square – do not force to the louver out of square to accommodate the cooler. **THE LOUVER MUST BE SQUARE** to operate properly. After confirming the louver is properly placed relative to the mounting surface (and to other subsequent sections, if applicable), install a self-drilling screw at each corner and at no greater than 18" centers along all flanges. If applicable, hoist subsequent sections into place and following the above instructions, attach each to the host structure. **DO NOT STEP ON LOUVER BLADES AT ANY TIME.** If you must step out onto the louver, use dimension lumber or plywood as a walking surface.
 - b. **For vertical applications**, hoist the louver (or first louver section) into place and after checking for clearance on moving parts, attach to the cooler with a self drilling screw at each corner and at no greater than 18" spaces along all flanges. Install all attachment screws before releasing hoist cables or hoisting device to ensure the louver is fully attached and there is no deflection in the louver frame. If applicable, hoist subsequent sections into place and following the above instructions, attach each to the host structure.
2. **If the louver is supplied in multiple sections, remove the connecting links / couplers from the shipping box and install them as required at the ends of actuator rods and torque tubes. End link installation instructions are detailed as attached "Reference B" and Torque Tube coupling installation instructions are detailed as attached "Reference C".**
3. When all sections are installed and connected, test the drive mechanism to ensure it moves freely, without binding or interference. On very large louvers with multiple sections, this may require use of a lever. Small to average size louvers should easily operate by hand strength on the torque tube.
4. Complete the installation by attaching any remaining components such as pneumatic actuator or grade level operators. Detailed installation instructions for actuator can be found in its shipping carton. For instructions on grade level operators, see attached "Reference D".
5. After installing any remaining operators, complete the installation process by cycling the louver several times to ensure it moves freely, without interference and isn't binding at any location. Some adjustment of end links may be required to ensure all louver blades open and shut consistently down the entire length of the louver.
6. Check all attachment fasteners to ensure all are properly tightened and completely engaged to the louver flange.
7. If applicable, check all end link connections and torque tube couplers to ensure they are properly tightened and fasteners are completely engaged.

MAINTENANCE INSTRUCTIONS (Annual)

1. Visually inspect all blade pins to ensure the pin bearings are in place and do not have unacceptable wear.
2. Visually inspect all connections between blade horns and actuator rod to confirm all connecting bearing, bolts and nuts are in place and not showing unacceptable wear.
3. Visually inspect all attachment screws to ensure none have backed off or are missing.
4. If dirt or grease buildup is excessive, clean louver blades and operating mechanisms with high pressure clear water wash.
5. Operate any manual levers or grade level operators to confirm all are in good working order and move freely without binding or interference.
6. If actuators are installed, visually inspect the mounting bolts to ensure all are tight and in place. Visually inspect the condition of all connecting links, the clevis and clevis pin.
7. Visually inspect all actuator rod end links and torque tube connectors to confirm all are in place and properly engaged.
8. Remove any leaves or other debris that may have collected in corners or between the louver blades and integral hailguards.

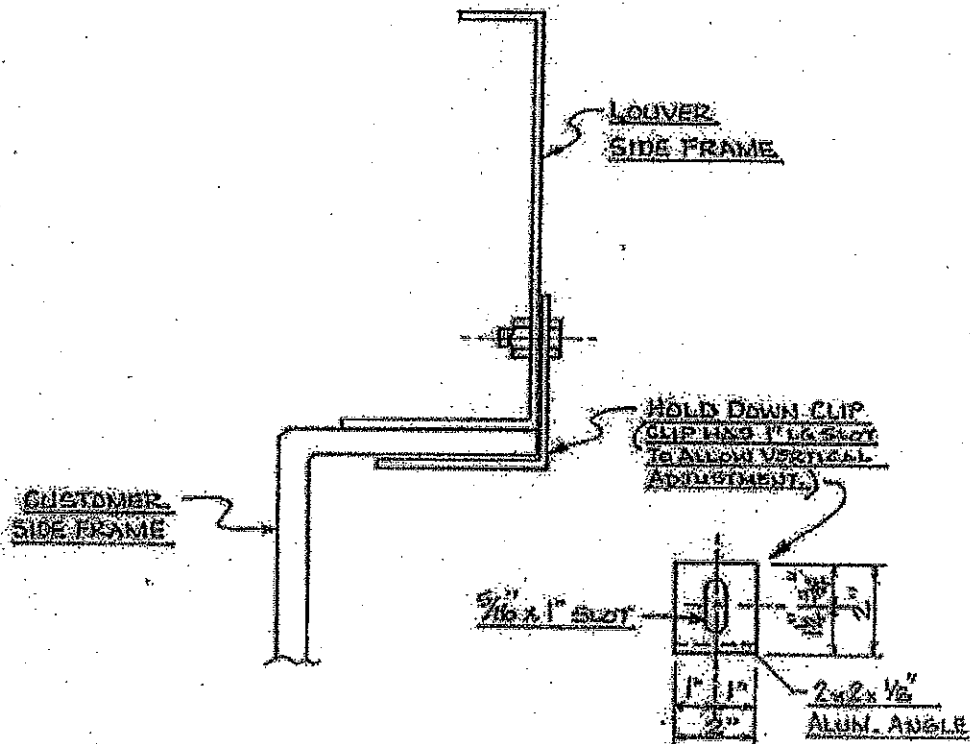
RECOMMENDED SPARE PARTS LIST

Item Description	Suggested Quantity
1. Blade horn bearing, bolt and nut kit	1 per 5 Ft ² louver area
2. Actuator rod end link kit	1 per 2 connections
3. Torque Tube couplings	1 per 2 torque tube connections
4. Blade Pin and Pin Bearing kits	5 per 10 Ft ² louver area
5. Manual handle kits	1

AIRTECH Products Inc.

Reference A

MOUNTING CLIP DETAIL



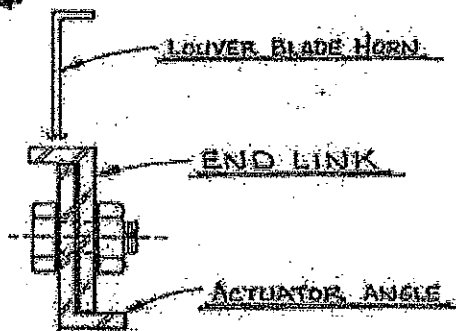
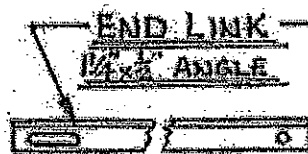
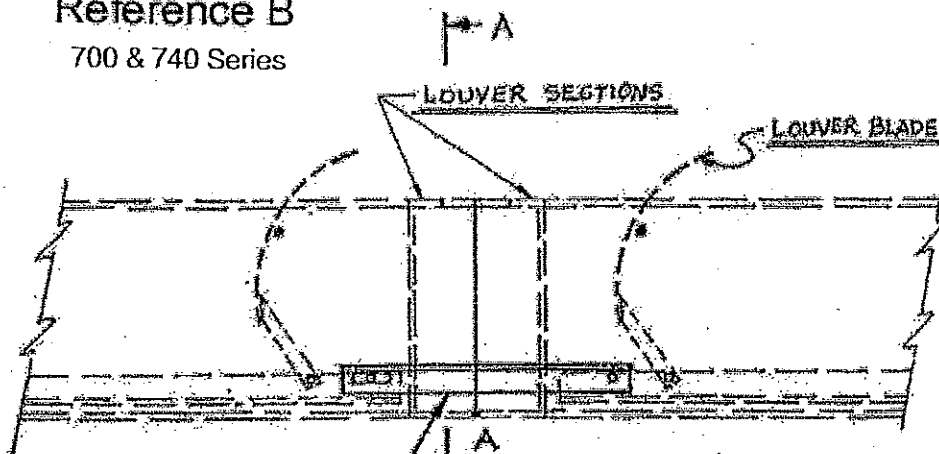
P.O. BOX 790

SAND SPRINGS, OK 74063

(918) 241-0264

Reference B

700 & 740 Series



INSTALLATION

1. Position blades in each louver section to same percent of opening.
2. Insert End Link through slots in louver section end frames.
3. Install End link by attaching to louver actuator rods using the 1/4" bolts and locknuts provided.

AIRTECH

INDUSTRIAL SHUTTERS

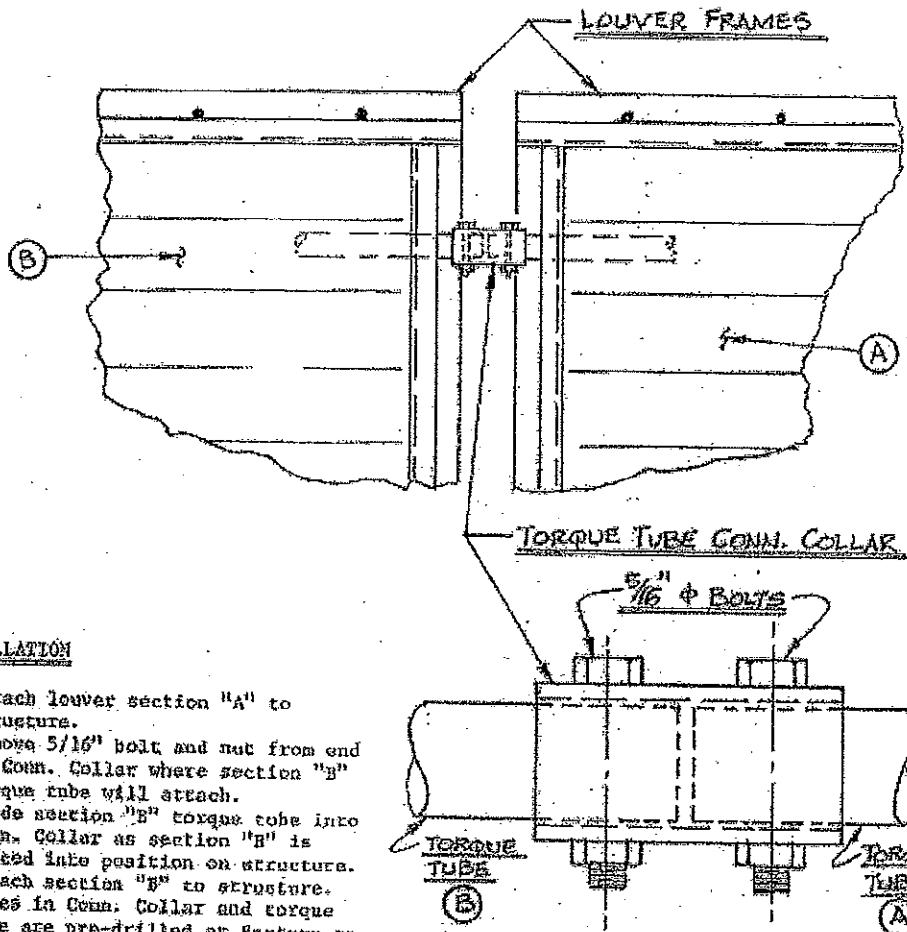
END LINK INSTALLATION

Chart.

Date

Dr. 700-1

Reference C



INSTALLATION

1. Attach louver section "A" to structure.
2. Remove 5/16" bolt and nut from end of Conn. Collar where section "B" torque tube will attach.
3. Slide section "B" torque tube into Conn. Collar as section "B" is placed into position on structure.
4. Attach section "B" to structure.
5. Holes in Conn. Collar and torque tube are pre-drilled at factory to assure proper opening and closing of louver blades. Be sure all louver blades are in same percent of opening before replacing 5/16" bolt and nut to Conn. Collar and section "B" torque tube.

AIRTECH

INDUSTRIAL SHUTTERS

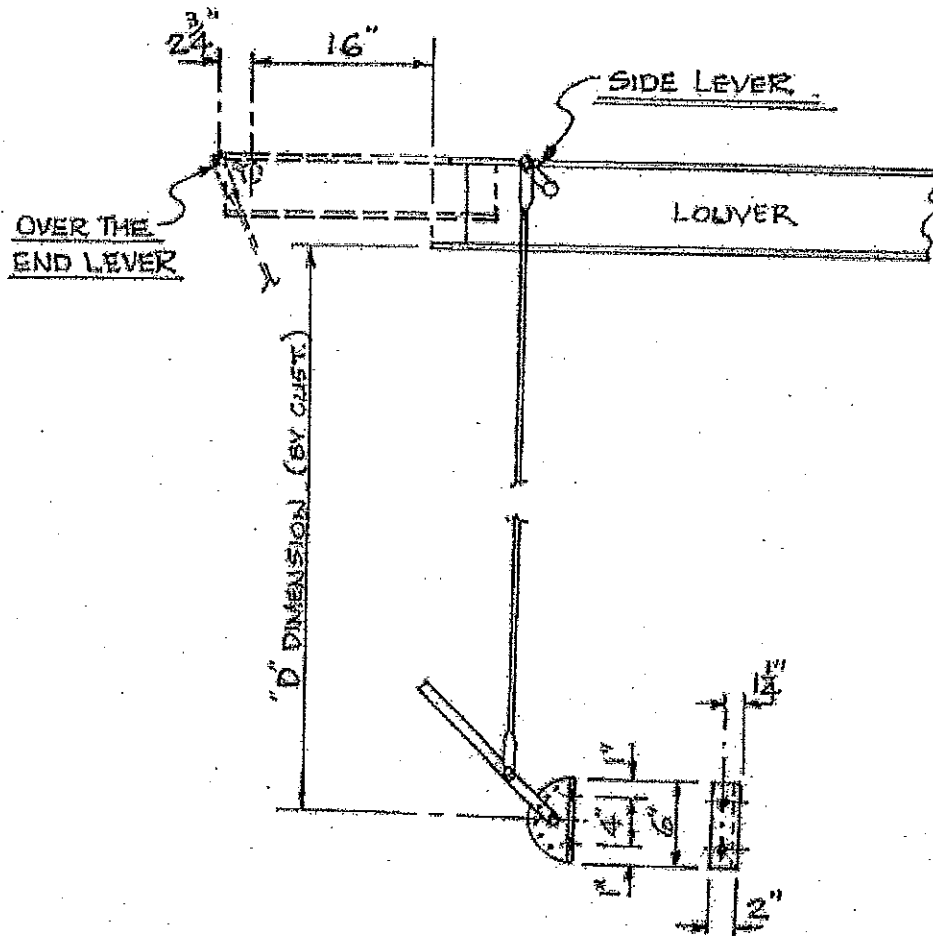
Connecting Collar Installation

Cost.

Date

DWG. 700-4

Reference D



AIRTECH

INDUSTRIAL SHUTTERS

MANUAL GRADE LEVEL OPERATOR

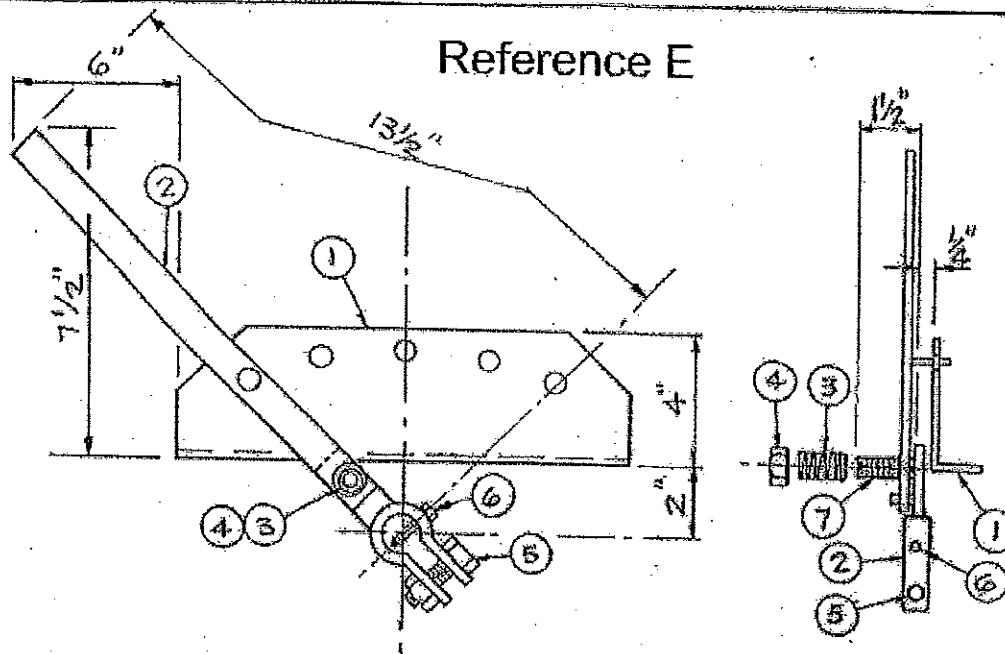
Cust.

Part

DWG.

700-5

Reference E



MANUAL OPERATOR DETAIL

- (1) = Manual Operator Bracket.
- (2) = Manual Operator Handle.
- (3) = Manual Operator Handle Spring.
- (4) = Manual Handle Nut.
- (5) = Manual Handle Clamp Bolt & Nut.
- (6) = Set Screw
- (7) = 3/8" dia. all-thread.

AIRTECH

INDUSTRIAL SHOOTERS

MANUAL OPERATOR PARTS

Cust.

Date

Dwg. 700 - 3

AIRTECH PRODUCTS, INC.

P.O. Box 786
8101 West 16th Street
Sand Springs, OK 74063

918-241-0264 (Phone)
918-241-0270 (Fax)

Louver Materials of Construction

Aluminum Frame (extrusion):	6063 T5
Aluminum Frame (folded sheet):	3003 H14
Galvanized Steel Frame:	A653-G90 10 Ga. Carbon Steel (Mechanical Galvanized Finish)
Blades:	6063-T6 Aluminum
Blade Pins:	
Aluminum:	6061-T6 Aluminum
Stainless Steel:	303 Stainless Steel
Torque Tube:	6063-T6 Aluminum
Actuator Rod:	6063-T6 Aluminum
Actuator Lever Arm:	6061-T6 Aluminum
Clevis:	1018 Carbon Steel
Clevis to Arm Connecting Link:	6061-T6 Aluminum
Assembly Hardware:	
Cap Screws:	ANSI/ASME B8.2.1 1/4-20, Grade 5, Zinc Plate
Nuts:	Nylon Insert lock nut, Performance Spec IF1/100, MIL-N/25027, Light Hex, Standard Height, Zinc Plate
Bearings:	Glass Filled Nylatron, (Per API Specification 681)

Airtech Products, Inc.

