



Fort Calhoun Station
P.O. Box 550
Fort Calhoun, NE 68023

May 15, 2008
LIC-08-0066

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Reference: Docket No. 50-285

SUBJECT: Fort Calhoun Station Unit No. 1 Request for Relief Pertaining to Liquid Penetrant Acceptance Criteria for Replacement Safety Injection and Refueling Water Tank (SIRWT) Outlet Header Level Control Valve (TAC No. MD8722)

Pursuant to the provision stated in 10 CFR 50.55a (a)(3)(i), the Omaha Public Power District (OPPD) requests relief from certain requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC), Section III, with regard to flaw acceptance criteria. This relief request applies to the Fisher Control valve procured as a replacement for the currently installed SIRWT Outlet Header Level Control Valve LCV-383-2.

Approval of this relief request is needed prior to Monday, May 19, 2008, in support of 2008 refueling outage activities. The current schedule for start up from this refueling outage (based upon successful resolution of this relief request) shows reactor criticality occurring on May 30, 2008.

The flaw tolerance analysis is ongoing and will be provided under a separate submittal.

The proposed duration is for one operating cycle. OPPD will be performing further evaluations and may request relief at a later date for permanent duration of the proposed alternative.

If you should have any additional questions regarding this submittal, please contact Mr. Tom Matthews at 402-533-6938.

Sincerely,

R. P. Clemens
Division Manager
Nuclear Engineering

Enclosure: 10 CFR 50.55a Relief Request

- c: E. E. Collins, NRC Regional Administrator, Region IV (w/o Attachments)
M. T. Markley, NRC Sr. Project Manager (w/o Attachments)
J. D. Hanna, NRC Sr. Resident Inspector (w/o Attachments)

10 CFR 50.55a Relief Request
Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(i)
--Alternative Provides Acceptable Level of Quality and Safety--

1. ASME CODE COMPONENT AFFECTED

This relief request involves one ASME Code Class 2 component; specifically, a proposed replacement valve for the currently installed LCV-383-2. This valve is one of two parallel Safety Injection and Refueling Water Tank (SIRWT) outlet header level control valves. The valve is a 20-inch, pressure class 150, butterfly valve with a pneumatic piston operator. It is maintained normally open as a supply isolation for the low pressure safety injection (LPSI), high pressure safety injection (HPSI) and containment spray (CS) pumps. It closes upon a safety injection recirculation actuation signal (RAS) to assist the downstream check valve in preventing backflow into the SIRWT. Replacement of the existing valve LCV-383-2 is necessary because it exhibited excess seat leakage testing during Technical Specification surveillance testing. Repair of the currently installed valve is not considered possible at this time because of the long lead time for obtaining replacement parts to refurbish the current valve. Therefore, two commercial grade replacement valves were procured for dedication as Safety Class 2.

2. APPLICABLE CODE EDITION AND ADDENDA

OPPD purchased this valve as a commercial grade item and is in the process of dedicating it from safety-related application. During the dedication process, the valve was rejected due to surface discontinuities discovered during the Liquid Penetrant (LP) Examination. As such, the replacement valve could not meet the requirements of ASME BPVC Section III, Division 1, Subsection NC-5350. Relief is being requested to accept the valve "As-Is" without repairing the surface discontinuities.

The valve is a Safety Class 2 component as defined in the Updated Final Safety Analysis Report (UFSAR), Appendix N "Reclassification of Systems." The applicable standard imposed for the valve's design is ANSI B16.34, "Valves - Flanged, Threaded and Welding End," 2004. From that standard, Appendix I, "Radiography Procedure and Acceptance Standards" and Appendix III, "Liquid Penetrant Procedure and Acceptance Standards" were imposed to make the valve equivalent in quality with respect to the design and inspection requirements from original plant construction for a valve in radioactive service. The proposed replacement valve is a (new) commercial grade valve which was procured by the Omaha Public Power District (OPPD) and inspected by a third party dedication vendor (Sigma), to ensure it meets the necessary quality requirements. The third party vendor has a quality assurance program which meets the requirements of 10 CFR 50 Appendix B.

As part of the dedication process, the vendor performed a dimensional (including wall thickness) verification, chemical (material) analysis on pressure retaining items and also performed the necessary non-destructive examinations (NDE) on pressure retaining items to ensure they meet the requirements. Hydrostatic testing of the body and seat were also performed. The applicable document prepared by the vendor is "Dedication of Butterfly Valves for Nuclear Safety Related Service". The OPPD purchase order (PO) for the valve

(from the commercial supplier) is PO #120934. The OPPD contract number for the dedication services is #120818.

3. APPLICABLE CODE REQUIREMENT

An alternative to the acceptance criteria for the Liquid Penetrant Inspection acceptance criteria regarding rounded indications as stated in ANSI B16.34, 2004, Appendix III "Liquid Penetrant Procedure and Acceptance Standards" for the body casting is being proposed. The proposed alternative is the acceptance criteria (ref. Original Contract 762 Acceptance Criteria) from USAS B31.1, 1967 "Power Piping" for Liquid Penetrant Inspection. These acceptance criteria apply to the existing valve, which conforms to original plant construction requirements (Ref. OPPD Contract 762 Section H-10, "Control Valves").

The acceptance criteria for the LP examination from ANSI B16.34 Appendix III paragraph D2.1 "Castings" as defined in the dedication document is repeated as follows:

Maximum acceptable indications are as follows:

(a) Linear Indications:

- (1) 0.3 in. long for materials up to 0.5 in. thick;*
- (2) 0.5 in. long for materials 0.5 in. to 1 in. thick;*
- (3) **0.7 in. long for materials over 1 in. thick.***

For linear indications, the indications must be separated by a distance greater than the length of an acceptable indication. A linear indication is one with length in excess of 3 times the width.

(b) Rounded Indications:

- (1) 0.3 in. diameter for materials up to 0.5 in. thick;*
- (2) **0.5 in. diameter for materials over 0.5 in. thick.***

Four or more rounded indications in a line separated by 0.06 in. or less edge to edge are unacceptable. Rounded indications are those that are not defined as linear indications.

The acceptance criteria for the LP examination from USAS B31.1 1967, Section 136.5.3(d) states the following:

"All linear discontinuities and aligned penetrant indications revealed by the test shall be removed. Aligned penetrant indications are those in which the average of the center-to-center distances between any one indication and the two adjacent indications in any straight line is less than 3/16". All other discontinuities revealed on the surface need not be removed unless the discontinuities are also revealed by radiography, in which case the pertinent radiographic specification shall apply."

4. REASON FOR REQUEST

A timeline of events (Attachment 1) is provided explaining the exigent circumstances for this Relief Request.

During surveillance test SE-ST-SI-3005, LCV-383-1 and LCV-383-2 exhibited seat leakage outside the acceptance criteria as documented in condition reports (CRs) 2008-2919 and 2008-2920, respectively. Replacement valves were purchased as commercial grade, as defined by 10 CFR 21, and were to be dedicated (see Attachment 3 for Dedication Plan) to meet the requirements of ASME BPVC Section III Class 2 Components. During the dedication process, the valves failed to meet applicable inspection criteria due to surface discontinuities discovered during the LP Examination. As such, the replacement valves could not meet the requirements of ASME BPVC Section III, Division 1, Subsection NC-5350. Relief is being requested to accept one of the valves "As-Is" without repairing the surface discontinuities.

OPPD was successful in repairing the other valve (LCV-383-1).

5. PROPOSED ALTERNATIVE AND BASIS FOR USE

The valve procured as commercial grade item to be dedicated as a replacement was examined in accordance with the ANSI B16.34, 2004 criteria as referenced in the Dedication Plan (Attachment 2).

Radiography was performed on the body and disc in accordance with ASME B16.34, 2004, Appendix I "Radiography Procedure and Acceptance Standards". The body and disc met all RT acceptance criteria in Appendix I.

In addition, the valve was hydrostatically tested to 450 psig per the requirements of Section 7 of ASME B16.34, 2004, and met the acceptance criteria of Section 7.

When the PT exam was performed, in accordance with Appendix III, on the body and disc, several areas of the valve body presented indications which were outside of the acceptance criteria. However, the valve is an acceptable replacement based on the following:

- Integrity of the valve body has been demonstrated, through radiography and hydrostatic testing, in accordance with the requirements for ASME B16.34 Class 150 valve for operating conditions (350°F, 150 psig).
- The expected operating condition the valve will experience is significantly less than rated operating conditions for an ASME B16.34 Class 150 valve. The limiting conditions are 120°F and 60 psig. This statement is supported by the following:
 - The SIRWT (SI-5) is vented to atmosphere. Thus, the only pressure experienced at the valve is the result of water above the valve location and pressure related to the fluid velocity. The valve centerline is located at the 974'-6" elevation and the top of the SIRWT is at the 1004'-0" elevation (a difference of ~30 feet). Converted to psig, 30 ft = 13 psig at 39.2°F (4°C). Therefore, an operating pressure of 60 psig is conservative.
 - LCV-383-2 has a check valve (SI-139) installed downstream of its location. The effect of the check valve is that LCV-383-2 is isolated from directly experiencing the

temperatures associated with RAS. Thus, the only temperature the valve experiences is the 105°F maximum operating temperature of the SIRWT. Therefore, 120°F is a conservative normal operating temperature.

- Taking into consideration the expected operating pressure (60 psig), a minimum wall thickness calculation (Attachment 2) results in a minimum wall thickness of 0.124". The actual wall thickness measured during the dedication process was 1.18" (valve s/n 16988576). Therefore, the valve exceeds the required wall thickness for the intended application.
- The flaw tolerance analysis of the indications from the PT examination is in progress. Preliminary, non-QA'd results indicate any propagation of these flaws would not challenge the integrity of the valve body. When finalized, this flaw tolerance analysis will be provided under a separate submittal.

6. DURATION OF THE PROPOSED ALTERNATIVE

The proposed duration is for one operating cycle. OPPD will be performing further evaluations and may request relief at a later date for permanent duration of the proposed alternative.

