

# OPERATION AND MAINTENANCE MANUALS

**PROJECT: Deacon Ultraviolet (UV) Light  
Disinfection Project – Supply of Pump  
Control Valves – City of Winnipeg, Canada  
CONSULTANT: Earth Tech**

Tender No. 385-2003  
(Quantity) Size: (2) 24", (3) 30"  
Figure No: X1740D  
GAI s/n 032145  
Date: September 13, 2004  
FF & D 125 ANSI

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## TABLE OF CONTENTS

### SECTION 1: Valve Operation:

Pre Water Treatment Operation	6 Pages
Post Water Treatment Operation	6 Pages

### SECTION 2: Drawings & BOM:

750 mm Valve drawing	G-1439
750 mm Valve BOM	1 Page
600 mm Valve drawing	G-1428
600 mm Valve BOM	1 Page
Solenoid Control Valves	3 Pages
Limit Switch	1 Page
Paint Data	1 Page
Valve Weights	1 Page

### SECTION 3: Dismantling & Reassembly Instructions:

750 mm Valve Instructions	7 Pages
600 mm Valve Instructions	2 Pages
Preventative Maintenance	1 Page

### SECTION 4: Test Results/Material Data:

Test Results/ Material Data	15 Pages
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**OPERATING INSTRUCTIONS**  
**ELECTRIC CHECK VALVES**  
**FIGURE X1740-D AND FIGURE**  
**NORMAL THROTTLING CONTROLS**  
**(Pre-Water Treatment Plant Configuration)**  
**Primarily For Gravity Flow Operation**

**DESCRIPTION**

The function of the Electric Check Valve is to prevent the pressure surges normally associated with the starting and stopping of pumps. In this configuration, NSP1 is normally closed, NSP2 is normally open, and the main valve is normally open. The emergency close function is generally not required for gravity flow operation.

**INSTALLATION**

The Electric Check Valve will operate when installed in any position, however, the pump discharge pressure should enter the valve under the main valve piston, part no. 2. This is in accordance with the arrow indication on the drawing or brass tag on the valve flange.

After the valve is installed, the valve closed limit switch on the valve cover should be adjusted so that the "clicking" action can be heard when the valve is as fully closed as practical. The wiring to the switch is usually done to the normally open contacts. The two-way normal solenoid pilot should be a "normally closed type" and the way normal solenoid pilot should be a "normally open type" and the emergency solenoid should be wired as indicated on the wiring diagram. The emergency solenoid is not required for operation. Close the (2) emergency closing speed controls. The exhaust line from the normal solenoid pilot valve NSP 2 must exhaust freely to atmosphere or drain. The air vent on the side of the main valve body must be open to atmosphere. The valve open limit switch on the valve cover should be adjusted so that the "clicking" action can be heard when the valve is as fully open as practical.

**DESCRIPTION OF OPERATION**

Within the main valve body is just one moving part, the piston, part no. 2. The piston is of the differential area design. Pump discharge pressure is applied to the underside or smaller area of the piston. This pressure times the area represents the opening force. The upper surface area of the piston is nearly twice as great as the smaller lower piston area. When equal pressures are applied to both surfaces, there results a closing force nearly twice as great as the opening force.

To open the main valve, all that is required, is to exhaust the pressure on the top surface of the piston to atmosphere and the pressure will force the valve piston to the open position. When pressure is readmitted to the top of the valve piston, the main valve will be closed. The speed at which pressure is admitted or exhausted from the main valve piston determines its operating speeds.

The main valve controls are comprised of three solenoid pilot valves, two normal and an emergency pilot valve. The normal solenoid pilot valves "NSP 1" and "NSP 2" are two-way solenoid pilot valves. The emergency solenoid pilot valve "E" (sometimes designated ESP) is not required for operation.

### SEQUENCE OF OPERATION

(Normal Opening) To open the main valve, de-energize solenoids NSP1 and NSP2. This will open solenoid pilot NSP2 and close solenoid pilot NSP1. The pressure atop the main valve piston will exhaust through solenoid NSP2, opening the main valve at a speed set at the opening speed control.

(Normal Closing) To close the main valve, energize solenoids NSP1 and NSP2. This will close solenoid pilot NSP2 and open solenoid pilot NSP1. The pressure admitted atop the main valve piston will close the main valve at a speed set at the closing speed control.

### EMERGENCY CLOSING SEQUENCE (Power Failure)

A power failure will de-energize both NSP's. The valve will open same as above normal opening sequence.

### MANUAL OPERATOR

The normal solenoid pilot (NSP 1) is provided with a manual operator knob which when turned clockwise will simulate the energizing of the solenoid coil and the main valve will close. This feature permits valve operation if the NSP1 coil is burned out.

To open the main valve, close the opening speed control and activate NSP1 using the manual operator.

In its normal position the manual operator is in the counter-clockwise position.



## START-UP

Before operation, the main valve should be purged of air. This can, in most cases, be accomplished by admitting static system pressure to the valve by opening the downstream gate valve. With no electrical power to the main valve, the valve will open. Then by turning the manual operator on the NSP 1 and closing the opening speed control, the valve will close.

When the air is gone, return the manual operator and opening speed control to the normal position. The normal closing speed valve and the normal opening speed control valve should be open about two turns. The valve should now be ready for the initial start-up.

The valve opening speed should be observed and adjusted to suit by way of opening speed control valve. The valve closing speed should be observed and adjusted by way of closing speed control.

## TROUBLE SHOOTING

### If The Valve Fails To Open:

1. Opening speed control valve closed.
2. Exhaust from NSP blocked.
3. Valve air vent blocked.
4. Pump not developing pressure or suction valve closed.

### If The Valve Fails To Close:

1. NSP2 coil burned out or not properly energized.
2. NSP1 coil burned out or not properly energized.
3. Closing speed control valve closed.
4. Power water not getting into controls thru strainer or isolating valves.

### Valve Does Not Close With Manual Operator:

1. Opening speed valve must be closed.
2. No pressure in valve inlet.

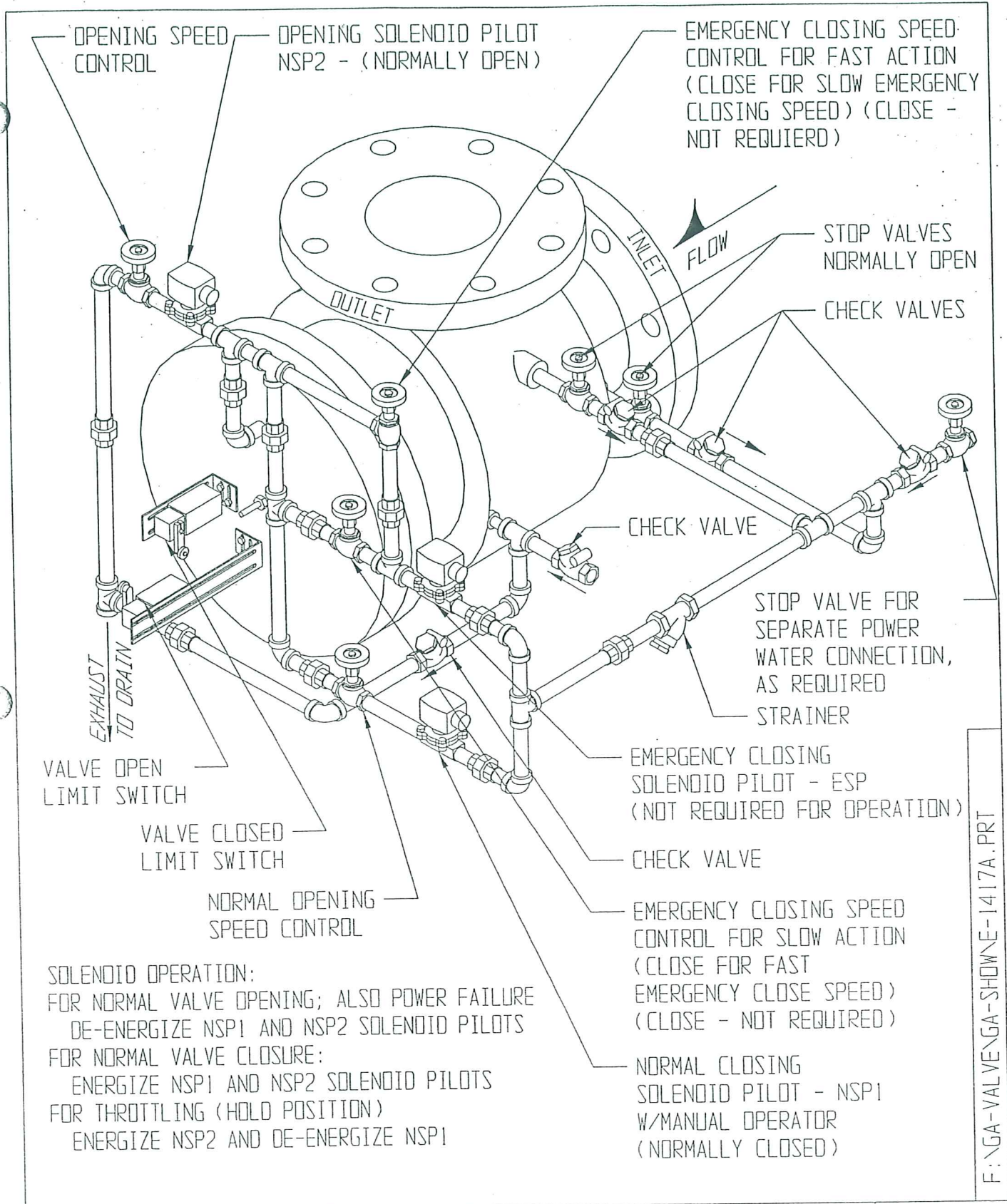
Electric Check Valves  
Figure X1740-D and X1730-D  
Normal Throttling Controls  
(Pre-WTP Configuration)  
Operating Instructions  
Page 4

## SERVICE

When the valve is first installed, there may be a slight drip occurring from the air vent. This leakage should stop once the seals wear themselves in.

Any excess leakage generally indicates the piston cup or liner cup seal is worn and needs replacing.

Anytime the main valve is dismantled, it is recommended that the machined surfaces be polished smooth with a fine emery paper and a light film of Vaseline or water proof grease be applied to the machined surfaces.



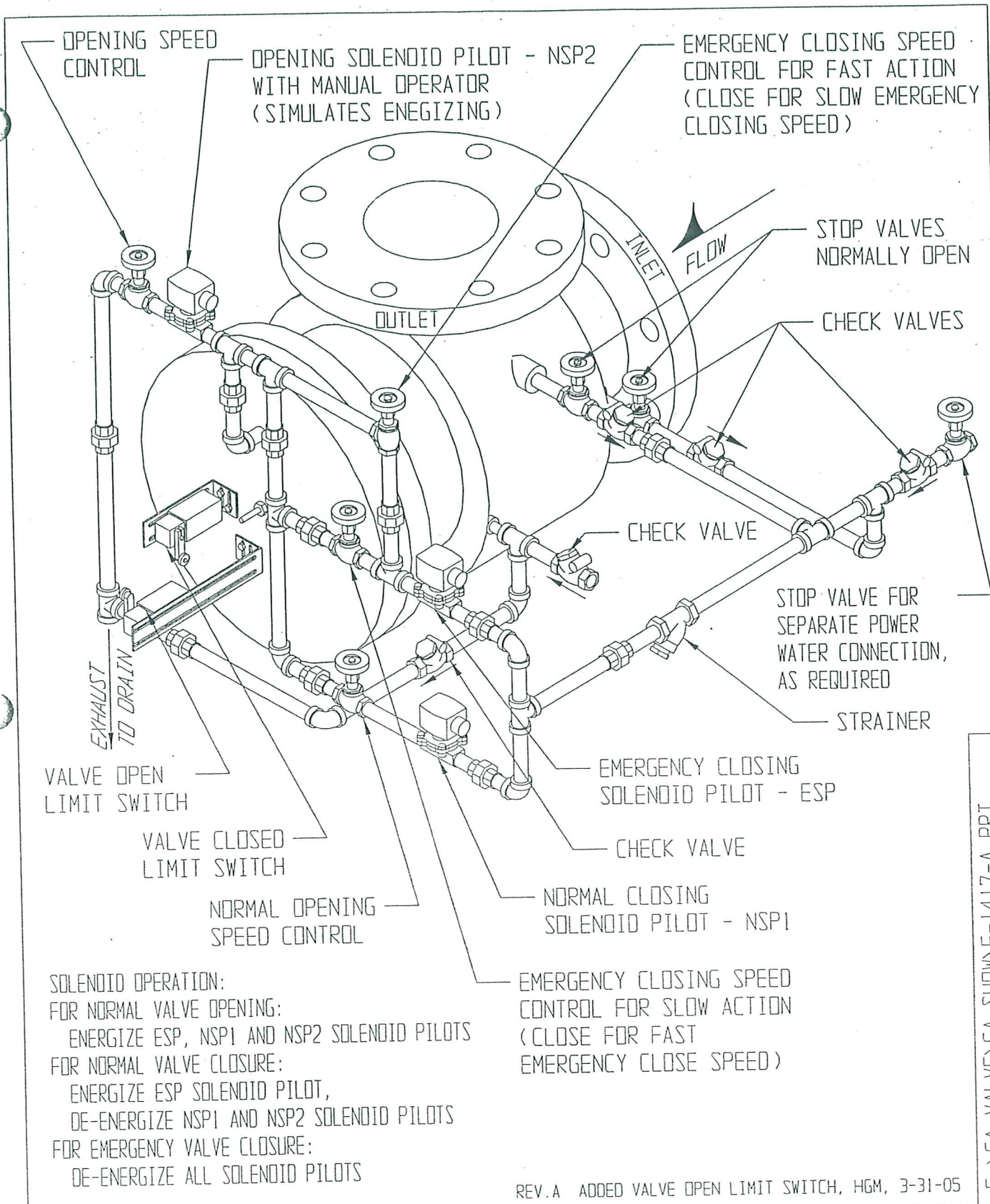
OPENING SPEED CONTROL  
 OPENING SOLENOID PILOT NSP2 - (NORMALLY OPEN)  
 EMERGENCY CLOSING SPEED CONTROL FOR FAST ACTION (CLOSE FOR SLOW EMERGENCY CLOSING SPEED) (CLOSE - NOT REQUIRED)  
 STOP VALVES NORMALLY OPEN  
 CHECK VALVES  
 INLET FLOW  
 CHECK VALVE  
 STOP VALVE FOR SEPARATE POWER WATER CONNECTION, AS REQUIRED  
 STRAINER  
 EMERGENCY CLOSING SOLENOID PILOT - ESP (NOT REQUIRED FOR OPERATION)  
 CHECK VALVE  
 EMERGENCY CLOSING SPEED CONTROL FOR SLOW ACTION (CLOSE FOR FAST EMERGENCY CLOSE SPEED) (CLOSE - NOT REQUIRED)  
 NORMAL CLOSING SOLENOID PILOT - NSP1 W/MANUAL OPERATOR (NORMALLY CLOSED)  
 EXHAUST TO DRAIN  
 VALVE OPEN LIMIT SWITCH  
 VALVE CLOSED LIMIT SWITCH  
 NORMAL OPENING SPEED CONTROL

**SOLENOID OPERATION:**  
 FOR NORMAL VALVE OPENING; ALSO POWER FAILURE DE-ENERGIZE NSP1 AND NSP2 SOLENOID PILOTS  
 FOR NORMAL VALVE CLOSURE:  
 ENERGIZE NSP1 AND NSP2 SOLENOID PILOTS FOR THROTTLING (HOLD POSITION)  
 ENERGIZE NSP2 AND DE-ENERGIZE NSP1

F: NGA-VALVE-GA-SHOWNE-1417A.PRT

<b>GA INDUSTRIES, INC.</b>  24" ANGLE BODY ELECTRIC CHECK VALVE WITH TWO EMERGENCY CLOSING SPEEDS INLET HORIZONTAL, OUTLET VERTICAL UP (PRE WTP CONFIGURATION)	STANDARD TOLERANCES (UNLESS OTHERWISE NOTED)	REFERENCES	SCALE	DRAWN BY	
	FINISHED SURFACES ONLY DIMENSIONS SHOWN IN INCHES	E-1417	NONE	HGM	
	.x = .02 .xx = .01 .xxx = .002 FRACTIONS 1/64" ANGLES 1° FINISH $\sqrt{\text{XX}}$ RMS	SERIAL NO. 032145	EFFECTIVE DATE: 3-31-05	APPR. BY JJF	
		FIG. NO.	FILE E9	DRAWING NO.	REV
			E-1417A		