P.O. Box 790

8101 West 16th Street

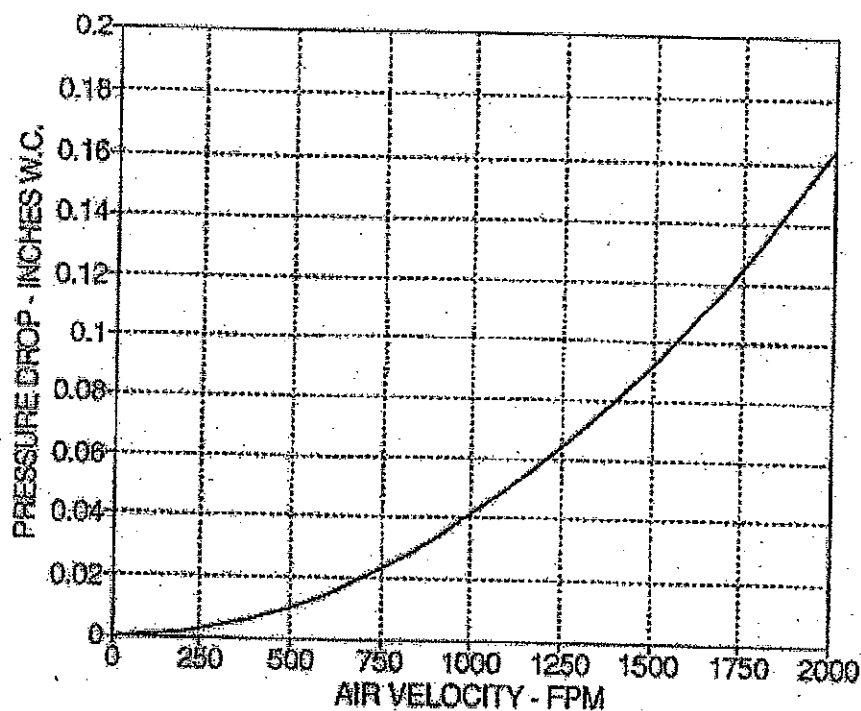
Sand Springs, OK 74063

Reference G

918-241-0264 Phone

918-241-0270 Fax

LOUVER PRESSURE DROP CURVE



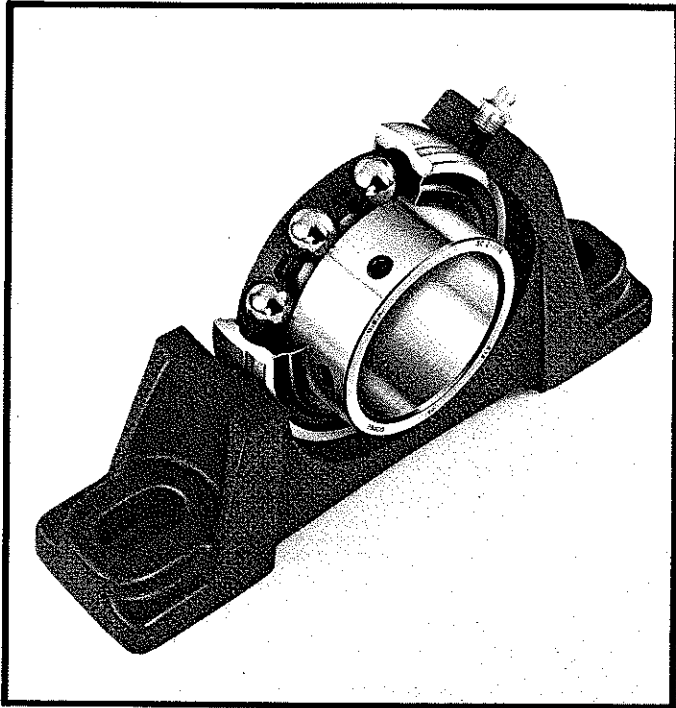
DENSITY RATIO = 1.0

Corrected Pressure Drop Across The Louvers As A
Function of Air Speed Within The Wind Tunnel.

DODGE SC/SCM

MOUNTED BALL BEARINGS

MOUNTED BEARING DATA SHEET



Dodge SC/SCM setscrew mounted ball bearings serve an extremely wide variety of mounted bearing applications. The SC/SCM line mounts single row ball bearing inserts on shafts from $\frac{1}{2}$ " to $3\frac{1}{2}$ " O.D. The SC ($\frac{1}{2}$ "- $2\frac{15}{16}$ ") is a standard 200 Series bearing for normal duty applications. The SCM ($1\frac{7}{16}$ "- $3\frac{1}{2}$ ") is designed for medium-duty with higher rated capacities due to use of a larger bearing.

Dodge SC/SCM inserts feature case carburized wide (through the bore) inner rings for greater support along the shaft. Case carburization makes the inner ring resistant to breakage, a common cause of failure with through-hardened inner rings. Raceway curvatures and the ball complement are consistent with industry standards.

The retainer is a one-piece ball-riding molded polynalide design. Retainer material consists of heat stabilized nylon with 33% fill "short" glass fiber re-inforcement. The short glass fiber strands allow for higher operating temperatures than plain (6/6) nylon retainers. They also offer greater flexibility than steel or long glass fiber retainers. This flexibility greatly improves retainer life under misalignment conditions.

HOUSINGS

Available SC/SCM housing configurations include pillow blocks, two- and four-bolt flange, piloted flange, take-up bearings, and wide slot take-up bearings. Tapped base pillow blocks, two- and three-bolt ductile flanges, three-bolt flange brackets, hanger bearings, screw conveyor hanger bearings, cylindrical units, and low-backed (SCB) and high backed (SCU) pillow blocks are available in SC style only.

SEALING

The Dodge ProGuard™ Seal is a land-riding, positive contact seal with steel shield protection. The rubber seal lip is molded as an integral part of the steel shield. The highly effective land-riding design assures uniform lip contact with the ground O.D. of the inner ring. The nitrile rubber, especially compounded for minimum drag, provides full pillow block speed capabilities and outstanding wear characteristics. The steel shield is mechanically anchored into the bearing's outer ring to resist blowout.

SHAFT MOUNTING

The inner ring is locked to the shaft by two setscrews spaced 65° apart. The 65° setscrew angle provides an optimum balance between shaft holding power and inner ring stress.

ANTI-ROTATION DEVICE

A simplified anti-rotation device prevents the bearing's outer ring from turning in the housing. A hardened anti-rotation plug is press-fitted into the outer ring; when assembled, the pin rests in one of the housing's loading slots.

LUBRICATION

The bearing is factory lubricated with a highly stable lithium base grease. A grease groove around the O.D. of the outer ring assures the bearing is lubricatable up to $\pm 2^\circ$ misalignment.

END COVERS

"Pop-in" end covers are available for all SC/SCM mounted units larger than 1" bore. The end covers install in seconds with no requirement for housing or insert modifications.

BEARING TECHNICAL SPECIFICATION

SC/SCM ball bearing shall be made of superior bearing quality steel. It will be double sealed, with a flexible nylon retainer, and prelubricated with water-resistant NLGI #2 lithium based grease. Relubricatable feature is standard. Bearings are mounted with two setscrews spaced 65° apart and are available from $\frac{1}{2}$ " to $2\frac{15}{16}$ " (SC) and $1\frac{7}{16}$ " to $3\frac{1}{2}$ " (SCM) shaft sizes.

Bearing housings are high quality gray iron, with a variety of bolt hole patterns.

Bearing and housing are basically dimensionally interchangeable with mounting holes, base to center line of shaft, and width through the base with the following manufacturers:

Fafnir	Hub City
SKF	McGill
PTC (Link Belt)	Sealmaster/Browning
	Boston

Bearings will have life and load characteristics which are equal to AFBMA ratings.

SELECTION SC/SCM Ball Bearing Size

Dodge SC/SCM ball bearings are primarily designed for radial loading. However they have the capacity to carry thrust loads and combined radial/thrust loads. The maximum recommended load which can be applied is limited by various components in the system, such as bearing, housing, shaft, shaft attachment, speed, and life requirements as listed in this catalog. Dodge SC/SCM ball bearings have been applied successfully when these limits have been exceeded under controlled operating conditions. Contact Dodge Engineering for applications which exceed the recommendations of this catalog.

Select a bearing from the SC/SCM Selection Chart having a radial load rating at the operating speed equal to or greater than the calculated "Equivalent Radial Load" for a desired L_{10} Life. This simple method is all that is required for the majority of general applications and provides for occasional average shock loads.

L_{10} Hours Life—is the life which may be expected from at least 90% of a given group of bearings operating under identical conditions.

For a L_{10} Hours Life other than those listed in the selection chart, multiply the Equivalent Radial Load by one of the following factors. For 20,000 L_{10} Hours Life use factor of .87; 40,000, 1.10; 60,000, 1.26; 80,000, 1.29. Then select a bearing from the bold face (30,000) L_{10} ratings only in the selection chart having a rating equal to or greater than this value.

Heavy Service—For heavy shock loads, frequent shock loads, or severe vibrations, add up to 50% (according to severity of conditions) to the Equivalent Radial Load to obtain a Modified Equivalent Radial Load. Consult Application Engineers for additional selection assistance.

A thrust load value of $C/10$ is recommended as a guide for general applications and will give adequate L_{10} life. Where substantial radial load pulls the housing away from the mounting base, both the hold-down bolts and housing must be of adequate strength. Auxiliary load carrying devices such as shear bars are advisable for side or end loading of pillow blocks and radial loads for flange units.

To determine the L_{10} Hours Life for loads and RPM's not listed, use the following equation:

$$L_{10} = \left(\frac{C}{P} \right)^3 \times \frac{16667}{\text{RPM}}$$

Where: L_{10} = Life, Hours

C = Dynamic Capacity, lbs. (Page 9.)

P = Equivalent Radial Load, lbs.

When the load on a ball bearing is solely a radial load with no thrust (axial) load, the equivalent radial load (P) is equal to the actual radial load. However, when a thrust (axial) load is applied, the radial and thrust loads applied must be converted into an equivalent radial load. The use of the X (radial factor) and Y (thrust factor) from Table 1 convert the actual applied thrust and radial loads to an equivalent radial load which has the same effect on the life of a bearing as a radial load of this magnitude.

$$P = X F_R + Y F_A$$

Where P = Equivalent radial load, lbs.

F_R = Radial load, lbs.

F_A = Thrust (axial) load, lbs.

e = Thrust load to radial load factor (Table 1 below)

X = Radial load factor (Table 1 below)

Y = Thrust factor (Table 1 below)

C_0 = Basic static capacity (Bearing Table Page 9.)

To find X and Y , first calculate $\frac{F_A}{C_0}$ to determine e . Calculate $\frac{F_A}{F_R}$ and compare to e to determine the X and Y factors to use from Table 1.

Substitute all known values into the equivalent radial load equation. The equivalent radial load (P) thus determined can be used in the L_{10} life formula or compared to the allowable equivalent radial load rating desired in the expanded rating table on the opposite page to select a bearing.

If calculated value of P is less than F_R , use $P = F_R$.

Table 1

$\frac{F_A}{C_0}$	e	Radial/Thrust Factors			
		If F_A/F_R is equal to or less than e		If F_A/F_R is greater than e	
		$F_A/F_R \leq e$		$F_A/F_R > e$	
		X	Y	X	Y
.014	.19	1	0	.56	2.30
.021	.21	1	0	.56	2.15
.028	.22	1	0	.56	1.99
.042	.24	1	0	.56	1.85
.056	.26	1	0	.56	1.71
.070	.27	1	0	.56	1.63
.084	.28	1	0	.56	1.55
.110	.30	1	0	.56	1.45
.17	.34	1	0	.56	1.31
.28	.38	1	0	.56	1.15
.42	.42	1	0	.56	1.04
.56	.44	1	0	.56	1.00

SELECTION SC/SCM Ball Bearings

Shaft Size		L-10 Hours Life	Allowable Equivalent Radial Load Rating (lbs.) at Various Revolutions Per Minute																	
SC	SCM		50	150	250	500	750	1000	1500	1750	2000	2500	3000	3500	4000	4500	5000	5500	6500	7500
$\frac{1}{2}$ 203 $\frac{3}{8}$ 203		5,000	675	465	395	315	275	250	215	205	195	185	170	165	155	150	145	140	135	125
		10,000	535	370	315	250	215	195	170	165	155	145	135	130	125	120	115	110	105	100
		30,000	370	255	215	170	150	135	120	115	110	100	95	90	85	80	80	75	70	70
		50,000	315	215	185	145	125	115	100	95	90	85	80	75	70	65	60	55	50	45
$\frac{1}{2}$ 204 $\frac{3}{8}$ 204 $\frac{3}{4}$		5,000	905	630	530	420	365	335	290	275	265	245	230	220	210	200	195	190	180	170
		10,000	720	500	420	335	290	265	230	220	210	195	185	175	165	160	155	150	140	135
		30,000	500	345	290	230	200	185	160	155	145	135	125	120	115	110	105	100	95	95
		50,000	420	290	245	195	170	155	135	130	125	115	110	100	100	95	90	90	85	80
$\frac{7}{8}$ 15/16 1		5,000	980	680	575	455	400	360	315	300	290	265	250	240	230	220	210	205	195	185
		10,000	780	540	455	360	315	290	250	240	230	210	200	190	180	175	170	165	155	145
		30,000	540	375	315	250	220	200	175	165	160	145	140	130	125	120	115	115	105	100
		50,000	455	315	265	210	185	170	145	140	135	125	115	110	105	100	100	95	90	85
$1\frac{1}{16}$ $1\frac{1}{8}$ $1\frac{3}{16}$ $1\frac{1}{4}$ (206)		5,000	1365	945	800	635	555	505	440	415	400	370	350	330	315	305	295	285	270	....
		10,000	1085	750	635	505	440	400	350	330	315	295	275	265	250	240	235	225	215	....
		30,000	750	520	440	350	305	275	240	230	220	205	190	180	175	170	160	155	150	....
		50,000	635	440	370	295	255	235	205	195	185	170	160	155	145	140	135	130	125	....
$1\frac{1}{4}$ (207) $1\frac{5}{16}$ $1\frac{3}{8}$ $1\frac{7}{16}$		5,000	1800	1245	1050	835	730	665	580	550	525	490	460	435	420	400	390	375	....	....
		10,000	1425	990	835	665	580	525	460	435	420	390	365	345	330	320	310	300	....	....
		30,000	990	685	580	460	400	365	320	305	290	270	255	240	230	220	215	205	....	....
		50,000	835	580	490	390	340	310	270	255	245	225	215	205	195	185	180	175	....	....
$1\frac{1}{2}$ $1\frac{5}{8}$	$1\frac{7}{16}$ $1\frac{1}{2}$ *	5,000	2290	1590	1340	1065	930	845	740	700	670	620	585	555	530	510	495	....	....	....
		10,000	1815	1260	1065	845	740	670	585	555	530	495	465	440	420	405	390	....	....	....
		30,000	1260	875	740	585	510	465	405	385	370	345	320	305	295	280	270	....	....	....
		50,000	1065	740	620	495	430	390	345	325	310	290	270	260	245	240	230	....	....	....
$1\frac{11}{16}$ $1\frac{3}{4}$	$1\frac{1}{2}$	5,000	2465	1710	1440	1145	1000	910	795	755	720	670	630	600	575	550	530	....	....	....
		10,000	1955	1355	1145	910	795	720	630	600	575	530	500	475	455	435	420	....	....	....
		30,000	1355	940	795	630	550	500	435	415	395	370	345	330	315	305	295	....	....	....
		50,000	1145	795	670	530	465	420	370	350	335	310	295	280	265	255	245	....	....	....
$1\frac{5}{16}$ 2	$1\frac{11}{16}$ $1\frac{3}{4}$	5,000	2465	1710	1440	1145	1000	910	795	755	720	670	630	600	575	550	530	....	....	....
		10,000	1955	1355	1145	910	795	720	630	600	575	530	500	475	455	435	420	....	....	....
		30,000	1355	940	795	630	550	500	435	415	395	370	345	330	315	305	295	....	....	....
		50,000	1145	795	670	530	465	420	370	350	335	310	295	280	265	255	245	....	....	....
$2\frac{3}{16}$ $2\frac{1}{4}$	$1\frac{5}{16}$ 2	5,000	3045	2110	1780	1415	1235	1120	980	930	890	825	780	740	705	680	655	....	....	....
		10,000	2415	1675	1415	1120	980	890	780	740	705	655	620	585	560	535	510	....	....	....
		30,000	1675	1165	980	780	680	620	540	515	490	455	430	405	390	375	360	....	....	....
		50,000	1415	980	825	655	575	520	455	435	415	385	360	345	330	315	300	....	....	....
$2\frac{7}{16}$	$2\frac{3}{16}$ $2\frac{1}{4}$	5,000	3680	2555	2155	1710	1495	1355	1185	1125	1080	1000	940	895	855	815	785	....	....	....
		10,000	2920	2025	1710	1355	1185	1080	940	895	855	795	745	710	675	645	615	....	....	....
		30,000	2025	1405	1185	940	825	745	655	620	595	550	520	495	475	455	435	....	....	....
		50,000	1710	1185	1000	795	695	630	550	525	500	465	435	415	395	375	355	....	....	....
$2\frac{1}{2}$	$2\frac{7}{16}$ $2\frac{1}{2}$	5,000	4370	3030	2555	2030	1775	1610	1410	1335	1280	1185	1120	1065	1015	965	915	....	....	....
		10,000	3470	2405	2030	1610	1410	1280	1120	1060	1015	945	885	835	785	735	685	....	....	....
		30,000	2405	1670	1410	1120	975	885	775	735	705	655	615	585	555	525	500	....	....	....
		50,000	2030	1410	1185	945	825	750	655	620	595	550	520	495	475	455	435	....	....	....
$2\frac{5}{16}$	$2\frac{11}{16}$	5,000	4645	3220	2715	2155	1885	1710	1495	1420	1360	1260	1190	1130	1080	1030	980	....	....	....
		10,000	3685	2555	2155	1710	1495	1360	1190	1130	1080	1000	945	895	845	795	745	....	....	....
		30,000	2555	1775	1495	1190	1040	945	825	785	750	695	655	625	595	565	535	....	....	....
		50,000	2155	1495	1260	1000	875	795	695	660	630	585	550	520	495	475	455	....	....	....
3	$2\frac{5}{16}$ 3	5,000	5435	3770	3180	2525	2205	2005	1750	1665	1590	1475	1400	1330	1265	1205	1145	....	....	....
		10,000	4315	2990	2525	2005	1750	1590	1390	1320	1265	1175	1105	1045	985	925	865	....	....	....
		30,000	2990	2075	1750	1390	1215	1105	965	915	875	815	755	705	655	605	555	....	....	....
		50,000	2525	1750	1475	1175	1025	930	815	775	740	685	635	585	535	485	435	....	....	....
$3\frac{1}{2}$	$3\frac{7}{16}$ $3\frac{1}{2}$	5,000	6695	4645	3920	3110	2720	2470	2160	2050	1960	1845	1745	1655	1565	1475	1385	....	....	....
		10,000	5315	3690	3110	2470	2160	1960	1715	1625	1555	1445	1355	1265	1175	1085	995	....	....	....
		30,000	3690	2560	2160	1715	1495	1360	1190	1130	1080	1000	945	895	845	795	745	....	....	....
		50,000	3110	2160	1820	1445	1265	1145	1000	950	910	845	795	745	695	645	595	....	....	....

* Piloted Flange Only

SC, SCB, SCM, SXR, SXRB, SXV, SXVB, VSC, VSCB, SL AND SLX BEARINGS

INSTALLATION

WARNING

To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

1. Clean shaft and bearing bore thoroughly. File flats on shaft at set-screw locations to permit easy removal of bearing.
2. Slip bearing into position. Be sure that bearing is not on a worn section of the shaft. For tighter fits tap inner ring face only with soft driver. DO NOT HAMMER ON HOUSING.
3. The bearing outer ring OD is spherical and swivels in the housing to accommodate misalignment. Snug hold-down bolts and use shaft to swivel each bearing until its final position is in the center of free movement top to bottom as well as side to side. Pass shaft through both bearings without forcing. This will prevent preloading of the bearings.
4. Shim mounting surfaces for full housing contact and vertical shaft adjustment—tighten hold-down bolts to proper torque (Table 1). Turn shaft by hand. Resistance to turning should be the same as before full tightening of hold down bolts.

5. For SC, SCB, VSC, VSCB, SL and SCM, the setscrews should be tightened alternately and in small increments to the torque specified in Table 1. After 24 hours operation, the setscrews should be retightened to the torque in Table 1 to assure full locking of the inner race to the shaft. Care should be taken that the socket key or driver is in good condition with no rounded corners and the key is fully engaged in the setscrew and held square with the setscrew to prevent rounding out of the setscrew socket when applying maximum torque.

Recommended Torque for Setscrews and Bolts

Setscrews				Hold Down Bolts	
Size	Key Hex Across Flats	Recommended Torque (Inch-Lbs.)		Size	Wrench Torque (Inch-Lbs.)
No. 10	3/32	MIN.	MAX.	3/8-16	240
		28	33		
1/4	1/8	66	80	1/2-13	600
5/16	5/32	126	156	5/8-11	1200
3/8	3/16	228	275	3/4-10	2100

Table 1

Do not drill through the setscrew holes for spot drilling of the shaft. (Some inner rings have tempered setscrew threads and can be damaged by a drill.) If spot drilling is required, locate bearings on the shaft and center punch through the setscrew hole. Remove bearing and spot drill the shaft; then reassemble bearing over the spot drill position and assemble as above. Filed flats are preferable to spot drilling.

6. For SXR, SXRB and SLX bearings—slide collar against cam end of inner race.
7. For SXR, SXRB and SLX bearings—use a punch in the hole provided in the collar, tap collar smartly in the direction of shaft rotation. Tighten setscrews to proper torque (Table 1).
8. TO REMOVE SX, SXRB and SLX bearings—Loosen setscrew and tap collar in the direction opposite of shaft rotation.