Attachments:

- 1: Timeline of Events
- 2: Min Wall Thickness Calc
- 3: Dedication Plan
- 4: Dedication Package
- 5: Drawings (Isometric, P&ID, Valve Drawings (4))
- 6: Photos (9)
- 7: Fisher Bulletin

Timeline for LCV-383-1 & LCV-383-2
Safety Injection Refueling Water Tank Outlet Header Level Control Valves

<u>Activity</u>	<u>Date</u>
1. 2008 Refueling Outage Begins	April 19, 2008
2. Safety Injection System Leakage Test	
a. Surveillance Test SE-ST-SI-3005	
i. LCV-383-1 acceptance criteria exceeded	April 28, 2008
ii. LCV-383-2 acceptance criteria exceeded	April 29, 2008
3. Special Work Assignment Team Formed	April 30, 2008
a. Resolve Seat leakage of valves	
4. Spare Parts Determination	May 1, 2008
a. Two Seats in warehouse	
b. Valve disk, stem and pins ordered	
c. Only enough parts available to repair one valve	
5. Two new Fisher valves ordered	May 2, 2008
a. Only commercial grade available	
b. Dedication plan developed	
c. Industry/Vendor search for safety related valves unsuccessful	
i. 14 – 16 week deliveries	
6. Valve LCV-383-2 removed from pipe header & inspected	May 4, 2008
a. Seat and disk not repairable	
7. Valve LCV-383-1 removed from pipe header & inspected	May 7, 2008
a. Valve repairable, best success for use of limited spare parts	
8. New Fisher Valve's NDE at factory	May 10-11, 2008
a. Visual & Radiography acceptable	
b. Dye Penetrant inspection	
i. Body Wafer #1 discontinuities & rejected	
ii. Body Wafer #2 discontinuities & rejected	
9. Valve LCV-383-1 Repaired & Passes Seat Leakage Test	May 12, 2008
10. FCS Begins Engineering Evaluation of discontinuities	May 12, 2008
11. Determination NRC Relief Request Needed	May 14, 2008
12. Scheduled installation of Repaired LCV-383-1	May 16, 2008

13. Scheduled installation of New Valve LCV-383-2	May 16, 2008
14. FCS Submittal of Relief Request	May 15, 2008
15. Requested NRC Approval of Relief Request	May 19, 2008
16. 2008 RFO Original Scheduled Breakers Closed	May 24, 2008
17. 2008 RFO Reactor Criticality	May 30, 2008
18. 2008 RFO Projected Breakers Closed	June 1, 2008

Internal Pressure Normal Operating (P_N) [psi]	60	See Pressure Discussion Below
Safety Factor	4	
Internal Pressure (P) [psi]	240	
Nominal Outside Diameter (D) [in.]	23	
Inside Radius (R) [in.]	10.320	
Stress Intensity Limit (S) [psi]	20000	
Membrane Stress Intensity [ksi] @ -20° to 300°F	20.0	Table 2A, ASME BPVC Sec. II, Part D, Subpart I See Temperature Discussion Below
Stress Intensity Factor	1	Table NC-3217-1, ASME BPVC Sec. III, Div I - NC
Minimum Wall Thickness (t) [in.]	0.124	$t = (P \times R) \div (S - 0.5 \times P)$ {ref. ASME BPVC Sec III, Div I, NC-3224.3(a)}
Actual Measured Wall Thickness [in.]	1.180 1.160	Serial Number 16988576 [On-Site 15-May-2008] Serial Number 16988575

Expected Normal Operating Pressure

The SIRWT (SI-5) is vent to atmosphere. Thus, the only pressure experience at the valves is the result of water above the valves location. The valve are located at the 974'-6" elevation and the top of the SIRWT is at the 1004'-0" elevation (a difference of ~30 feet). Converted to psig, 30 ft = 13 psig at 39.2°F (4°C). Allowing for the maximum operating temperature of 105°F, this value could be less due less dense water. However, with all SI pumps (SI-1A/B, SI-2A/B/C & SI-3A/B/C) operating, each header can see flow approaching 9000 gpm which will induce approximately 10 psi in velocity pressure. Therefore, an operating pressure of 60 psig is conservative.

Expected Normal Operating Temperature

LCV-383-1/2 have check valves installed downstream of their respective locations. The effect of these check valves is that LCV-383-1/2 never see the temperatures associated with RAS. Thus, the only temperature the valves experiences is the 105°F maximum operating temperature of the SWIRT. Therefore, 120°F is a conservative normal operating temperature.

Conclusion

A minimum wall thickness calculation indicates the valve would require a 0.124" minimum wall thickness for the expected operating pressure of 60 psig. This wall thickness incorporates a safety factor of 4 and is valid from -20°F to 300°F. The actual wall thickness measure by Sigma during the dedication process was 1.18" for the valve with serial number 16988576 which is currently on site. The wall thickness for the valve with serial number 16988575 was measured at 1.16". Thus, the valve has > 1" of additional material above what is required for the expected operating condition.

The radiography demonstrated the flaws were on the surface only and did not permeate into the body of the valve. Therefore, the valves have more than a sufficient amount of wall thickness to operate with an acceptable level of safety and quality.

<p style="text-align: center;">DEDICATION PLAN Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications Dedication Code: ND</p>

SIGMA SALES ORDER NO: 8904

CUSTOMER: OPPD-FORT CALHOUN

PURCHASE ORDER NO.: 120818

Products

QTY	LI#	CUSTOMER'S STOCK #	DESCRIPTION
2	*	*	VALVE, WAFER BUTTERFLY, 20", ASME B16.34 150# CLASS, ASTM A351 GRADE CF8M BODY AND DISC, POSI-SEAL FIGURE A31A

* The valves being dedicated under this plan were purchased directly by the end user from the manufacturer.

Prepared By: §©

Date: May 7, 2008

DEDICATION PLAN**Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications****Dedication Code: ND****1.0 Purpose**

This plan establishes the requirements for performing the dedication activities of butterfly valves, commercial grade for use in nuclear facilities in safety related applications. This plan shall establish the requirements that will reasonably assure that the valves will perform their safety related function.

2.0 Scope

This plan is applicable to valves purchased commercial grade from the manufacturer's published catalog descriptions.

3.0 Responsibilities

- 3.1 The QA Manager is responsible for implementation for this plan and shall comply with the requirements of QAP-7 Dedication of Commercial Grade Items.
- 3.2 Vendors performing non-destructive examination and material verification services shall be qualified in accordance with the QA Manual section 6.
- 3.3 Suppliers of calibration services shall be qualified in accordance with the QA Manual Section 6.

4.0 Commercial Grade Criteria

- 4.1 An item is a commercial grade item if its critical characteristics can be verified during the dedication process. Butterfly valves purchased commercial from the manufacturer's published catalog description are commercial grade items as defined in 10CFR21.

5.0 Safety Function

- 5.1 The safety function of valves dedicated under this plan is pressure retention and isolation.

6.0 Applicable Industry Standards

- 6.1 ASME B16.34: Valves-Flanged, Threaded, and Welding End
- 6.2 MSS SP61: Pressure Testing of Steel Valves

7.0 Manufacturer's Commercial Publications

- 7.1 Posi-Seal Product Bulletin 21.1:A31A dated October 2005

8.0 Critical Characteristics/Acceptance Criteria

- 8.1 QAP-8 Attachment A "Receipt Inspection" provides assurance that the item is identifiable to the manufacturer's outline drawing (part number) and is not damaged.
- 8.2 Dimensional Verification provides assurance that the valve's critical dimensions meets the manufacturer's published literature.
- 8.3 Chemical Analysis of the pressure retaining components will provide assurance that the item meets the applicable ASTM specification for chemistry.
- 8.4 Non-Destructive Examination (RT and PT) of the pressure retaining components will provide assurance that defects in material and workmanship do not exist that would preclude the part from performing its design function (pressure retention).
- 8.5 Hydrostatic shell and pneumatic seat leak testing will provide assurance that the pressure retaining components (body and disc) will perform their safety function of pressure retention and isolation.

DEDICATION PLAN
Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications
Dedication Code: ND

No.	Critical Characteristic	Basis	Acceptance Criteria
1	Receipt Inspection	Form	QAP-8 Attachment A
2	Configuration/ Dimensions <ul style="list-style-type: none"> • End to end • Height • Diameter (RO) • Bolt Circle • Weight • Minimum Wall 	Fit, Form	5.0" ± (later) 26.0" ± (later) 23.0" ± (later) 25" ± (later) 368 lbs ± 10% 0.51"
3	Material Verification <ul style="list-style-type: none"> • Body, Disc 	Form, Function	ASM A351 GRADE CF8M
4	NDE RT BODY & DISC 100% PT BODY & DISC: Machined surfaces	Function	ASME B16.34-2004 Appendix I ASME B16.34-2004 Appendix III
5	Pressure Testing <ul style="list-style-type: none"> • Hydrostatic Shell Test • Pneumatic Seat Leak Test 	Function	ASME B16.34, (later) PSIG FOR MINUTES , ZERO LEAKAGE Manufacturer's Acceptance criteria. (later) PSIG FOR MINUTE , (later) LEAKAGE

DEDICATION PLAN Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications Dedication Code: ND

9.0 Verification Inspection Plan

No.	Method	Instructions	RESULTS	VERIFIED BY
1	1	Verify acceptable QAP- 8 "Receipt Inspection". Record Heat Codes on Table A		
2	2	Verify acceptable critical dimensions. Record results on Table B.		
3	2	Verify acceptable Chemical Analysis for body and disc.		
4	2	Verify acceptable RT and PT examination results. Verify OPPD acceptance of RT & PT results		
5	2	Verify acceptable hydrostatic shell and seat leak test results.		

Method of Acceptance:

1. Special Tests and Inspections
2. Commercial Grade Survey of Suppliers
3. Source Verification
4. Acceptable Supplier/Item Performance

Final Acceptance

By:

Date:

DEDICATION PLAN
Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications
Dedication Code: ND

10.0 **Plan Controls**

- 10.1 All documentation generated as a result of this plan shall be identified with the dedication code for traceability.
- 10.2 All valves dedicated under this plan shall be stamped with the dedication code and serialized with successive numbers and be traceable to the documentation.
- 10.3 All measuring and test equipment used shall be calibrated and identified on the documentation.
- 10.4 Material acceptance of the body and disc shall be accomplished by review and acceptance of Chemical Analysis obtained by Optical Emission Spectrograph.
- 10.5 Valves that fail RT, PT or Chemical Analysis shall be rejected and an NCR written in accordance with QAP-2.
- 10.6 Hydrostatic testing shall be performed in accordance with the manufacturer's test procedure and shall comply with ANSI/ASME B16.34 and MSS-SP-61.
- 10.7 Valves that fail the hydrostatic shell test shall be rejected and an NCR written in accordance with QAP-2. Valves that fail the seat leak test may be reworked and retested.
- 10.8 Valves that successfully pass all the criteria set forth in this plan shall either be processed in accordance with QAP-10 "Sales Order Processing" or tagged with the commercial grade dedication code and stored in accordance with QAP-8 "Control of Nuclear Safety Related Components".