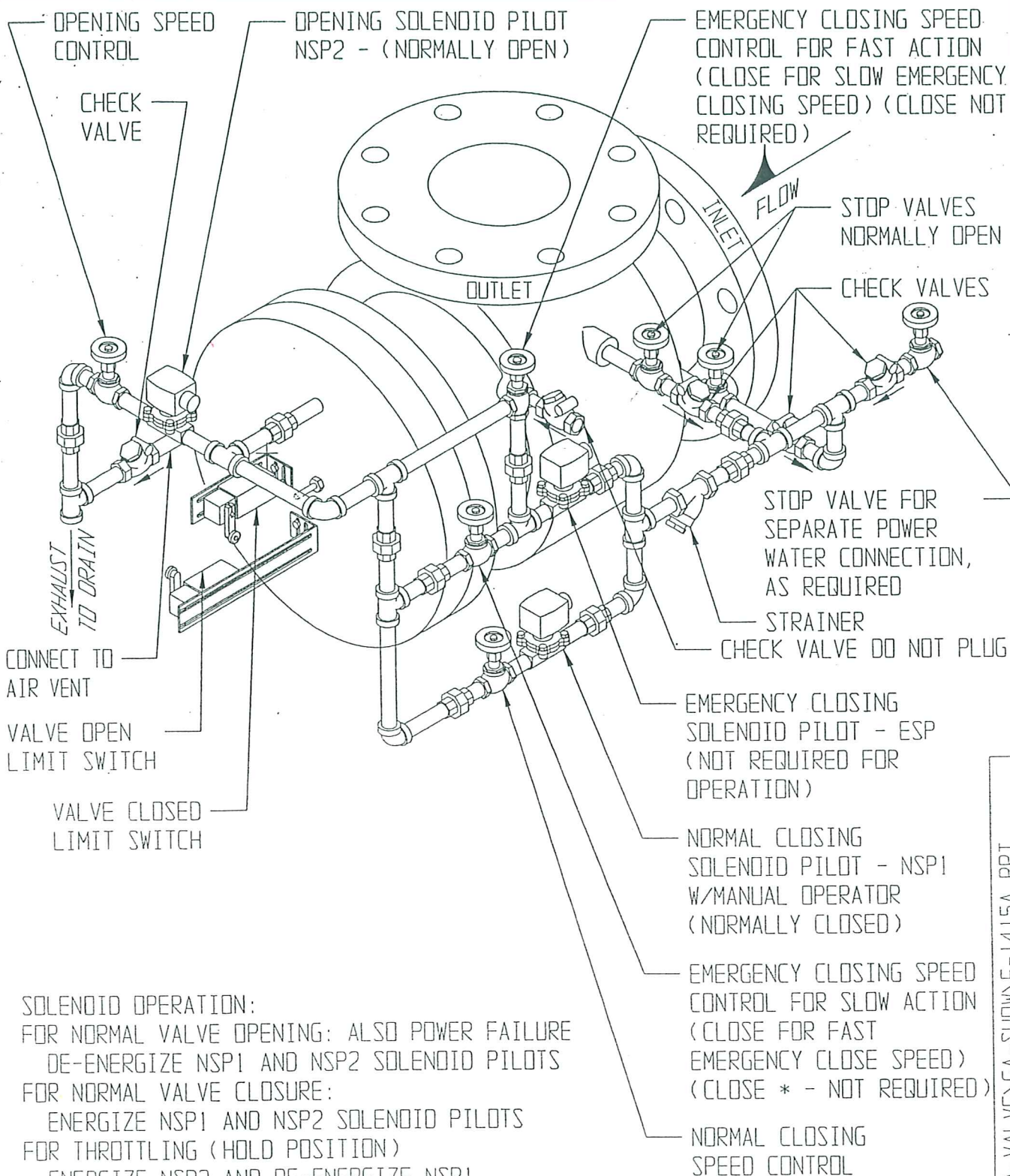


REV. A ADDED VALVE OPEN LIMIT SWITCH, HGM, 3-31-05

F:\GA-VALVINGA-SHOWNE-1417-A.PRT

<b>GA INDUSTRIES, INC.</b>  24" ANGLE BODY ELECTRIC CHECK VALVE WITH TWO EMERGENCY CLOSING SPEEDS INLET HORIZONTAL, OUTLET VERTICAL UP	STANDARD TOLERANCES (UNLESS OTHERWISE NOTED)	REFERENCES	SCALE NONE	DRAWN BY JJF
	FINISHED SURFACES ONLY DIMENSIONS SHOWN IN INCHES	SERIAL NO. 032145	EFFECTIVE DATE: 06-15-2004	APPR. BY HGM
	.x = .02 .xx = .01 .xxx = .002 FRACTIONS: 1/64" ANGLES: 1° FINISH: XX RMS	FIG. NO.	FILE E9	DRAWING NO. REV E-1417 A



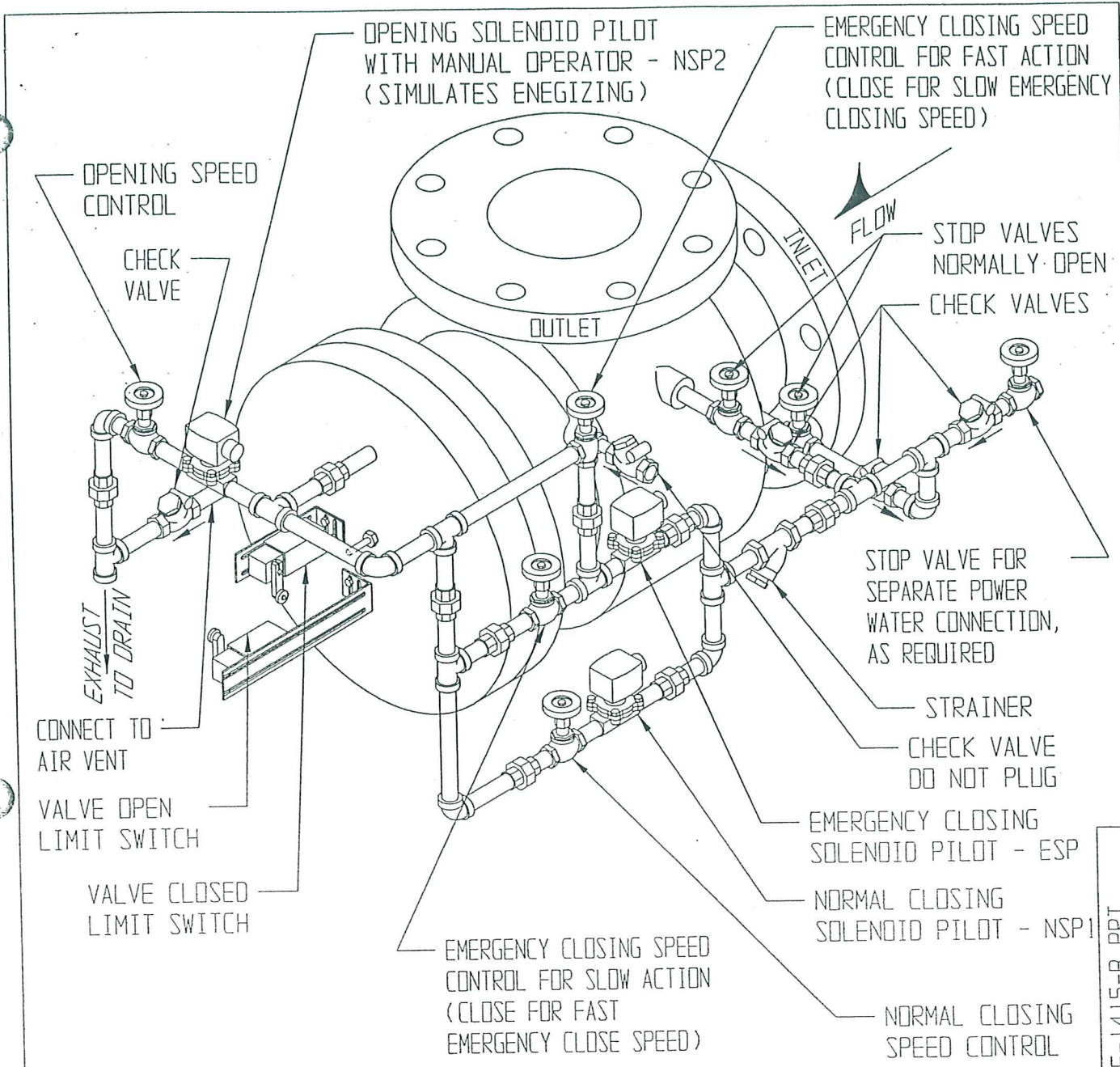


SOLENOID OPERATION:  
 FOR NORMAL VALVE OPENING: ALSO POWER FAILURE  
 DE-ENERGIZE NSP1 AND NSP2 SOLENOID PILOTS  
 FOR NORMAL VALVE CLOSURE:  
 ENERGIZE NSP1 AND NSP2 SOLENOID PILOTS  
 FOR THROTTLING (HOLD POSITION)  
 ENERGIZE NSP2 AND DE-ENERGIZE NSP1

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<b>GA INDUSTRIES, INC.</b>	STANDARD TOLERANCES (UNLESS OTHERWISE NOTED)	REFERENCES E-1415	SCALE NONE	DRAWN BY HGM
	FINISHED SURFACES ONLY DIMENSIONS SHOWN IN INCHES	SERIAL NO. 032145	EFFECTIVE DATE: 3-31-05	APPR. BY JJF
	.x = .02 .xx = .01 .xxx = .002 FRACTIONS: 1/64" ANGLES: 1° FINISH: - XX RMS	FIG. NO.	FILE E9	DRAWING NO. REV E-1415A

30" ANGLE BODY ELECTRIC CHECK VALVE  
 WITH TWO EMERGENCY CLOSING SPEEDS  
 INLET HORIZONTAL, OUTLET VERTICAL UP  
 (PRE-WTP CONFIGURATION)



SOLENOID OPERATION:  
 FOR NORMAL VALVE OPENING:  
 ENERGIZE ESP, NSP1 AND NSP2 SOLENOID PILOTS  
 FOR NORMAL VALVE CLOSURE:  
 ENERGIZE ESP SOLENOID PILOT,  
 DE-ENERGIZE NSP1 AND NSP2 SOLENOID PILOTS  
 FOR EMERGENCY VALVE CLOSURE:  
 DE-ENERGIZE ALL SOLENOID PILOTS

REV. B ADDED VALVE OPEN LIMIT SWITCH, HGM, 3-31-05  
 REV. A REVISED FOR "AS BUILT", JJF, 06-23-2004

F:\GA-VALVE\GA-SHOWNE-1415-B.PRT

<b>GA INDUSTRIES, INC.</b>	STANDARD TOLERANCES (UNLESS OTHERWISE NOTED)	REFERENCES	SCALE	DRAWN BY
	FINISHED SURFACES ONLY DIMENSIONS SHOWN IN INCHES	SERIAL NO.	NONE	JJF
30" ANGLE BODY ELECTRIC CHECK VALVE WITH TWO EMERGENCY CLOSING SPEEDS INLET HORIZONTAL, OUTLET VERTICAL UP	.x = .02 .xx = .01 .xxx = .002	032145	EFFECTIVE DATE:	APPR. BY
	FRACTIONS: 1/64" ANGLES: 1° FINISH: $\sqrt{\text{xx}}$ RMS	FIG. NO.	02-06-2004	MJB
		FILE	E9	DRAWING NO. REV
				E-1415 B



**OPERATING INSTRUCTIONS**  
**ELECTRIC CHECK VALVES**  
**FIGURE X1740-D AND FIGURE X1730-D**  
**NORMAL AND EMERGENCY CONTROLS**  
**(Post Water Treatment Plant Configuration)**  
**For Continuous Pumping Operation**

**DESCRIPTION**

The function of the Electric Check Valve is to prevent the pressure surges normally associated with the starting and stopping of pumps. In this configuration, NSP1 is normally open, NSP2 is normally closed, and the main valve is normally closed. The emergency close function is activated by de-energizing all solenoid valves.

**INSTALLATION**

The Electric Check Valve will operate when installed in any position, however, the pump discharge pressure should enter the valve under the main valve piston, part no. 2. This is in accordance with the arrow indication on the drawing or brass tag on the valve flange.

After the valve is installed, the limit switch on the valve cover should be adjusted so that the "clicking" action can be heard when the valve is as fully closed as practical. The wiring to the switch is usually done to the normally open contacts. The (2) two-way normal solenoid pilots and the emergency solenoid should be wired as indicated on the wiring diagram. The exhaust line from the normal solenoid pilot valve NSP 2 must exhaust freely to atmosphere or drain. The air vent on the side of the main valve body must be open to atmosphere. The valve open limit switch on the valve cover should be adjusted so that the "clicking" action can be heard when the valve is as fully open as practical.

**DESCRIPTION OF OPERATION**

Within the main valve body is just one moving part, the piston, part no. 2. The piston is of the differential area design. Pump discharge pressure is applied to the underside or smaller area of the piston. This pressure times the area represents the opening force. The upper surface area of the piston is nearly twice as great as the smaller lower piston area. When equal pressures are applied to both surfaces, there results a closing force nearly twice as great as the opening force.

To open the main valve, all that is required, is to exhaust the pressure on the top surface of the piston to atmosphere and the pump pressure will force the valve piston to the open position. When pressure is readmitted to the top of the valve piston, the main valve will be closed. The speed at which pressure is admitted or exhausted from the main valve piston determines its operating speeds.

Electric Check Valves  
Figure X1740-D and X1730-D  
Normal & Emergency Controls  
(Post WTP Configuration)  
Operating Instructions  
Page 2

The main valve controls are comprised of three solenoid valves, two normal and an emergency pilot valve. The normal solenoid pilot valves "NSP 1" and "NSP 2" are two-way solenoid pilot valves which when energized will exhaust pressure atop the main valve piston. The emergency solenoid pilot valve "E" (sometimes designated ESP) is always energized simultaneously with the pump start-up. The ESP is a normally open type pilot valve which when energized will close and will remain closed until a power failure occurs or the pump is once again shutdown.

**SEQUENCE OF OPERATION (Normal Opening)**

When the pump start contact is closed, the pump motor starts and simultaneously the ESP and the NSP solenoids are energized. (NOTE: On many installations, the NSP solenoids are wired through a pressure switch on the valve inlet. The NSP's are not energized until the pump develops sufficient pressure. This will prevent reverse flow should the pump fail to start while the check valve opens).

With all solenoid pilots energized, the ESP is closed and the NSP 2 opens its exhaust port to vent pressure from atop the valve piston to atmosphere. The opening speed is adjusted by speed control valve. The opening speed should be slow.

(Normal Closing): When the pump stop button is pressed, the pump will continue to run. The NSP's are de-energized only, causing the main valve to begin to close slowly at a speed set on speed control valve. The ESP remains energized during valve closure. As the main valve closes slowly, the water column is brought to a gradual stop. When the main valve is about 95% closed, the valve indicator rod trips the limit switch which de-energizes the pump and the ESP pilot.

**EMERGENCY CLOSING SEQUENCE**

A power failure to the pumps will also de-energize both the ESP and the NSP's. The ESP when de-energized will open and admit pressure to the top of the main valve piston at a faster rate adjusted on the emergency speed control valve.

The valve is provided with (2) emergency closing speed controls. Open the desired emergency closing speed control valve for slow or fast action (speed) for the emergency closing.



### MANUAL OPERATOR

The normal solenoid pilot (NSP 2) is provided with a manual operator knob which when turned clockwise will simulate the energizing of the solenoid coil and the main valve will open provided the ESP is energized. This feature permits valve operation if the NSP coil is burned out. If the ESP is not energized, then the emergency closing speed valve must be closed or the main valve cannot open.

In its normal position the manual operator is in the counter-clockwise position.