LUBRICATION

SL and SLX Bearings—are lubricated at the factory for the life of the bearing and require no further lubrication. These bearings are to be used for normal conditions of service.

SC, SCB, SCM, SXR, SXRB, SXV, SXVB, VSC and VSCB Bearings Storage or Special Shutdown—If exposed to wet or dusty conditions or to corrosive vapors, extra protection is necessary: Add grease until it shows at the seals; rotate the bearing to distribute grease; cover the bearing. After storage or idle period, add a little fresh grease before running.

High Speed Operation—In the higher speed ranges too much grease will cause overheating. The amount of grease that the bearing will take for a particular high speed application can only be determined by experience—see "Operating Temperature" below. If excess grease in the bearing causes overheating, it will be necessary to remove grease fitting to permit excess grease to escape. The bearing has been greased at the factory and is ready to run. When establishing a relubrication schedule, note that a small amount of grease at frequent intervals is preferable to a large amount at infrequent intervals.

Operation in Presence of Dust, Water or Corrosive Vapors—Under these conditions the bearing should contain as much grease as speed will permit since a full bearing with consequent slight leakage is the best protection against entrance of foreign material. In the higher speed ranges too much grease will cause overheating—see "High Speed Operation" above. In the lower speed ranges it is advisable to add extra grease to a new bearing before putting into operation. Bearings should be greased as often as necessary (daily if required) to maintain a slight leakage at the seals.

Normal Operation—This bearing has been greased at the factory and is ready to run. The following table is a general guide for relubrication. However, certain conditions may require a change of lubricating periods as dictated by experience. See "High Speed Operation" and "Operation in Presence of Dust, Water or Corrosive Vapors" above.

Operating Temperatures—Abnormal bearing temperatures may indicate faulty lubrication. Normal temperature may range from "cool to warm to the touch" up to a point "too hot to touch for more than a few seconds," depending on bearing size and speed and surrounding conditions. Unusually high temperature accompanied by excessive leakage of grease indicates too much grease. High temperature with no grease showing at the seals, particularly if the bearing seems noisy, usually indicates too little grease. Normal temperature and a slight showing of grease at the seals indicate proper lubrication.

Kind of Grease—Many ordinary cup greases will disintegrate at speeds far below those at which DODGE bearings will operate successfully if proper grease is used. DODGE bearings have been lubricated at the factory with No. 2 consistency lithium base grease which is suitable for normal operating conditions. Relubricate with lithium base grease or a grease which is compatible with original lubricant and suitable for ball bearing service. In unusual or doubtful cases the recommendation of a reputable grease manufacturer should be secured.

Special Operating Conditions—Refer acid, chemical, extreme or other special operating conditions to RELIANCE ELECTRIC, Greenville, SC.

Lubrication Guide

Read Preceding Paragraphs Before Establishing Lubrication Schedule.

Hours Run per Day	Suggested Lubrication Period in Weeks							
	1 to 250 RPM	251 to 500 RPM	501 to 750 RPM	751 to 1000 RPM	1001 to 1500 RPM	1501 to 2000 RPM	2001 to 2500 RPM	2501 to 3000 RPM
8	12	12	10	7	5	4	3	2
16	12	7	5	4	2	2	1	1
24	10	5	3	2	1	1	1	1

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed: Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Reliance Electric Industrial Company nor are the responsibility of Reliance Electric Industrial Company. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a failsafe device must be an integral part of the driven equipment beyond the speed reducer output shaft.

DODGE / P.O. Box 499 / 2 Ponders Court / Greenville, South Carolina 29602 / 803-297-4800

REPLACEMENT PARTS FOR

Series	203	204	205	206	207	208	209	210	211	212	214	215	216	218	Series
Lube Fitting Locking Screw @	405020*	405015*	405015*	405015*	405015*	405015*	405015*	405015*	405015*	405015*	405015*	405015*	405015*	405015*	Lube Fitting Locking Screw @
Pil Bk Hsg	123840	131826	131824	044060	123844	123845	044067	044062	044063	044064	126825	126826	126827	044104	Pil Bk Hsg
NI Pl Bk Hsg	—	131823	—	123850	123851	123852	—	123853	—	—	—	—	—	—	NI Pl Bk Hsg
U Pil Bk Hsg	—	—	131824	123876	—	—	—	—	—	—	—	—	—	—	U Pil Bk Hsg
B Pil Bk Hsg	—	—	131826	123899	123893	123894	123890	123891	123892	123893	—	—	—	—	B Pil Bk Hsg
Tapped Base PB Hsg	—	124485	124486	124487	124488	—	—	—	—	—	—	—	—	—	Tapped Base PB Hsg
CC Fan & Blower PB Hsg	—	—	124489	124490	124491	—	—	—	—	—	—	—	—	—	CC Fan & Blower PB Hsg
CC Fan & Blower CC F & B Hsg	—	—	124492	124493	124494	—	—	—	—	—	—	—	—	—	CC Fan & Blower CC F & B Hsg
Snap Wire for CC F & B Hsg	—	—	124495	124496	124497	—	—	—	—	—	—	—	—	—	Snap Wire for CC F & B Hsg
SL & SLX Pil Bk Hsg Strap	128020	128022	128023	128024	128025	128026	—	134153	134155	134156	—	—	—	—	SL & SLX Pil Bk Hsg Strap
SL & SLX Pil Bk Hsg Base	128021	—	—	128025	128026	128027	—	134183	134184	134185	—	—	—	—	SL & SLX Pil Bk Hsg Base
SC & SCM Pil Fig Hsg	—	—	—	—	124222	124223	044079	044080	044081	126213	126214	—	126215	044092	SC & SCM Pil Fig Hsg
SC VSC, SCM 3B Fig Hsg	124200	044072	124302	044072	124304	124305	044074	044095	044077	124309	126220	126223	126221	044078	SC VSC, SCM 3B Fig Hsg
SC NI, PL 4B Fig Hsg	—	124279	124280	124281	124282	124283	—	044096	—	—	—	—	—	—	SC NI, PL 4B Fig Hsg
SXR & SXV 4B Fig Hsg	131292	131293	131294	131295	131296	131297	131298	131299	131300	131301	—	—	—	—	SXR & SXV 4B Fig Hsg
SCLF 3B Fig Hsg	124680	124681	124682	124683	124684	124685	—	131299	131300	—	—	—	—	—	SCLF 3B Fig Hsg
SL & SLX 3B & 4B Fig Hsg (2 req)	—	128010	128011	128012	128013	128014	—	128015	128016	—	—	—	—	—	SL & SLX 3B & 4B Fig Hsg (2 req)
SCFB Fig Bkt Hsg	—	124494	124495	124496	124497	124498	—	—	—	—	—	—	—	—	SCFB Fig Bkt Hsg
SC & SCM 2B Fig Hsg	124314	044069	124318	044071	124316	124317	044073	044075	—	—	—	—	—	—	SC & SCM 2B Fig Hsg
SC NI, PL 2B Fig Hsg	—	124355	124356	124357	124358	124359	—	124360	—	—	—	—	—	—	SC NI, PL 2B Fig Hsg
SXR & SXV 2B Fig Hsg	131280	131281	131282	131283	131284	131285	131286	131287	—	—	—	—	—	—	SXR & SXV 2B Fig Hsg
SCFLT 2B Fig Hsg	124700	124701	124702	124703	124704	124705	—	—	—	—	—	—	—	—	SCFLT 2B Fig Hsg
SL & SLX 2B Fig Hsg (2 req)	128100	128101	128102	128103	128104	—	—	—	—	—	—	—	—	—	SL & SLX 2B Fig Hsg (2 req)
Req. TU Hsg	—	125301	125302	125303	125304	—	044083	044085	044105	044087	—	—	—	—	Req. TU Hsg
NI, PL, TU Hsg	—	125285	125286	125287	125288	125289	—	125290	—	—	—	—	—	—	NI, PL, TU Hsg
Wide Slot TU Hsg	—	125314	125315	125316	125317	125318	044084	044086	044106	044088	135160	125323	135061	—	Wide Slot TU Hsg
Top Angle TU Hsg	—	—	—	—	—	—	—	044085	044065	044067	136050	012283	136051	044088	Top Angle TU Hsg
Hanger Hsg Brg	—	—	—	—	124334	—	—	044103	—	124352	—	—	—	—	Hanger Brg Hsg
Screw Conv Hsg	—	—	—	044089	—	124346	—	124349	—	—	—	—	124353	—	Screw Conv Hsg
Cyl Unit Hsg	—	044107	—	044108	064109	—	—	—	—	—	—	—	—	—	Cyl Unit Hsg

★ One required for PB, Flgs. & Hgr Brgs; Cylindrical Units, SCLF and SCLFT require 1 Part No. 405020. T.U. Brgs require 1 Part No. 405016.

(m) One required for Cylindrical Units only.

INVERTS		203		204		205		206		207		208		INVERTS	
Series	Part No.	1/2	3/4	1/2	3/4	7/8	15/16	1/2	3/4	1/2	3/4	1/2	3/4	Series	Part No.
SC	123328	123329	123330	123331	123332	123333	123334	123335	123336	123337	123338	123339	123340	SC	123341
VSC/SL	—	—	—	—	3/4	—	—	1	—	—	13/16	1/4	—	VSC/SL	389930
Part No.	—	—	—	—	389925	—	—	389926	—	—	389927	389928	—	Part No.	—
SCM	—	—	—	—	—	—	—	—	1	—	—	13/16	—	SCM	123342
Part No.	—	—	—	—	—	—	—	—	123419	—	—	123420	—	Part No.	123343
CC F & B	—	—	—	—	—	—	15/16	1	—	1/4	13/16	1/4	—	CC F & B	123344
Part No.	—	—	—	—	—	—	134181	134162	—	134164	134165	134166	—	Part No.	123345
SXR	131900	131901	131902	131903	131904	131905	131906	1	1/4	1/4	13/16	1/4	15/16	SXR	131916
Part No.	—	—	—	—	131904	131905	131906	131907	131908	131909	131910	131911	131912	Part No.	131913
SXV/SLX	—	—	—	—	3/4	7/8	15/16	1	1/4	1/4	13/16	1/4	15/16	SXV/SLX	131914
Part No.	—	—	—	—	131435	131436	131437	131438	131439	131440	131441	131442	131443	Part No.	131444
Series	209	210	211	212	213	214	215	216	217	218	219	220	221	Series	222
SC	123346	123347	123348	123349	123350	123351	123352	123353	123354	123355	123356	123357	123358	SC	123359
Part No.	123346	123347	123348	123349	123350	123351	123352	123353	123354	123355	123356	123357	123358	Part No.	123360
VSC/SL	—	2	2	—	—	—	—	—	—	—	—	—	—	VSC/SL	389931
Part No.	—	2	2	—	—	—	—	—	—	—	—	—	—	Part No.	—
SCM	123354	123355	123356	123357	123358	123359	123360	123361	123362	123363	123364	123365	123366	SCM	123367
Part No.	123354	123355	123356	123357	123358	123359	123360	123361	123362	123363	123364	123365	123366	Part No.	123368
CC F & B	—	—	—	—	—	—	—	—	—	—	—	—	—	CC F & B	123369
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	123370
SXR	131918	131919	131920	131921	131922	131923	131924	131925	131926	131927	131928	131929	131930	SXR	131931
Part No.	131918	131919	131920	131921	131922	131923	131924	131925	131926	131927	131928	131929	131930	Part No.	131931
SXV/SLX	—	—	—	—	—	—	—	—	—	—	—	—	—	SXV/SLX	131932
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	131933
Series	223	224	225	226	227	228	229	2	2	2	2	2	2	Series	230
SC	123445	123446	123447	123448	123449	123450	123451	123452	123453	123454	123455	123456	123457	SC	123458
Part No.	123445	123446	123447	123448	123449	123450	123451	123452	123453	123454	123455	123456	123457	Part No.	123458
VSC/SL	—	—	—	—	—	—	—	—	—	—	—	—	—	VSC/SL	389932
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	—
SCM	123459	123460	123461	123462	123463	123464	123465	123466	123467	123468	123469	123470	123471	SCM	123472
Part No.	123459	123460	123461	123462	123463	123464	123465	123466	123467	123468	123469	123470	123471	Part No.	123472
CC F & B	—	—	—	—	—	—	—	—	—	—	—	—	—	CC F & B	123473
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	123474
SXR	131934	131935	131936	131937	131938	131939	131940	131941	131942	131943	131944	131945	131946	SXR	131947
Part No.	131934	131935	131936	131937	131938	131939	131940	131941	131942	131943	131944	131945	131946	Part No.	131947
SXV/SLX	—	—	—	—	—	—	—	—	—	—	—	—	—	SXV/SLX	131948
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	131949
Series	231	232	233	234	235	236	237	238	239	240	241	242	243	Series	244
SC	123475	123476	123477	123478	123479	123480	123481	123482	123483	123484	123485	123486	123487	SC	123488
Part No.	123475	123476	123477	123478	123479	123480	123481	123482	123483	123484	123485	123486	123487	Part No.	123488
VSC/SL	—	—	—	—	—	—	—	—	—	—	—	—	—	VSC/SL	389933
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	—
SCM	123489	123490	123491	123492	123493	123494	123495	123496	123497	123498	123499	123500	123501	SCM	123502
Part No.	123489	123490	123491	123492	123493	123494	123495	123496	123497	123498	123499	123500	123501	Part No.	123502
CC F & B	—	—	—	—	—	—	—	—	—	—	—	—	—	CC F & B	123503
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	123504
SXR	131950	131951	131952	131953	131954	131955	131956	131957	131958	131959	131960	131961	131962	SXR	131963
Part No.	131950	131951	131952	131953	131954	131955	131956	131957	131958	131959	131960	131961	131962	Part No.	131963
SXV/SLX	—	—	—	—	—	—	—	—	—	—	—	—	—	SXV/SLX	131964
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	131965
Series	245	246	247	248	249	250	251	252	253	254	255	256	257	Series	258
SC	123499	123500	123501	123502	123503	123504	123505	123506	123507	123508	123509	123510	123511	SC	123512
Part No.	123499	123500	123501	123502	123503	123504	123505	123506	123507	123508	123509	123510	123511	Part No.	123512
VSC/SL	—	—	—	—	—	—	—	—	—	—	—	—	—	VSC/SL	389934
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	—
SCM	123513	123514	123515	123516	123517	123518	123519	123520	123521	123522	123523	123524	123525	SCM	123526
Part No.	123513	123514	123515	123516	123517	123518	123519	123520	123521	123522	123523	123524	123525	Part No.	123526
CC F & B	—	—	—	—	—	—	—	—	—	—	—	—	—	CC F & B	123527
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	123528
SXR	131966	131967	131968	131969	131970	131971	131972	131973	131974	131975	131976	131977	131978	SXR	131979
Part No.	131966	131967	131968	131969	131970	131971	131972	131973	131974	131975	131976	131977	131978	Part No.	131979
SXV/SLX	—	—	—	—	—	—	—	—	—	—	—	—	—	SXV/SLX	131980
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	131981
Series	259	260	261	262	263	264	265	266	267	268	269	270	271	Series	272
SC	123513	123514	123515	123516	123517	123518	123519	123520	123521	123522	123523	123524	123525	SC	123526
Part No.	123513	123514	123515	123516	123517	123518	123519	123520	123521	123522	123523	123524	123525	Part No.	123526
VSC/SL	—	—	—	—	—	—	—	—	—	—	—	—	—	VSC/SL	389935
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	—
SCM	123527	123528	123529	123530	123531	123532	123533	123534	123535	123536	123537	123538	123539	SCM	123540
Part No.	123527	123528	123529	123530	123531	123532	123533	123534	123535	123536	123537	123538	123539	Part No.	123540
CC F & B	—	—	—	—	—	—	—	—	—	—	—	—	—	CC F & B	123541
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	123542
SXR	131982	131983	131984	131985	131986	131987	131988	131989	131990	131991	131992	131993	131994	SXR	131995
Part No.	131982	131983	131984	131985	131986	131987	131988	131989	131990	131991	131992	131993	131994	Part No.	131995
SXV/SLX	—	—	—	—	—	—	—	—	—	—	—	—	—	SXV/SLX	131996
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	131997
Series	273	274	275	276	277	278	279	280	281	282	283	284	285	Series	286
SC	123543	123544	123545	123546	123547	123548	123549	123550	123551	123552	123553	123554	123555	SC	123556
Part No.	123543	123544	123545	123546	123547	123548	123549	123550	123551	123552	123553	123554	123555	Part No.	123556
VSC/SL	—	—	—	—	—	—	—	—	—	—	—	—	—	VSC/SL	389936
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	—
SCM	123557	123558	123559	123560	123561	123562	123563	123564	123565	123566	123567	123568	123569	SCM	123570
Part No.	123557	123558	123559	123560	123561	123562	123563	123564	123565	123566	123567	123568	123569	Part No.	123570
CC F & B	—	—	—	—	—	—	—	—	—	—	—	—	—	CC F & B	123571
Part No.	—	—	—	—	—	—	—	—	—	—	—	—	—	Part No.	123572
SXR	131998	131999	132000	132001	132002	132003	132004	132005	132006	132007	132008	132009	132010	SXR	132011
Part No.	131998	131999	132000	132001	132002	132003	132004	132005	132006	132007	132008	132009	132010	Part No.	132011
SXV/SLX	—	—	—	—	—	—	—								

◆ Except 1 1/2 SCM Piloted Flange.

+ 1 1/2" Piloted Flange Only.



THIS MACHINE IS EQUIPPED WITH DODGE®
PRE-LUBRICATED BALL BEARING UNITS ...
READY FOR IMMEDIATE USE

Generally Recommended Relubrication Frequency in MONTHS

OPERATING SPEED (RPM)	BORE IN INCHES					
	1/2 to 1	1 1/8 to 1 1/2	1 5/8 to 1 15/16	2 to 2 1/2	2 11/16 to 3	3 7/16 to 3 1/2
TO 500	6	6	6	6	5	4
500-1000	6	6	6	5	4	3
1000-1500	5	5	5	4	3	2
1500-2000	5	4	4	3	2	1
2000-2500	4	4	3	2	1	—
2500-3000	4	3	2	2	2	—
3000-3500	3	2	2	2	—	—
3500-4000	3	2	1	—	—	—
4000-4500	2	1	1	—	—	—
4500-5000	2	1	—	—	—	—

If possible relubricate slowly with grease while running, without endangering personnel, until clean grease purges at the seals. If relubricating while idle, add only 1-2 shots up to 2" bore, 4-5 shots above 2" bore with a hand gun.

A Lithium 12-Hydroxystearate Soap grease or a Lithium Complex Soap grease conforming to NLGI grade 2 consistency such as those listed here may be used.

Shell Alvania #2
Exxon Unirex N2
Mobil Mobilux #2

Mobil 532
Texaco Multifak #2
Texaco Premium RB

At speeds higher than 70% of the DODGE catalog max. speed rating or at bearing operating temperatures greater than 150°F but not to exceed 250°F, Exxon Unirex N3 grease may be used.

Adjust lubrication frequency depending on condition of purged grease. Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid in preventing corrosion.

DODGE/P.O. Box 499/6040 Ponders Court/Greenville, SC 29602-0499/864-297-4800

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A-869-5

3/96 20M-K

MAINTENANCE

This section of the manual contains information and vendor documents concerning service and maintenance of your air-cooled heat exchanger.

General Maintenance:

WARNING! Turn off and lock out or tag power source before proceeding with inspection of cooler internal surfaces or mechanical equipment.

The interior and exterior of the air-cooled heat exchanger should be inspected periodically for safety, damage and cleanliness. All guards provided with the unit must be in place and properly attached. No buildup of grease or dirt should be allowed on any of the components. The finned tubes exterior should be checked for dirty fins and clogging of the fins with dirt or lint. The interior of the tubes should be checked for rust and scale. The thermal design is based on clean exterior and interior heat exchanger surfaces.

Maintenance of the mechanical components is described in the following information. Vendor information is included and is specific for the components used for this air-cooled heat exchanger as well as general information on some components.