11.0 **Documentation**

- 11.1 All documentation generated as a result of this plan shall be identified with the dedication code and be controlled in accordance with QAP-5 "Document Control".

<p style="text-align: center;">DEDICATION PLAN Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications Dedication Code: ND</p>

TABLE A
MATERIAL TRACEABILITY RECORD

SERIAL NUMBER	HEAT CODES	
	BODY	DISC
MD1		
MD2		

<p align="center">DEDICATION PLAN</p> <p align="center">Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications</p> <p align="center">Dedication Code: ND</p>

Table B Critical Dimensions

Serial No.	End to End	Height	Diameter (RO)	Bolt Circle	Weight (lbs)	MIN WALL ¹
					331-405	.51
MD1						
MD2						

Dimensions are in inches.

¹Record smallest measurement

Caliper No.:	Calibration Due Date:

QUALITY ASSURANCE DATA PACKAGE TABLE OF CONTENTS

SIGMA SALES ORDER NO: 8904
 CUSTOMER: OPPD-FORT CALHOUN
 PURCHASE ORDER/CONTRACT NO.: Contract No.120818
 Purchase Order No. 120934

Products

QTY	LI#	CUSTOMER'S STOCK #	DESCRIPTION
1	1	00001302011	VALVE, WAFER BUTTERFLY, 20", ASME B16.34 150# CLASS, ASTM A351 GRADE CF8M BODY AND DISC, POSI-SEAL FIGURE A31A

Shipment Date:

MAY 14, 2008

Document	Page Numbers
Certificate of Conformance	1
Hydrostatic Shell & Seat Leak Test Report	2
Material Traceability Record	3
PMI Report for Bodies & Discs	4
RT for Bodies	5-8
PT for the Bodies	9
RT for the Discs	10-11
PT for the Discs	12
Dimensional Inspection Report with Minimum Wall	13
OPPD Dedication Plan Approval from Glen Seier	14
NCR 48 for PT of Bodies	15
Acceptance of S/N 16988576 by Glen Seier	16

Note: RT film was picked up at the manufacturer's facility by OPPD Tom Muff

SIGMA, INC.
1295 HWY 62
CHARLESTOWN IN 47111

CERTIFICATE OF CONFORMANCE

SIGMA SALES ORDER NO: 8904
CUSTOMER: OPPD-FORT CALHOUN
PURCHASE ORDER/CONTRACT NO.: Contract No. 120818
Purchase Order No. 120934

Products

QTY	LI#	CUSTOMER'S STOCK #	DESCRIPTION
1	1	00001302011	VALVE, WAFER BUTTERFLY, 20", ASME B16.34 150# CLASS, ASTM A351 GRADE CF8M BODY AND DISC, POSI-SEAL FIGURE A31A, SERIAL NUMBER 16988576 (ND2)

SIGMA CERTIFIES THAT THE ITEMS LISTED ABOVE WERE PROCURED BY OPPD FORT CALHOUN AS COMMERCIAL GRADE ITEMS AND DEDICATED BY SIGMA AS A BASIC COMPONENT AS PROVIDED FOR IN 10CFR PART 21. THE DEDICATION PROCESS WAS CONDUCTED IN ACCORDANCE WITH SIGMA'S 10CFR50 APP. B QUALITY ASSURANCE PROGRAM REV. 7, DATED 3/09/2008.

SIGMA CERTIFIES THAT THE ITEM(S) SUPPLIED MEET THE REFERENCED PO REQUIREMENTS EXCEPT FOR THE FOLLOWING:

NCR 48 FOR UNACCEPTABLE PT EXAMINATION RESULTS APPLIES TO THIS VALVE AND FINAL DISPOSITION HAS NOT BEEN DETERMINED.

STORAGE LEVEL IS ANSI N45.2.2 LEVEL: C

NDE was verified by method 3, source surveillance, at CONAM. Surveillance records are not part of the Documentation Package and are on file at Sigma and available for inspection. All NDE Reports showing item identification as Wafer #1 and Disc #1 is valve serial number 16988575 (Dedication I.D. ND1). All NDE Reports showing item identification as Wafer #2 and Disc #2 is valve serial number 16988576 (Dedication I.D. ND2).

QUALITY ASSURANCE
MANAGER:

Joseph A. Barton

DATE: 5/15/08

SIGMA, INC.
1295 HWY 62
CHARLESTOWN, IN 47111

HYDROSTATIC TEST REPORT

Test Procedure: QAP-6 Rev. 4

Serial Nos. 16988576 (ND2)
Reference: S08904

Description: VALVE, WAFER BUTTERFLY, 20", 150#, ASTM A351,
CF8M BODY AND DISC, SUPPLIED BY CUSTOMER

Test Criteria: ASME/ANSI B16.34
MSS-SP61

Test Gauge No. B407 @ INSTRUMENT AND VALVE SERVICES

Calibration Due Date: 09-11-08

Test Medium: WATER

Shell Test Pressure: (PSIG)	450				
Shell Test Duration:	10 MINUTES				
Acceptance Criteria:	Zero leakage				
Shell Test Results:	Passed				
Seat Test Pressure: (PSIG)	325				
Seat Test Duration:	2 MINUTES				
Acceptance Criteria: (ml/hr)	ZERO (0) LEAKAGE				
Actual Seat Leakage: (ml/hr)	S/N16988576				
	0				
I certify that the above results to be correct and accurate as tested.					
Test Performed By:	INSTRUMENT AND VALVE SERVICES			Date: 05-14-08	
Test Observed By:	STEVEN WELLS				

DEDICATION PLAN
Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications
Dedication Code: ND

TABLE A
MATERIAL TRACEABILITY RECORD

SERIAL NUMBER	HEAT CODES	
	BODY	DISC
16988575	X651	Y3439
16988576	W114	Y4179



Inspection & Engineering Services, Inc.

A Member of MISTRAS Holdings Group

Certificate of Positive Material Identification

Cust. Order #: G-11082	Work Order #: 156103	Date: 5/11/08	Page: 1 of 1
Customer:		Purchase Order Number:	
Instrument & Valve Services Company		2004063035	
4320 West 166 th Street		Item Description:	
Oak Forest, IL 60452		Disc & Body, Wafer Castings	
Exam Specification / Code:		Surface Condition:	Form:
ASTM E 1476 - 97		Partial Machining	Casting
Procedure:		Acceptance Criteria:	
96-MC-003 Rev 1		Client Info	

PMI Equipment:

Instrument Manufacturer:	Model Number:	Serial Number:	Standardization Results:
INNOV X-Ray Technologies	XT-260	1034	<input checked="" type="checkbox"/> Acceptable <input type="checkbox"/> Unacceptable
Nominal Alloy Specification:	Fe	Cr	Ni
Material Description:	Mo	Mn	Cu
N/S	Nb	V	Zr
N/S	Ti	Co	

Test Results (Percentage of alloying elements listed):

Item	Mat'l. ID	Fe	Cr	Ni	Mo	Mn	Cu	Nb	V	Zr	Ti	Co
Body, Wafer #1	316 /Duplex	66.92	20.41	9.42	2.38	0.86						
#V165856X012												
Body, Wafer #2	316 /Duplex	67.06	20.04	9.48	2.41	1.00						
#V165856X012												
Disc #1	316	68.01	19.79	8.99	2.19	1.02						
#V169943X012												
Disc #2	316	68.36	19.84	9.04	2.20	0.56						
#V169943X012												

Additional Information:

Name: Richard Gerhard Jr **Signature:**  **Date:** 5/11/08

161 Tower Drive / Unit: E / Burr Ridge, IL 60527 - Phone: (630) 230-3400 - Fax: (630) 230-3408 - Internet: <http://www.conaminsp.com>



17081 Westview Avenue Suite: B
South Holland, IL. 60473
708-339-0957 Fax: - 7237
www.conaminsp.com

CERTIFICATE OF INSPECTION RADIOGRAPHY [CASTING]

Date: 5/11/08
Work Order #: 156103
Customer Order #: G - 11082
Purchase Order #: 2004063035
Page: 1 of 1

Customer: Instrument & Valve Serv., Co Address: 4320 West 166th St / Oak Forest, IL 60452

CF8M FMS

Item Part No.:# V165856X012 Material: 20B58 Proj-Code: N/S Serial #: -1

Casting Description: Body, Wafer Condition: Partial Machining

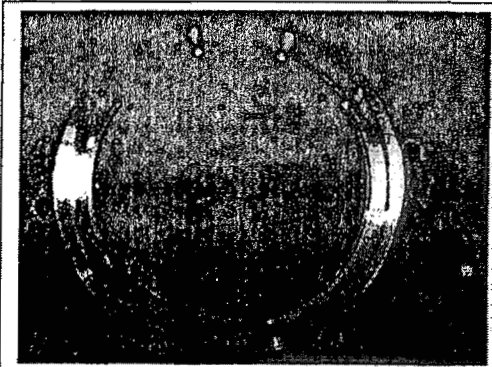
Specification/Code:	Acceptance Criteria:
ASME B16.34- 2004	ASME B16.34- 2004 [Appendix I - E446, E280]

DISPOSITION

IDENTIFICATION	View	VIEW OVERALL GRADE	DISPOSITION										Film Artifact
			Accept	Reject	GAS (A)	SAND (B)	SHRINK, T 1 (CA)	SHRINK, T 2 (CB)	SHRINK, T 3 (CC)	SHRINK, T 4 (CD)	Hot Tears & Cracks		
V165856X012 -1	V-1	1	√			1							
Body, Wafer	V-2	1	√		1	1							
	V-3	1	√		1	1							
	V-4	1	√										√
	V-5	1	√										
	V-6	1	√			1							
	V-7	1	√										
	V-8	1	√										
	V-9	1	√										
	V-10	1	√										