### START-UP

Before starting a pump, the main valve should be purged of air. This can, in most cases, be accomplished by admitting static system pressure to the valve by opening the downstream gate valve. With no electrical power to the main valve, open the emergency closing speed control fully. Then by turning the manual operator on the NSP 2, air can be released from atop the main valve piston and controls.

When the air is gone, return the manual operator to the normal position. Close the emergency closing speed valve and re-open it about  $\frac{1}{4}$  turn. The normal closing speed valve and the normal opening speed control valve should be open about two turns. The valve should now be ready for the initial pump start-up.

During the pump start-up, the valve opening speed should be observed and adjusted to suit by way of speed control valve. On pump shutdown, the valve will close first and its speed should be observed and adjusted by way of speed control.

To adjust the emergency closing speed control other than its  $\frac{1}{4}$  turn suggested setting, it would be prudent to simulate a power failure with a gate valve on the valve inlet side closed during testing and then set the emergency closing speed valve as desired during the simulating of a power failure.

## TROUBLE SHOOTING

### If The Valve Fails To Open On Pump Start-UP:

1. NSP coil burned out or not properly energized.
2. ESP coil burned out or not energized.
3. Opening speed control valve closed.
4. Exhaust from NSP blocked.
5. Valve air vent blocked.
6. Pump not developing pressure or suction valve closed.

### If The Valve Fails To Close When NSP De-Energized:

1. NSP manual operator in "open" or "on" position.
2. Closing speed control valve closed.
3. NSP faulty. A constant exhaust from this pilot when de-energized indicates problem is in this solenoid pilot.
4. Power water not getting into controls thru strainer or isolating valves.

### Valve Does Not Open With Manual Operator:

1. Emergency closing speed valve must be closed, or the ESP must be energized.
2. No pressure in valve inlet.

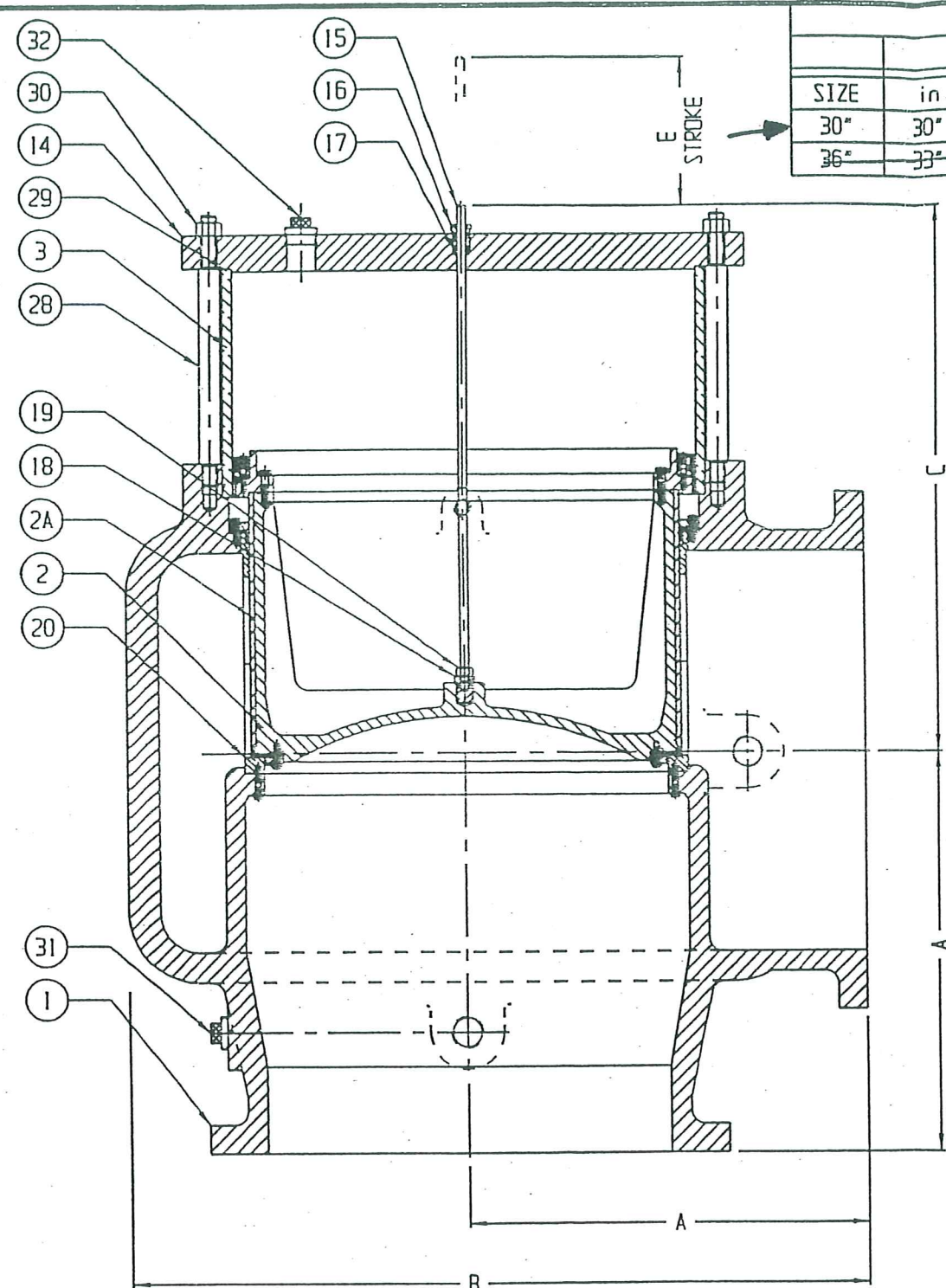
## SERVICE

When the valve is first installed, there may be a slight drip occurring from the air vent. This leakage should stop once the seals wear themselves in.

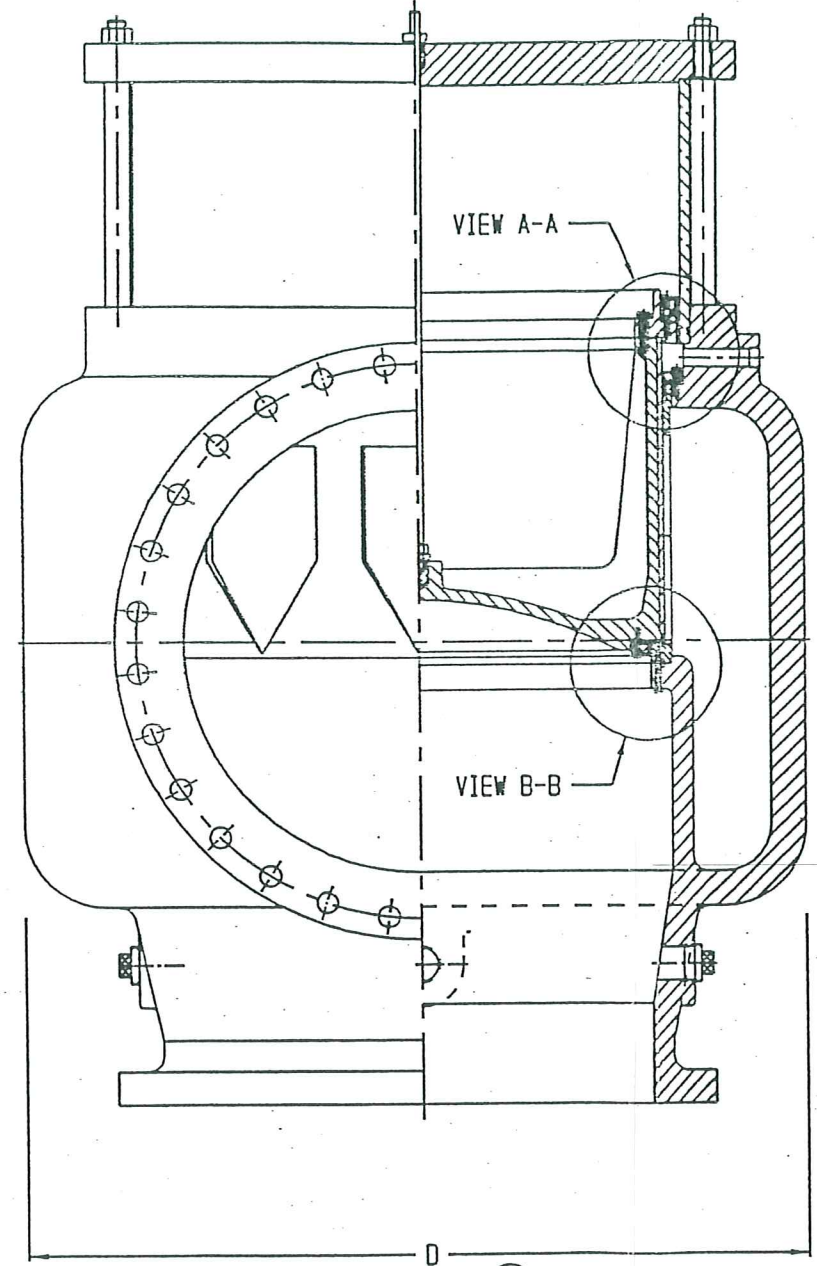
Any excess leakage generally indicates the piston cup or liner cup seal is worn and needs replacing.

Anytime the main valve is dismantled, it is recommended that the machined surfaces be polished smooth with a fine emery paper and a light film of Vaseline or water proof grease be applied to the machined surfaces.



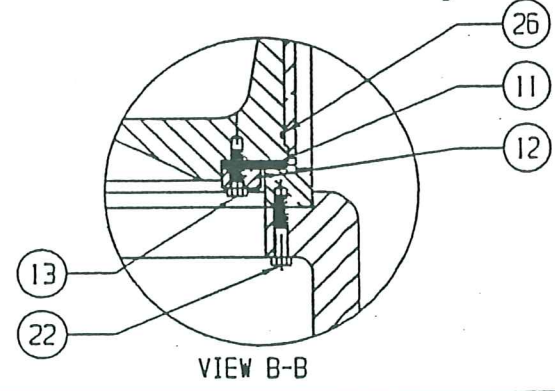
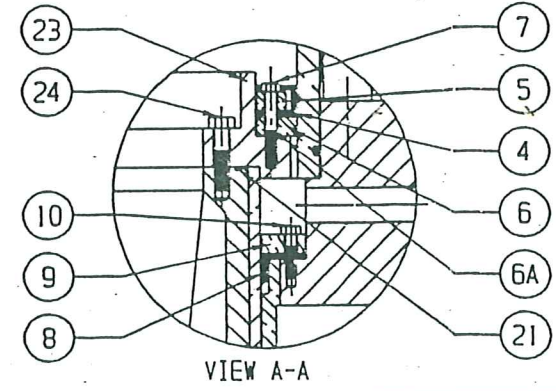


		DIMENSIONS									
		A		B		C		D		E	
SIZE		in	mm	in	mm	in	mm	in	mm	in	mm
30"		30"	762	55 1/4"	1403	41 1/4"	1048	50 1/2"	1283	13 1/4"	337
36"		33"	838	62 1/2"	1588	46 1/2"	1181	59"	1499	15"	381



NO.	PART NAMES
1	BODY
2	PISTON CORE
2A	PISTON SLEEVE
3	LINER
4	PISTON CUP
5	PISTON CUP FOLLOWER
6	PISTON CUP SEPARATOR
6A	PISTON CUP SEPARATOR SEAL
7	PISTON CUP SCREWS
8	LINER CUP
9	LINER CUP FOLLOWER
10	LINER CUP SCREWS
11	SEAT RING
12	SEAT RING FOLLOWER
13	SEAT RING SCREWS
14	COVER
15	INDICATOR ROD
16	INDICATOR GLAND
17	INDICATOR PACKING
18	INDICATOR BUSHING
19	INDICATOR LOCKNUT
20	SEAT CROWN
21	PISTON FLANGE SEAL
22	SEAT CROWN SCREW
23	PISTON FLANGE
24	PISTON FLANGE SCREW
26	PISTON SLEEVE SEAL
28	COVER SUPPORT STUDS
29	COVER SEAL
30	COVER SUPPORT NUT
31	BODY PLUG
32	COVER PLUG
33	LINER LIFTING CLETES (NOT SHOWN)
34	LIFTING CLETE BOLTS (NOT SHOWN)

NOTES:  
 1. FLANGES PER ANSI B16.1  
 2. "A" DIMENSION ON VALVES WITH RAISED FACE FLANGES DOES NOT INCLUDE THE RAISED FACE HEIGHT.



REV	DESCRIPTION	DATE	BY
A	REDRAWN	11-13-00	JF

F:\GA-VALVE\GA-SHOWING-1439-A.PRT

**GA INDUSTRIES, INC.**  
 30" & 36" UNIVERSAL SERVICE ANGLE  
 BODY ASSEMBLY, NECKLESS DESIGN

STANDARD TOLERANCES UNLESS OTHERWISE NOTED	SERIAL NO.	SCALE	DRAWN BY
FRACTIONAL SURFACES ONLY DECIMALS SHOWN IN INCHES		NONE	DAB
.125 ± .002	REFERENCES	EFFECTIVE DATE	APPR. BY
.250 ± .002		10-28-92	TB
FRACTIONS 1/64"	FIG. NUMBER	FILE	DRAWING NO.
DECIMALS .01" ± .0005	G	G	G-1439
FRACTIONS 1/32"			REV
			A

AVAILABLE IN SIZES 1 AND 1 1/2



Project: Deacon (UV)  
Serial Number: 032145

**LIST OF MATERIALS**  
**30" & 36" UNIVERSAL SERVICE ANGLE BODY ASSEMBLY**  
**NECKLESS DESIGN**  
**DRAWING G-1439**

*1	Body	Cast Iron	A-126 Class B
2	Piston Core	Cast Iron	A-126 Class B
2A	Piston Sleeve	Bronze	B62
*3	Liner	Bronze	B62
4	Piston Cup	Leather	Retan
5	Piston Cup Follower	Bronze	B62
6	Piston Cup Separator	Bronze	B62
6A	Piston Cup Separator Seal	Rubber	Buna-N
7	Piston Cup Screws	Stainless Steel	18-8
8	Liner Cup	Leather	Retan
9	Liner Cup Follower	Bronze	B62
10	Liner Cup Screws	Stainless Steel	18-8
11	Seat Ring	Bronze	B62
12	Seat Ring Follower	Bronze	B62
13	Seat Ring Screws	Stainless Steel	18-8
*14	Cover	Steel	A36
15	Indicator Rod	Brass	SAE 72
16	Indicator Gland	Brass	SAE 72
17	Indicator Packing	Teflon	Kevlar
18	Indicator Bushing	Brass	SAE 72
19	Indicator Locknut	Brass	SAE 72
20	Seat Crown	Bronze	B62
21	Piston Flange Seal	Rubber	Buna-N
22	Seat Crown Screw	Stainless Steel	18-8
23	Piston Flange	Cast Iron	A-126 Class B
24	Piston Flange Screw	Stainless Steel	18-8
26	Piston Sleeve Seal	Rubber	Buna-N
*28	Cover Support Studs	Steel	Alloy
29	Cover Seal	Rubber	Buna-N
*30	Cover Support Nut	Steel	A563-DH
31	Body Plug	Iron	Malleable
32	Cover Plug	Iron	Malleable
33	Liner Lifting Cletes	Stainless Steel	18-8
34	Lifting Clete Bolts	Stainless Steel	18-8