Component Vendor Maintenance Documents:

1. Electric Motor Information
2. Vibration Switch Information
3. V-belt or HTD belt drive information
4. Fan Information
5. Fan Bearing Information
6. Gear Box Information (if applicable)
7. Gear to Motor Coupling Information (if applicable)
8. Louver Information (if applicable)
9. Louver Actuator Information (if applicable)
10. Louver Controller Information (if applicable)

Procedures That Follow:

1. Electric Motor Maintenance (Pg. 8)
2. V-Belt Tensioning (Pg. 9, Pg. 10)
3. HTD Belt Tensioning (Pg. 11)
4. Lubrication of Bearings (Pg. 12)
5. Gear Maintenance (Pg. 13, Pg. 14)

ELECTRIC MOTOR MAINTENANCE

WARNING! Turn off and lock out or tag power source before proceeding.

Inspection:

Each motor should be inspected at regular intervals. The frequency and thoroughness will depend on the amount of operation, nature of service and the environment.

Cleanliness:

The motor exterior should be kept free of oil, dust, dirt, water and chemicals. For fan-cooled motors, it is important to keep the air intake opening clear of debris.

Moisture:

On non-explosion proof TEFC motors, a removable plug in the bottom center of the motor frame permits removal of any accumulated moisture. Drain regularly.

Lubrication Schedule:

Check and re-lubricate bearings each six months (more often if conditions require) as follows:

For best results, grease should be compounded from a lithium soap base and petroleum oil. It should be of No. 2 consistency and stabilized against oxidation. Operating temperature range should be from -15°F to +250°F for Class B insulation and to +300°F for Class F and H. Most major oil companies have special bearing greases that are satisfactory.

CAUTION! Adding grease to bearing when motor is operating may cause grease to go through clearance around inside end cap and be slung onto motor windings.

1. Thoroughly clean the grease connections at the ends of the extended lube lines.
2. Remove plugs from drains.
3. Remove hardened grease from drains with stiff wire or rod.
4. Add grease to inlet with hand type gun until small amount of new grease is forced out of the drain.
5. Clean excess grease from the drains and grease connections and run the motor 30 minutes before replacing the drain plug.

V-BELT TENSIONING INSTRUCTIONS

WARNING! Turn off and lock out or tag power source before proceeding.

SIMPLIFIED BELT TENSIONING METHOD

This tensioning method assumes average static tensions for drives, thereby eliminating the need for calculating static tension. Use this method if the small sheave diameter, small sheave rpm and speed ratio fall within the limits as given in table number 1; the number of belts used corresponds to the number recommended in this manual; and the drive has at least 2 belts.

Step 1: From TABLE NUMBER 1, determine the force required to deflect one belt 1/64" per inch of span length (length from C to C of sheaves along the belt)

- Measure the span length (t) of the drive.
- At the center of the span measure the force required to deflect one belt on the drive 1/64 per inch of span length from its normal position. The adjacent belt can be used as a reference for measuring the deflection. (see the figure below TABLE NUMBER 1, Page 10) Be sure to apply the force perpendicular to the belt.
- Measure the force required to deflect a band of belts 1/64 per inch of span length as discussed above. Divide the value by the number of belt strands in the band to find the deflection force per belt.

Note: Lay a steel bar or a narrow block of wood across the belt and apply the deflection force to the bar so that all of the individual strands in the band are deflected the same amount. If more than one belt is used in the drive, the neighboring band can be used as a reference for measuring the deflection, just as is done with individual belts. If only one band is used, lay a straightedge or stretch a string from sheave-to-sheave to use as a reference for measuring the deflection. Lay the straightedge or string across the back of the belt on the sheaves.

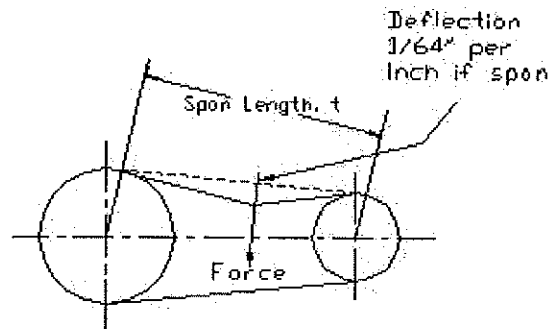
Step 2: Compare this deflection with the range of forces given in TABLE NUMBER 1.

- If it is less than the minimum recommended force, the belts tensioned must be increased.
- If it is more than the maximum recommended force, the drive tension must be reduced.

TABLE NUMBER 1

RECOMMENDED DEFLECTION FORCE PER BELT

Cross Section	Smallest Sheave Diameter Range	RPM Range	Belt Deflection Force				Cross Section	Smallest sheave diameter Range	RPM Range	Belt Deflection Force			
			S-L Classic & Polyband		Classic Cog					D-V Wrapped		D-V Cog	
			Normal	New Belt	Normal	New Belt				Normal New	New Belt	Normal	New Belt
A, AX	3.0-3.6	1000-2500 2501-4000	3.7 2.8	5.5 4.2	4.1 3.4	6.1 5.0	3VX	2.2-2.4	1000-2500 2501-4000			3.3 2.9	4.9 4.3
	3.8-4.8	1000-2500 2501-4000	4.5 3.8	6.8 5.7	5.0 4.3	7.4 6.4		2.65-3.65	1000-2500 2501-4000	3.8 3.0	5.1 4.4	4.2 3.6	6.2 5.6
	5.0-7.0	1000-2500 2501-4000	5.4 4.7	8.0 7.0	5.7 5.1	9.4 7.8		4.12-6.90	1000-2500 2501-4000	4.9 4.4	7.3 6.6	5.3 4.9	7.9 7.3
B, BX	3.4-4.2	860-2500 2501-4000			4.9 4.2	7.2 6.2	6V, 6VX	4.4-6.7	500-1740 1750-3000 3001-4000			10.2 8.8 5.6	15.2 13.2 8.5
	4.4-5.6	860-2500 2501-4000	5.3 4.5	7.9 6.7	7.1 7.1	10.5 9.1		7.1-10.9	500-1740 1741-3000	12.7 11.2	18.9 16.7	14.8 13.7	22.1 20.1
	5.8-8.6	860-2500 2501-4000	6.3 6.0	9.4 8.9	8.5 7.3	12.6 10.9		11.8-16.0	500-1740 1741-3000	15.5 14.6	23.4 21.6	17.1 16.8	25.5 25.0
C, CX	7.0-9.0	500-1740 1741-3000	11.5 9.4	17.0 13.8	14.7 11.9	21.8 17.5	8V	12.5-17.0	200-850 851-1500	33.0 26.8	49.3 38.9		
	9.5-16.0	500-1740 1741-3000	14.1 12.5	21.0 18.5	15.9 14.6	23.5 21.6		18.0-22.4	200-850 851-1500	39.6 35.3	59.2 52.7		
D	12.0-16.0	200-850 851-1500	24.9 21.2	37.0 31.3									
	18.0-20.0	200-850 851-1500	30.4 25.6	45.2 38.0									



Belt Deflection Figure

HTD BELT TENSIONING INSTRUCTIONS

WARNING! Turn off and lock out or tag power source before proceeding

BELT TENSION

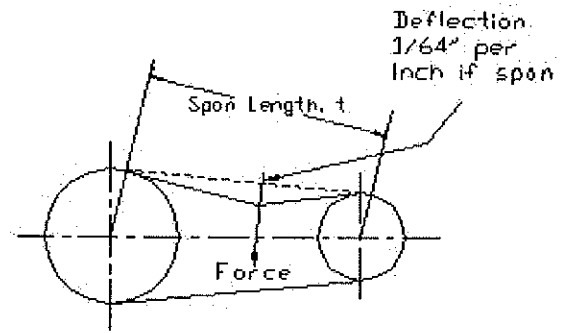
HTD drives do not require as much tension as V- belt drives that depend on friction to transmit the load. HTD belts should be installed with a snug fit, neither too taut nor too loose. After the belt has been so tensioned, a force to deflect the belt by an amount to assure proper tension can be measured. Measure the belt span (see sketch). Using a spring scale, apply force perpendicular to the center of the belt width and the center of the belt span. Measure the force necessary to deflect the belt 1/64" for each inch of belt span. For example, the deflection for a 32" belt span is $32 \times 1/64 = 1/2$ " deflection. The force required to deflect the belt the amount required at the proper tension is listed in table below.

DEFLECTION FORCE FOR Power Grip & Poly Chain GT2 BELTS

PITCH	WIDTH	FORCE
8mm	20mm	24 lbs.
	30mm	39 lbs.
	50mm	67 lbs.
	85mm	122 lbs.
14mm	40mm	99 lbs.
	55mm	156 lbs.
	85mm	266 lbs.
	115mm	378 lbs.
	170mm	581 lbs.

NOTE: For belts wider than 2" (50mm), it is suggested that a strip of key stock, or something similar, be placed across the belt under the point of force to prevent distortion.

For drives with shock loading or other unusual conditions, the force may have to be increased for proper operation of the drive.



LUBRICATION OF FAN BEARINGS

The bearings have been greased at the factory and are ready to run. The following table is a general guide for re-lubrication. Operating conditions may require different lubrication periods.

Bearings have been lubricated at the factory with number two consistency lithium base grease which is suitable for normal operating conditions.

Re-lubricate with lithium base grease or grease compatible with original lubricant and suitable for ball bearing service. In certain cases, such as low temperature or high temperature applications, it may be necessary to consult a lubrication supplier for recommendations.

LUBRICATION GUIDE

Read Preceding Paragraphs Before Establishing Lubrication Schedule.

Hours Run Per Day	Fan Shaft RPM and Suggested Lubrication Period In Weeks							
	1 to 250 RPM	251 to 500 RPM	501 to 750 RPM	751 to 1000 RPM	1001 to 1500 RPM	1501 to 2000 RPM	2001 to 2500 RPM	2501 to 3000 RPM
8	12	12	10	7	5	4	3	2
16	12	7	5	4	2	2	1	1
24	10	5	3	2	1	1	1	1

GEAR MAINTENANCE

LUBRICATION INSTRUCTIONS

Recommended lubricants are as follows:

AMBIENT-DEGREES F	15-50	50-125
AGMA NUMBER	4EP	5EP
VISCOSITY RANGE	626-755 SSU @ 100°F	918-1122 SSU @ 100°F

Consult the gear manufacturer's data for a recommended oil and manufacturer.

SYNTHETIC GEAR LUBRICANTS

Synthetic oils have been used in enclosed gear drives for special operating conditions. Synthetic lubricants can be advantageous over standard oils in that they are generally more stable, have a longer life, and operate over a wider temperature range.

INSTRUCTIONS FOR INSTALLATION AND STARTING NEW UNIT

WARNING! Turn off and lock out or tag power source before proceeding.

1. When units are shipped, internal parts are protected by rust preventive film. Flushing is not required since it is soluble in the lubricant. Fill the case with recommended lubricant to the proper oil level.
NOTE: units may be shipped without oil and must be filled before starting.
2. Gear units may be shipped with the breather port plugged. Prior to operation, a breather type plug (supplied with the unit) must be installed in the upper housing.
3. Coupling connections must be aligned for proper parallel and angular misalignment.
4. If it is required to shim the gearbox for alignment, care must be taken to prevent distortion of the housing. **Note: coupling and unit alignment should be rechecked after two weeks operation.**
5. When units furnished with force feed lubrication are started, it should be confirmed that oil is being pumped.
6. For low temperature operation, with oil viscosity at starting greater than 5,000 SUV, heaters must be used. For units with pressure lubrication systems, confirm the pump is pumping the cold oil.

7. The minimum viscosity required under normal operating conditions ranges from 150 to 400 SUV. Oils having this viscosity under normal operating conditions may not be satisfactory for low temperature starting and heaters must be used.
8. Where unit will not warm up under intermittent operating conditions, low-viscosity oil may be required for low temperature operation.

WARNING! Turn off and lock out or tag power source before proceeding.

OIL CHANGES

After installation, the first oil change should occur after two weeks of operation. After the original oil has been drained, fill the case to the required level with SAE-10 straight run mineral flushing oil containing no additives. Start the fan and let it get up to speed, then stop it. This works as a flushing procedure. Drain the flushing oils and fill with the recommended lubricant to the proper level.

Change the oil every six months unless conditions warrant closer intervals. If the oil temperature is continuously above 200°F, or if the unit is subjected to an unusually moist atmosphere, oil changes may be necessary at one, two or three month intervals, as determined by field inspection of the oil.

Prevent any foreign matter from entering the gear case. Dust, dirt, moisture, and chemical fumes form sludge.

INSTRUCTIONS FOR MAINTENANCE

1. Stop the unit and check the oil level once a week. The lubricant level should be no more than 1/4" below specified level.
2. Units should be given daily visual inspections and observation for oil leaks or unusual noises. If either occurs, the cause must be found and corrected.
3. The operating temperature of the unit is the temperature of the oil inside the housing. The maximum operating temperature should not exceed 200°F.

INSTRUCTIONS FOR SHUTDOWN PERIODS

If unit will be idle for a period longer than one week, it will be necessary to run the unit for ten minutes every week it is idle. This short operation will keep the gears and bearings coated with oil and prevent rusting due to condensations of moisture resulting from temperature changes.

PO#J12098

813V64770 S010135 ID#4468

1009700
REV. 1 (12-05)MITAL STEEL USA
QUALITY DEPARTMENT

BURNS HARBOR PLATE

REPORT OF TESTS AND ANALYSES

WARRANT NO.	DATE SHIPPED	CAR OR VEHICLE NO.	PAGE
803-00032	03-12-07	INGRAM BARGE LINES	2

BENTRY SUPPLY INC
 DBA SUPERIOR SUPPLY & STEEL CO
 PO BOX 2087
 LAKE CHARLES LA 70602-2087

SUPERIOR SUPPLY & STEEL CO
 C/O RICHWAY STEVEDORING
 CITY DOCKS PORT OF HOUSTON
 111 E LOOP NORTH
 HOUSTON TX

S/N	SERIAL NUMBER	PAT. NO.	HEAT NUMBER	SIZE AND QUANTITY				YIELD POINT PSI	TENSILE STRENGTH PBI	ELONG.		RED. %
				NO. PCS	THICKNESS INCHES	WIDTH OR DIA. INCHES	LENGTH INCHES			IN	%	

PRODUCED UNDER A CERTIFIED QMS COMPLYING WITH ISO 9002 ABS-QE CERT. #30477
QUALITY STEEL MELTED & MANUFACTURED IN THE U. S. A.

PLATES - ASTM A516-90 GR 70 PVO CE FOR INFO
 PER IIW FORMULA, ASME SA516 GR 70
 PVO 2004 EDITION, CH-V SA2085 PLT L
 15/12 FTLBS AT -30F --- GAS CUT 4
 SIDES PLT NORMALIZED & COOLED IN
 STILL AIR --- TEST CERTS ARE
 PREPARED IN ACCORD WITH PROCEDURES
 OUTLINED IN EN 10204:2004 PARA 3.1
 NO WELD REPAIR WAS PERFORMED ON BELOW PLATE(S)
 CO# 412144-4 OH B16-1999G

PLATES HEAT TREATED - TEST SPECIMENS ATTACHED & YIELD STRENGTH @ .5% EUL

S010135 813V64770 1 2 3/4 96 360 26953 48800 79100 2 32
 N 1650 DEG F - 139 MIN
 (M55)MFST REF#: 08

Q-QUENCH TEMPERATURE	T-TEMPER TEMPERATURE	N-NORMALIZE TEMPERATURE
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SERIAL NUMBER	PAT. NO	HEAT NUMBER	HARD	BEND	CHARPY IMPACT															
					THICKNESS	TYPE	SIZE	DIR.	TEST TEMP. F	ENERGY	FT LBS			SHEAR (%)			LAT. EXP	MILS		
					INCHES					1	2	3	1	2	3	1	2	3		
5010135		813V64770			2.750	V	FULL	L	-30	22	24	18								

8010135 813V64770 2.750 V FULL L -30 22 24 18

SUBSCRIBED AND SWORN TO before me
 this 22 DAY OF DECEMBER
 NOTARY PUBLIC JAMES L. REEL
 LA PORTA COUNTY WISCONSIN
 MY COMMISSION EXPIRES DECEMBER 28, 2009
 COUNTY OF RESIDENCE: LA PORTE

HEAT NUMBER	CHEMICAL ANALYSIS																McQUAD GRAIN SIZE
	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	N	S	Ca	N	Gr	

813V64770 .24 1.10 .016 .010 .279.028 .01 .04.006.001.002.028.0002 .003.005.002

Q.A. APPROVED

By ME Date 9-27-09

I CERTIFY THAT THE ABOVE RESULTS ARE A TRUE AND CORRECT COPY OF ACTUAL
 RESULTS CONTAINED IN RECORDS MAINTAINED BY MITAL STEEL USA AND ARE IN FULL
 COMPLIANCE WITH THE REQUIREMENTS OF THE SPECIFICATION CITED ABOVE. THIS
 TEST REPORT CANNOT BE ALTERED AND MUST BE TRANSMITTED INTACT WITH ANY
 SUBSEQUENT THIRD PARTY TEST REPORTS, IF REQUIRED.

QUALITY MANAGER

FOR

PO#J12098

MITTAL STEEL USA
QUALITY DEPARTMENT

823Y69810 W031299 ID#4469

BURNS HARBOR PLATE
SHIPMENT NO.

REPORT OF TESTS AND ANALYSES

803-15264 10-10-07 INB-DOLTN-UP HLSC 001023 PAGE 5

SOLD TO METALS USA PLATES & SHAPES S CTL
PLATES & SHAPES - ENID
PO BOX 3528
ENID OK 73702

SHIP TO METALS USA PLATES & SHAPES S CTL IN
ENID PRIME MATERIAL
101 E ILLINOIS
ENID OK

NOTE	SERIAL NUMBER	PAT. NO.	HEAT NUMBER	NO. PCS	SIZE AND QUANTITY				YIELD POINT	TENSILE STRENGTH	ELONG.	
					THICKNESS	WIDTH OR DIA.	LENGTH	WEIGHT			IN	%
					INCHES	INCHES	INCHES	POUNDS	PSI	PSI		

PRODUCED UNDER A CERTIFIED QMS COMPLYING WITH ISO 9002 ABS-QE CERT. #30477
QUALITY STEEL MELTED & MANUFACTURED IN THE U. S. A.

PLATES - ASTM A516-90 GR 70 FVG, ASME SA516
GR 70 FVG 2004 EDITION, CH-V SA2095
PLT L 15/12 FT LBS AT -30F --- GAS
CUT 4 SIDES PLT NORMALIZED & COOLED
IN STILL AIR --- TEST CERTIFICATES
PREPARED IN ACCORD WITH PROCEDURES
OUTLINED IN EN 10204:2004 PARA 3.1
NO WELD REPAIR WAS PERFORMED ON BELOW PLATE(S)
MFST - MFST MILL SERIAL# MFST TEST CERTIFICATES
PREPARED IN ACCORD WITH PROCEDURES OUTLINED IN
MFST EN 10204:2004 PARA 3.1

UNLDG FORK LIFT - LIFT MAX 10 TON
CON ENI-212800 GH 816-213BA

PLATES HEAT TREATED - TEST SPECIMENS ATTACHED & YIELD STRENGTH @ .5% EUL

W031298	823Y69810	1	2	3/4	72	253	14207	47100	78700	2	36
(M55)MFST REF#002											
N 1650 DEG F - 139 MIN											
W031299	823Y69810	1	2	3/4	72	253	14207	47000	75300	2	36
(M55)MFST REF#002											
N 1650 DEG F - 139 MIN											

NOTE Q-QUENCH TEMPERATURE

T-TEMPERATURE

N-NORMALIZE TEMPERATURE

SERIAL NUMBER	PAT. NO.	HEAT NUMBER	HARD	BEND	THICKNESS INCHES	CHARPY IMPACT												
						TYPE	SIZE	DIA.	TEST TEMP.	ENERGY FT - LBS.			SHEAR (%)			LAT. EXP.	M.I.	
W031298		823Y69810			2.750	V	FULL	L	-30	92	65	67	1	2	3	1	2	
W031299		823Y69810			2.750	V	FULL	L	-30	68	87	84						

HEAT NUMBER	CHEMICAL ANALYSIS																
	C	Mn	P	S	Si	Cu	Mo	Cr	Al	Ni	As	Sb	Sn	Bi	Se	Te	Mo
823Y69810	.19	1.11	.007	.009	.353	.252	.17	.03	.045	.001	.002	.035				.002	

Q.A. APPROVED

By MLC Date 10-21-08

I CERTIFY THAT THE ABOVE RESULTS ARE A TRUE AND CORRECT COPY OF ACTUAL RESULTS CONTAINED IN RECORDS MAINTAINED BY MITTAL STEEL USA AND ARE IN FULL COMPLIANCE WITH THE REQUIREMENTS OF THE SPECIFICATION CITED ABOVE. THIS TEST REPORT CANNOT BE ALTERED AND MUST BE TRANSMITTED INTACT WITH ANY SUBSEQUENT THIRD PARTY TEST REPORTS, IF REQUIRED.