TYPICAL SKETCH

TYPICAL SKETCH



TECHNIQUE

SMINDEVELOP

Views	V-1, 2, 3, 4	V-5, 6, 7, 8	V-9, 10		
Isotope / Curies	Ir-192 / 60 ci	Ir-192 / 60 ci	Ir-192 / 60 ci		
S.F.D.	11"	11"	19"		
Exposure Time	3 min	1 min 15 sec	10 min		
Effective Focal Spot Size	.111"	.111"	.111"		
ACTUAL Thickness (S)	1.75"	.75"	1.50"		
Penetrameter (s) Mat'L: Steel	30 & 35	12	30		
Penetr. Blocks (s) Mat'L: Steel	On part surface	On part surface	On part surface		
Film Size (s)	7" x 17"	4.5" x 17"	4.5" x 10"		
Film Speed (s) MFG / Speed	Kodak T & AA	Kodak T	Kodak T		
Number of Film Used	8	4	2		
Radiographic Quality Level	2 - 2T	2 - 4T	2 - 2T		

Technician: (Print) Richard Gerhard Jr	Technician: (Signature) <i>[Signature]</i>	Level: III	Date: 5/11/08
-------------------------------------------	-----------------------------------------------	---------------	------------------

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RI-1 9-8-01



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CERTIFICATE OF INSPECTION RADIOGRAPHY [CASTING]

Date: 5/11/08
Work Order #: 156103
Customer Order #: G - 11082
Purchase Order #: 2004063035
Page: 1 of 1

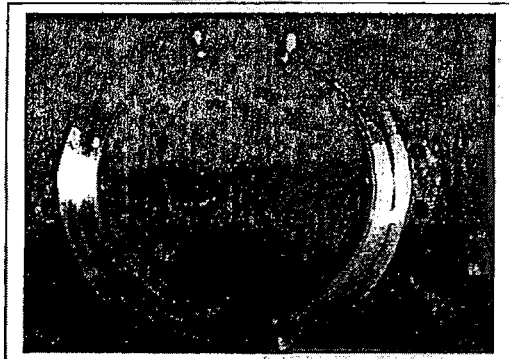
Customer: Instrument & Valve Serv., Co Address: 4320 West 166th St / Oak Forest, IL 60452
Item Part No.:# V165856X012 Material: 20B58 CF8M FMS Proj-Code: N/S Serial #: -1
Casting Description: Body, Wafer Condition: Partial Machining

Specification/Code:	Acceptance Criteria:
ASME B16.34- 2004	ASME B16.34- 2004 [Appendix I - E446, E186, E280]

DISPOSITION

IDENTIFICATION	View	VIEW OVERALL GRADE	Accept	Reject	GAS (A)	SAND (B)	SHRINK, T1 (CA)	SHRINK, T2 (CB)	SHRINK, T3 (CC)	SHRINK, T4 (CD)	Hot Tears & Cracks	Film Artifact
V165856X012 -1	V-11	1	✓		1	1						
Body, Wafer	V- 12	1	✓		1							
	V- 13	1	✓									
NOTE:												
Composite View V11												
for areas around bolt												
holes.												

TYPICAL SKETCH



TECHNIQUE

5 MIN DEVELOP

Views	V-11	V-12	V-13		
Isotope / Curies	Co-60 / 16 ci	Co-60 / 16 ci	Co-60 / 16 ci		
S.F.D.	23"	23"	29"		
Exposure Time	30 min	30 min	90 min		
Effective Focal Spot Size	.184"	.184"	.184"		
ACTUAL Thickness (S)	3.0" - 4.2"	1.25" - 4"	4.2" - 5"		
Penetrameter (s) Mat'L: Steel	30, 45, 50	20, 30, 40	60, 70		
Penetr. Blocks (s) Mat'L: N/A	On part surface	On part surface	On part surface		
Film Size (s)	14" x 17"	14" x 17"	7" x 17"		
Film Speed (s) MFG / Speed	D-5, F-50, D-7	D-5, F-50, D-7	Kodak AA, D-7		
Number of Film Used	3	3	2		
Radiographic Quality Level	2 - 2T	2 - 2T	2 - 2T		

Technician : [Print] **Richard Gerhard Jr** Technician: [Signature] *[Signature]* Level: **III** Date: **5/11/08**

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CERTIFICATE OF INSPECTION RADIOGRAPHY [CASTING]

Date: 5/11/08
Work Order #: 156103
Customer Order #: G - 11082
Purchase Order #: 2004063035
Page: 1 of 1

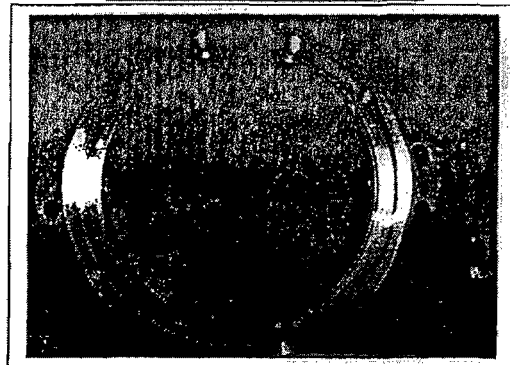
Customer: Instrument & Valve Serv., Co Address: 4320 West 166th St / Oak Forest, IL 60452
Item Part No.:# V165856X012 Material: 20B58 Proj-Code: N/S Serial #: -2
Casting Description: Body, Wafer Condition: Partial Machining

Specification/Code:	Acceptance Criteria:
ASME B16.34- 2004	ASME B16.34- 2004 [Appendix I - E446, E280]

DISPOSITION

IDENTIFICATION	View	VIEW OVERALL GRADE	Accept	Reject	GAS (A)	SAND (B)	SHRINK, T1 (CA)	SHRINK, T2 (CB)	SHRINK, T3 (CC)	SHRINK, T4 (CD)	Hot Tears & Cracks	Film Artifact
V165856X012 -2	V-1	2	√		1	2						
Body, Wafer	V-2	1	√									
	V-3	1	√		1	1	1					
	V-4	1	√		1							
	V-5	1	√									
	V-6	1	√		1							
	V-7	1	√									
	V-8	1	√									
	V-9	1	√		1							
	V-10	1	√		1							

TYPICAL SKETCH



TECHNIQUE

SYNCHRO DEVELOP

Views	V-1, 2, 3, 4	V-5, 6, 7, 8	V-9, 10		
Isotope / Curies	Ir-192 / 60 ci	Ir-192 / 60 ci	Ir-192 / 60 ci		
S.F.D.	11"	11"	19"		
Exposure Time	3 min	1 min 15 sec	10 min		
Effective Focal Spot Size	.111"	.111"	.111"		
ACTUAL Thickness (S)	1.75"	.75"	1.50"		
Penetrameter (s) Mat'L: Steel	30 & 35	12	30		
Penetr. Blocks (s) Mat'L: Steel	On part surface	On part surface	On part surface		
Film Size (s)	7" x 17"	4.5" x 17"	4.5" x 10"		
Film Speed (s) MFG / Speed	Kodak T & AA	Kodak T	Kodak T		
Number of Film Used	8	4	2		
Radiographic Quality Level	2-2T	2-4T	2-2T		

Technician : [Print] Richard Gerhard Jr	Technician : [Signature] <i>Richard Gerhard Jr</i>	Level: III	Date: 5/11/08
---------------------------------------------------	-------------------------------------------------------	----------------------	-------------------------

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CERTIFICATE OF INSPECTION RADIOGRAPHY [CASTING]

Date: 5/11/08
Work Order #: 156103
Customer Order #: G - 11082
Purchase Order #: 2004063035
Page: 1 of 1

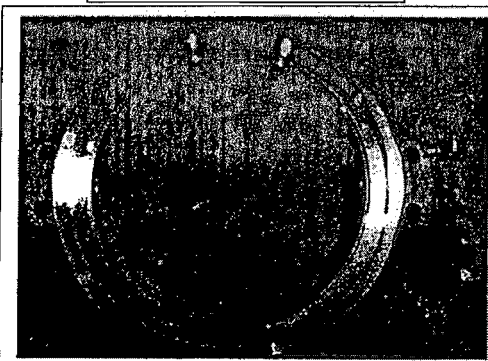
Customer: Instrument & Valve Serv., Co Address: 4320 West 166th St / Oak Forest, IL 60452
CF8M FMS
Item Part No.: V165856X012 Material: 20B58 Proj-Code: N/S Serial #: -2
Casting Description: Body, Wafer Condition: Partial Machining

Specification/Code:	Acceptance Criteria:
ASME B16.34- 2004	ASME B16.34- 2004 [Appendix I - E446, E186, E280]

DISPOSITION

IDENTIFICATION	View	VIEW OVERALL GRADE	Accept	Reject	GAS (A)	SAND (B)	SHRINK, T1 (CA)	SHRINK, T2 (CB)	SHRINK, T3 (CC)	SHRINK, T4 (CD)	Hot Tears & Cracks	Film Artifact
V165856X012 -2	V -11	1	√		1	1						
Body, Wafer	V- 12	1	√									
	V - 13	1	√									
NOTE:												
Composite View V11												
for areas around bolt												
holes.												