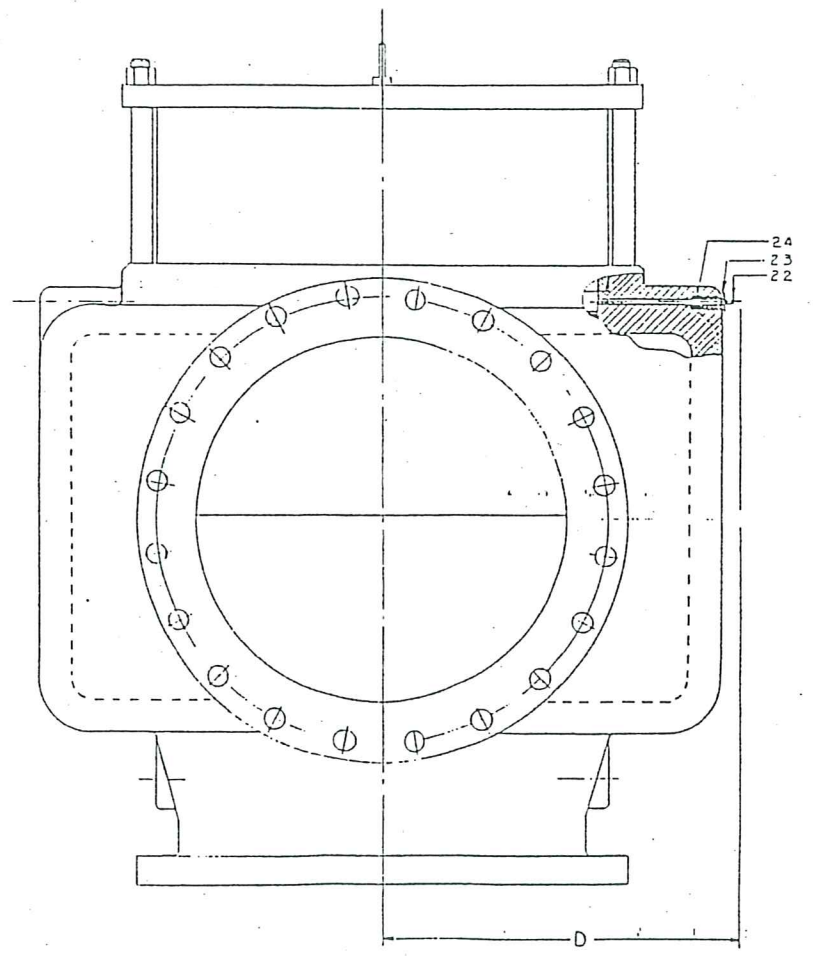
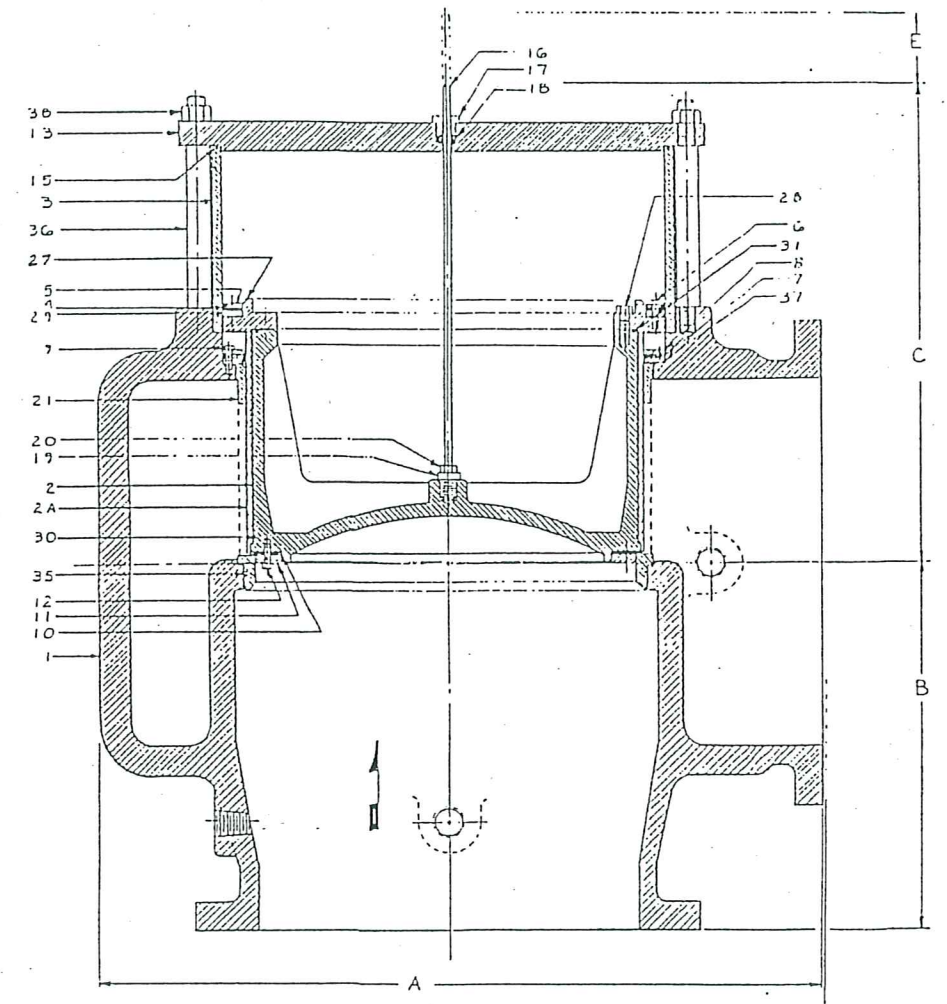
\*Chemical & Physical Test Reports



	A	B	C	D	E
125 # FLANGE	46"	24"	32"	23"	9 7/8"
<del>125 # FLANGE</del>	<del>46"</del>	<del>24"</del>	<del>32"</del>	<del>23"</del>	<del>9 7/8"</del>

FLANGES PER ANSI

PARTS LIST		16	INDICATOR ROD	35	SUPPORT STUD NUT
1	BODY	16	INDICATOR GLAND		
2	PISTON CORE	17	INDICATOR PACKING		
2A	PISTON SLEEVE	18	INDICATOR BUSHING		
3	LINER	19	INDICATOR LOCKNUT		
4	PISTON CUP	20	INDICATOR		
5	PISTON CUP FOLLOWER	21	SEAT CROWN		
6	PISTON FOLLOWER SCREW	22	VENT TUBE		
7	LINER CUP	23	VENT GLAND		
8	LINER CUP FOLLOWER	24	VENT PACKING		
9	LINER FOLLOWER SCREW	25	PISTON FLANGE		
10	SEAT RING	26	PISTON FLANGE SCREW		
11	SEAT FOLLOWER	27	PISTON SUPPORT RING		
12	SEAT SCREWS	28	PISTON SLEEVE SEAL		
13	COVER	29	PISTON FLANGE SEAL		
14	COVER SEAL	30	SEAT CROWN SEAL		
		31	COVER SUPPORT STUDS		
		32	SEAT CROWN RETAINER		



NOTE: 'A' DIMENSION ON VALVE WITH RAISED FACE FLANGES DOES NOT INCLUDE THE RAISED FACE HEIGHT.

GA INDUSTRIES INC. MARS, PA.

24" W.S/W.R. ANGLE BODY ASSEMBLY ~

**GA**

BY	DA B.	SCALE	NONE	FILE	DRAWING NUMBER
DATE	5-10-72	PROJ. NO.	3000 D	G	G-1425

Project: Deacon (UV)  
Serial Number: 032145

## LIST OF MATERIALS

### 24" Water Service / Water Reducing Body Assembly Dwgs: G-1428 (Angle)

*1	Body	Cast Iron	A-126 Class B
2	Piston Core	Cast Iron	A-126 Class B
2A	Piston Sleeve	Bronze	B-62
*3	Liner	Bronze	B-62
4	Piston Cup	Leather	Retan
5	Piston Cup Follower	Bronze	B-62
6	Piston Follower Screws	Stainless Steel	18-8
7	Liner Cup	Leather	Retan
8	Liner Cup Follower	Bronze	B-62
9	Liner Follower Screws	Stainless Steel	18-8
10	Seat Ring	Rubber	Buna-N
11	Seat Follower	Bronze	B-62
12	Seat Screws	Stainless Steel	18-8
*13	Cover	Mild	A36
15	Cover Seal	Rubber	Buna-N
16	Indicator Rod	Brass	SAE 72
17	Indicator Gland	Brass	SAE 72
18	Indicator Packing	Teflon	Kevlar
19	Indicator Bushing	Brass	SAE 72
20	Indicator Locknut	Brass	SAE 72
21	Seat Crown	Bronze	B-62
22	Vent Tube	Brass	SAE 72
23	Vent Gland	Brass	SAE 72
24	Vent Packing	Graphite	Kevlar
27	Piston Flange	Cast Iron	A-126 Class B
28	Piston Flange Screws	Stainless Steel	18-8
29	Piston Support Ring	Bronze	B-62
30	Piston Sleeve Seal	Rubber	Buna-N
31	Piston Flange Seal	Rubber	Buna-N
35	Seat Crown Seal	Rubber	Buna-N
*36	Cover Support Studs	Steel	Alloy
37	Seat Crown Retainer	Bronze	B-62
*38	Support Stud Nut	Steel	A563-DH

\* Chemical & Physical Test Reports



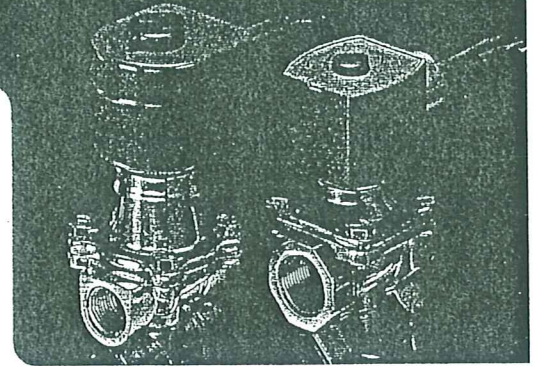
# 2 WAY PILOT OPERATED General Service Solenoid Valves

Brass or Stainless Steel Bodies • 3/8" to 2 1/2" N.P.T.

ASCO

Red-Hat • Red-Hat II

8210  
SERIES



## Specifications

**Solenoid Enclosures:** Valves listed in this series have either Red-Hat metal solenoid enclosures or Red-Hat II molded epoxy solenoids. Red-Hat II valves are identified by the change letter "G" in their catalog numbers, e.g., 8210G4, and are shown in red.

## Standard Enclosures:

Red-Hat — Type 1 General Purpose  
Red-Hat II — Types 1, 2, 3, 3S, 4 and 4X Combination General Purpose and Watertight.

## Optional Enclosures:

Red-Hat — Types 3, 7 and 9 Combination Explosionproof and Raintight. To order, add prefix "EF" to catalog number. (Except Catalog Numbers 8210B57, 8210B58 and 8210B59)®

Red-Hat II — Types 3, 3S, 4, 4X, 6, 6R, 7 and 9 Combination Explosionproof and Watertight. To order, add prefix "EF" to catalog number.

Additional constructions are available. The Optional Electrical Features Section,

page 11, contains descriptions and ordering information for: Open Frame Solenoids • Junction Box Enclosures • Panel Mount Constructions.

**Electrical:** Standard Voltages: 24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz)  
6, 12, 24, 120, 240 volts, DC

Other voltages are available when required.

**Coil:** Continuous duty molded Class F or H, as listed.

## Nominal Ambient Temperature

Ranges: Red-Hat and Red-Hat II Valves/AC Construction: 32°F to 125°F

Red-Hat Valves/DC Construction: 32°F to 77°F (104°F occasionally).

Red-Hat II Valves/DC Construction: 32°F to 104°F

Refer to Engineering Section for details.

## Valve Parts in Contact with Fluids:

Body — Brass or Stainless Steel, as listed  
Seals and Discs — Buna "N" or Teflon\*, as listed

Disc Holder — Nylon, as listed  
Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s.

Shading Coil — Copper (brass body); Silver (stainless steel body)

**Approvals:** CSA certified.

UL listed as indicated. Refer to Engineering Section for details.

## Ordering Information:

**Important:** We must have catalog number, voltage and Hertz, operating pressure and fluid handled. Use strainers with solenoid valves.

\*DuPont Co. trademark

## SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)									Max. Fluid Temp. °F.	Standard Solenoid Enclosures					Watt Rating/Class of Coil Insulation ①	
			Max. AC			Max. DC			Red-Hat-Type 1		Red-Hat II-Types 1,2,3,3S,4 and 4X								
			Min.	Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU	AC	DC		Catalog Number	Constr. Ref. No. ②	UL Listing	Catalog Number	Constr. Ref. No. ②		
<b>NORMALLY CLOSED (Closed when de-energized), Buna "N" or Teflon® Seating</b>																			
3/8	3/8	1.5	①	150	125	—	40	40	—	180	150	8210G73③	1P	•	8210G36⑥	1P	•	6.1/F	11.6/F
3/8	5/8	3	0	150	150	—	40	40	—	180	150	8210G93	5D	o	—	—	—	10.1/F	11.6/F
3/8	5/8	3	5	200	150	135	125	100	100	180	150	8210G1	6D	o	—	—	—	6.1/F	11.6/F
3/8	5/8	3	5	300	300	300	—	—	—	175	—	8210G6	5D	o	—	—	—	17.1/F	—
1/2	7/16	2.2	①	150	125	—	40	40	—	180	150	8210G15③	2P	•	8210G37⑥	2P	•	6.1/F	11.6/F
1/2	5/8	4	0	150	150	—	40	40	—	180	150	8210G94	5D	o	—	—	—	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	40	40	—	175	150	—	—	—	8210G87	7D	•	17.1/F	11.6/F
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G2	6D	o	—	—	—	6.1/F	11.6/F
1/2	5/8	4	5	300	300	300	—	—	—	175	—	8210G7	5D	o	—	—	—	17.1/F	—
3/4	5/8	5	0	150	150	125	40	40	—	175	150	—	—	—	8210G88	7D	•	17.1/F	11.6/F
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G9	9D	o	—	—	—	6.1/F	11.6/F
3/4	3/4	5	0	150	150	—	40	40	—	180	150	8210G95	8D	o	—	—	—	10.1/F	11.6/F
3/4	3/4	6.5	5	250	150	100	125	125	125	180	150	8210G3	11D	o	—	—	—	6.1/F	11.6/F
3/4	3/4	6	0	350	300	200	200	180	180	200	77	8210B26②	10P	⑤	—	—	—	15.4/F	30.6/H
1	1	13	0	150	125	125	100	100	80	180	77	8210B54⑩	31D	⑤	8210D89	15D	⑤	15.4/F	30.6/H
1	1	13	5	150	150	100	125	125	125	180	150	8210B4	12D	o	—	—	—	6.1/F	11.6/F
1	1	13.5	0	300	225	115	—	—	—	200	—	8210B27	14P	•	—	—	—	20/F	—
1 1/4	1 1/8	15	0	150	125	125	100	100	80	180	77	8210B55⑩	32D	⑤	—	—	—	15.4/F	30.6/H
1 1/4	1 1/8	15	5	150	150	100	125	125	125	180	150	8210G8	16D	o	—	—	—	6.1/F	11.6/F
1 1/2	1 1/4	22.5	0	150	125	125	100	100	80	180	77	8210B56⑩	33D	⑤	—	—	—	15.4/F	30.6/H
1 1/2	1 1/4	22.5	5	150	150	100	125	125	125	180	150	8210G22	18D	•	—	—	—	6.1/F	11.6/F
2	1 3/4	43	5	150	125	90	50	50	50	180	150	8210G100	20P	•	—	—	—	6.1/F	11.6/F
2 1/2	1 3/4	45	5	150	125	90	50	50	50	180	150	8210G101	21P	•	—	—	—	6.1/F	11.6/F



SPECIFICATIONS (continued)