QUALITY MANAGER D.W. ELWOOD PER WNE

3/4" 514.30N

PO#J12098

E7G168 A13 ID#2063



12400 Highway 43 North, Axis, Alabama 36505

Test Certificate

Form TC1: Revision 1: Date 31 Oct 2000

Customer: METALS USA PLATES & SHAPES SOU P.O. BOX 3528 101 EAST ILLINOIS ENID OK 75702		Customer P.O. No.: MUS-225360		Mill Order No.: 41-1E2955-03		Shipping Manifest: AR040740										
Product Description: ASME SA516-70/SA516-65/SA516-60(04ED.) ASTM A516-70/SA516-65/SA516-60(06) LCVN 15/12 FT.LBS @ -60F/A673-P NORMALIZED		Ship Date: 23 Jul 07		Cart No: 081092494		(Page 1 of 1)										
Size: 1.250 X 120.0 X 480.0 (IN)																
Tested Pieces		Tensiles		Charpy Impact Tests												
Heat Id	Piece Id	Piece Dimensions	YS (PSI)	UTS (PSI)	%RA	Elong % (2in 8in)	Abs. Energy (FTLB)	% Shear	Tst Temp	Tst Dir	Tst Siz (mm)	BDWTT Temp				
E7G168	A13	1.250 X 120.0 DISCRETE	48000	72000		31	80	64	68	74.0	-60F	L	10			
Chemical Analysis																
Heat Id	C	Mn	P	S	Si	Total Sol Al	Ca	Ni	Cr	Mo	Cu	V	Ti	CEV	ORGN	
E7G168	.18	1.11	.013	.006	.20	.028	.026	.28	.16	.15	.04	.003	.007	.011	.43	USA
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT CEV (IIW) = C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15 100% MELTED AND MANUFACTURED IN THE USA. MTR DIN EN10204 TYPE 3.1 COMPLIANT. NORMALIZED PLATES. HEATED AT 1650F FOR 50 MINUTES. E7G168 A13 6036473 PCES: 1, WGT: 20739 E7G168 A13 6036499 PCES: 1, WGT: 20748 E7G168 A13 6036498 PCES: 1, WGT: 20769																
Cust Part #:		WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATION Jason Thomas SENIOR METALLURGIST 0.A. APPROVED PN MVE Date 2-9-08														



12400 Highway 43 North, Axis, Alabama 36505

Test Certificate

Form TCI: Revision 1: Date 31 Oct 2000

PO#J12098

E8E278 B27 ID#1868

Customer: METALS USA PLATES & SHAPES SOU P.O. BOX 3528 101 EAST ILLINOIS ENID OK 73702		Customer P.O. No.: MUS-227485		Mill Order No.: 41-215299-09		Shipping Manifest: AR056602	
Product Description: ASME SA516-70/SA516-65/SA516-60(07ED.) ASTM A516-70/A516-65/A516-60(06) LCVN 15/12 FT. LBS @ .50F/A673-P NORMALIZED				Ship Date: 27 May 08 Cert Date: 27 May 08		Cert No: 98137164 (Page 1 of 1)	
Size: 1.125 X 96.00 X 480.0 (IN)							
Tested Pieces				Tensiles			
Heat Id	Piece Id	Piece Dimensions	Tst Loc	YS (PSI)	UTS (PSI)	%RA Elong % 2in 8in Dir	Average Hardness
E8E278	B27	1.128 X 96.00 (DISCRO)	47X00	72000		29 T	
Chemical Analysis				Si	Mn	P	S
E8E278				.18	1.08	.014	.004
Total Al				Fe	Cu	Mo	Cr
E8E278				.028	.026	.26	.15
Chemical Analysis				Ni	Cr	Mo	Cb
E8E278				.05	.14	.05	.003
Charpy Impact Tests				Abs. Energy (FTLB)	% Shear	Tst Dir	EDWTT Temp %Shr
E8E278				26 22 38 28.7	1 2 3 Avg	1 2 3 Avg	60F L 10
Heat Id							
E8E278							
ORGN							
USA							
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT CEV (LIW) = C + MN/6 + (CR-MO*V)/5 + (NI-CU)/15 100% MELTED AND MANUFACTURED IN THE USA. MTR DIN EN10204 TYPE 3.1 COMPLIANT. NORMALIZED PLATES. HEATED AT 1650F FOR 48 MINUTES. E8E278 B27 6080555 PCES: 1, WGT: 14941 E8E278 B27 6080553 PCES: 1, WGT: 14938							
Cust Part # :				WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATION			
				Jason Thomas SENIOR METALLURGIST			

PO#J12098

Mittal Steel USA Burns Harbor Plate.

811Y06410 W030905 ID#0857

QUALITY ASSURANCE
REPORT OF TEST AND ANALYSIS

SHIPMENT NO. 803-14106	DATE SHIPPED 09-16-07	CAR OR VEHICLE NO. IHB-DOLTY-UP	UP 215767	PAGE 1
METALS USA PLATES & SHAPES S CTL PLATES & SHAPES - MUSKOGEE PO BOX 917 MUSKOGEE OK 74402		METALS USA PLATES & SHAPES S CTL IN TRACK 747 PORT OF MUSKOGEE MUSKOGEE OK		

N O T E	S E R I A L N U M B E R	P A Y N O.	H E A T N U M B E R	N O. P C S	SIZE AND QUANTITY			W E I G H T	Y I E L D P O I N T	T E N S I L E S T R E N G T H	E L O N G.	R E D.
					THICKNESS	WIDTH OR DIA.	LENGTH					
					INCHES	INCHES	INCHES	POUNDS	PSI	PSI	IN	%

QUALITY STEEL MELTED & MANUFACTURED IN THE U. S. A.

PLATES - ASTM A516-90 GR 70 FVQ, ASME SA516

GR 70 FVQ 2004 EDITION, CH-V A2085

PLT L 15/12 FTLS AT -50F --- PLT

NORMALIZED & COOLED IN STILL AIR

--- TEST CERTS ARE PREPARED IN

ACCORD WITH PROCEDURES OUTLINED IN

EN 10204:2004 PARA 3.1

NO WELD REPAIR WAS PERFORMED ON BELOW PLATE(S)

MFST - MFST MILL SERIAL# MFST TEST CERTS ARE PREPARED

IN ACCORD WITH PROCEDURES OUTLINED IN MFST EN

10204:2004 PARA 3.1

- LIFT MAX 25 TON UNLDG

OH-CHAIN-SLING LOAD MAX 185000 #

CO# MUS-225735 GH 816-2126

PLATES HEAT TREATED - TEST SPECIMENS ATTACHED & YIELD STRENGTH @ .5% EUL

W030904	811Y06410	3	1/2	96	480	19602	54100	75500	8	24
N 1650 DEG F - 26 MIN										

(M55)MFST REF#:001

W030905	811Y06410	3	1/2	96	480	19602	55000	75000	8	24
N 1650 DEG F - 26 MIN										

(M55)MFST REF#:001

Q-QUENCH TEMPERATURE

T-TEMPERATURE

N-NORMALIZE TEMPERATURE

S E R I A L N U M B E R	P A Y N O.	H E A T N U M B E R	H A R D	B E N D	T H I C K N E S S I N C H E S	T Y P E	S I Z E	D I R	T E M P E R A T U R E F	CHARTER IMPACT			S H E A R (%)			L A T. E X P M I L S		
										E N E R G Y F T L B S			1			1		
W030904		811Y06410			.500	V	FULL L	-50	118	111	112		1	2	3	1	2	3
W030905		811Y06410			.500	V	FULL L	-50	112	124	116							

H E A T N U M B E R	C H E M I C A L A N A L Y S I S																M E T A L L O G R A M S I Z E
	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	Al	B	Cb	N	Ra	
811Y06410	.16	1.05	.011	.004	.344	.273	.17	.04	.008	.001	.002	.031	.0003	.002	.006	.005	

I certify that the above results are a true and correct copy of actual results obtained in records maintained by Mittal Steel Inc. and are in full compliance with the requirements of the specification cited above. This test report cannot be altered and must be transmitted intact with any subsequent third party test reports, if required.

PRODUCED UNDER A CERTIFIED QMS COMPLYING WITH ISO 9002 ABS-CIS CERT. #30477

D. W. ELWOOD PER WNK

REPL. TRIP. TP

SUPV. QUALITY ASSURANCE

Q.A. APPROVED

By ME Date 2-15-08

PO#J12098

MITTAL STEEL USA
QUALITY DEPARTMENT

823Y69810 W031299 ID#4469

BURNS HARBOR PLATE

REPORT OF TESTS AND ANALYSES

SHIPMENT NO.

DATE SHIPPED

CAR OR VEHICLE NO.

803-15264

10-10-07

IHE-DOLTN-UP

HLSC 001023

PAGE 5

SOLD TO METALS USA PLATES & SHAPES S CTL
PLATES & SHAPES - ENID
PO BOX 3528
ENID OK 73702

SHIP TO METALS USA PLATES & SHAPES S CTL IN
ENID PRIME MATERIAL
101 E ILLINOIS
ENID OK

NOTE	SERIAL NUMBER	PAT. NO.	HEAT NUMBER	NO. PCS	SIZE AND QUANTITY			YIELD POINT	TENSILE STRENGTH	ELONG.	
					THICKNESS	WIDTH OR DIA	LENGTH			IN	%
					INCHES	INCHES	INCHES	POUNDS	PSI	PSI	

PRODUCED UNDER A CERTIFIED QMS COMPLYING WITH ISO 9002 ABS-QE CERT. #30477
QUALITY STEEL MELTED & MANUFACTURED IN THE U. S. A.

PLATES - ASTM A516-90 GR 70 PVO, ASME SA516
GR 70 PVO 2004 EDITION, CH-V SA2085
PLT L 15/12 FT LBS AT -30F --- GAS
CUT 4 SIDES PLT NORMALIZED & COOLED
IN STILL AIR --- TEST CERTIFICATES
PREPARED IN ACCORD WITH PROCEDURES
OUTLINED IN EN 10204:2004 PARA 3.1
NO WELD REPAIR WAS PERFORMED ON BELOW PLATE(S)
MFST - MFST MILL SERIAL# MFST TEST CERTIFICATES
PREPARED IN ACCORD WITH PROCEDURES OUTLINED IN
MFST EN 10204:2004 PARA 3.1

UNLDG FORK LIFT

- LIFT MAX 10 TON

CON ENI-212800 GH 816-2138A

PLATES HEAT TREATED - TEST SPECIMENS ATTACHED % YIELD STRENGTH @ .5% EUL

W031298	823Y69810	1	2	3/4	72	253	14207	47100	78700	2	36
(M55)MFST	REF#002										
				N	1650 DEG F - 139 MIN						
W031299	823Y69810	1	2	3/4	72	253	14207	47000	75300	2	36
(M55)MFST	REF#002										
				N	1650 DEG F - 139 MIN						

NOTE Q-QUENCH TEMPERATURE

T-TEMPERATURE

N-NORMALIZE TEMPERATURE

SERIAL NUMBER	PAT. NO.	HEAT NUMBER	HARD	BEND	THICKNESS INCHES	TYPE	SIZE	DR.	TEST TEMP	CHARPY IMPACT									
										ENERGY FT. LBS.			SHEAR (IN)			LAT. EXP		MIT	
										1	2	3	1	2	3	1	2		

W031298	823Y69810				2.750	V	FULL L	-30	92	65	67								
W031299	823Y69810				2.750	V	FULL L	-30	68	87	84								

HEAT NUMBER	CHEMICAL ANALYSIS																	MO. OF ST.
	C	Mn	P	S	Si	Cu	NI	Cr	Mo	V	Ti	AL	B	Co	N	Sn		

823Y69810	.19	1.11	.007	.009	.353	.252	.17	.03	.045	.001	.002	.035					.002
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Q.A. APPROVED

By MLC Date 10-21-08

I CERTIFY THAT THE ABOVE RESULTS ARE A TRUE AND CORRECT COPY OF ACTUAL
RESULTS CONTAINED IN RECORDS MAINTAINED BY MITTAL STEEL USA AND ARE IN FULL
COMPLIANCE WITH THE REQUIREMENTS OF THE SPECIFICATION CITED ABOVE. THIS
TEST REPORT CANNOT BE ALTERED AND MUST BE TRANSMITTED INTACT WITH ANY
SUBSEQUENT THIRD PARTY TEST REPORTS, IF REQUIRED.

QUALITY MANAGER D.W. ELWOODPER WNE

PO#J12098

E8E277 B20 ID#1669



12400 Highway 43 North, Axis, Alabama 36505

Test Certificate

Form TC1: Revision 1: Date 31 Oct 2000

Customer: METALS USA PLATES & SHAPES SOU P.O. BOX 3528 101 EAST ILLINOIS ENID OK 73702		Customer P.O. No.: MUS-227485		Mill Order No.: 41-215299-07		Shipping Manifest: AR056672										
Product Description: ASME SA516-70/SA516-65/SA516-60(07ED.) ASTM A516-70/SA516-65/SA516-60(06) LCVN 15/12 FT.LBS @ -60F/A673-P NORMALIZED		Ship Date: 27 May 08 Cert Date: 27 May 08		Cert No: 081137243 (Page 1 of 1)												
Size: 1.000 X 96.00 X 480.0 (IN)																
Tensiles		Charpy Impact Tests														
Heat Id	Piece Id	Piece Dimensions	Tst Loc	YS (PSI)	UTS (PSI)	%RA	Elong % 2in 8in	Tst Dir	Abs. Energy (FTLB)	% Shear	Tst Temp	Tst Dir	Tst Temp	BDWTF		
E8E277	B20	1.001 X 96.00 (DISCR)	48000	70000	32	T	29	T	16 54 18 29.3	1	2	3	Avg			
E8E277	B21	1.002 X 96.00 (DISCR)	47000	70000	29	T	29	T	39 15 35 29.7	1	2	3	Avg			
E8E278	B22	1.001 X 96.00 (DISCR)	46000	70000	29	T	29	T	19 34 16 23.0	1	2	3	Avg			
Chemical Analysis																
Heat Id	C	Mn	P	S	Si	Tot Al	Sal Al	Cu	Ni	Cr	Mo	Co	V	Ti	CEV	ORGN
E8E277	.18	1.11	.011	.003	.21	.028	.026	.26	.15	.08	.05	.003	.005	.024	.42	USA
E8E278	.18	1.08	.014	.004	.19	.028	.026	.26	.15	.14	.05	.003	.005	.023	.42	USA
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT																
CEV (IIV) = C + MN/6 + (CR+MO+V)/5 + (NI+CU)/15																
100% MELTED AND MANUFACTURED IN THE USA. MFR DIN EN10204 TYPE 3.1 COMPLIANT.																
NORMALIZED PLATES. HEATED AT 1650F FOR 43 MINUTES.																
E8E277 B21	6080450	PCES:	1,	WGT:	13214											
E8E277 B20	6080448	PCES:	1,	WGT:	13224											
E8E277 B20	6080446	PCES:	1,	WGT:	13224											
E8E277 B21	6080438	PCES:	1,	WGT:	13214											
E8E278 B22	6080434	PCES:	1,	WGT:	13-98											
O.A. APPROVED																
By: <u>MLT</u> Date: <u>10-13-08</u>																
WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATION																
Jason Thomas SENIOR METALLURGIST																



A DIVISION OF USSS

12400 Highway 43 North, Axis, Alabama 36505

Test Certificate

Form TC1: Revision 1: Date 31 Oct 2000

PO#J12098

E7J213 B26 ID#1406

Customer: METALS USA PLATES & SHAPES SOU P.O. BOX 3528 101 EAST ILLINOIS END OK 75702	Customer P.O. No.: MJS-225613	Mill Order No.: 41-J86586-04	Shipping Manifest: AR045306
Product Description: ASME SA516-70/SA516-65/SA516-60(04ED.) ASTM A516-70/SA516-65/SA516-60(06) LCVN 15/12 FT-LBS @ -60F/A573-P NORMALIZED		Ship Date: 21 Oct 07	Cert No: 081106021 (Page 1 of 1)
Size: 0.875 X 96.00 X 480.0 (IN)			

Heat Id	Place Id	Place Dimensions	Tensiles				Charpy Impact Tests				HDWTT Temp %Sbr
			YS (PSI)	UTS (PSI)	%ELONG	Avg Hardness	Abs. Energy(FTLB)	% Shear	Tst Temp	Tst Dir	
E7J213	B26	0.875 X 96.00 (DISCUT)	49000	71000	29		73 76 48	65.7	-60F	L	10.
E7J213	B27	0.871 X 96.00 (DISCUT)	50000	72000	28		38 45 60	47.7	-60F	L	10.

Heat Id	Chemical Analysis														ORGN	
	C	Mn	P	S	Si	Tot Al	Sol Al	Ca	Ni	Cr	Mo	Co	V	Ti	CEV	USA
E7J213	.18	1.06	.009	.006	.20	.028	.026	.33	.16	.11	.04	.005	.007	.022	.42	

MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT
100% MELTED AND MANUFACTURED IN THE USA. MTR DIN EN10204 TYPE 3.1 COMPLIANT.
NORMALIZED PLATES. HEATED AT 1650F FOR 38 MINUTES.

E7J213 B26	6048257	PCES:	1, WGT:	11482
E7J213 B27	6048259	PCES:	1, WGT:	11479
E7J213 B26	6048283	PCES:	1, WGT:	11499
E7J213 B26	6048285	PCES:	1, WGT:	11482
E7J213 B26	6048258	PCES:	1, WGT:	11482
E7J213 B27	6048260	PCES:	1, WGT:	11460
E7J213 B26	6048284	PCES:	1, WGT:	11482

O.A. APPROVED

By one Date 7-11-08

Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATION

JESSE THOMAS

SENIOR METALLURGIST



CERTIFICATE OF COMPLIANCE

DATE: 20 OCTOBER, 2008
SUBJECT: NACE

GENTLEMEN:

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH PRESCRIBED METHODS IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING DOES CONFORM TO THE BHN REQUIREMENT OF NACE MR 01-75.

PLATE: ASTM A516-70N AND ASME SA516-70N LATEST EDITION.
SIZE: 7/8" NOMINAL.
MILL CERTIFIED: IPSCO
HEAT: E7J213
SLAB: B26

Specification: NACE MR 01-75

Hardness, HRC	Results	Hardness, BHN	Results
			160, 164, 160

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT.