TYPICAL SKETCH



TECHNIQUE

SWIN DEVELOP

Views	V-11	V-12	V-13		
Isotope / Curies	Co-60 / 16 ci	Co-60 / 16 ci	Co-60 / 16 ci		
S.F.D.	23"	23"	29"		
Exposure Time	30 min	30 min	90 min		
Effective Focal Spot Size	.184"	.184"	.184"		
ACTUAL Thickness (S)	3.0" - 4.2"	1.25" - 4"	4.2" - 5"		
Penetrameter (s) Mat'L: Steel	30, 45, 50	20, 30, 40	60, 70		
Penetr. Blocks (s) Mat'L: N/A	On part surface	On part surface	On part surface		
Film Size (s)	14" x 17"	14" x 17"	7" x 17"		
Film Speed (s) MFG / Speed	D-5, F-50, D-7	D-5, F-50, D-7	Kodak AA, D-7		
Number of Film Used	3	3	2		
Radiographic Quality Level	2 - 2T	2 - 2T	2 - 2T		

Technician : [Print]

Richard Gerhard Jr

Technician: [Signature]

[Signature]

Level:

III

Date:

5/11/08

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KI-1 9-B-417



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CERTIFICATE OF INSPECTION LIQUID PENETRANT

Date: 5/10/08
Work Order #: 156103
Customer Order #: G - 11082
Purchase Order #: 2004063035
Page: 1 of 1

Customer: Instrument & Valve Services Company
Street Address: 4320 West 166th Street
City: Oak Forest State: IL Zip: 60452
Description: Body, Wafer

Location: Conam I & ES, Inc. / S. Holland, IL
Contact: Stella
Part No. / Item No: V165856X012

Inspection Method:

<input type="checkbox"/> Fluorescent	<input type="checkbox"/> Water Wash	<input checked="" type="checkbox"/> Red Visible Dye	<input type="checkbox"/> Water Wash
<input type="checkbox"/> Solvent Removable			<input checked="" type="checkbox"/> Solvent Removable
<input type="checkbox"/> Post Emulsified: <input type="checkbox"/> Hydrophilic <input type="checkbox"/> Lipophilic			<input type="checkbox"/> Post Emulsified
<input type="checkbox"/> Post Emulsified (High Sensitivity)		<input type="checkbox"/> Other:	

Specification/Code:	Acceptance Criteria:	Procedure:	Test Temperature:
ASME B16.34 [ASTM E 165]	ASME B16.34 [Appendix III]	100-PT-001	65° F

Equipment / Material Data:

	Manufacturer	Type	Batch Number(s)	Application Method
Cleaner:	Magnaflux	SKC - S	07E16K	Spray / Wipe
Penetrant:	Magnaflux	SKL - SP1	04F10K	Brush
Developer:	Magnaflux	SKD - S2	07A05K	Light Spray
Emulsifier:	N/A	N/A	N/A	N/A
Black Light:	Meter Model: N/A	Serial #: N/A	Output: N/A	$\mu\text{W}/\text{cm}^2$
Visible Light	Meter Model: DSE-100X	Serial #: 169910	Light Level: > 100 Foot Candles	<input checked="" type="checkbox"/>

Technique Data:

Pre-Clean Time: 5 minutes	Dwell Time: 10 minutes	Emulsifier Time: N/A	Developer Time: 10 minutes
------------------------------	---------------------------	-------------------------	-------------------------------

Temperature Gage:	Serial #: 403-082-0774	Cal Due: 9/14/08	Water Pressure: N/A
Test Material Info:	Type: CF8M FMS 20B58	Thickness: Various	Water Temperature: N/A

Test Results:

Quantity Inspected: 2 Quantity Accepted: 0 Quantity Rejected: 2

Visible- Solvent Removable Dye Penetrant Inspection was performed on (2) - Body, Wafers Item #: V165856X012
(Machined Faces only) with the following results:

SEE ATTACHED PHOTOS FOR SPECIFIC DEFECT LOCATIONS

Body, Wafer #1 was rejected for:

- (1) pore was found on the gasket seating surface that exceeded the .500" diameter size restriction for over .75" in thickness.
- (4) areas of concentrated porosity were found to have multiple locations that exceed the (4) or more pores in a line criteria.

Body, Wafer #2 was rejected for:

- (2) pores were found on the inner I.D. surface that exceeded the .500" diameter size restriction for over .75" in thickness.
- (4) areas of concentrated porosity were found to have multiple locations that exceed the (4) or more pores in a line criteria.

NOTE: NO minimum relevant size discontinuity was noted in the ASME B16.34 Standard.

Technician (Print) Richard Gerhard Jr.	Technician (Signature) 	Level: III	Date: 5/10/08
-------------------------------------------	----------------------------	---------------	------------------

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CERTIFICATE OF INSPECTION RADIOGRAPHY [CASTING]

Date: 5/11/08
Work Order #: 156103
Customer Order #: G - 11082
Purchase Order #: 2004063035
Page: 1 of 1

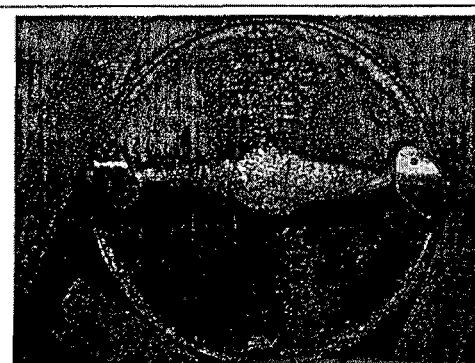
Customer: Instrument & Valve Serv., Co Address: 4320 West 166th St / Oak Forest, IL 60452
Item Part No.:# V169943X012 Material: 316 Proj-Code: N/S Serial #: -1
Casting Description: Disc 20" / Class: 150 Condition: Partial Machining

Specification/Code:	Acceptance Criteria:
ASME B16.34- 2004	ASME B16.34- 2004 [Appendix I - E446 / E186]

DISPOSITION

IDENTIFICATION	View	VIEW OVERALL GRADE	Accept	Reject	GAS (A)	SAND (B)	SHRINK, T1 (CA)	SHRINK, T2 (CB)	SHRINK, T3 (CC)	SHRINK, T4 (CD)	Hot Tears & Cracks	Film Artifact
DISC	V-1	1	✓		1							
V169943X012 -1	V-2	1	✓		1	1						
	V-3	2	✓		1	2						
	V-4	1	✓			1						✓
	V-5	2	✓		2	1						
	V-6	2	✓		2	1						✓

TYPICAL SKETCH



TECHNIQUE

5 MIN DEVELOP - 70° F

Views	V-1, 2 (Exp-1)	V-1, 2 (Exp-2)	V-3,4,5,6		
Isotope / Curies	Co-60 / 16 ci	Co-60 / 16 ci	Co-60 / 16 ci		
S.F.D.	21"	21"	21"		
Exposure Time	16 min	20 min	20 min		
Effective Focal Spot Size	.184"	.184"	.184"		
ACTUAL Thickness (S)	.90" - 3.7"	2.5" - 3.7"	.90" - 3.7"		
Penetrameter (s) Mat'L: Steel	17, 20, 25, 30, 50	50, 60	17, 20, 25, 30, 50		
Penetr. Blocks (s) Mat'L: N/A	On part surface	On part surface	On part surface		
Film Size (s)	7" x 17"	7" x 17"	14" x 17"		
Film Speed (s) MFG / Speed	Kodak T & AA	Kodak AA	AgfaD5, F-50, D7		
Number of Film Used	4	2	12		
Radiographic Quality Level	2 - 2T	2 - 2T	2 - 2T		
Technician : [Print] Richard Gerhard Jr	Technician: [Signature]		Level: III	Date: 5/11/08	

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R1-1 9-8-00

CONAM

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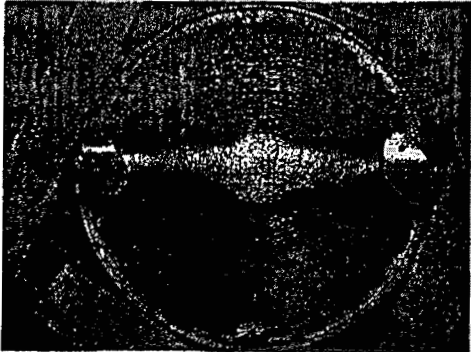
**CERTIFICATE OF INSPECTION
 RADIOGRAPHY [CASTING]**

Date: 5/11/08
 Work Order #: 156103
 Customer Order #: G - 11082
 Purchase Order #: 2004063035
 Page: 1 of 1

Customer: Instrument & Valve Serv., Co Address: 4320 West 166th St / Oak Forest, IL 60452
 Item Part No.:# V169943X012 Material: 316 Proj-Code: N/S Serial #: -2
 Casting Description: Disc 20" / Class: 150 Condition: Partial Machining

Specification/Code:	Acceptance Criteria:
ASME B16.34- 2004	ASME B16.34- 2004 [Appendix I - E446 / E186]

DISPOSITION

IDENTIFICATION	View	VIEW OVERALL GRADE	DISPOSITION										Film Artifact	TYPICAL SKETCH
			Accept	Reject	GAS (A)	SAND (B)	SHRINK, T1 (CA)	SHRINK, T2 (CB)	SHRINK, T3 (CC)	SHRINK, T4 (CD)	Hot Tears & Cracks			
DISC	V-1	1	✓											
V169943X012 -2	V-2	1	✓											
	V-3	1	✓											
	V-4	1	✓		1									
	V-5	1	✓											
	V-6	1	✓								✓			

TECHNIQUE**5 MIN DEVELOP - 70°F**

Views	V-1, 2 (Exp-1)	V-1, 2 (Exp-2)	V-3,4,5,6		
Isotope / Curies	Co-60 / 16 ci	Co-60 / 16 ci	Co-60 / 16 ci		
S.F.D.	21"	21"	21"		
Exposure Time	16 min	20 min	20 min		
Effective Focal Spot Size	.184"	.184"	.184"		
ACTUAL Thickness (S)	.90" - 3.7"	2.5" - 3.7"	.90" - 3.7"		
Penetrameter (s) Mat'L: Steel	17, 20, 25, 30, 50	50, 60	17, 20, 25, 30, 50		
Penetr. Blocks (s) Mat'L: N/A	On part surface	On part surface	On part surface		
Film Size (s)	7" x 17"	7" x 17"	14" x 17"		
Film Speed (s) MFG / Speed	Kodak T & AA	Kodak AA	AgfaD5, F-50, D7		
Number of Film Used	4	2	12		
Radiographic Quality Level	2 - 2T	2 - 2T	2 - 2T		

Technician: [Print] **Richard Gerhard Jr** Technician: [Signature] *[Signature]* Level: **III** Date: **5/11/08**

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RI-1 9-8-00



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CERTIFICATE OF INSPECTION LIQUID PENETRANT

Date: 5/11/08
 Work Order #: 156103
 Customer Order #: G - 11082
 Purchase Order #: 2004063035
 Page: 1 of 1

Customer: Instrument & Valve Services Company
 Street Address: 4320 West 166th Street
 City: Oak Forest State: IL Zip: 60452
 Description: Disc 20" / 150 LB

Location: Conam I & ES, Inc. / S. Holland, IL
 Contact: Stella
 Part No. / Item No: V169943X012

Inspection Method:

<input type="checkbox"/> Fluorescent	<input type="checkbox"/> Water Wash	<input checked="" type="checkbox"/> Red Visible Dye	<input type="checkbox"/> Water Wash
<input type="checkbox"/> Solvent Removable			<input checked="" type="checkbox"/> Solvent Removable
<input type="checkbox"/> Post Emulsified: <input type="checkbox"/> Hydrophilic <input type="checkbox"/> Lipophilic			<input type="checkbox"/> Post Emulsified
<input type="checkbox"/> Post Emulsified (High Sensitivity)		<input type="checkbox"/> Other:	