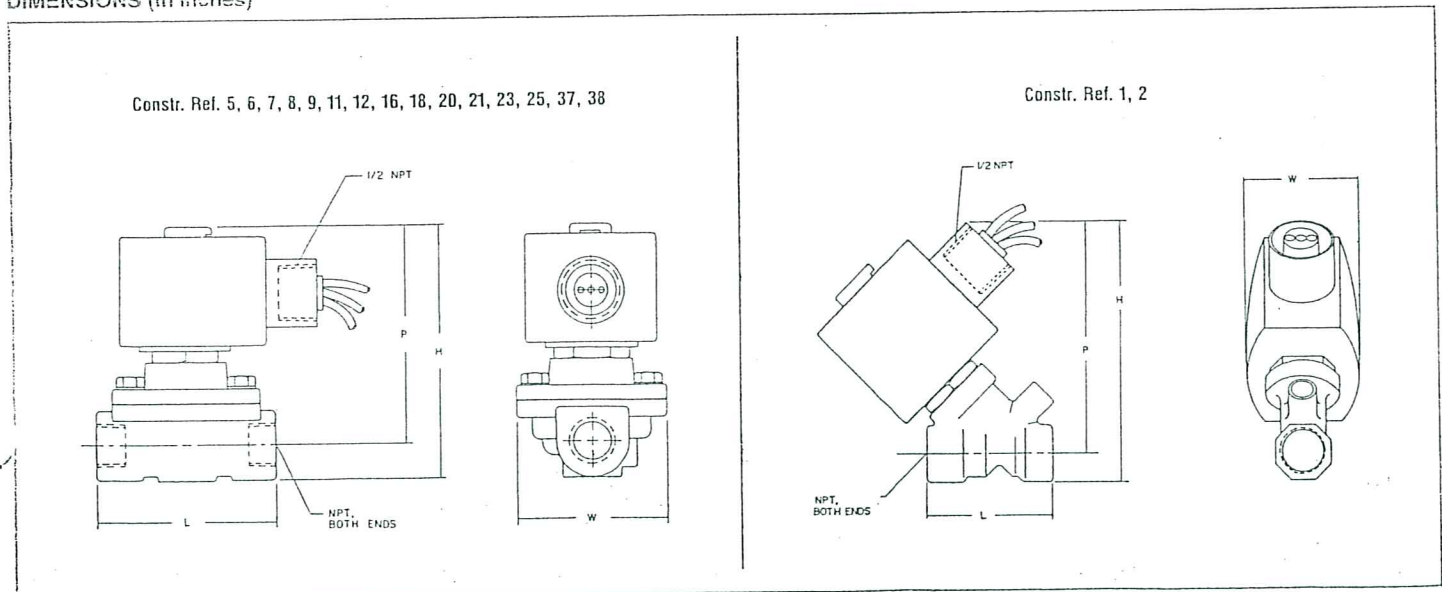
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)							Max. Fluid Temp. °F.		Standard Solenoid Enclosures Red-Hat-Type 1 Red-Hat II-Types 1, 2, 3, 3S, 4 and 4X					Watt Rating/ Class of Coil Insulation		
			Max. AC			Max. DC				AC	DC	Brass Body			S.S. Body		AC	DC	
			Min.	Air-Inert Gas	Water	Air-Inert Gas	Water	Light Oil @ 300 SSU	Light Oil @ 300 SSU			Catalog Number	Constr. Ref. No. ④	UL Listing	Catalog Number	Constr. Ref. No. ④			UL Listing
										Light Oil @ 300 SSU	Light Oil @ 300 SSU								
<b>NORMALLY OPEN (Open when de-energized), Buna "N" Seating (Nylon Disc Holder, except as noted)</b>																			
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G33	23D	•	—	—	—	10.1/F	11.6/F
3/8	5/8	3	5	250	200	200	250	200	200	180	180	8210G11 ⑥⑦	39D	•	—	—	—	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G34	23D	•	—	—	—	10.1/F	11.6/F
1/2	5/8	3	0	150	150	100	125	125	80	180	150	—	—	—	8210G30	37D	•	—	—
1/2	5/8	4	5	250	200	200	250	200	200	180	180	8210G12 ⑥⑦	39D	•	—	—	—	10.1/F	11.6/F
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G35	25D	•	—	—	—	10.1/F	11.6/F
3/4	5/8	3	0	150	150	100	125	125	80	180	150	—	—	—	8210G38	38D	•	—	—
3/4	3/4	6.5	5	250	200	200	250	200	200	180	180	8210C13	24D	•	—	—	—	15.4/F	16.8/F
1	1	13	0	125	125	125	—	—	—	180	—	8210B57 ⑥⑦	34D	•	—	—	—	20/F	—
1	1	13	5	150	150	125	125	125	125	180	180	8210D14	26D	•	—	—	—	15.4/F	16.8/F
1 1/4	1 1/8	15	0	125	125	125	—	—	—	180	—	8210B58 ⑥⑦	35D	•	—	—	—	20/F	—
1 1/4	1 1/8	15	5	150	150	125	125	125	125	180	180	8210D18	28D	•	—	—	—	15.4/F	16.8/F
1 1/2	1 1/4	22.5	0	125	125	125	—	—	—	180	—	8210B59 ⑥⑦	36D	•	—	—	—	20/F	—
1 1/2	1 1/4	22.5	5	150	150	125	125	125	125	180	180	8210D32	29D	•	—	—	—	15.4/F	16.8/F
2	1 3/4	43	5	125	125	125	125	125	125	180	150	8210103	30P	•	—	—	—	15.4/F	16.8/F
2 1/2	1 3/4	45	5	125	125	125	125	125	125	180	150	8210104	27P	•	—	—	—	15.4/F	16.8/F

- Notes: ① 5 psi on Air; 1 psi on Water.  
 ② Valve provided with Teflon main disc.  
 ③ Valve includes Ultem (G.E. trademark) piston.  
 ④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.  
 ⑤ UL listed as General Purpose Valve on AC voltage only.  
 ⑥ Valves not available with Explosionproof enclosures.  
 ⑦ On 50 Hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.  
 ⑧ AC Construction also has nylon seating.  
 ⑨ No disc holder.  
 ⑩ Stainless Steel disc holder  
 ⑪ DC construction must have solenoid mounted vertical and upright.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.			
	DC Watts	AC			General Purpose		Explosionproof	
		Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	—	6.1	16	40	238210	—	238214	—
F	11.6	10.1	25	70	238610	238710	238614	238714
F	16.8	15.4	27	160	99257	97617	99257	97617
F	—	17.1	40	93	238610	—	238614	—
F	—	20	43	240	99257	—	99257	—
H	30.6	—	—	—	—	74073	—	74073

DIMENSIONS (in inches)





# BULLETIN No. 200-AR

**DEPENDABLE  
PACKLESS**

*Solenoid Valves*



## TYPE "AR" FULL PORT — NORMALLY OPEN

P.O. BOX 17 • HAWTHORNE • NEW JERSEY 07507

### INTERNAL PILOT OPERATED

#### OPERATION:

Valve closes when energized and opens when de-energized. When the coil is energized the laminated plunger presses the poppet, closing the pilot orifice, and opens a bleed passageway to permit pressure to build above the piston and seat it. Upon de-energizing the coil, the pilot orifice is opened, relieving the pressure above the piston allowing it to leave its seat. The bottom spring allows the valve to operate at zero pressure drop.

#### CONSTRUCTION:

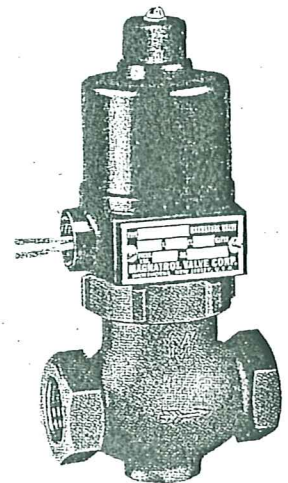
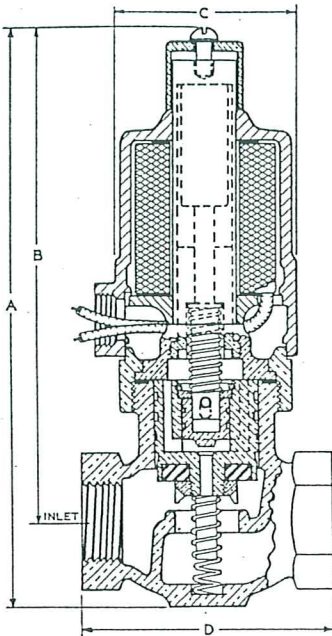
- \*Valve Body — Cast Bronze, Globe Pattern
- \*Piston — Cast Bronze
- Coil Enclosure — Malleable or Cast Iron
- \*Plunger — 430 St. Stl.
- \*Poppet — 303 St. Stl.
- \*Stem — 303 St. Stl.
- \*Bonnet Tube — 304 St. Stl.
- \*Springs — Inconel and 302 St. Stl.
- \*Body Seal — Buna N or Non Asbestos Gasket
- \*Orifice Seal — Buna N (Viton or Glass Filled Teflon available)
- \*AC Shading Coil — Copper
- \*Stem Pin — 304 St. Stl.
- Coil — Encapsulated Class A, 18" leads (Class H available)
- \*Wetted parts in contact with fluid

#### APPLICATION:

To control the flow of water, oil, air, gas, solvents, brine, vacuum and any other fluids not reactive with construction materials and free of sediment. Valve operates from zero to maximum differential pressure indicated in table. Valve must be mounted in horizontal pipe with solenoid enclosure vertical and on top.

Pipe Size — 1/2" to 3"  
Max. Fluid Temp. — 212° F  
Max. Static Press. — 300 PSI

\*Except valves listed for 500 PSI diff.



TYPE 18AR44

NO DIFFERENTIAL PRESSURE REQUIRED TO OPEN.

#### WHEN YOU ORDER

Be sure to specify the following:

- Pipe Size
- Type
- Voltage (AC or DC)
- Hertz
- Fluid
- Fluid Temp.
- Max. Diff. Press.
- Optional Features (Pg. 4)

Strainers (Pg. 19) are recommended for use with solenoid valves.

Pipe Size Inches	Max. Diff. Press. P.S.I.	Type No.	*List Price				Watts A.C.	Amps Hold. 120-60	Amps Inrush 120-60	Watts D.C.	Ship. Wt. Lbs.	Dimensions, Inches			
			Standard	With DP (Flow Control)	With F (Add for Exp. Proof)							A	B	C	D
1/2	110	18AR42	\$181	\$306	\$53	25	.5	1.5	18	8	8 1/8	7	2 3/4	3 1/4	
	200	18AR32	186	311	53	25	.5	1.6	18	9	8 1/2	7 1/8	2 3/4	3 1/2	
	300	18AR52	190	315	53	25	.5	1.6	18	9	8 1/2	7 1/8	2 3/4	3 1/2	
	500	E33AR62	296	421	20	45	1.0	2.7	23	16	9 3/8	8 1/4	4 1/8	3 1/4	
3/4	50	18AR23	194	339	53	25	.5	1.6	18	9	8 1/2	7 1/8	2 3/4	3 1/2	
	110	18AR43	194	339	53	25	.5	1.6	18	9	8 1/2	7 1/8	2 3/4	3 1/2	
	200	33AR33	253	398	63	45	1.0	2.9	23	13	9 1/4	8 1/8	3 1/2	3 1/2	
	300	33AR53	263	408	63	45	1.0	2.9	23	13	9 1/4	8 1/8	3 1/2	3 1/2	
1	500	E133AR63	334	479	20	65	1.5	4.3	33	18	9 1/2	8 3/8	4 1/8	3 1/2	
	50	18AR24	230	390	53	25	.5	1.8	18	11	9	7 3/4	2 3/4	4 1/8	
	110	18AR44	230	390	53	25	.5	1.8	18	11	9	7 3/4	2 3/4	4 1/8	
	200	33AR34	293	453	63	45	1.0	3.0	23	14	10	8 5/8	3 1/2	4 1/8	
1 1/4	300	33AR54	301	461	63	45	1.0	3.0	23	14	10	8 5/8	3 1/2	4 1/8	
	500	E133AR64	386	546	20	65	1.5	4.5	33	19	10 1/2	8 7/8	4 1/8	4 1/8	
	50	18AR25	276	451	53	25	.5	1.9	18	13	9 3/4	8 1/8	2 3/4	4 1/2	
	90	18AR45	276	451	53	25	.5	1.9	18	13	9 3/4	8 1/8	2 3/4	4 1/2	
1 1/2	200	33AR35	345	520	63	45	1.0	3.2	23	17	10 3/4	9 1/8	3 1/2	4 1/2	
	300	33AR55	345	520	63	45	1.0	3.2	23	17	10 3/4	9 1/8	3 1/2	4 1/2	
	500	††40AR65	578	753	85	60	1.7	6.2	33	21	11	9 3/8	4 1/2	4 1/2	
	50	35AR26	363	588	63	45	1.0	3.8	23	21	11 3/8	9 1/2	4	4 7/8	
2	115	35AR46	363	588	63	45	1.0	3.8	23	21	11 3/8	9 1/2	4	4 7/8	
	200	41AR36	533	723	85	60	1.7	6.5	35	25	11 5/8	9 3/4	4 1/2	4 7/8	
	300	41AR56	558	758	85	60	1.7	6.5	35	25	11 5/8	9 3/4	4 1/2	4 7/8	
	500	††41AR66	689	889	85	85	3.5	9.7	45	31	12 3/8	10 1/8	5 1/8	6	
2 1/2	50	36AR27	532	782	63	45	1.0	4.2	23	31	12 3/8	10 1/8	5 1/8	6	
	100	36AR47	539	789	63	45	1.0	4.2	23	31	12 3/8	10 1/8	5 1/8	6	
	200	42AR37	753	1003	85	60	1.7	7.3	35	36	12 5/8	10 3/8	5 3/8	6	
	300	42AR57	805	1055	85	60	1.7	7.3	35	36	12 5/8	10 3/8	5 3/8	6	
3	500	††42AR67	931	1181	85	85	3.5	11.0	45	45	14 1/8	11 1/8	6 3/8	8 3/8	
	50	43AR28	856	1131	85	60	1.7	8.0	35	45	13 1/2	10 3/4	5 7/8	7 1/4	
	125	43AR48	888	1163	85	60	1.7	8.0	35	45	13 1/2	10 3/4	5 7/8	7 1/4	
	200	43AR38	958	1233	85	60	1.7	8.0	35	45	13 1/2	10 3/4	5 7/8	7 1/4	
3	300	143AR58	1075	1350	85	85	3.5	13.0	45	57	14 3/8	11 1/8	6 3/8	8 3/8	
	50	44AR29	1172	1497	85	60	1.7	8.8	35	57	14 3/8	11 1/8	6 3/8	8 3/8	
	100	44AR49	1220	1545	85	60	1.7	8.8	35	57	14 3/8	11 1/8	6 3/8	8 3/8	
	200	44AR39	1300	1625	85	60	1.7	8.8	35	57	14 3/8	11 1/8	6 3/8	8 3/8	
300	144AR59	1402	1727	85	85	3.5	13.0	45	57	14 3/8	11 1/8	6 3/8	8 3/8		

\* For 120, 208, 240, or 480 Volts, 60 Hertz. All other A.C. add \$13 to List Price. For D.C. up to 250 Volts add: 1/2"-1 1/4" \$18 1 1/2"-3" \$36. †† Not available for D.C. operation.

MS — Mounting Stud ..... List Extra \$20 (Not available 2, 2 1/2, 3). Class "H" coils available at extra price. Consult factory.



# HDLS Heavy duty limit switches

Front and rear oil impregnated sintered bronze bearings on stainless steel operating shaft for long mechanical life and operational reliability.

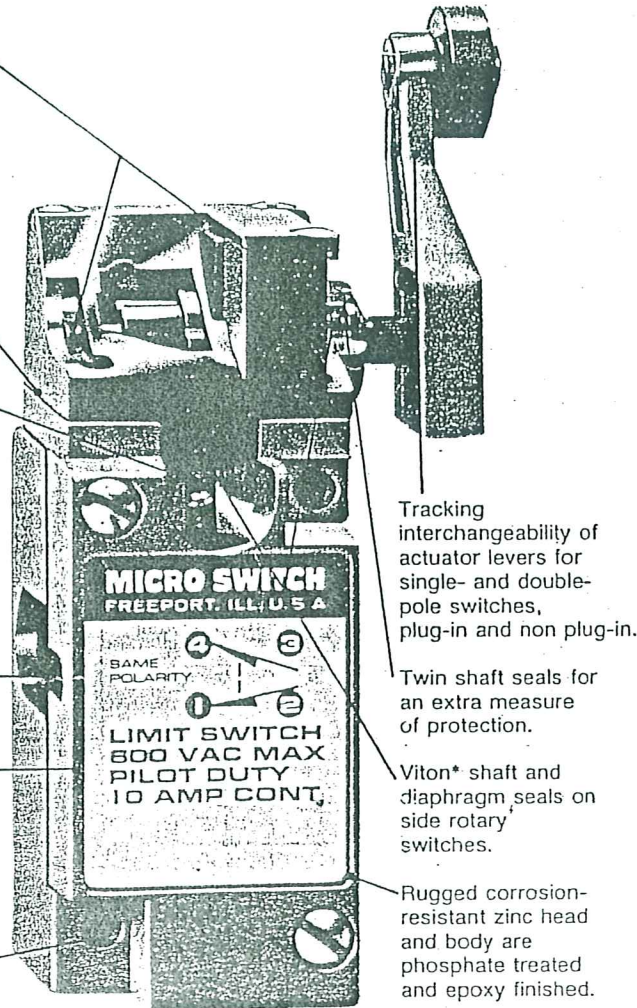
Boss-and-socket head design for secure head-to-body retention.