MARTY L. EUBANKS
QUALITY ASSURANCE MANAGER
(918) 583-2222

TO: SMITHCO ENGINEERING

Line# :1

QTY: :4

To: :SMITHCO ENGINEERING

CPO# : J12096

DATE: 07/31/08
TIME: 09:51:48
SERIAL NO: F0050588

**TUBULAR PRODUCTS
CERTIFIED TEST REPORT**

UNITED STATES STEEL

(IN ACCORDANCE WITH ISO 10474/JEN10204/DIN50049 "type 3.1")

MILL ORDER/ITEM NO DS45270 03	SHIPPERS NO. Y23254	P.O. NUMBER 825-S-08	VEHICLE ID SOD63134	INVOICE NO 0458689
SOLD TO ADDRESS MATTSO SUPPLY CO P O BOX 2925 TULSA OK 74101-2925		MAIL TO ADDRESS MATTSO SUPPLY CO P O BOX 2925 TULSA OK 74101-2925		
VENDOR USS TUBULAR PRODUCTS USS FAIRFIELD WORKS P.O. BOX 599 FAIRFIELD ALABAMA 35064				

SPECIFICATION AND GRADE

PIPE CARBON SMLS STD PIPE API 5L-43RD EDITION DATED 3/04 PSL-1 GRADE B AND GRADE X42 ASTM A53-*06A
AL06-*06A GRADE B QUAD STENCIL ASME SA53-*2007 EDITION ASME SA106-*2007 EDITION GRADE B BLK REG
WILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75
* :2003/COR.1:2005

MATERIAL COND:		AS-ROLLED		O.D.: 6.625 (168.275)		WALL: 0.719 (18.262)		In (mm)		In (mm)													
PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH	YIELD		EXT %	TENSILE		Y/T	ELONG % (IN 2')	HARDNESS SCALE: R15B	MIN HYDRO PSI	DWELL (SEC)										
				MIN:	MAX:		PSI	MIN:						MAX:									
U61555	*NOTE A STRIP/L/B	AR	**	1.5	48,500	.50	80,000	0.61		37.4	78.5	6840	5										
			**	END OF DATA THIS SHEET																			
LEGEND:														B - BODY W - WELD									
L - LONGITUDINAL U - UPSET				T - TRANSVERSE NM - NORMALIZED				QT - QUENCH & TEMPERED SR - STRESS RELIEVED				AR - AS ROLLED				B - BODY							
PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	Ti	CB	CO	C.E.*					
U61555	HEAT	25	.93	010	009	.25	.03		.01	.03	.01	.023	.00				.001						
U61555	PROD	25	.95	009	006	.25	.04	.01	.01	.04	.01	.024	.00				.002						
U61555	PROD	26	.94	009	006	.24	.04	.02	.04	.01	.025	.00					.001						
** 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.

CAA 3-0-0 PAGE 1 OF 2

10/28/2008 From: MATTSCO SUPPLY CO.

To: SMITHCO ENGINEERING

Our# : 28649

Line# : 1

QTY: : 4

To: : SMITHCO ENGINEERING

CPO# : J12096

DATE: 07/31/08
TIME: 09:51:48
SERIAL NO: F0050588

TUBULAR PRODUCTS

CERTIFIED TEST REPORT

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

UNITED STATES STEEL



MILL ORDER ITEM NO DS45270 03		SHIPPERS NO. Y23254		P.O. NUMBER 825-S-08		INVOICE NO 0458689	
MATERIAL COND: AS-ROLLED		O.D.: 6.625 (168.275)		WALL: 0.719 (18.262)		In (mm)	
PRODUCT IDENTIFICATION U61555	FLAT OK	BEND	GRAIN SIZE	MIN COLLAPSE	DIR	TEST LOC	TEMP
TEST / INSPECTION		T-TRANSVERSE		B-BODY		W-WELD	
FULL LENGTH VISUAL		YES		HAZ - HEAT AFFECTED ZONE			
FULL LENGTH EMI		X					
FULL LENGTH MPI		X					
FULL LENGTH UT		X					
END AREA INSPECTION (PLAIN END)		X					
SPECIAL END AREA (SEA) INSP		MPI					
FULL LENGTH DRIFT		DRIFT MANDREL SIZE:					
ALL MELTING AND MANUFACTURING TOOK PLACE IN THE USA. MANUFACTURED IN AN ISO 9001 CERTIFIED FACILITY - CERTIFICATE #30727. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT. 01 MILL ALSO MEETS THE REQUIREMENTS OF ASTM A106-06A/ASME SA106-2007 ED. GRADE C PRODUCT PROCESSING AND API MONOGRAM APPLICATION WAS PERFORMED AT A SUBCONTRACTED API LICENSEE FACILITY.							
THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS. PREPARED BY THE OFFICE OF: J.T. CLAYTON - MANAGER, Q.A. DATE 07/31/08							

** END OF DATA **

529071004

KQ109B19

0158554012

CAA 3-0-0

PAGE

2 OF

2

**

10/28/2008 From:MATTSCO SUPPLY CO.

To: SMITHCO ENGINEERING

Our# :28649

Line# :1

QTY: :4

To: :SMITHCO ENGINEERING

CPO# :J12096

DATE: 07/31/08
TIME: 09:51:50
PAGE: 1

TUBULAR PRODUCTS
TENSILE TEST REPORT

UNITED STATES STEEL



MILL ORDER ITEM NO DS45270 03		SHIPPER'S NO. Y23254		P.O. NUMBER 825-S-08		HEAT		SERIAL NUMBER: F0050588	
SOLD TO ADDRESS MATTSCO SUPPLY CO P O BOX 2925 TULSA OK 74101-2925				MAIL TO ADDRESS				VENDOR USS TUBULAR PRODUCTS USS FAIRFIELD WORKS P.O. BOX 599 FAIRFIELD ALABAMA 35064	

HEAT	PIPE/ LOT	TYPE/ DIR/ LOC	TEST COND	YIELD	EXT%	TENSILE	Y/T	ELONG %	REDUC AREA
U61555 2012	STRIP/L/B	AR	48,500	0.50	80,000	0.61	37.4		
U61555 2011	STRIP/L/B	AR	47,600	0.50	78,500	0.61	41.7		
U61555 2010	STRIP/L/B	AR	46,700	0.50	78,500	0.59	33.6		
U61555 2009	STRIP/L/B	AR	46,200	0.50	78,500	0.59	41.6		

10/29/2008 From: MATTSO SUPPLY CO.

To: SMITHCO ENGINEERING

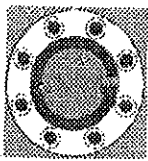
Our# :28598

Line# :1

QTY: :8

To: :SMITHCO ENGINEERING

CPO# :J12095/J12097

**GALPITI, INC.**
 160 Southbelt Industrial Drive
 Houston, Texas 77047
 PH. 713-433-0700 - FAX 713-433-5550
 Email: galpmail@galpiti-am.com

TEST/CERTIFICATE

EN 10204

INTERNAL JOB

3.1B**072745****MATTSO SUPPLY**
**P.O.BOX 2925
 TULSA OK 74101**

M.T. CERTIFICATE N.

007270/B

DATE

09/04/2007

YOUR P.O.

566-S-07B

DATE

08/02/2007

ITEM	DESCRIPTION	QUANTITY	B/P	MATERIAL	HEAT N°	#
014/014	6" 900 WN RJ 160 A105 B1 F COUNTRY OF ORIGIN: ITALY	5	B	ASTM A/SA105 03c	19723/02 ✓	A

Handwritten:
 11/3/08

CHEMICAL ANALYSIS

#	C %	MN %	SI %	P %	S %	CR %	NI %	MO %	CU %	V %	SN %	AL %	NE %	TI %	N %	CB%	FL%
A	0.160	1.120	0.240	0.013	0.007	0.060	0.080	0.010	0.250	0.001			0.001			0.001	0.38
A C	0.150	1.140	0.220	0.010	0.010	0.070	0.090	0.020	0.260	0.001			0.001			0.001	0.38

NOTES

FL=Carbon Equivalent Long Formula

C = CHECK ANALYSIS

MECHANICAL PROPERTIES

#	TENSILE									CHARPY TESTES			
	TYPE	Ø DIAMETER mm.	AREA mm²	LENGHT mm.	TEMP. F	TENSILE PSI	YIELD PSI	ELONG %	REDUCT. %	TYPE	TEMP.	VALUES	HB HARDNESS (AVERAGE)
A	S	12.50	122.70	50.00	68	70,000	36,000	22.0	30.0				187
A	O	12.50	122.70	50.00	68	78,462	47,054	27.2	66.8				160

NOTES

 O = OBTAINED
 S = STANDARD

HEAT TREATMENTS

GENERAL NOTES

A Normalized at 900 dgr.C for 2.1/2 h.-Cooling from 900 dgr.C in still air

ROUGHNESS

F =FINISH 63 MICROINCH MAX

STANDARD

B1 = ANSI B16.5

NOTES

Material I.A.W. Nace MR-0175

TRADE MARK



INT. INSPECT DATE

09/04/2007

INT. INSPECTOR

D.RUZICKA

INSPECTION AUTHORITY

Handwritten signature:
 D. Ruzicka



10/29/2008 From: MATTSCO SUPPLY CO.

To: SMITHCO ENGINEERING

Our# : 28598

Line# : 4

QTY: : 4

To: : SMITHCO ENGINEERING

CPO# : J12095/J12097



Phoenix * Capitol * Camco Cap Products

Commanding a Higher Standard_{sm}

Certified Mill Test Report

10/16/2008

Customer

MATTSCO SUPPLY CO
PO BOX 2925
TULSA, OK 74101

P.O. 904-S-09 ADD2

Heat No 4246

Heat Code 4246

Phoenix Order # 581089

Material ASTM A105-2005 / ASME SA105-2007 Edition, No Addenda

Part Number

12302010

Description

1 FS 6M THD COUPLING

YC
11/3/08

Chemical Properties

C	Mn	P	S	Si	Cu	Cr	Ni	C Eq. Long	
0.200	1.000	0.008	0.018	0.210	0.160	0.060	0.040	0.396	
Mo	V	Co	Al	Cb	N	Pb	Sn	Ta	Ti
0.020	0.000		0.021	0.014					

Additional Chemical Properties

Cr + Cu + Ni
0.260

Mechanical Properties**Charpy Minimum Impact -**

Tensile (PSI)	Yield (PSI)	Elong. % in 2 in.	R of A	BHN	Test 1	Test 2	Test 3	Average
78,173	51,183	28.0%	45.0%	152	N/A	N/A	N/A	N/A

COUNTRY OF ORIGIN: CANADA

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

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

Comments:

Meets ASME SA-181-70 2007 and hardness requirements of NACE MRO175 LATEST EDITION.

Capitol Manufacturing

1125 Capitol Road
Crowley, LA 70526



MATERIAL TEST REPORT

Page 1 of 1

Sold To: 2170000
SMITHCO ENGINEERING CO.
6211 S. 39TH WEST AVENUE
TULSA OK 74131 US

5541

Ship To: 2442000
TEK-FINS INCORPORATED
11255 E. 55TH PLACE
TULSA OK 74159 US

Purchase Order: J12207
Sales Order: 110126
Material: A13010000830 A/SA 214/178-A ERW 10000D 083M
Delivery: 80166820

Description: ASTM/ASME A/SA 214-96(05) ERW

Test: NDT ELECTRIC TESTED TO ASTM A450 OR A1016 & APPLICABLE TEST METHOD E309 OR E426.
FLANGE TEST PASSED. FLATTENING TEST PASSED. REVERSE FLATTENING TEST PASSED.

Heat Number:	WE81084	WE81812
--------------	---------	---------

CARBON	Idl	0.0900	0.0900
MANGANESE	Idl	0.4200	0.3500
PHOSPHORUS	Idl	0.0110	0.0080
SULFUR	Idl	0.0080	0.0020
SILICON	Idl	0.0200	0.0260
NICKEL	Idl	0.0500	0.0300
CHROMIUM	Idl	0.0500	0.0300
MOLYBDENUM	Idl	0.0150	0.0100
COPPER	Idl	0.1100	0.0700
ALUMINUM	Idl	0.0320	0.0410
BORON	Idl		0.0001
NITROGEN	Idl		0.0061
TIN	Idl	0.0060	
TITANIUM	Idl		0.0020
VANADIUM	Idl	0.0020	0.0010

Ultimate (PSI)		
Yield (PSI)		
Elongation (%)		
Hardness (RB)	62 / 63	62 / 64
Manufactured in	USA	USA

SMITHCO ENGINEERING, INC.
QUALITY CONTROL

APPROVED BY YC
DATE 12/3/08

Webco Industries, Inc. certifies that the material described was manufactured and tested and/or inspected in accordance with the specification and fulfills requirements in such respect.

This document conforms to the requirements of Specification EN 10204 Inspection Document Type 3.1.

This document was prepared by means of electronic processing and is valid without signature.

Date: 12/02/2008

Tim Benear

Quality Manager



MATERIAL TEST REPORT

Page 1 of 1

Sold To: 2170000
SMITHCO ENGINEERING CO.
6211 S. 39TH WEST AVENUE
TULSA OK 74131 US

5541

Ship To: 2170000
SMITHCO ENGINEERING CO.
6211 S. 39TH WEST AVENUE
TULSA OK 74131 US

Purchase Order: ~~107289~~
Sales Order: 106024
Material: A13010000830 A/SA 214/178-A ERW 10000D 083M
Delivery: 80162451

Description: ASTM/ASME A/SA 214-96(05) ERW

Test: NDT ELECTRIC TESTED TO ASTM A450 OR A1016 & APPLICABLE TEST METHOD E309 OR E426.
FLANGE TEST PASSED. FLATTENING TEST PASSED. REVERSE FLATTENING TEST PASSED.

Heat Number: WE82209

CARBON	Idl	0.1000
MANGANESE	Idl	0.3300
PHOSPHORUS	Idl	0.0150
SULFUR	Idl	0.0050
SILICON	Idl	0.0240
NICKEL	Idl	0.0400
CHROMIUM	Idl	0.0800
MOLYBDENUM	Idl	0.0100
COPPER	Idl	0.1300
ALUMINUM	Idl	0.0370
BORON	Idl	0.0001
NITROGEN	Idl	0.0073
TITANIUM	Idl	0.0020
VANADIUM	Idl	0.0020

SMITHCO ENGINEERING, INC.
QUALITY CONTROL

APPROVED BY

DATE

YC
12/2/08

Ultimate (PSI)
Yield (PSI)
Elongation (%)
Hardness (RB) 58 / 60
Manufactured in USA

Webco Industries, Inc. certifies that the material described was manufactured and tested and/or inspected in accordance with the specification and fulfills requirements in such respect.

This document conforms to the requirements of Specification EN 10204 Inspection Document Type 3.1.
This document was prepared by means of electronic processing and is valid without signature.

Date: 08/25/2008

Tony Stubblefield
Quality Manager



Sold To: 2170000
SMITHCO ENGINEERING CO.
6211 S. 39TH WEST AVENUE
TULSA OK 74131 US

Ship To: 2442000
TEK-FINS INCORPORATED
11255 E. 55TH PLACE
TULSA OK 74159 US

Purchase Order: J12207
Sales Order: 110126
Material: ZCUSTOMERSUPPOUT Customer Supplied Material - Out
Delivery: 80166823

Description: CUSTOMER SUPPLIED MATERIAL

This document is to provide clarification regarding Smithco Purchase Order J12207 reference Heat Number WE81084, WE81812, and WE82209 and those tubes supplied by Webco Industries, Inc.

Tubes under Smithco Purchase Order J12207 were held in stock by Smithco and were to be utilized on Smithco Job#2008B554. The requirements for those tubes called for a reduction in length from 38ft to 34ft. Webco picked up stock tubes as per Heat Number WE81084, WE81812, and WE82209 transported those to Webco facility and reduced to required length. Tubes were then delivered to Tek Fins at the required 34ft length for extrusion process. At time of pick up Webco issued a Material Test Report indicating the receipt of the Customer Supplied Material reference Heat Number WE81084, WE81812, and WE82209. The following attachment contains a copy of the MTR's for tubes received by Webco which were cut to length for Smithco Job#2008B554.