Specification/Code:	Acceptance Criteria:	Procedure:	Test Temperature:
ASME B16.34 [ASTM E 165]	ASME B16.34 [Appendix III]	100-PT-001	67° F

Equipment / Material Data:

	Manufacturer	Type	Batch Number(s)	Application Method
Cleaner:	Magnaflux	SKC - S	07E16K	Spray / Wipe
Penetrant:	Magnaflux	SKL - SP1	04F10K	Brush
Developer:	Magnaflux	SKD - S2	07A05K	Light Spray
Emulsifier:	N/A	N/A	N/A	N/A
Black Light:	Meter Model: N/A	Serial #: N/A	Output: N/A	$\mu\text{W}/\text{cm}^2$
Visible Light	Meter Model: DSE-100X	Serial #: 169910	Light Level: > 100 Foot Candles	<input checked="" type="checkbox"/>

Technique Data:

Pre-Clean Time: 5 minutes	Dwell Time: 10 minutes	Emulsifier Time: N/A	Developer Time: 10 minutes
------------------------------	---------------------------	-------------------------	-------------------------------

Temperature Gage:	Serial #:	403-082-0774	Cal Due:	9/14/08	Water Pressure:	N/A
Test Material Info:	Type:	316 GRP A 20B80	Thickness:	Various	Water Temperature:	N/A

Test Results:

Quantity Inspected: 2 Quantity Accepted: 2 Quantity Rejected: 0

Visible- Solvent Removable Dye Penetrant Inspection was performed on (2) - Discs Item #: V169943X012
 (Machined Faces only) with the following results:

DISC #1:

FINAL DISPOSITION: No rejectable discontinuities were noted at the time of inspection.

DISC #2:

FINAL DISPOSITION: No rejectable discontinuities were noted at the time of inspection.

NOTE: NO minimum relevant size discontinuity was noted in the ASME B16.34 Standard.

Technician [Print] Richard Gerhard Jr.	Technician [Signature] 	Level: III	Date: 5/11/08
-------------------------------------------	----------------------------	---------------	------------------

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DEDICATION PLAN
Dedication of Butterfly Valves For Use In Nuclear Safety Related Applications
Dedication Code: ND

Table B Critical Dimensions

Serial No.	End to End	Height	Diameter (R)	Bolt Circle	Weight (lbs)	MIN WALL'
	4.98-5.02	26.25 maximum	22.50-23.50	24.98-25.02	331-405	.51
16988575 ND1	5.00	25.79	22.88	25.0	363	1.16
16988576 ND2	5.00	25.84	22.56	25.0	358	1.18

Dimensions are in inches.

'Record smallest measurement on body

Caliper No.:	Calibration Due Date:
DC0089	12/31/2008
FCD24A	5/8/09

Verify By:

Steve Wells

Date:

5-14-08

Joe Barbera

From: SEIER, GLEN R [gseier@oppd.com]
Sent: Wednesday, May 14, 2008 6:12 PM
To: joe@sigmappc.com
Cc: Adam Gartner; Bernard Saucier; Earl Sullivan; John DeWitt; NICOLE BRETEY; Peter Donaldson; Robert Bunz; Russell Cowley; Thomas Muff
Subject: Dedication Plan for Fisher 20" Wafer Butterfly Valves
Attachments: Dedication Plan 8904.doc

Joe,

The attached dedication plan has been reviewed and found acceptable. Sigma may continue with the remaining dedication items.

Thank you.

Glen R. Seier
Supervisor Procurement Engineering / Procurement Quality
Fort Calhoun Station
(402)533-6540
gseier@oppd.com

From: Joe Barbera [mailto:joe@sigmappc.com]
Sent: Wednesday, May 14, 2008 5:04 PM
To: SEIER, GLEN R
Subject:

Joe Barbera

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5/14/2008

SIGMA, INC. POWER PLANT COMPONENTS
NONCONFORMANCE REPORT
NCR NO. 48

Nonconforming Condition:

Unacceptable indications were discovered during PT examinations of (2) valve bodies for 20" Posi Seal Butterfly Valves, Model A31A. The acceptance criteria was ASME B16.34-2004 Appendix III, See Conam PT Report Work Order 156103 attached. Photo's of indications have been sent to Fort Calhoun.

References: SO8904, Dedication ND, OPPD POs 120934 & 120818

Item description:

Qty (2) 20" butterfly valve bodies, ASTM A351 Grade CF8M material, Valve serial numbers 16988575 and 16988576, heat codes W114 and X651

Initiator: *Joseph A. Bartone*

Date: May 13, 2008

Disposition:

☐ use as is ☐ repair ☐ rework ☐ reject
Forward NCR to OPPD Fort Calhoun for disposition

Reportable in accordance with 10CFR Part 21? Yes: No: **X**

Q A Manager *Joseph A. Bartone*

Date: May 13, 2008

President: _____ Date: _____

Is corrective action required to prevent recurrence? Yes: No:

Probable cause:

Action taken to prevent recurrence:

Action taken on items prior to discovery:

Final review and close-out:

Q A Manager: _____ Date: _____

Joe Barbera

From: SEIER, GLEN R [gseier@oppd.com]
Sent: Wednesday, May 14, 2008 6:24 PM
To: jpe@sigmappc.com
Cc: DYER, JOSEPH L; COSTELLO, JAY P; CLAYTON, OWEN J; Adam Gartner; Bernard Saucier; Earl Sullivan; John DeWitt; NICOLE BRETEY; Peter Donaldson; Robert Bunz; Russell Cowley; Thomas Muff
Subject: INFO: Fort Calhoun Disposition of NCR 48

Joe,

REFERENCE:

Contract / Purchase Order Number: 120818 / 120934
Subject: Two (2) Fisher 20 inch Post Seal Butterfly Valves, Model A31A

Regarding Sigma NCR No. 48 related to unacceptable PT indications on two (2) 20 inch wafer butterfly valve bodies, Fort Calhoun provides the following direction.

1. Fort Calhoun has been unsuccessful in Code reconciliation of the PT indications noted on Conam PT inspection report dated 2/10/08
2. Fort Calhoun has begun the process of getting code exemption from the NRC. This process continues.

Therefore, Sigma is authorized to Accept-As-Is and ship valve ND-2, S/N 18988578 with the identified but yet unresolved PT indications. This waiver to the dedication plan is only valid for the PT nonconformance. All other dedication critical characteristics shall be completed satisfactory as defined in Dedication Plan "Dedication of Butterfly Valves For Use in Nuclear Safety Related Applications" Dedication Code: ND.

Valve ND-1, S/N 18988575 shall be held by Sigma until further direction (Accept-As-Is or repair by welding) is provided by Fort Calhoun.

Currently, the Fort Calhoun Purchasing System is unavailable. A Purchase Order 120934 revision was to be generated to capture the above disposition and direction regarding NCR 48 along with a clarification that the Sigma's dedication plan is to be provided in part or whole to parallel to the Fisher manufacturing efforts. The Purchase Order revision will be processed as soon as the Purchasing System is available. This email is to suffice as direction for Sigma until Purchase Order 120934 can be revised.

Glen R. Seier
Supervisor Procurement Engineering / Procurement Quality
Fort Calhoun Station
(402)533-6540
gseier@oppd.com

From: Joe Barbera [mailto:joe@sigmappc.com]
Sent: Wednesday, May 14, 2008 2:57 PM
To: SEIER, GLEN R
Subject: CORRECTED NCR

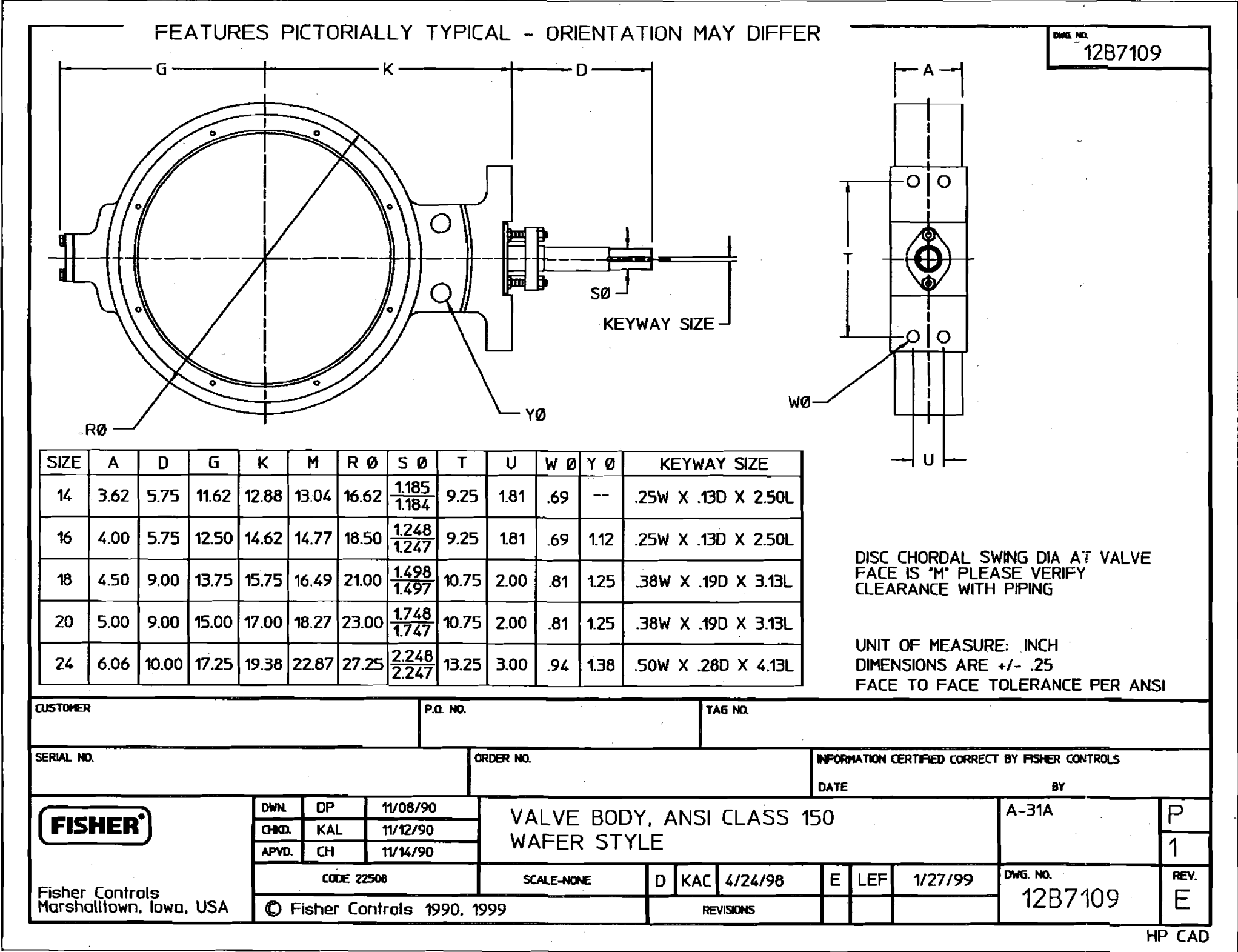
Glen:

Attached is the corrected NCR.