Unique all-metal drive train for consistent operating characteristics even at high temperature; lasts longer (without the need for frequent adjustment) than drive trains with plastic parts.

Self-lifting pressure plate terminals save wiring time.

Easily identified grounding terminal (inside) for compliance with OSHA and other regulatory agency standards.

Front mounting and interchangeability of single- and double-pole switches, plug-in and non plug-in with one another and with other switch brands.



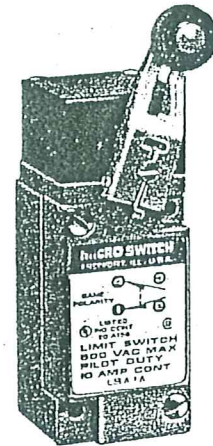
Tracking interchangeability of actuator levers for single- and double-pole switches, plug-in and non plug-in.

Twin shaft seals for an extra measure of protection.

Viton\* shaft and diaphragm seals on side rotary switches.

Rugged corrosion-resistant zinc head and body are phosphate treated and epoxy finished.

\*Dupont trademark



1.62"W x 4.2"H x 2.44"D

## ADDITIONAL FEATURES

- Wide variety of operating heads.
- Field adjustable operating modes, for reduced inventory.
- Convenience of on-the-spot adjustment instructions.
- Complete choice of circuitry and electrical rating options.
- Plug-in and non plug-in versions have identical operating characteristics and are dimensionally interchangeable.
- Meets NEMA 1, 3, 4, 4X, 6, 6P, and 13.
- UL listing and CSA certification.
- Captive head and body screws.
- Complete replacement parts listings are available in Catalog 40.

## ELECTRICAL RATINGS

Circuits on any one pole must be the same polarity.

Elec. Rating.	Circuitry	AC Volts Pilot Duty: 600 VAC, 720 VA 10 amps continuous carry			DC Volts Pilot Duty: 240 VDC		
		VAC	Amps at 0.35 Power Factor		VDC	Make and Break Amps	
			Make	Break		Inductive	Resistive
A	SPDT	120	60	6	120	0.25	0.8
		240	30	3	240	0.15	0.4
		480	15	1.5			
		600	12	1.2			
B	DPDT	120	30	3	120	0.25	0.8
		240	15	1.5	240	0.15	0.4
		480	7.5	0.75			
		600	6	0.60			

## OTHER CONTACT BLOCK OPTIONS

HDLS switches are also available with the following contact block options:

1. SP-NC contact blocks, with same electrical rating as shown for A.
2. SPDT shaped gold contact blocks, rated at 50 mA for 250 VAC or 60 VDC max. load.
3. Solid state Hall effect contact blocks; rated for 20 mA, current sinking or sourcing digital outputs, 5 VDC or 6 to 16 VDC supply voltage. They interface directly with most electronic circuits, discrete transistor circuits, microprocessors, integrated logic circuits (RTL, DTL, TTL, and HTL), and SCR's.

Refer to Catalog 40.



### Selection & Specification Data

<b>Generic Type</b>	Cycloaliphatic Amine Epoxy
<b>Description</b>	High solids, high-build potable water coating widely used for lining interior steel and concrete tanks, valves and pipe. Formulated for application at conventional builds (4.0-6.0 mils per coat) as well as high builds (10.0 mils per coat).
<b>Features</b>	<ul style="list-style-type: none"> <li>▪ Excellent film build and edge protection</li> <li>▪ VOC compliant to current AIM regulations</li> <li>▪ Meets or exceeds all requirements of:                             <ul style="list-style-type: none"> <li>•ANSI/NSF Std. 61 for potable water tanks of 1000 gallons or larger</li> <li>•AWWA D102 Inside System 1 and 2</li> <li>•AWWA C210-92 for use on interior of steel water pipe</li> <li>•Complies with FDA 21CFR 175.300 criteria for food contact</li> </ul> </li> </ul>
<b>Color</b>	White (S800); Off White (1898); Gray (0794), Blue (4196) Other colors may be available but are limited to various approvals.
<b>Finish</b>	Gloss
<b>Primers</b>	Self-priming
<b>Topcoats</b>	Acrylics, Alkyds, Epoxies, Polyurethanes for non-immersion applications.
<b>Dry Film Thickness</b>	4.0-10.0 mils (100-250 microns) per coat. Do not exceed 12 mils (300 microns) per coat.
<b>Solids Content</b>	By Volume: 75% ± 2%
<b>Theoretical Coverage Rate</b>	1203 mil ft <sup>2</sup> (30.0 m <sup>2</sup> /l at 25 microns) 241 ft <sup>2</sup> at 5 mils (6.0 m <sup>2</sup> /l at 25 microns) Allow for loss in mixing and application
<b>VOC Values</b>	As supplied: 1.80 lbs/gal (214 g/l) Thinned: 8 oz/gal w/ #2: 2.10 lbs/gal (249 g/l) 16 oz/gal w/ #33: 2.40 lbs/gal (285 g/l) These are nominal values and may vary with slightly with color.
<b>Dry Temp. Resistance</b>	Continuous: 250°F (121°C) Non-Continuous: 300°F (149°C) Discoloration and loss of gloss is observed above 200°F (93°C).
<b>Wet Temp. Resistance</b>	Immersion temperature resistance depends upon exposure. Consult Carboline Technical Service for specific information. It is recommended that metal tanks operating above 140°F (60°C) be insulated.
<b>Limitations</b>	Epoxies lose gloss, discolor and eventually chalk in sunlight exposure.

### Substrates & Surface Preparation

<b>General</b>	Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.						
<b>Steel</b>	<table border="0"> <tr> <td><u>Immersion:</u></td> <td>SSPC-SP10</td> </tr> <tr> <td><u>Non-Immersion:</u></td> <td>SSPC-SP6</td> </tr> <tr> <td><u>Surface Profile:</u></td> <td>1.5-3.0 mils (38-75 micron)</td> </tr> </table>	<u>Immersion:</u>	SSPC-SP10	<u>Non-Immersion:</u>	SSPC-SP6	<u>Surface Profile:</u>	1.5-3.0 mils (38-75 micron)
<u>Immersion:</u>	SSPC-SP10						
<u>Non-Immersion:</u>	SSPC-SP6						
<u>Surface Profile:</u>	1.5-3.0 mils (38-75 micron)						
<b>Concrete</b>	<table border="0"> <tr> <td><u>Immersion:</u></td> <td>Concrete must be cured 28 days at 75°F (24°C) and 50% relative humidity or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete. Voids in concrete may require surfacing.</td> </tr> </table>	<u>Immersion:</u>	Concrete must be cured 28 days at 75°F (24°C) and 50% relative humidity or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete. Voids in concrete may require surfacing.				
<u>Immersion:</u>	Concrete must be cured 28 days at 75°F (24°C) and 50% relative humidity or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete. Voids in concrete may require surfacing.						

### Performance Data

Test Method	System	Results	Report #
ASTM D4541 Adhesion	Blasted Steel 2 cts. 891	2331 psi (Pneumatic)	03457
ASTM D3363 Pencil Hardness	Blasted Steel 2 cts. 891	3H	03457
ANSI/NSF Std. 61	Blasted Steel 2 cts. 891	Pass	09434
AWWA C210 Specification	Blasted Steel 2 cts. 891	Pass	03457

Test reports and additional data available upon written request.



## VALVE WEIGHTS

Valve Size	Installed Weight	Shipping Weight
750 mm (30 inch)	4772 kg (10,500 lbs)	5,000 kg (11,000 lbs)
600 mm (24 inch)	3180 kg (6996 lbs)	3,320 kg (7510 lbs)
500 mm (20 inch)	1910 kg (4180 lbs)	2050 kg (4510 lbs)

# DISMANTLING AND REASSEMBLY INSTRUCTIONS

## 24" - 36" UNIVERSAL BODY ASSEMBLY

Refer to Appropriate Valve Body Drawing

### DISMANTLING

1. Prior to beginning the dismantling procedure, the valve assembly must be isolated from upstream and downstream pressure by tightly closing upstream and downstream isolating gate or butterfly valves.

DO NOT attempt to dismantle the valve assembly while the valve is under pressure. EQUIPMENT DAMAGE, SERIOUS INJURY, OR DEATH could occur if it is attempted to dismantle the valve while it is under pressure.

2. Carefully loosen and remove pipe plugs located on the inlet side, outlet side, and cover of the main valve body to relieve any internal pressure. If control piping is connected to the available taps in the inlet, outlet, and/or cover of the main valve body, internal pressure can be relieved by carefully loosening the control piping at a suitable union. Note the original position of all handvalves in the control piping so they can be returned to the original settings after repairs are complete.
3. Remove the control piping, noting the orientation of the control piping and all piping connections to the main valve body. Mark the cover and the valve body in order to insure that the cover can be installed in the same orientation relative to the valve body upon reassembly.
4. Loosen or remove the packing gland around the valve indicator rod. Remove any mechanical attachments to the indicator rod and remove any paint or debris on the indicator rod itself.
5. Remove the nuts from the cover support studs.

Note on valves installed with the piston moving in a horizontal orientation, the weight of the cover and the liner should be supported prior to removing all of the nuts from the cover support studs. This can be accomplished by erecting a suitable scaffold or support under the cover and liner in order to safely support the weight of these items while being handled.

6. Remove the valve cover by lifting vertically up (or horizontally, if the valve is installed with the piston moving horizontally). Note that the valve cover will have tapped holes for the temporary attachment of lifting eye bolts to facilitate handling of the valve cover. It may be necessary to clean the tapped holes if they have been painted over. When removing the cover, be careful not to damage, score, or bend the indicator rod.
7. If desired, the cover support studs may be removed at this point although it is not necessary to remove the cover support studs to proceed with valve disassembly.

The valve liner may be removed at this point by lifting vertically upward (or horizontally, if the valve is installed with the piston moving horizontally). The liner will be provided with lifting cleets attached to the liner to facilitate handling of the liner.

8. The valve piston may be removed by first removing the indicator rod and indicator rod bushing from the piston. To facilitate handling the piston, a lifting eye bolt can be threaded into the tapped connection in the piston where the indicator rod bushing was attached. When removing the valve piston, use care not to bump, scratch, or damage the machined surfaces of the piston.
9. The condition of the seat crown may now be inspected without removing the seat crown from the valve body. If the inside surfaces of the seat crown and the seating surface of the seat crown are not damaged it will not be necessary to remove the seat crown from the valve body.

If the seat crown is in good condition and only requires cleaning, skip to Step #11.

10. If the seat crown is damaged and requires replacement, the seat crown may be removed from the valve body by first removing the liner cup bolts, liner cup follower and separator rings, and liner cup(s).

In some valve sizes, the seat crown will be bolted to the valve body by means of seat crown bolts or screws (refer to the appropriate valve drawing) which should be removed at this time.



10. Continued -

The damaged seat crown can now be removed by lifting vertically upward (or horizontally, if the valve is installed with the piston moving horizontally).

Before installing the new seat crown and seat crown seal, the machined bore in the valve body should be inspected and all debris cleaned. The new seat crown and seat crown seal can now be installed.

11. Inspect all machined surfaces of the liner, piston, and seat crown. If there are any damaged areas (i.e. - deep scratches, pits, or other mechanical damage) contact the factory since such damaged items may require replacement.

Polish all machined surfaces (in particular, the surfaces which seal against the piston cup, liner cup, and seat ring) to "shiny metal" using a medium to fine grade of waterproof emery cloth. Failure to polish smooth the sealing surfaces of the piston, liner, and seat crown can result in the new cups and seat ring failing to hold a tight seal and/or can cause premature wear of the new cups and seat ring when the valve is put back into normal operation.

Use extreme caution if cleaning the machined surfaces with power tools. Use of power sanders can result in the creation of flat spots and/or cause the sealing surfaces of the piston, liner, and/or seat crown to go out of round in which case the new cups and seat ring may fail to hold a tight seal.

12. Inspect the condition of the valve body, in particular the bore where the liner fits, as well as the air vent passage. The air vent passage should be cleaned to insure proper operation of the valve. Remove all loose debris and corrosion from these areas of the valve body prior to reassembly.

### REASSEMBLY

13. Remove the liner cup bolts, liner cup follower, old liner cup(s), and separator ring(s). Inspect the follower and separator rings to insure they are flat and not damaged. Clean the follower and separator rings using a medium to fine grade of waterproof emery cloth.

The separator ring that is installed between the valve body and the liner cup must be sealed against the valve body by application of Permatex, Liquid Gasket, or other permanent sealant; it is not necessary to apply sealant between the separator ring and the liner cup(s).

13. Continued -

Install the new liner cup(s) in the valve, making sure that the sealing edge(s) of the liner cup(s) are properly oriented in accordance with the appropriate valve drawing. (See the Note under Step 15 below if the valve employs two liner cups or is described as a "double cup" design.)

If the new liner cup(s) appear to be too "stiff" to work with, they may be treated with a food grade oil prior to installation in the new valve in order to make the new cups more pliant. Note that some leather cup treatments result in cups that are naturally "stiff" (e.g. - Thiokol treated cups) and soaking in food grade oil may not make them appreciably more pliant.

Use care when tightening the liner cup bolts to insure even compression of the liner cup(s), and to avoid overtightening. All bolts should first be installed "hand tight" in order to evenly press the follower and/or separator against the liner cup(s) without any gaps. The bolts can then be tightened by hand in a criss-cross fashion in order to insure an even load on the liner cup. There is no specific torque used when tightening the liner cup bolts since different leather cup treatments and other factors result in different cup hardness. Tighten by hand until the cups are firmly seated, but do not tighten to the point where the leather cup is "deformed" (as evidenced by the diameter of the cup changing, or if the cup appears to be "extruding" from under the follower ring).

14. Carefully lay the piston on its side to replace the seat ring; use care not to scratch or damage the machined surface of the piston or to bend the lower outside edge of the piston. Replace the seat ring on the base of the piston following the same procedures as described in Step #13 above (Note that there is no separator ring between the seat ring and the base of the piston.)

Note that some plastic seat ring materials may require an O-ring seal to be placed between the piston and seat ring, or the application of Permatex, Liquid Gasket, or other permanent sealant may be required (refer to the appropriate valve drawing or consult the factory for details).

After installing the new seat ring and tightening the seat ring bolts, inspect the OD of the seat ring to insure that it has not "bulged" past the OD of the piston. If any such areas are found, the seat ring can be trimmed back to the proper OD by using a utility knife. The seat ring should fit tightly against the bottom of the piston and inside the lip around the outside edge of the piston; the OD of the seat ring should not extend past the OD of the piston or lay on top of the lip around the outside edge of the piston.



15. Remove the piston cup bolts, piston cup follower and/or separator ring, and old piston cup(s). If the valve employs two liner cups or is a "double cup" design, see the note below.

The piston can now be carefully reinstalled inside the seat crown (before installing the new piston cup(s) and before reinstalling the liner in the valve body), using care not to bump, scratch, or damage the machined surfaces of piston or "catching" the edge of the liner cup with the base of the piston. A light coating of Vaseline or food grade oil can be applied to the machined surface of the piston to facilitate installation of the piston through liner cup(s).

Note that some Universal Body Assemblies employ double liner cups and double piston cups (refer to the appropriate valve drawing). If the valve has double liner cups, it may be necessary to remove the piston flange bolts and piston flange and install the piston in the seat crown prior to installation of new liner cups. Once the piston is installed in the seat crown, the new liner cups can be installed with the piston in place by following the procedure described under Step #13 above. After the new liner cups are installed, the piston flange, piston flange seal, and piston flange bolts can be reinstalled.

16. Carefully reinstall the liner in the valve body, using care not to bump, scratch, or damage the machined surfaces of the liner. If the liner is to be installed horizontally (if the valve is installed with the piston moving horizontally), the weight of the liner must be supported by means of a suitable scaffold or support under the liner).
17. The new piston cup(s) can now be installed on the piston, with the liner in place, following the same procedures as described in Step #13 above.
18. Reinstall the indicator rod gland, indicator rod, and indicator rod locknut in the piston. The indicator rod should be clean and smooth before reinstalling on the valve. If the indicator rod is damaged, bent, or cracked at the threaded portion, it should be replaced with a new indicator rod.