Date: 01/19/2009

SMITHCO ENGINEERING, INC.
QUALITY CONTROL

APPROVED BY VC

DATE

2/18/09

[Signature] 2/18/09

PRECISION HEAT TREATING
6300 S. 57TH W. AVE
TULSA, OK 74131

CHART

CUSTOMER: SMITHCO
CUST. PO#: J12102
QUANTITY

SMITHCO ENGINEERING, INC.
QUALITY CONTROL

ORDER#

12/11/2008

2

HEADER BOXES 5541-AF-AB

WT#

APPROVED BY

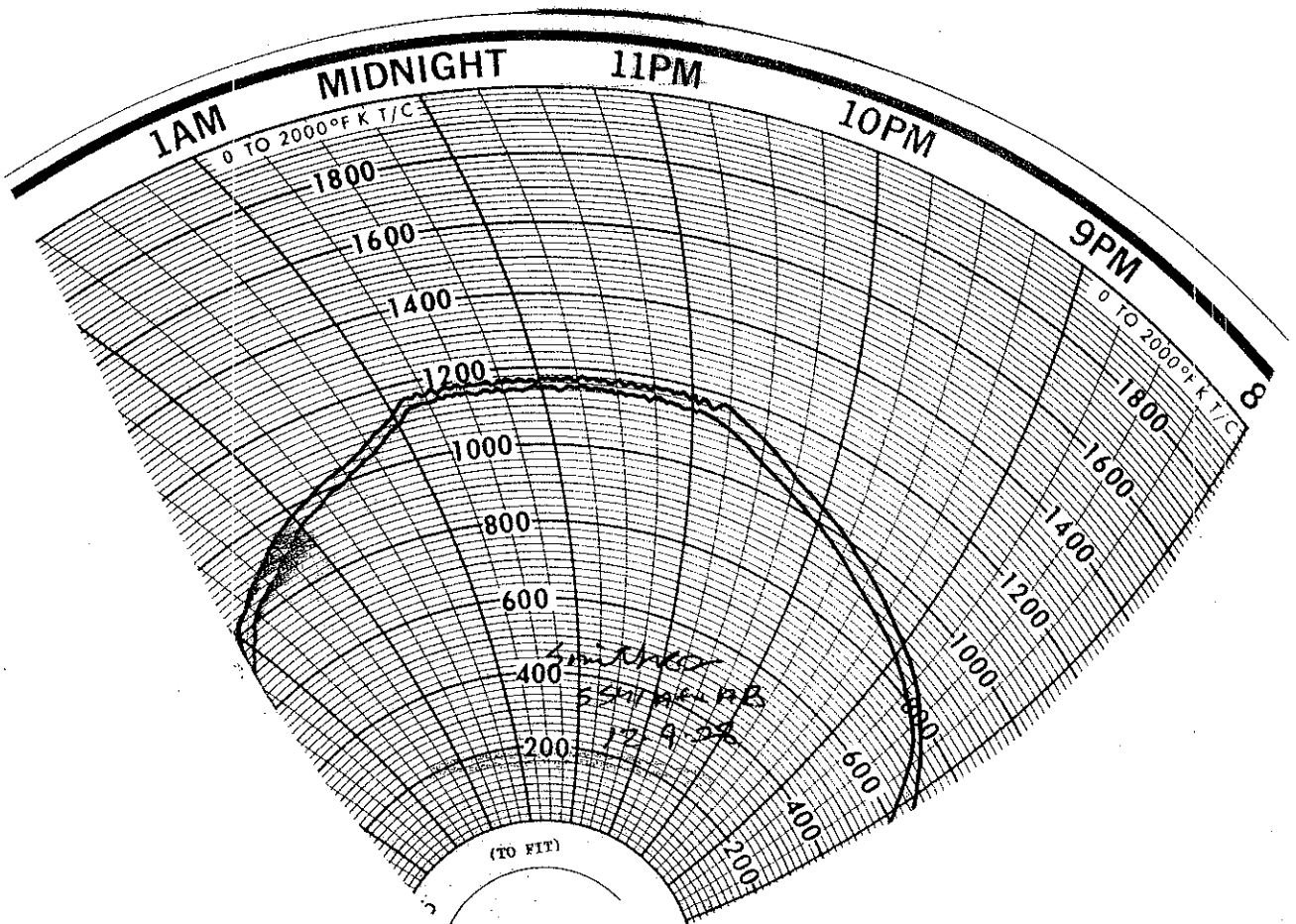
DATE

YC
12/16/08

FURNACE #SR: CALIBRATION DATE: 1-15-08

APPROVED BY: JIM MOSS

RECORDER:
15MIN



PRECISION HEAT TREATING
6300 S. 57TH W. AVE
TULSA, OK 74131

CHART

CUSTOMER: SMITHCO ENGINEERING
CUST. PO#: J12102
QUANTITY

ORDER#
17415
12/12/2008
WT#

2 HEADER BOXES 5541-BF-BB

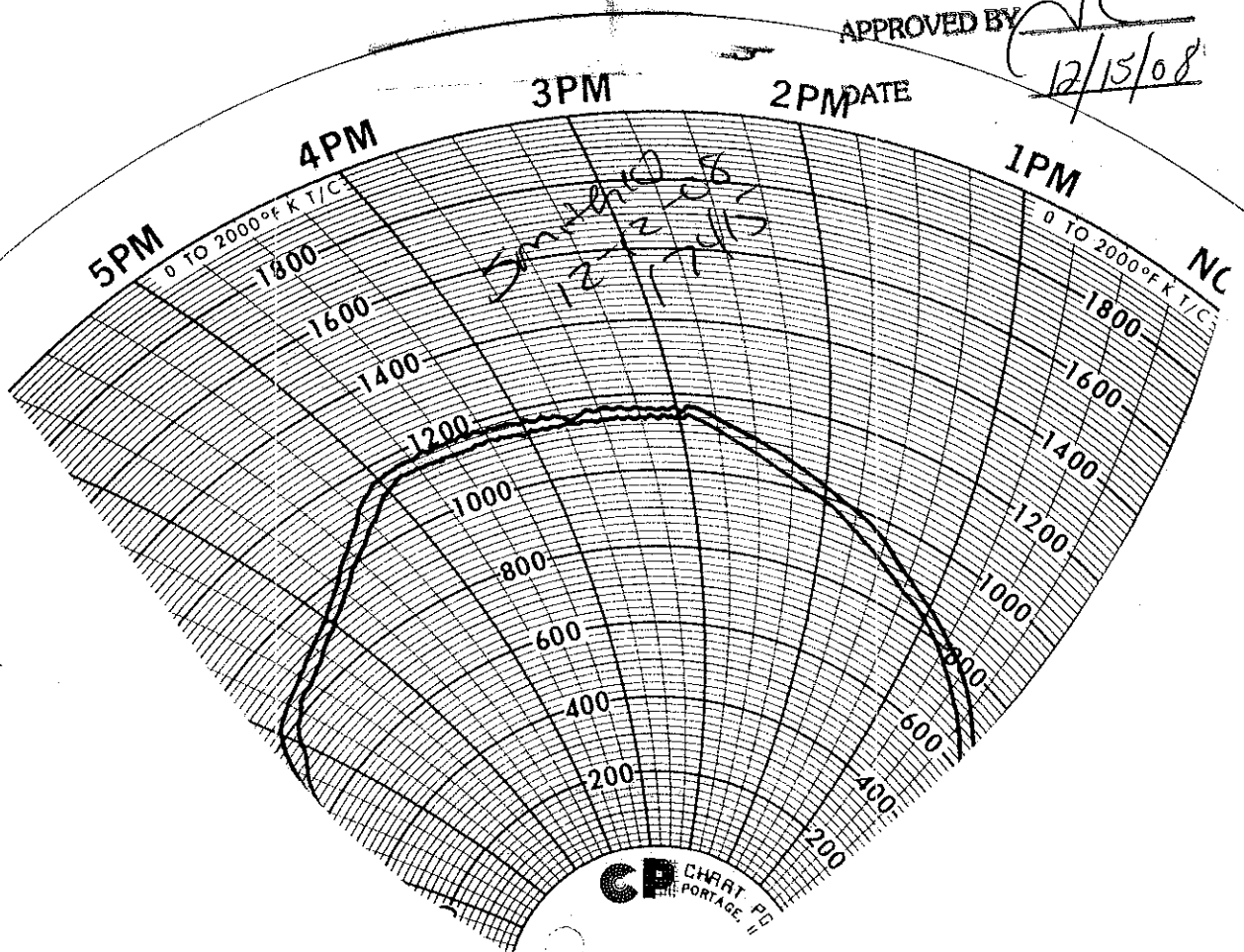
FURNACE #SR: CALIBRATION DATE: 1-15-08
APPROVED BY: JIM MOSS

RECORDER:

SMITHCO ENGINEERING, INC.
15MIN.
QUALITY CONTROL

APPROVED BY

VC
12/15/08





TULSA GAMMA RAY, INC.

1127 SOUTH LEWIS AVENUE
TULSA, OKLAHOMA 74104-3900
918 / 585-3228 • FAX 918 / 584-5598
1 - 800 - 625-9288
www.tulsagammaray.com

TECHNIQUE/INSPECTION REPORT

CUSTOMER DATA	
NAME <u>Smithco</u>	
ADDRESS _____	
PHONE _____	ATTN: _____
W.O. # <u>5541</u>	P.O. # _____
JOB LOCATION <u>Tulsa, OK</u>	
DESCRIPTION <u>spots</u>	MATERIAL TYPE <u>SA-516-20</u>

DATE 12-5-08 DAY FR

DEFECT CODE

AB - ARC BURN
AI - ALIGNED INDICATION
BT - BURN THROUGH
CON - CONCAVITY
CRACK - CRACK

HB - HOLLOW BEAD
IF - INADEQUATE FUSION
IP - INCOMPLETE PENETRATION
MA - MISALIGNMENT
POR - POROSITY

SLI - SLAG INCLUSION
SL - SLAG LINE
SURF - SURFACE INDICATION
UCE - UNDERCUT EXTERNAL
UCI - UNDERCUT INTERNAL

ABBREVIATED TERMS

SOD = SOURCE TO OBJECT DISTANCE
OFD = SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD = OUTER DIAMETER
WT = WELD THICKNESS
WR = WELD REINFORCEMENT
REP = REPAIR
RES = RESHOOT
RET = RETAKE
BM = BASE MATERIAL

WELD/FILM NUMBER	JOB NUMBER	OD	BM	WR	WT	WITHIN STD'S YES NO	# FILM	FILM SIZE / MFG / TYPE	SOD	OFD	IQ S6	# EXP	DEFECT LOCATION
1-3	5541-AB	-	1.125"	1.125"	1.125"	✓	1	3 1/2" x 8 1/2" - 80	8"	1.25"	B	1	W, H, 13, 45
2-3	L	L	L	L	L	✓	L	L	L	L	L	L	
4-5	L	L	0.875"	L	1"	✓	L	3 1/2" x 11" - 80	14"	1"	L	L	J
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
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21													
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25													
26													
27													
28													
29													
30													

45 min Stand-by
Derek Work

METHOD <u>ICT</u>	SOURCE SIZE DIAG. <u>1150</u>	ISOTOPE <u>Ir-192</u>	NO. CURIES <u>40</u>	DEV. TIME <u>5:00</u>	DEV. TEMP <u>68°</u>	DENSITY <u>2.4</u>		
NO. OF WELDS <u>2</u>	FT. LONG SEAMS	STANDARDS <u>ASME sec III</u>	NO. OF FILM <u>3</u>	FILM/ CASSETTE <u>1</u>	EXPOSURE: DBL WALL <u>X</u> S. WALL <u>X</u>	MR/ SCREENS <u>3 Pb</u>		
VIEWING: DBL WALL <u>X</u> S. WALL <u>X</u>	TRUCK NO. / SHOP <u>DC</u>	REPORT NO. OF	PAGE NO. OF	TECH. HOURS	ASST. HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE
FILM INTERPRETER <u>Derek Work II</u>	COMPANY REPRESENTATIVE	ASST. NAME <u>Derek Work</u>	NDT TECHNICIAN <u>Derek Work</u>	ASNT LEVEL <u>I</u>	ASNT LEVEL <u>II</u>			

SIGNATURE CERTIFIES TIME & MATERIALS CORRECT

SIGNATURE

TULSA GAMMA RAY, INC. ASSUMES NO RESPONSIBILITY FOR LOSSES
OF ANY KIND DUE TO INTERPRETATION

No. 124568



TULSA GAMMA RAY, INC.

1127 SOUTH LEWIS AVENUE
TULSA, OKLAHOMA 74104-3900
918 / 585-3228 • FAX 918 / 584-5598
1 - 800 - 625-9288
www.tulsagammaray.com

CUSTOMER DATA

NAME Smithco
ADDRESS _____
PHONE _____ ATTN: _____
W.O. # 5541 P.O. # _____
JOB LOCATION Tulsa, OK
DESCRIPTION Spots MATERIAL TYPE SA-516-70

TECHNIQUE/INSPECTION REPORT

DATE 12-4-08 DAY Thurs.

DEFECT CODE

AB - ARC BURN
AI - ALIGNED INDICATION
BT - BURN THROUGH
CON - CONCAVITY
CRACK - CRACK

HB - HOLLOW BEAD
IF - INADEQUATE FUSION
IP - INCOMPLETE PENETRATION
MA - MISALIGNMENT
POR - POROSITY

SLI - SLAG INCLUSION
SLL - SLAG LINE
SURF - SURFACE INDICATION
UCE - UNDERCUT EXTERNAL
UCI - UNDERCUT INTERNAL

ABBREVIATED TERMS

SOD = SOURCE TO OBJECT DISTANCE
OFD = SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD = OUTER DIAMETER
WT = WELD THICKNESS
WR = WELD REINFORCEMENT
REP = REPAIR
RES = RESHOOT
RET = RETAKE
BM = BASE MATERIAL

WELD/FILM NUMBER	JOB NUMBER	OD	BM	WR	WT	WITHIN STD'S		# FILM	FILM SIZE / MFG / TYPE	SOD	OFD	IQI #	# EXP	DEFECT LOCATION
						YES	NO							
1 <u>1-2</u>	<u>5541-BF</u>	<u>-</u>	<u>1.25"</u>	<u>1.25"</u>	<u>1.375"</u>	☒		<u>1</u>	<u>3 1/2" x 8 1/2" - 80</u>	<u>8"</u>	<u>1.375"</u>	<u>3</u>	<u>1</u>	<u>13, 45, 12</u>
2 <u>2-3</u>	<u>L</u>	<u>L</u>	<u>L</u>	<u>L</u>	<u>L</u>	☒		<u>1</u>	<u>3 1/2" x 11" - 80</u>	<u>11"</u>	<u>1.25"</u>	<u>1</u>	<u>2</u>	<u>L</u>
3 <u>4-5</u>														
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METHOD <u>RT</u>	SOURCE SIZE DIAG. <u>150"</u>	ISO TYPE <u>IR-192</u>	NO. CURIES <u>40</u>	DEV. TIME <u>5.00</u>	DEV. TEMP <u>68°</u>	DENSITY <u>2.4</u>	
NO. OF WELDS <u>2</u>	FT. LONG SEAMS	STANDARDS <u>ASME Sec. VIII</u>	NO. OF FILM <u>3</u>	FILM/ CASSETTE <u>1</u>	EXPOSURE: DBL WALL <u>X</u> S. WALL <u>X</u>	MR. SCREENS <u>3</u> <u>P6</u>	
VIEWING: DBL WALL	S. WALL <u>X</u>						
TRUCK NO. / SHOP <u>DC.</u>	REPORT NO. OF	PAGE NO. OF	TECH. HOURS	ASST. HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE
FILM INTERPRETER <u>Blair</u>	ASST. NAME <u>Adam Hedding</u>	ASST. LEVEL <u>I</u>					
COMPANY REPRESENTATIVE <u>Blair</u>	ASST. NAME <u>Don Chrus</u>	ASST. LEVEL <u>II</u>					

SIGNATURE CERTIFIES TIME & MATERIALS CORRECT

SIGNATURE



TULSA GAMMA RAY, INC.

1127 SOUTH LEWIS AVENUE
TULSA, OKLAHOMA 74104-3900
918 / 585-3228 • FAX 918 / 584-5598
1 - 800 - 625-9288
www.tulsagammaray.com

CUSTOMER DATA

NAME Smithco
ADDRESS _____
PHONE _____ ATTN: _____
W.O. # 5541 P.O. # _____
JOB LOCATION Tulsa, OK
DESCRIPTION Spots MATERIAL TYPE SA-516-70

TECHNIQUE/INSPECTION REPORT

DATE 12-8-08 DAY Monday

DEFECT CODE

AB - ARC BURN
AI - ALIGNED INDICATION
BT - BURN THROUGH
CON - CONCAVITY
CRACK - CRACK

HB - HOLLOW BEAD
IF - INADEQUATE FUSION
IP - INCOMPLETE PENETRATION
MA - MISALIGNMENT
POR - POROSITY

SLI - SLAG INCLUSION
SLL - SLAG LINE
SURF - SURFACE INDICATION
UCE - UNDERCUT EXTERNAL
UCI - UNDERCUT INTERNAL

ABBREVIATED TERMS

SOD = SOURCE TO OBJECT DISTANCE
OFD = SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD = OUTER DIAMETER
WT = WELD THICKNESS
WR = WELD REINFORCEMENT
REP = REPAIR
RET = RETAKE
RES = RESHOOT
BM = BASE MATERIAL

WELD/FILM NUMBER	JOB NUMBER	OD	BM	WR	WT	WITHIN STD'S YES NO	# FILM	FILM SIZE / MFG / TYPE	SOD	OFD	IQI S-0	# EXP	DEFECT LOCATION
1-2	5541-BB	-	1.0"	.125"	.125"	✓	1	3 1/2" x 8 1/2" - 80	8"	1.125"	13	1	10, 13
2-3	1	1	1	1	1	✓	1	3 1/2" x 8 1/2" - 80	1	1	1	1	
4-5	1	1	.875"	1	1"	X	1	3 1/2" x 17" - 80	14"	1"	1	1	SLI J
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
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29													
30													

METHOD <u>RT</u>	SOURCE SIZE DIAG. <u>.150"</u>	ISOTOPE <u>IR-192</u>	NO. CURIES <u>40</u>	DEV. TIME <u>5:00</u>	DEV. TEMP. <u>68°</u>	DENSITY <u>2.4</u>
NO. OF WELDS <u>2</u>	FT. LONG SEAMS	STANDARDS <u>ASME SEC. VIII</u>	NO. OF FILM <u>3</u>	FILM/ CASSETTE <u>1</u>	EXPOSURE: DBL WALL VIEWING: DBL WALL	S. WALL <u>X</u> S. WALL <u>X</u>
TRUCK NO. / SHOP <u>DC</u>	REPORT NO. OF	PAGE NO. OF	TECH. HOURS	ASST. HOURS	TRAVEL HOURS	TOTAL HOURS
FILM INTERPRETER <u>Black II</u>	ASST. NAME <u>Adam LeJing</u>				ASNT LEVEL <u>I</u>	
COMPANY REPRESENTATIVE <u>[Signature]</u>	NDT TECHNICIAN <u>[Signature]</u>				ASNT LEVEL <u>II</u>	

SIGNATURE CERTIFIES TIME & MATERIALS CORRECT

SIGNATURE



TULSA GAMMA RAY, INC.

1127 SOUTH LEWIS AVENUE
TULSA, OKLAHOMA 74104-3900
918 / 585-3228 • FAX 918 / 584-5598
1 - 800 - 625-9288
www.tulsagammaray.com

TECHNIQUE/INSPECTION REPORT

DATE 12-10-08 DAY WED

CUSTOMER DATA

NAME Smithco
ADDRESS _____
PHONE _____ ATTN: _____
W.O. # 5541 P.O. # _____
JOB LOCATION Tulsa, OK
DESCRIPTION Repair MATERIAL TYPE SA-516-70

DEFECT CODE

AB - ARC BURN
AI - ALIGNED INDICATION
BT - BURN THROUGH
CON - CONCAVITY
CRACK - CRACK

HB - HOLLOW BEAD
IF - INADEQUATE FUSION
IP - INCOMPLETE PENETRATION
MA - MISALIGNMENT
POR - POROSITY

SLI - SLAG INCLUSION
SLL - SLAG LINE
SURF - SURFACE INDICATION
UCE - UNDERCUT EXTERNAL
UCI - UNDERCUT INTERNAL

ABBREVIATED TERMS

SOD = SOURCE TO OBJECT DISTANCE
OPD = SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD = OUTER DIAMETER
WT = WELD THICKNESS
WR = WELD REINFORCEMENT
REP = REPAIR
RES = RESHOOT
RET = RETAKE
BM = BASE MATERIAL

WELD/FILM NUMBER	JOB NUMBER	OD	BM	WR	WT	WITHIN STD'S YES NO	# FILM	FILM SIZE / MFG / TYPE	SOD	OPD	IOD SOD	# EXP	DEFECT LOCATION
1 <u>4-5</u>	<u>5541-BB</u>	<u>-</u>	<u>.575"</u>	<u>.125"</u>	<u>1"</u>	<u>✓</u>		<u>1 3/8" x 17" - 80</u>	<u>14"</u>	<u>1"</u>	<u>8</u>	<u>1</u>	
2													
3													
4													
5													
6													
7													
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27													
28													
29													
30													

METHOD <u>ICT</u>	SOURCE SIZE DIAG. <u>.150</u>	ISOTOPE <u>Ir-192</u>	NO. CURIES <u>40</u>	DEV. TIME <u>5:00</u>	DEV. TEMP. <u>68°</u>	DENSITY <u>0.4</u>	
NO. OF WELDS <u>1</u>	FT. LONG SEAMS <u>ASME Sec. VIII</u>	STANDARDS <u>ASME Sec. VIII</u>	NO. OF FILM <u>1</u>	FILM/ CASSETTE <u>1</u>	EXPOSURE: DBL WALL VIEWING: DBL WALL	S. WALL S. WALL	MIRR. SCREENS <u>3</u>
TRUCK NO. <u>PL</u>	REPORT NO. <u>OF</u>	PAGE NO. <u>OF</u>	TECH. HOURS <u>1</u>	ASST. HOURS <u>1</u>	TRAVEL HOURS <u>1</u>	TOTAL HOURS <u>1</u>	MILEAGE <u>1</u>
FILM INTERPRETER <u>[Signature]</u>			ASST. NAME <u>Adam Leiding</u>			ASST. LEVEL <u>II</u>	
COMPANY REPRESENTATIVE <u>[Signature]</u>			NDT TECHNICIAN <u>[Signature]</u>			ASST. LEVEL <u>II</u>	

SIGNATURE CERTIFIES TIME & MATERIALS CORRECT

SIGNATURE



SMITHCO ENGINEERING, INC.

MAGNETIC PARTICLE TESTING REPORT

CUSTOMER: Poseidon oil DATE: 11/13/08
TIME: 1:20 PM
EQUIPMENT SERIAL NUMBER 2008B5541AFAB BFBB *Preweld plate edges*

APPLICABLE CODE: ASME SECTION V ARTICLE 7
ASME SECTION V ARTICLE 25, SE-709
ASTM E-709
ASME SECTION VIII DIV. 1, APPENDIX 6

EXAMINATION MEDIUM: DRY POWDER

COLOR OF POWDER: RED

LIGHTING EQUIPMENT USED 3 D cell Mag-Lite => 100fc(1000Lx)

EQUIPMENT MANUFACTURER: PARKER RESEARCH CORPORATION

MODEL NUMBER: B-100

MAGNETIZING CURRENT: AC ☒ DC ☒

DEMAGNETIZING REQUIRED: YES ☐ NO ☒

TESTED MATERIAL TYPE AND THICKNESS SA516 GR70 2 3/4 1 1/4 1 1/8 1/2 1"

NON-REJECTABLE INDICATIONS

SIZE, TYPE AND LOCATIONS: _____

ACCEPTED ☒

REJECTED ☐

ACCEPTANCE CRITERIA: ABOVE REFERENCED CODES AND STANDARDS
SMITHCO MPT PROCEDURE LATEST REVISION

PERFORMED BY: [Signature]

LEVEL OF CERTIFICATION: II

WITNESSED OR ACCEPTED BY: _____

LEVEL OF CERTIFICATION: _____

MPT PROCEDURE - Page 4 of 4 Rev. 10 (09-11-07)

SMITHCO ENGINEERING, INC.

TULSA OFFICE & PLANT: 6312 S. 39th W. Ave. Tulsa, OK 74132 Phone (918) 446-4406 Fax (918) 445-2857

www.smithco-eng.com



SMITHCO ENGINEERING, INC.