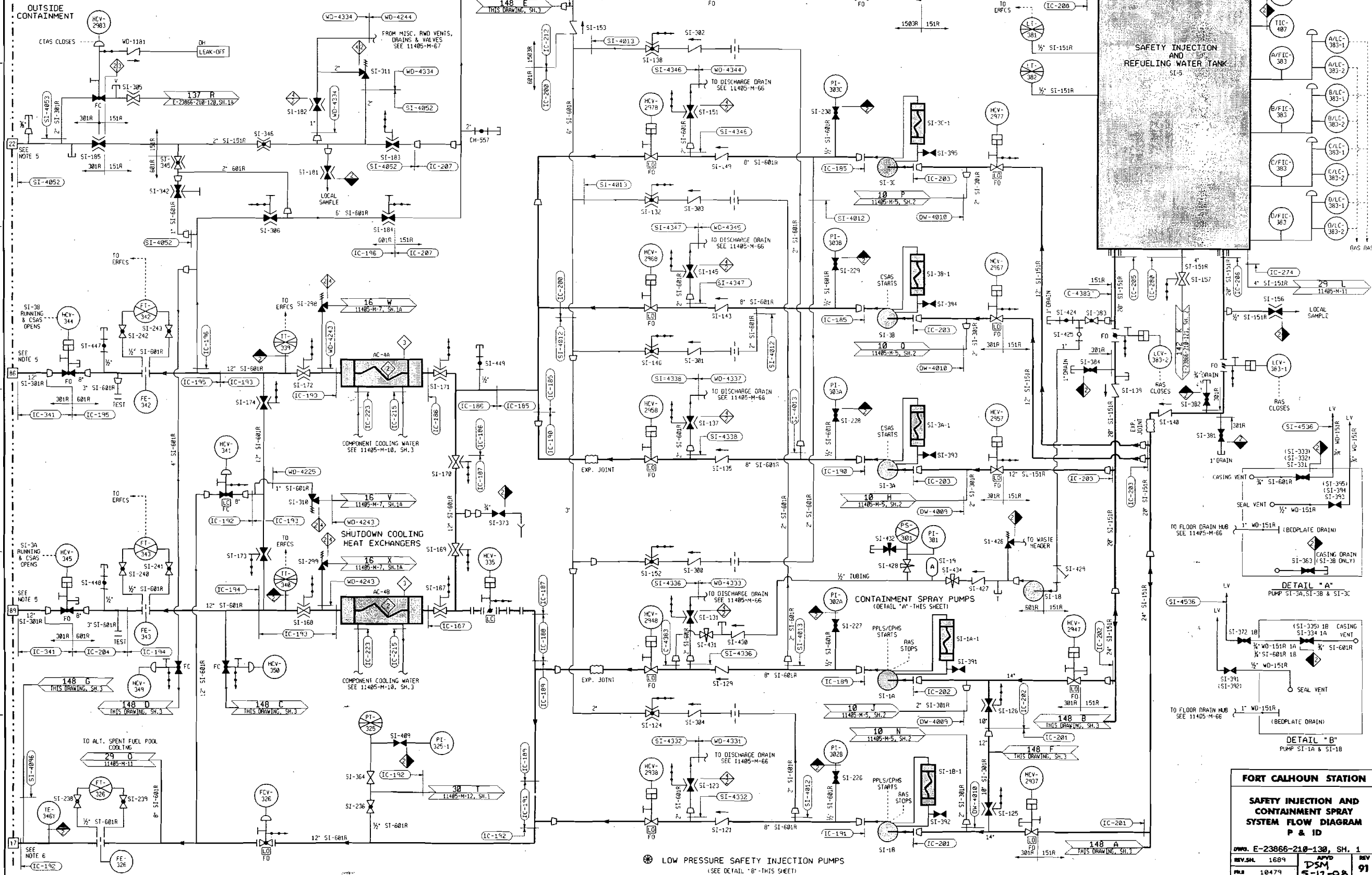
Joe Barbera

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5/14/2008



- NOTES:
1. FOR INSTRUMENT CHANNEL COMPONENTS SEE DWG. E-23866-413-100.
 2. ALL "M" SERIES INTERCONNECTING DWG. NUMBERS ARE QW&R 11405-M-XXI.
 3. DIRECT OPERATING SOLENOID VALVES.
 4. AIR CYLINDER OPERATED VALVE.
 5. PENETRATIONS M-22, M-86 AND M-89 ARE CONTINUED ON E-23866-210-130, SH.2
 6. PENETRATION M-17 IS CONTINUED ON E-23866-210-130, SH. 2A

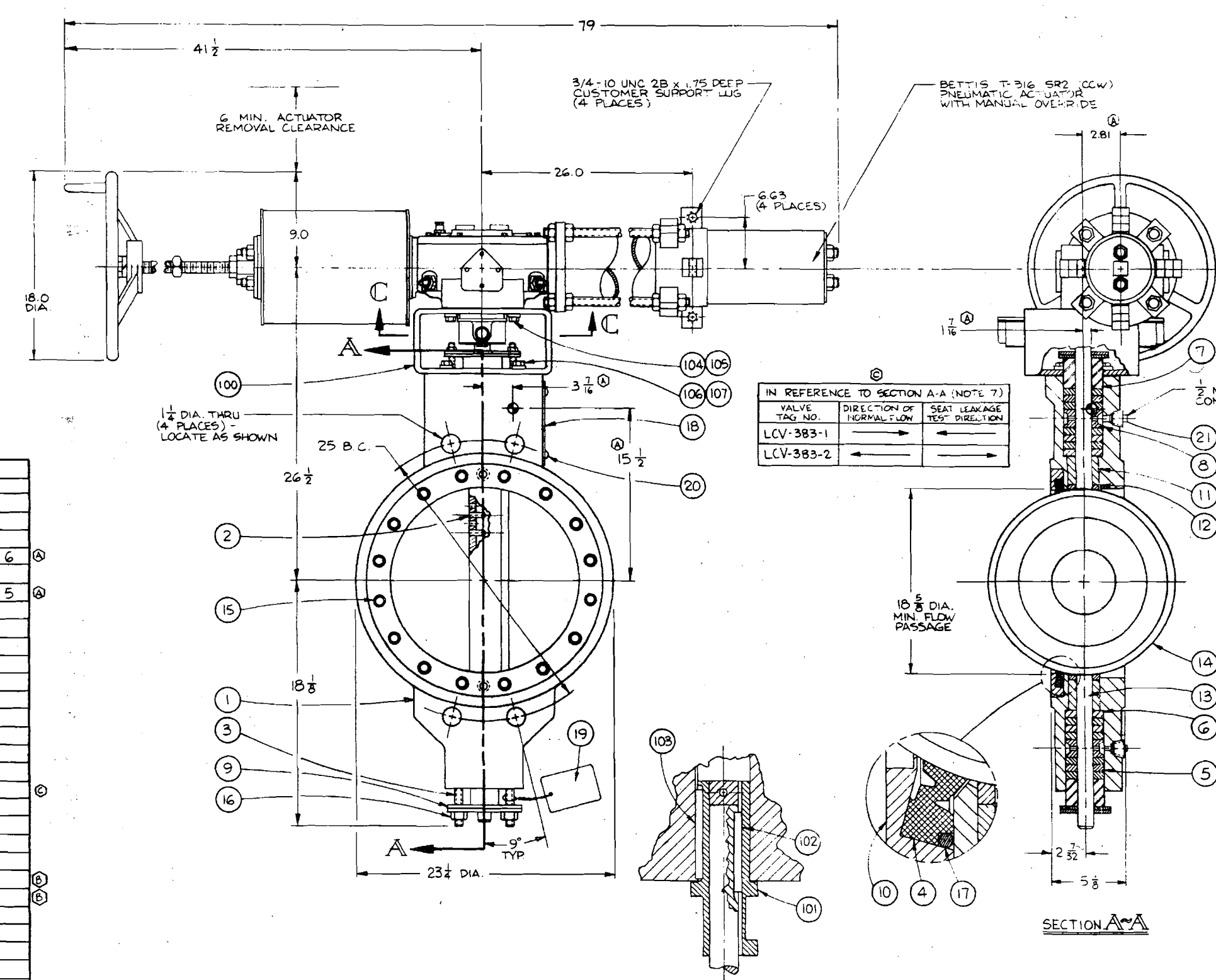
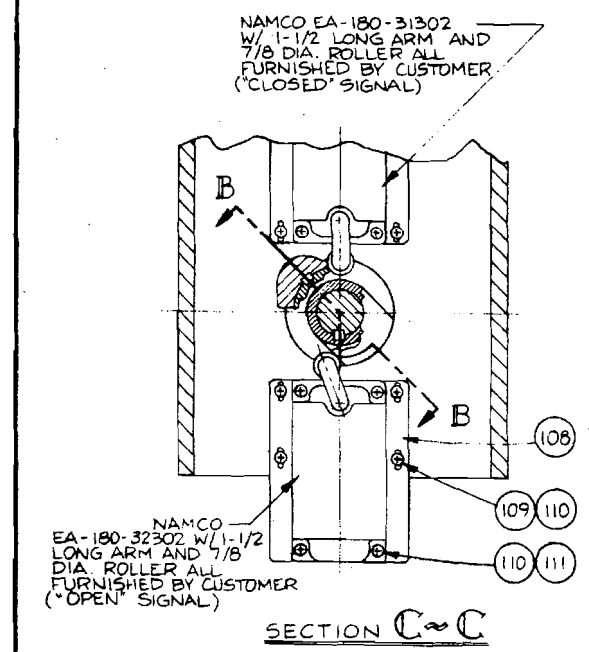