If the cover support studs were previously remove, they can be reinstalled in the valve body at this point making sure that all cover support studs are firmly seated against the valve body.



19. Remove the old indicator rod packing from the cover (if this hasn't already been done).

Note that the wetted portion of the valve cover may be found to be corroded on older valves when first removed. In such instances, prior to reinstalling the cover on the valve, it is helpful to remove the corrosion by hand tools or sand blasting. A coating of corrosion inhibiting paint can be applied to arrest future corrosion, and to prevent corrosion from adversely affecting the service life of the new cups. If applying such a coating, follow the surface preparation and painting instructions of the coating to be applied and allow sufficient cure time before exposing the valve to water. It may be necessary to trim excess paint from the outside edge of the extended portion of the cover that fits into the inner bore of the liner and/or the area of the cover that fits against the top of the liner. Failure to remove excess paint from these areas can result in leakage past the cover seal and/or misalignment of the cover.

20. The valve cover can now be installed, noting the markings previously made on the valve cover and valve body in order to properly orient the cover. Install the new cover seal and carefully lower the cover in place around the cover support studs and indicator rod, taking care not to damage, score, or bend the indicator rod. When lowering the cover, make sure the extension on the wetted portion of the cover fits inside the ID of the liner and does not catch the edge of the liner. If the cover is to be installed horizontally (if the valve is installed with the piston moving horizontally) the weight of the cover must be supported by means of a suitable scaffold or support under the cover.
21. Reinstall the nuts on the cover support studs, first attaching all of the nuts hand tight. Before tightening the nuts, inspect the cover to insure that the extended portion of the cover is inside the inner bore of the liner, and that the cover is even and tight against the top edge of the liner. The nuts can then be tightened in a criss-cross fashion in order to insure an even load on the cover.
22. Install the new indicator rod packing. Reinstall the packing gland around the indicator, tightening by hand slightly. Do not overcompress the packing. If leakage should occur around the indicator rod when water pressure is applied to the valve, the packing gland can be tightened as necessary to stop the leakage.

23. Before reinstalling the valve's control piping, inspect the condition of all fittings, nipples, handvalves, pilot(s), and strainer to insure that there are no obstructions in the control piping. The control pilot(s) may be repaired at this time if required (separate instruction sheets are available for the repair of the control pilots - consult the factory for additional information).

Reinstall the control piping in the original orientation and return all handvalves to their original positions. Reinstall any pipe plugs removed from the body assembly or cover which were removed to initially drain the valve.

24. Crack open the inlet isolation valve to gradually admit water pressure to the rebuilt valve. Air can be purged from the valve assembly by carefully loosening appropriate unions or fittings in the control piping and/or carefully loosening the pipe plug on the valve cover.

After the air has been purged from the valve and control piping, and with the inlet isolation valve cracked open to apply system pressure to the valve assembly, carefully inspect the valve body assembly and control piping for leaks.

Leaks in the control piping can be stopped by tightening the appropriate fittings. Leaks from under the cover can be corrected by tightening the nuts on the cover support studs in the vicinity of the leak. Leakage around the indicator rod can be corrected by tightening the packing gland.

If some minor leakage appears from the air vent in the valve body, simply make note of the leakage. In many cases, the piston cup(s) and liner cup(s) will require some time under pressure and/or several operating cycles to seal completely. If the leakage persists or increases in volume after several days of operation, contact the factory.

25. The inlet isolation valve can now be fully opened and the outlet isolation valve can be fully opened in order to place the valve back into fully automatic operation.



**Dismantling Procedure**  
**24" Neckless Water Service And Water Reducing Valve**  
**Drawing Number: G1428 / G1419**  
**(Angle) (Globe)**

The following is a proper sequence for dismantling and re-assembling the valve body assembly. Prior to beginning, the upstream and downstream gate valves must be closed tightly.

**DISMANTLING:**

1. Carefully remove the pipe plug on the inlet side of the main valve. This will relieve any pressure trapped within the valve body. This will also act to break any vacuum which may occur when the piston is being removed.
2. Remove the control piping.
3. Remove all cover nuts, part no. 38.
4. Remove the valve cover, part no. 13, by lifting straight up. Be careful not to damage or score the brass indicator rod, part no. 16.
5. The brass indicator rod and the brass cap screw, into which it is screwed, may be removed and the 5/8" eye bolt installed. The valve piston assembly (part no's. 2, 2A, 4, 5, 6, 10, 11, 12, 19, 20, 27, 28, 29, 30 and 31) may now be lifted out of the body, being careful not to bump the machined surfaces.
6. The piston assembly may be dismantled further by removing the piston follower screws, part no. 6 and the seat screws, part no. 12. The piston cup, seat ring, piston sleeve seal and piston flange seal, part no's. 4, 10, 30 and 31 may now be inspected to see if they should be replaced.
7. The liner assembly, part no. 3, may now be carefully lifted from the valve body. As with any machined bronze or brass parts, be especially careful not to bump or scratch the finished surfaces. Remove the liner follower screws, part no. 9, to inspect the liner cup, part no. 7.
8. The bronze seat crown, part no. 21, may now be inspected and if necessary lifted out of the body.
9. Inspect all machined surfaces and polish with a very fine emery paper or crocus cloth. This includes the seat crown. Replace the piston cup part no. 4, liner cup, part no. 7, and seat rubber, part no. 10, the piston sleeve seal, part no. 30, piston flange seal, part no. 31, and seat crown o-ring, part no. 35, if needed.

**RE-ASSEMBLY:**

10. Coat all of the machined surfaces with a light film of grease. (Lubriplate Marine Lube "A" is a good water-proof grease obtainable from most marine supply stores). Vaseline is also satisfactory.

11. Re-assemble and replace the crown and liner assemblies carefully.
12. Install the liner cup and liner cup follower and screws.
13. Re-assemble the piston assembly. Before installing the piston, run a finger under the liner cup lip to flare it inward to assure initiating a good seal.
14. Lower the piston assembly into the body carefully. The piston assembly should slide up and down very easily.
15. Inspect and/or replace the cover seal, part no. 15.
16. The valve cover may be installed after the indicator rod is installed, polished and greased. It is recommended that you loosen the indicator gland or remove it completely. When installing the cover, lower it carefully so that the raised face on the cover fits down into the liner bore. Do not tighten any bolts until sure the cover is correctly installed or damage to the liner may result.
17. Replace the indicator packing, part no.18, if needed and tighten (lightly) the indicator gland.
18. The controls may now be re-installed. The control pilots, if any, should be dismantled, cleaned and greased. The seat should be replaced and the o-ring seals inspected as well as the diaphragm. A separate instruction sheet is available, describing the repair of the pilot controls, if required.



## PREVENTATIVE MAINTENANCE

1. Monitor cavity exhaust vent for excessive leakage. ( Indicates worn valve liner/piston caps)
2. Monitor packing gland on valve extension stem for excessive leakage. (Tighten as required).



# *GA Industries Inc.*

9025 MARSHALL ROAD \* CRANBERRY TOWNSHIP, PA 16066 \* USA

Manufactures of  
Golden Anderson Valves

## CERTIFIED IN-PLANT VALVE TEST REPORT

Date: June 22, 2004

Project: Deacon Ultraviolet (UV) Light Dis-infection Project – City Of  
Winnipeg – Tender No. 385-2003

Valve Description: (2) 24" Figure X1740D Electric Check Valves

Valve Serial Number: 032145

Hydrostatic Test: 300 PSI For 30 Minutes

Acceptance: No evidence of structural failure, seepage, or leakage  
at any point.

Seat Leakage Test: 150 PSI For 15 Minutes

Acceptance: Leakage through the valve shall not exceed one fluid  
oz/h/in of nominal port diameter.

Seat Leakage Test: 35 PSI For 15 Minutes

Acceptance: No evidence of leakage at any point during the test.

Operation Test: Open and Close Main Valve Three Times

Acceptance: Valve Operated Smoothly

Test(s) Performed:

*Randy Lewis*  
*Carol Black*





# GA Industries Inc.

9025 MARSHALL ROAD \* CRANBERRY TOWNSHIP, PA 16066 \* USA

Manufactures of  
Golden Anderson Valves

## CERTIFIED IN-PLANT VALVE TEST REPORT

Date: June 11, 2004

156583-1, -3  
(2) VALVES

Project: Deacon Ultraviolet (UV) Light Dis-infection Project – City Of  
Winnipeg – Tender No. 385-2003

Valve Description: (3) 30" Figure X1740D Electric Check Valves

Valve Serial Number: 032145

Hydrostatic Test: 300 PSI For 30 Minutes

Acceptance: No evidence of structural failure, seepage, or leakage  
at any point.

Seat Leakage Test: 150 PSI For 15 Minutes

Acceptance: Leakage through the valve shall not exceed one fluid  
oz/h/in of nominal port diameter.

Seat Leakage Test: 35 PSI For 15 Minutes

Acceptance: No evidence of leakage at any point during the test.

Operation Test: Open and Close Main Valve Three Times

Acceptance: Valve Operated Smoothly

The above tests were undertaken  
successfully, for both valves.

*Albert L...*  
June 11, 2004

Test(s) Performed:

*Bill Panovay*  
*Cian Black*

# GAGE AND INSTRUMENT RECORD CARD

SERIAL / I. D. NO. <span style="font-size: 1.2em;">G-600-4</span>	LOCATION <span style="font-size: 1.2em;">ASSEMBLY</span>
TYPE <span style="font-size: 1.2em;">NOSHOK - 4 1/2" ROUND</span>	SIZE / RANGE <span style="font-size: 1.2em;">0-600 PSI</span>
MODEL <span style="font-size: 1.2em;">45.660</span>	RATED ACCURACY
CALIBRATION / INSPECTION FREQUENCY <span style="font-size: 1.2em;">6 MONTHS</span>	
MEASUREMENT STANDARD <span style="font-size: 1.2em;">DEADWEIGHT TESTER</span>	PROCEDURE NO.
PURCHASE DATE: <span style="font-size: 1.2em;">2/29/00 NEW</span>	ORIGINAL PO#:
VENDOR / SUPPLIER:	PHONE: (    )
ADDRESS:	
DATE RETIRED / REPLACED:	
REMARKS: <span style="font-size: 1.2em;">GLYCERIN FILLED.</span>	

GAGE/INSTRUMENT RECORD CARD

ID NO. G-600-4

FREQUENCY 6 MONTHS

CAL/INSP DATE	CHECKED BY	CONDITION FOUND	ADJUSTMENTS	COMMENTS	RECAL DATE
2/29/00	JE	NEW	_____	_____	4/2000
4/10/00	JE	"	NOT USED	_____	10/2000
11/6/00	JE	"	NOT USED	_____	10/2001
10/30/01	JE	"	NOT USED	_____	4/2002
3/15/02	JE	"	125-124: 225-223; 300-300 425-425; 525-525-600-600:	_____	10/2002
9/27/02	JE	"	_____ "	_____	4/2003
4/9/03	JE	"	V-GOOD	_____	10/2003
9/24/03	JE	"	V-GOOD	_____	4/2004
3/29/04	JE	"	150-150 - 300-300 - 450-450 600-600 PSI	V6	10/2004



30" X 1740 D  
COVERS

ISG PLATE INC.  
YOUNGSTOWN PIPE & SUPPLY INC.  
PHONE# 330.783.2700

TEST CERTIFICATE

PAGE NO: 01 OF 01  
FILE NO: 8462-01-0  
MILL ORDER NO: 74239-005  
MELT NO: T4869  
DATE: 09/04/03

*ATTN: WAREHOUSE  
2 PAGES*

THESE TESTS REPORTS APPLY TO:  
SOLD TO: CA INDUSTRIES  
YOUR P.O. # 04021233  
YS&S O.M. # SB17939-1  
SIGNED BY YP&S [Signature]

03-

PLATE DIMENSIONS / DESCRIPTION					
TOTAL QTY	GAUGE	WIDTH	LENGTH	DESCRIPTION	PIECE WEIGHT
1	2.75"	96"	480"	RECTANGLE	35938#

CUSTOMER INFORMATION  
CUSTOMER PO: J.C.R. 3807

SPECIFICATION(S)  
THIS MATERIAL HAS BEEN MANUFACTURED AND TESTED IN ACCORDANCE WITH PURCHASE ORDER REQUIREMENTS AND SPECIFICATION(S).  
ASME SA36 REV ED YR 01  
ASTM A36 01  
MATERIAL PRODUCED UNDER A CERTIFIED QUALITY MGMT SYSTEM COMPLYING WITH ISO 9002 ABS-QE CERT. NO. 30130

CHEMICAL COMPOSITION									
	C	MN	P	S	CU	SI	NI	CR	MO
MELT: T4869	.17	1.09	.016	.020	.13	.22	.08	.05	.02
	V	AL	CB						
MELT: T4869	.001	.045	.001						

TENSILE PROPERTIES					
LOC	DIR	YIELD STRENGTH PSI X 100	TENSILE STRENGTH PSI X 100	ELONGATION GAGE LGTH	%
BOT.	TRANS.	380	691	2.00"	27.0
BOT.	TRANS.	402	763	2.00"	26.0

GENERAL INFORMATION  
ALL STEEL HAS BEEN MELTED AND MANUFACTURED IN THE U.S.A.  
B/L #14511 TTJX 80741

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT:  
QUALITY ASSURANCE LABORATORY  
COATESVILLE, PA 19320

*Elinore Zaplitny*  
SUPERVISOR - TEST REPORTING  
ELINORE ZAPLITNY

**(USS)** A unit of USX Corporation  
 T-5555V  
 P. O. Box 06/26/00  
 180/5-07  
 712218 00 00 00 UED3160 154-121855  
 00 00 OK 31226  
 GARY WORKS  
 GARY, INDIANA 46402  
 \*\* MELTED AND MANUFACTURED IN THE USA \*\*  
 BEING DULY SWORN ACCORDING TO THE  
 LAW, DEPOSES AND SAYS THAT THE  
 SAMPLES DESCRIBED HEREIN WAS MFGD,  
 SAMPLED, TESTED AND/OR INSPECTION  
 IN ACCORDANCE WITH THE SPECIFICATION  
 AND FULFILLS REQUIREMENTS IN SUCH  
 RESPECTS, AS PREPARED BY THE OFFICE OF  
 S. C. PAPE GEN. MGR, Q. A.

State of Indiana  
 COUNTY OF LAKE  
 SUBSCRIBED AND SWORN TO BEFORE ME  
 THIS 08TH DAY OF AUGUST A. D. 2000  
 NOTARY PUBLIC  
 MY COMMISSION EXPIRES 12/01/2001

Item No	Material Description	Width, Dia or Ft. Wt	Length	Quantity	Weight	Heat No	Test or Place Identifying	Yield Strength, KSI	Tensile Strength, KSI	Elongation, %		Hardness
										In 8"	In 2"	
05	PLATE CARBON ASTM A36-97A ASME SA36-1998 EDITION, JULY 1, 1998 REST FLATNESS TOL 1/2 STD INSP: 01 MILL RA/SN SWORN-T/R MAILED-- FURNISH-GERTIPIED-T/R-WITH LOAD SHOW ON T/RS MADE AND MELTED IN U.S.A. ***END OF DATA***	96,0000	240"	03 <i>see</i>	49005	W06081		40.0 49.0	71.0 73.0	23.0	32.0 48.0	
POUNGUSTOWN PIPE & SUPPLY INC. PHONE# 330.783.2700 THESE TESTS REPORTS APPLY TO: OLD TO: C&A INDUSTRIES FOUR P.O. # 0402233 S&S C.M. # SB1793A-1 SIGNED BY YP&S: SLD THIS REPORT SHALL NOT BE REPRODUCED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE USX CORPORATION. W06081 HEAT 20 098 011 009 20 03 02 04 00 ***END OF DATA*** C 146 ACCREDITED BY A2LA METHODS ACCREDITED BY A2LA DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE ON DECIMAL POINT. ALL TEST RESULTS WERE CONDUCTED AND RECORDED IN ACCORDANCE WITH TEST METHODS ACCREDITED BY A2LA 0103701009 01 BDW 0103701009 01 700666030 080800 000800 NV21 1950 GRA 2 0 1 PAGE 1 OF 1 24 XI190V COVERS 91 000 0777 REV 75												



24' X 1740 L  
LINER

Johnson Brass & Machine Foundry, Inc.