MAGNETIC PARTICLE TESTING REPORT

CUSTOMER: Roseidon oil DATE: 12 15 08
TIME: 9:10 AM / 6:25 AM
NOZ OPENING
EQUIPMENT SERIAL NUMBER 2008B 5541 AFBF

APPLICABLE CODE: ASME SECTION V ARTICLE 7
ASME SECTION V ARTICLE 25, SE-709
ASTM E-709
ASME SECTION VIII DIV. 1, APPENDIX 6

EXAMINATION MEDIUM: DRY POWDER

COLOR OF POWDER: RED

LIGHTING EQUIPMENT USED 3 D Cell Mag-lite => 100fc(1000Lx)

EQUIPMENT MANUFACTURER: PARKER RESEARCH CORPORATION
MODEL NUMBER: B-100
MAGNETIZING CURRENT: AC ☒ DC ☒
DEMAGNETIZING REQUIRED: YES ☐ NO ☒
TESTED MATERIAL TYPE AND THICKNESS 304/6 GR 70 1 1/4"

NON-REJECTABLE INDICATIONS
SIZE, TYPE AND LOCATIONS: _____

ACCEPTED ☒ REJECTED ☐

ACCEPTANCE CRITERIA: ABOVE REFERENCED CODES AND STANDARDS
SMITHCO MPT PROCEDURE LATEST REVISION

PERFORMED BY: [Signature]

LEVEL OF CERTIFICATION: II

WITNESSED OR ACCEPTED BY: _____

LEVEL OF CERTIFICATION: _____

MPT PROCEDURE - Page 4 of 4 Rev. 10 (09-11-07)



SMITHCO ENGINEERING, INC.

MAGNETIC PARTICLE TESTING REPORT

CUSTOMER: Roscidon Oil DATE: 12/10/08
TIME: 6:20 AM
POSTWELD Photo Edges
EQUIPMENT SERIAL NUMBER 2008B5541 AFAB

APPLICABLE CODE: ASME SECTION V ARTICLE 7
ASME SECTION V ARTICLE 25, SE-709
ASTM E-709
ASME SECTION VIII DIV. 1, APPENDIX 6

EXAMINATION MEDIUM: DRY POWDER

COLOR OF POWDER: RED

LIGHTING EQUIPMENT USED 3 D Cell Mag-Lite $\Rightarrow$ 100fc(1000Lx)

EQUIPMENT MANUFACTURER: PARKER RESEARCH CORPORATION

MODEL NUMBER: B-100

MAGNETIZING CURRENT: AC ☒ DC ☐

DEMAGNETIZING REQUIRED: YES ☐ NO ☒

TESTED MATERIAL TYPE AND THICKNESS SAF516 GR70 2 3/4 1 1/4 1"

NON-REJECTABLE INDICATIONS

SIZE, TYPE AND LOCATIONS: _____

ACCEPTED ☒

REJECTED ☐

ACCEPTANCE CRITERIA: ABOVE REFERENCED CODES AND STANDARDS
SMITHCO MPT PROCEDURE LATEST REVISION

PERFORMED BY: [Signature]

LEVEL OF CERTIFICATION: [Signature]

WITNESSED OR ACCEPTED BY: _____

LEVEL OF CERTIFICATION: _____

MPT PROCEDURE - Page 4 of 4 Rev. 10 (09-11-07)

SMITHCO ENGINEERING, INC.

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www.smithco-eng.com



SMITHCO ENGINEERING, INC.

MAGNETIC PARTICLE TESTING REPORT

CUSTOMER: Rosidown Oil DATE: 12 112 108
TIME: 7:10 Am
RESTORED Photo Edges
EQUIPMENT SERIAL NUMBER 2608B 5541 BFBB

APPLICABLE CODE: ASME SECTION V ARTICLE 7
ASME SECTION V ARTICLE 25, SE-709
ASTM E-709
ASME SECTION VIII DIV. 1, APPENDIX 6

EXAMINATION MEDIUM: DRY POWDER

COLOR OF POWDER: RED

LIGHTING EQUIPMENT USED 3 D Cell MAG-Lite => 100fc(1000Lx)

EQUIPMENT MANUFACTURER: PARKER RESEARCH CORPORATION

MODEL NUMBER: B-100

MAGNETIZING CURRENT: AC ☒ DC ☐

DEMAGNETIZING REQUIRED: YES ☐ NO ☒

TESTED MATERIAL TYPE AND THICKNESS SA516 GR70 2 3/4 1 1/4 1"

NON-REJECTABLE INDICATIONS
SIZE, TYPE AND LOCATIONS: _____

ACCEPTED ☒ REJECTED ☐

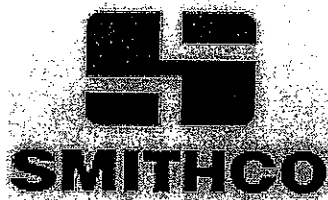
ACCEPTANCE CRITERIA: ABOVE REFERENCED CODES AND STANDARDS
SMITHCO MPT PROCEDURE LATEST REVISION

PERFORMED BY: [Signature]

LEVEL OF CERTIFICATION: [Signature]

WITNESSED OR ACCEPTED BY: _____

LEVEL OF CERTIFICATION: _____



HARDNESS TEST CERTIFICATE

Machine :

Krautkramer

SERIAL # :

Mic 10 SN 5684

Mic 20 SN 2567

DATE: 12-10-08

Inspector : SV

HEADER ID: 2008B 5541 A

BHN				BHN			
AF	Weld	HAZ			Weld	HAZ	
LS	181	179		N	175	173	
				NB	176	175	
				N	173	172	
				NB	174	171	
				N	173	171	
				NB	175	174	
				N	172	171	
				NB	173	172	
EB	183	181					



SMITHCO

CUSTOMER: Posedon Oil Pipeline

SMITHCO SERIAL NO.: 2008B5541-A

TEST GAUGE NO.: #66

RANGE: 0-500psi

DATE CAL.: 5-21-08

TEST PRESSURE: 2600psi

DATE TESTED: 12-22-08

WE CERTIFY THE ABOVE REFERENCED AIR COOLED HEAT EXCHANGER WAS SUCCESSFULLY HYDROSTATICALLY TESTED FOR ONE (1) HOUR MINIMUM AND THE TEST GAUGE WAS CALIBRATED AS STATED.

MF

MATT FADENRECHT
QC CONSOLIDATED REP

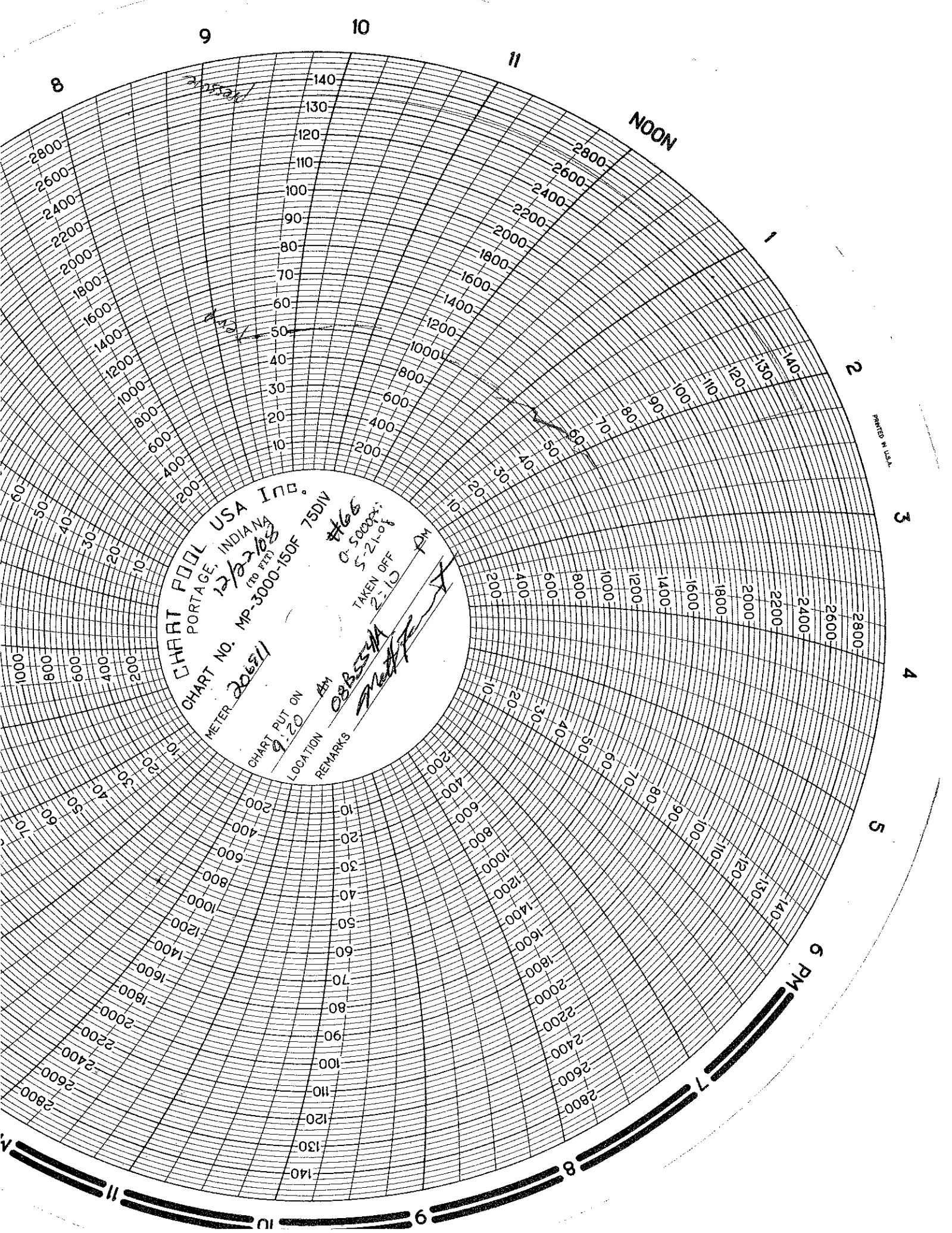


CHART POOL USA INC.
PORTAGE, INDIANA
12/22/03
CHART NO. MP-3000-150F 75DIV
METER 206811
CHART PUT ON 9:20 AM
LOCATION 088534
REMARKS #66
0-5000ft
5-2400ft
TAKEN OFF 2:10 PM
Met 7-1

RECEIVED 11/1/03



SMITHCO

HYDROSTATIC TEST CERTIFICATE

CUSTOMER: Poseidon oil Pipeline

SMITHCO SERIAL NO.: 200PB5541-A

TEST GAUGE NO.: #66

RANGE: 0-5000psi

DATE CAL.: 5-21-08

TEST PRESSURE: 2600psi

DATE TESTED: 1-8-09

WE CERTIFY THE ABOVE REFERENCED AIR COOLED HEAT EXCHANGER WAS SUCCESSFULLY HYDROSTATICALLY TESTED FOR ONE (1) HOUR MINIMUM AND THE TEST GAUGE WAS CALIBRATED AS STATED.

Shawn Blanck
ASSEMBLY INSPECTOR

SMITHCO ENGINEERING, INC
P.O. BOX 571330
TULSA, OK 74157

PHONE: (918) 446-4406
FAX: (918) 445-2857

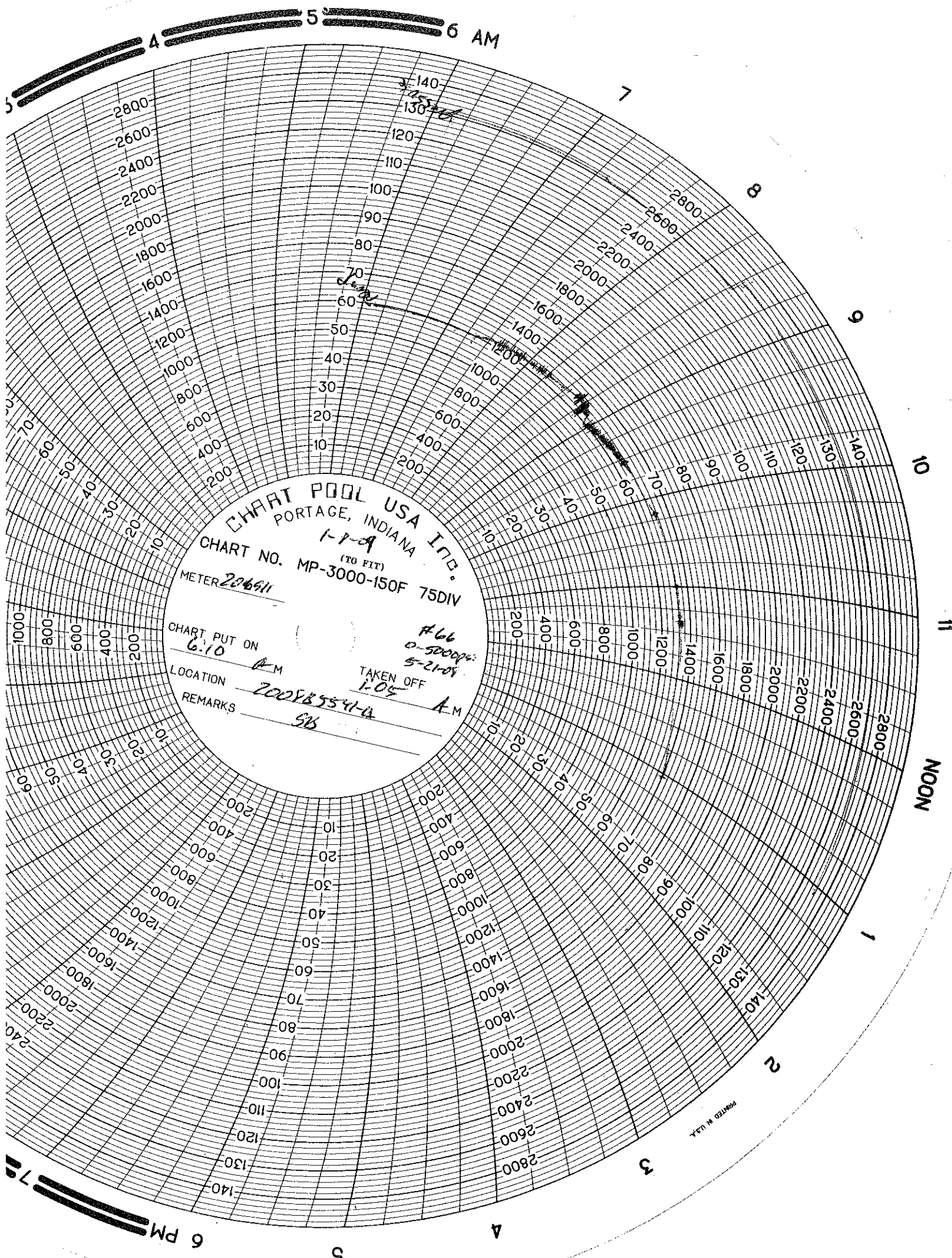


CHART POOL USA INC.
PORTAGE, INDIANA
CHART NO. MP-3000-150F 75DIV
METER 206411

CHART PUT ON
6.10 AM

TAKEN OFF
1.05 AM

LOCATION 20098554-4
REMARKS SB

PRINTED IN U.S.A.



SMITHCO

HYDROSTATIC TEST CERTIFICATE

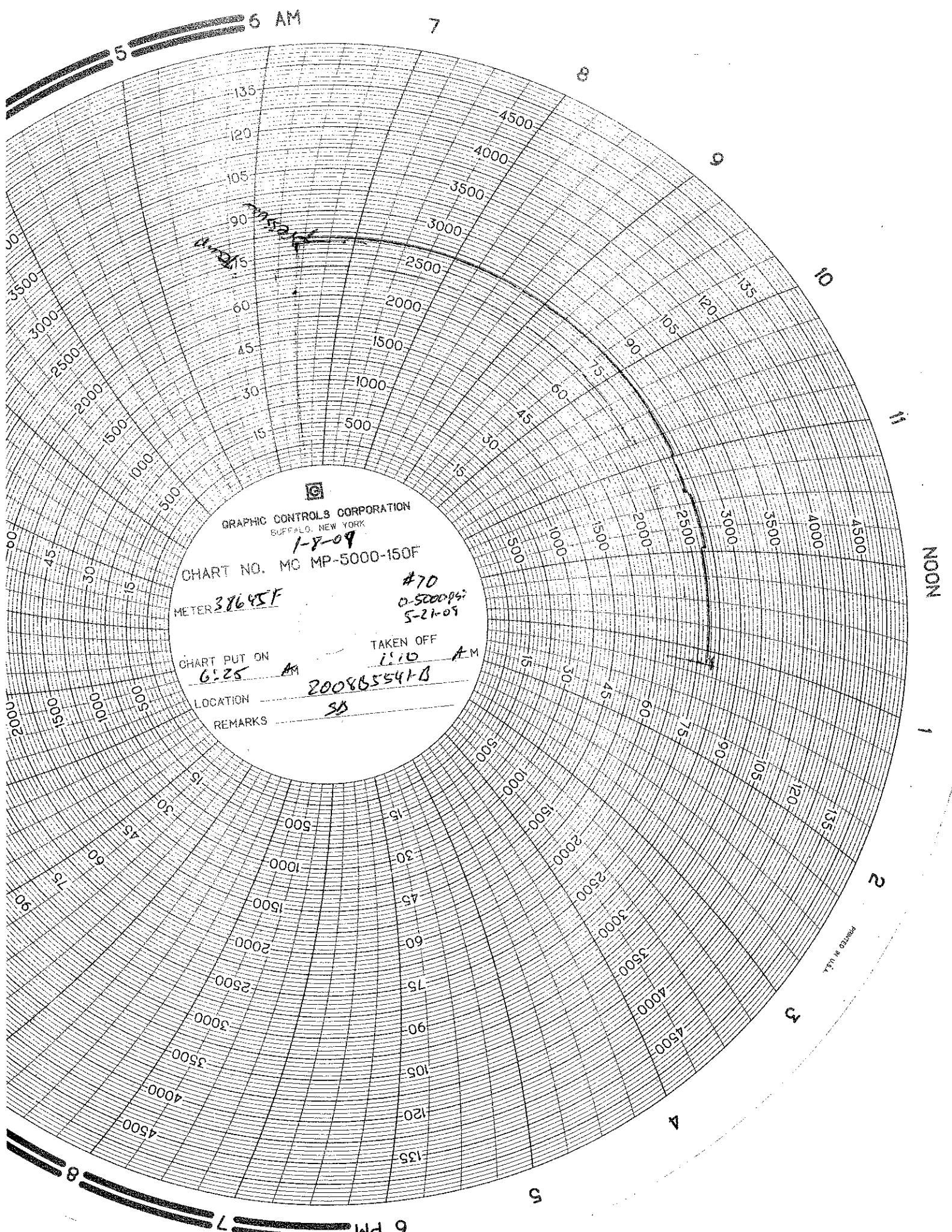
CUSTOMER: Poseidon oil Pipeline
SMITHCO SERIAL NO.: 2007B5541-13
TEST GAUGE NO.: #70
RANGE: 0-5000psi
DATE CAL.: 5-21-08
TEST PRESSURE: 2600psi
DATE TESTED: 1-8-09

WE CERTIFY THE ABOVE REFERENCED AIR COOLED HEAT EXCHANGER WAS SUCCESSFULLY HYDROSTATICALLY TESTED FOR ONE (1) HOUR MINIMUM AND THE TEST GAUGE WAS CALIBRATED AS STATED.

Shawn Blanck
Shawn Blanck
ASSEMBLY INSPECTOR

SMITHCO ENGINEERING, INC
P.O. BOX 571330
TULSA, OK 74157

PHONE: (918) 446-4406
FAX: (918) 445-2857



GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK

1-8-09
CHART NO. MC MP-5000-150F

METER 38645F

#70
0-5000psi
5-21-09

CHART PUT ON 6:25 AM
TAKEN OFF 1:10 AM
200885541-B

LOCATION
REMARKS SD

PRINTED IN U.S.A.

U

W

HT

CERTIFIED BY SMITHCO ENGINEERING, INC.
MUSCOGEE, OKLAHOMA

WATER FLOW 2000 PSIG 150
WATER FLOW 0 PSIG 2000
WATER FLOW 2008B5541 A 2008
WATER FLOW 2600 PSIG HAL-4110
WATER FLOW PIPELINE PUMP RECYCL

U

W

HT

CERTIFIED BY SMITHCO ENGINEERING, INC.
MUSCOGEE, OKLAHOMA

WATER FLOW 2000 PSIG 150
WATER FLOW 0 PSIG 2000
WATER FLOW 2008B5541 B 2008
WATER FLOW 2600 PSIG HAL-4120
WATER FLOW PIPELINE PUMP RECYCL