P.O. BOX 219 • SAUKVILLE, WISCONSIN • 53080

SERVING INDUSTRY SINCE 1905



Telephone (262) 377-9440

FAX (262) 284-7066

GA Industries, Inc.  
9025 Marshall Road  
Cranberry Twp., PA 16066-3696

CENTRIFUGAL  
CASTINGS  
AND MACHINING

Date: 12/16/03  
JBM Order No.: 100194

MATERIAL CERTIFICATION

We hereby certify that the following figures are in accordance with the specified contract/purchase order requirements of ASTM B62 Alloy C83600 on your Part No. 24178 Rev. 8, LESS LIFTING CLETE on your Purchase Order Number 0311W50.

**METAL CHEMISTRY**

HEAT NUMBER

136804

Serial #s: 1,2

Sn	5.514
Pb	4.665
Zn	4.297
Fe	<0.001
Sb	0.010
Ni (inc. Co)	0.160
S	0.002
P	<0.001
Al	<0.001
Si	0.002
Cu	85.333

**PHYSICAL TEST RESULTS**

HEAT NUMBER

136804

Tensile: 47.5 ks

Yield\*: 21.8 ks

Elong. in 2": 47.9 %

HEAT NUMBER

136808

Tensile: 44.7 ks

Yield\*: 21.1 ks

Elong. in 2": 45.4 %

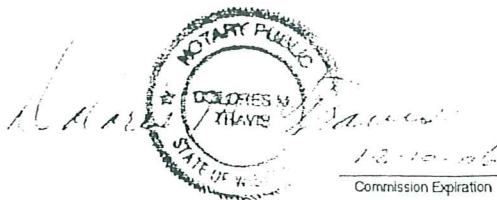
\* Yield strength determined at 0.5% extension under load.

Tests establishing the above data were conducted at our laboratories. This material is free of metallic mercury contamination and was inspected per MIL-I-45208A. A copy of this report is kept on file in our general offices. Material represented by this certification was manufactured in the USA.

Sincerely,

*Bernard Schneider*

Bernard Schneider, Chemist



Notary Public

SO X 17400  
LINE

*Johnson Brass & Machine Foundry, Inc.*  
P.O. BOX 219 • SAUKVILLE, WISCONSIN • 53080  
SERVING INDUSTRY SINCE 1905



Telephone (262) 377-9440  
FAX (262) 284-7066

GA Industries, Inc.  
9025 Marshall Road  
Cranberry Twp., PA 16066-3696

CENTRIFUGAL  
CASTINGS  
AND MACHINING

Date: 2/13/04  
JBm Order No.: 100193

### MATERIAL CERTIFICATION

We hereby certify that the following figures are in accordance with the specified contract/purchase order requirements of ASTM B62 Alloy C83600 on your Part No. 30114A Rev. 2, Number 0311W50. on your Purchase Order

#### METAL CHEMISTRY

HEAT NUMBER 136806		HEAT NUMBER 137589		HEAT NUMBER 137591	
Serial #s: 1		Serial #s: 2		Serial #s: 3	
Sn	5.435	Sn	5.161	Sn	5.262
Pb	4.830	Pb	4.686	Pb	4.891
Zn	4.853	Zn	4.714	Zn	4.849
Fe	<0.001	Fe	0.023	Fe	<0.001
Sb	0.021	Sb	0.068	Sb	0.045
Ni (inc. Co)	0.195	Ni (inc. Co)	0.525	Ni (inc. Co)	0.394
S	0.004	S	0.016	S	0.012
P	<0.001	P	0.023	P	0.028
Al	0.001	Al	0.001	Al	<0.001
Si	0.002	Si	0.002	Si	0.002
Cu	84.640	Cu	84.747	Cu	84.488

#### PHYSICAL TEST RESULTS

HEAT NUMBER 136806		HEAT NUMBER 137589		HEAT NUMBER 137591	
Tensile:	44.4 ksi	Tensile:	42.1 ksi	Tensile:	42.4 ksi
Yield*:	21.0 ksi	Yield*:	20.3 ksi	Yield*:	19.9 ksi
Elong. in 2":	32.7 %	Elong. in 2":	32.1 %	Elong. in 2":	33.0 %

\* Yield strength determined at 0.5% extension under load.

Tests establishing the above data were conducted at our laboratories. This material is free of metallic mercury contamination and was inspected per MIL-I-45208A. A copy of this report is kept on file in our general offices. Material represented by this certification was manufactured in the USA.

Sincerely,

*Bernard Schneider*

Bernard Schneider, Chemist

*Delores M. Travis*  
12-10-06  
Commission Expiration



Notary Public



LOT NO.  
138375A

# NUCOR FASTENER

30 X 14012  
COVER NUTS

A Division of Nucor Corporation

Post Office Box 8100 • Saint Joe, Indiana 46785 • Telephone 260/337-1600

CUSTOMER NUMBER 9040  
CUSTOMER NAME ANIXTER PENTACON  
CUSTOMER P.O. # 03AB0116  
CUSTOMER PART #

DATE SHIPPED 1/24/03  
NUCOR ORDER # 459363  
DATE TESTED 4/12/01

\*\*\*\*\*CERTIFIED MATERIAL TEST REPORT\*\*\*\*\*

MANUFACTURER ID: n

PART NO. QUANTITY LOT NO. DESCRIPTION  
175840 350 138375A 1 1/8-7 GR DH HV HEX NUT HEX NUT BLACK

---CHEMISTRY MATERIAL GRADE -1045H  
MATERIAL HEAT \*\*CHEMISTRY COMPOSITION (WT% HEAT ANALYSIS) BY MATERIAL SUPPLIER  
NUMBER NUMBER C MN P S SI  
RH019019 544994 .44 .70 .017 .027 .22  
---MECHANICAL PROPERTIES IN ACCORDANCE WITH ASTM A563-00

SURFACE HARDNESS (R30N)	CORE HARDNESS (RC)	PROOF LOAD 133600 LBS	TENSILE STRENGTH	
			(LBS)	DEG-WEDGE STRESS (PSI)
N/A	28.8	PASS	N/A	N/A
N/A	29.8	PASS	N/A	N/A
N/A	28.2	PASS	N/A	N/A
N/A	30.7	PASS	N/A	N/A
N/A	30.1	PASS	N/A	N/A
AVERAGE VALUES FROM TESTS		PRODUCTION LOT SIZE	28350 PCS	
29.5				

---VISUAL INSPECTION IN ACCORDANCE WITH ASTM A563 80 PCS. SAMPLED LOT PASSED  
HEAT TREATMENT - AUSTENITIZED, OIL QUENCHED & TEMPERED (MIN 800 DEG F)

THE NUCOR FASTENER TESTING LABORATORY HAS BEEN ACCREDITED BY THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION IN THE FIELD OF MECHANICAL TESTING. ALL TESTS ARE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE METHODS PRESCRIBED IN THE APPLICABLE SAE AND ASTM SPECIFICATIONS. THE SAMPLES TESTED CONFORM TO ANSI B18.2.2-1987 DIMENSIONAL SPECIFICATIONS ALONG WITH THE SPECIFICATIONS AS DESCRIBED/LISTED ABOVE AND WERE MANUFACTURED FREE OF MERCURY CONTAMINATION THE STEEL WAS MELTED AND MANUFACTURED IN THE U.S.A. AND THE PRODUCT WAS MANUFACTURED AND TESTED IN THE U.S.A.  
WE CERTIFY THAT THIS DATA IS A TRUE REPRESENTATION OF INFORMATION PROVIDED BY THE MATERIAL SUPPLIER AND OUR TESTING LABORATORY. THIS CERTIFIED MATERIAL TEST REPORT RELATES ONLY TO THE ITEMS LISTED ON THIS DOCUMENT AND MAY NOT BE REPRODUCED EXCEPT IN FULL.

NUCOR FASTENER  
A DIVISION OF NUCOR CORPORATION

CHRIS RAHER  
QUALITY ASSURANCE SUPERVISOR



# INSPECTION CERTIFICATE



**UNYRITE, INC.**

One Unylite Drive  
 Peru, Illinois 61354  
 815-224-2221 — FAX# 815-224-3434

Customer	Specification	Lot No.	Date
	ASTM A-194 GRADE 2H HEAVY HEX NUT	10323	Feb. 17, '03
	Size		
	1 - 8 UNC		

Mechanical properties tested in accordance to ASTM F606/F606M, ASTM A370, ASTM E10

Chemical Composition (%)												
Mill Maker	Material Size	Heat No.	Spec.	C	Si	Mn	P	S	Cu	Ni	Cr	Mo
INLAND	CARBON			MIN. 0.40 MAX. 0.40	0.40	1.00	MAX. 0.040	0.050	-	-	-	-
STBBL	STEEL	290003		0.43	0.21	0.67	0.009	0.025	0.06	0.04	0.05	0.02
Mechanical Property Inspection												
Item	Proof Load	Cone Stripping	Hardness	Hardness	Absorbed Energy			Heat Treatment				
Spec	106,000 lbf	- kn • kgf = lbf	24 - 38 HRC	MIN. 89 HKB • HB	- J • kgfm • ftlbf			T: MIN. 850 F				
Results	n	n	26.4 28.3 26.1 27.5 26.9	101.9	-			Q: FORGING Q (W.Q.) T: 1079 F/45M. (W.C.) Q: Quenching T: Tempering ST: Solution Treatment				
Results	GOOD	-	27.0	After 24 HrX1000°F (°C)	at °F (°C)			Remarks: " 2H U " Production Quantity 5,500 pcs.				

Chief of Quality Assurance Section  
*[Signature]*  
 Material used for the nut was melted and manufactured in the USA. The nut was manufactured in the USA to the above specification.  
 We hereby certify that the material described has been manufactured and inspected satisfactorily with the requirement of the above specification.

UNYRITE COVER



30" X 11400  
COVERS

CERTIFICATION

FAY INDUSTRIES, INC.

17200 FOLTZ INDUSTRIAL PKWY

STRONGSVILLE, OH 44149

PHONE 440-572-5030

FAX 440-572-5614

724-625-3553

TO: G.A. INDUSTRIES, INC.  
9025 MARSHALL RD.

DATE: 07/05/04

CUSTOMER PO NO: 0402W241

ORDER NO: 110870

HEAT NO: 3M39040

CRANBERRY TOWNSHIP, PA 16066

PRODUCT DESCRIPTION

1.6250 RD CD 4140 ANNEALED

ASTM A322-91, A304-96

CHEMICAL ANALYSIS

C.	Mn	P.	S.	Si	Cr	Ni	Mo	W.
0.4300	0.8900	0.0220	0.0260	0.1900	1.0000	0.0700	0.1600	0.000
V.	Al	Ti	Cu	Cb	Ta	N.	Sn	Co
0.0060	0.0240	0.0000	0.2000	0.0020	0.0000	0.0052	0.0070	0.000
Bi	Zn	Fe	Mg				Pb	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		

PHYSICAL PROPERTIES

HEAT NO.	TENSILE	YIELD	%ELONG	%RED AREA	BRINNELL	ROCKWELL
3M39040			0.0	0.0	212	

TO THE BEST OF OUR KNOWLEDGE THE TEST RESULTS SHOWN ABOVE ARE A TRUE COPY OF THE DATA FURNISHED BY THE PRODUCING MILL NOW ON FILE AT OUR OFFICE.

DATE

*7/5/04*

SIGNATURE

*[Handwritten Signature]*

24" X 1740 D  
COVERS

C E R T I F I C A T I O N

FAY INDUSTRIES, INC.

17200 FOLTZ INDUSTRIAL PKWY

STRONGSVILLE, OH 44149

PHONE 440-572-5030

FAX 440-572-5614

724-625-3553

TO: G.A. INDUSTRIES, INC.  
9025 MARSHALL RD.

DATE: 07/05/04

CUSTOMER PO NO: 0402W241

ORDER NO: 110870

HEAT NO: 723439

CRANBERRY TOWNSHIP, PA 16066

PRODUCT DESCRIPTION

1.5000 RD CD 4140 ANNEALED

ASTM A322-91, A29/A29M-99

CHEMICAL ANALYSIS

C.	Mn	P.	S.	Si	Cr	Ni	Mo	W.
0.4100	0.9000	0.0070	0.0120	0.2100	1.0100	0.0500	0.1600	0.000
V.	Al	Ti	Cu	Cb	Ta	N.	Sn	Co
0.0200	0.0010	0.0000	0.1100	0.0000	0.0000	0.0107	0.0000	0.000
Bi	Zn	Fe	Mg				Pb	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		

PHYSICAL PROPERTIES

HEAT NO.	TENSILE	YIELD	%ELONG	%RED AREA	BRINNELL	ROCKWELL
723439			0.0	0.0		

TO THE BEST OF OUR KNOWLEDGE THE TEST RESULTS SHOWN ABOVE ARE A TRUE COPY OF THE DATA FURNISHED BY THE PRODUCING MILL NOW ON FILE AT OUR OFFICE.

DATE 7-6-04

SIGNATURE *Anna Lynee*



30 XI170L  
Body

RODNEY HUNT CO  
CHEMICAL ANALYSIS

JOB NUMBER-----036854-6  
PO NUMBER----- 0311W2  
CASTING #-----156583-1-2 GA BODY 30"  
CLASS IRON-----A126 CL/B  
DATE-----11/21/03  
HEAT #-----8161

CHEMISTRY

CARBON-----3.21  
SILICON-----2.33  
NICKEL-----.24  
CHROMIUM-----.11  
COPPER-----.11  
MANGANESE-----.42  
PHOSPHORUS-----.05  
SULFUR-----.04  
MAGNESIUM-----

PHYSICAL PROPERTIES

GRAY IRON

TENSILE----- 37,820 PSI

DUCTILE IRON

ULTIMATE STRENGTH--  
YIELD STRENGTH-----  
% ELONGATION-----

30 X11400  
Barry

RODNEY HUNT CO  
CHEMICAL ANALYSIS

JOB NUMBER-----036854-6  
PO NUMBER----- 0311W2  
CASTING #-----156583-3 GA BODY 30"  
CLASS IRON-----A126 CL/B  
DATE-----11/24/03  
HEAT #-----8162

CHEMISTRY

CARBON-----3.38  
SILICON-----2.17  
NICKEL-----.35  
CHROMIUM-----.10  
COPPER-----.27  
MANGANESE-----.48  
PHOSPHORUS-----.05  
SULFUR-----.04  
MAGNESIUM-----

PHYSICAL PROPERTIES

GRAY IRON

TENSILE----- 37,920 PSI

DUCTILE IRON

ULTIMATE STRENGTH--  
YIELD STRENGTH-----  
% ELONGATION-----



24 XI 140L  
Body

RODNEY HUNT CO  
CHEMICAL ANALYSIS

JOB NUMBER-----036853-6  
PO NUMBER----- 0311W2  
CASTING #-----156582-1 GA BODY 24"  
CLASS IRON-----A126 CL/B  
DATE-----2/4/04  
HEAT #-----8276

CHEMISTRY

CARBON-----3.38  
SILICON-----2.20  
NICKEL-----.38  
CHROMIUM-----.10  
COPPER-----.29  
MANGANESE-----.58  
PHOSPHORUS-----.05  
SULFUR-----.04  
MAGNESIUM-----

PHYSICAL PROPERTIES

GRAY IRON

TENSILE----- 38,490 PSI

DUCTILE IRON

ULTIMATE STRENGTH--  
YIELD STRENGTH-----  
% ELONGATION-----

24 XI 1400  
Body

RODNEY HUNT CO  
CHEMICAL ANALYSIS

JOB NUMBER-----036853-6  
PO NUMBER----- 0311W2  
CASTING #-----156582-2 GA BODY 24"  
  
CLASS IRON-----A126 CL/B  
DATE-----2/5/04  
HEAT #-----8280B

CHEMISTRY

CARBON-----3.10  
SILICON-----2.08  
NICKEL-----.60  
CHROMIUM-----.10  
COPPER-----.17  
MANGANESE-----.60  
PHOSPHORUS-----.05  
SULFUR-----.03  
MAGNESIUM-----

PHYSICAL PROPERTIES

GRAY IRON

TENSILE----- 42,980 PSI

DUCTILE IRON

ULTIMATE STRENGTH--  
YIELD STRENGTH-----  
% ELONGATION-----