FORT CALHOUN STATION

**SAFETY INJECTION AND
CONTAINMENT SPRAY
SYSTEM FLOW DIAGRAM
P & ID**

DWG. E-23866-210-130, SH. 1
REV. SH. 1689
REV. 10479
DSM
S-12-08
REV 91

111	4	SOCK HD. CAP SCREW	1/4" - 20 x 1 1/2 LONG COMMERCIAL STEEL		
110	8	SPLIT WASHER	COMMERCIAL STEEL		
109	4	SOCK HD. CAP SCREW	1/4" - 20 x 7/8 LONG COMMERCIAL STEEL		
108	2	MOUNT PLATE	COMMERCIAL STEEL		
107	4	SPLIT WASHER	COMMERCIAL STEEL		
106	4	HEX HD. CAP SCREW	3/4" - 10 x 1-3/4 LONG ASTM A193 GR B7	6	A
105	4	SPLIT WASHER	COMMERCIAL STEEL		
104	4	HEX HD. CAP SCREW	7/8" - 9 x 1-3/4 LONG ASTM A193 GR B7	5	A
103	1	KEY	ASTM A276 XM-2B		
102	1	KEY	ASTM A276 XM-2B		
101	1	ADAPTER/CAM ASSY	ASME SA564 GR G30	2	
100	1	MOUNT YOKE	ASTM A500 GR B		
21	2	PIPE PLUG	ASME SA479 TY 316		
20	8	DRIVE PIN	COMMERCIAL SS		
19	1	NAMEPLATE	COMMERCIAL SS		
18	1	NAMEPLATE	COMMERCIAL SS		
17	1	O-RING	VITON		
16	4	HEX NUT	ASME SA194 GR B		
15	16	SOCK. HD. CAP SCREW	ASTM F437 AUSTENITIC STAINLESS	1	
14	1	DISK	ASME SA351 CF8M	1,2,3	
13	1	SHAFT	ASME SA564 GR G30	1,2	
12	2	THRUST WASHER	ASTM B505-UN9 C90400		
11	2	BUSHING	ASTM B505-UN9 C90300		
10	1	SEAT RETAINER	ASME SA240 TY 304		
9	4	GLAND RETAINER	ASME SA479 TY 304		
8	2	LANTERN RING	ASTM A479 GR 304		
7	2	GLAND RING	ASTM A479 GR 304		
6	2	GLAND RING	ASTM A479 GR 304		
5	12	PACKING	GRAFOIL		
4	1	SEAT	UHMWPE		
3	4	STUD	ASME SA193 GR BB		
2	4	PIN	ASME SA479 TY 316		
1	1	BODY	ASME SA351 CF8M	1,2,3	
DET. NO.	NO. REQD	DESCRIPTION	MATERIAL	NDT	GEN. NOTES



IN REFERENCE TO SECTION A-A (NOTE 7)

VALVE TAG NO.	DIRECTION OF NORMAL FLOW	SEAT LEAKAGE TEST DIRECTION
LCV-383-1	→	←
LCV-383-2	←	→

- NDT NOTES
1. CERTIFIED MAT'L TEST REPORTS REQUIRED.
 2. LIQUID PENETRANT EXAM. REQ'D ON ALL ACCESSIBLE AREAS OF CLEANED CASTINGS, PRECIP. HARDENED MAT'L'S AFTER FINAL HEAT TREAT. EXAMINATION PER ASME SECT VIII, APPENDIX VIII, ACCEPTANCE STDS. ANG. B31.1-1967.
 3. RADIOGRAPHY PER ASTM E-94 ACCEPTANCE STDS PER ASTM E-446 OR E-186 CLASS I OR CLASS 2.
 4. HYDROTEST IN ACCORDANCE WITH ANCHOR/DARLING PROCEDURE EN-HST-1.

- GENERAL NOTES
1. TOTAL ASSEMBLY WEIGHT IS 1233 LBS. VALVE ASSEMBLY MAY BE MOUNTED WITH ACTUATOR UP TO 36° FROM TOP CENTER LOCATION.
 - 2.
 - 3.
 4. ACTUATOR MUST BE MOUNTED TO VALVE OR REMOVED FROM VALVE WHILE VALVE IS IN FULL UPRIGHT POSITION SHOWN IN ACCORDANCE WITH APPROVED INSTALLATION/MAINTENANCE PROCEDURE.
 5. TORQUE (DRY) 180-200 FT.-LBS.
 6. TORQUE (DRY) 130-150 FT.-LBS.
 7. NORMAL FLOW AND SEAT LEAKAGE TEST DIRECTION SHALL BE AS INDICATED IN THE CHART ADJACENT TO VIEW A-A.
 8. ROTATION OF HANDWHEEL IN THE COUNTERCLOCKWISE DIRECTION WILL CLOSE VALVE.
- * SUPPLIED IN ACCORDANCE WITH ORPD PURCHASE ORDER NO. BPI7960 001

ANCHOR/DARLING INDUSTRIES, INC.

20" WAFER STYLE BUTTERFLY VALVE, 150# CLASS, WITH A BETTIS T-316 ACTUATOR

UNLESS OTHERWISE SPECIFIED TOLERANCES SHALL BE:

FRACTIONAL DIMENSIONS: 1/16

DECIMALS WITH -

Two Decimal Places ± .010

Three Decimal Places ± .005

STD. FINISH 125 RMS UNLESS NOTED OTHERWISE

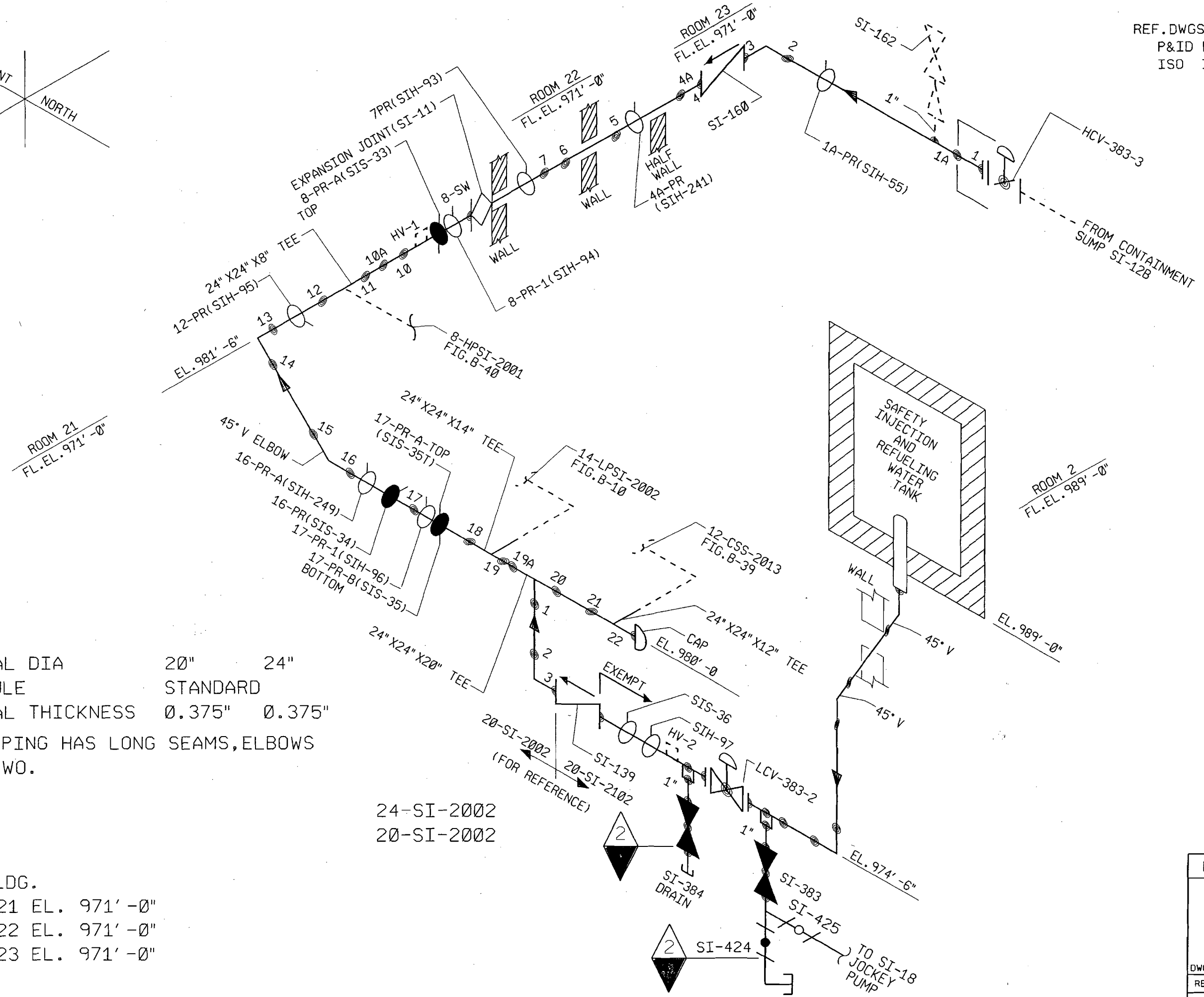
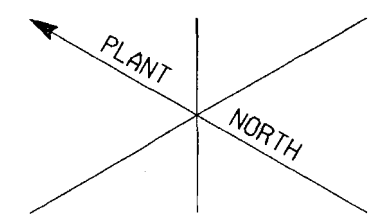
OWN BY: T. HARRIS DATE: 10/10/91 DRAWING TYPE: REV.

CHK BY: JAM SCALE: NTS 2498-20-50 C

PORT CALHOUN STATION
PRODUCTION ENGINEERING DIVISION
REV. SH. 34673
FILE 44441
REV. 10/24/92

NOTE: NOTE 2 WAS "SECT XIII - GEN'L NOTES AND: NOTE 1 WAS 1170 LBS, NOTES 4 & 5 C. ADD'D. ACTUATOR ORIENT: 3.0° DIA. APPROX. C.G. POINTS NAMED AND (7/16) DIA. APPROX. C.G. POINTS ON FRONT VIEW CHAS'D. 3/16 WAS 3/16, 15/16 WAS 15/16. CHANGED ON EAM 1630 11/14/91 BY JAM/WP

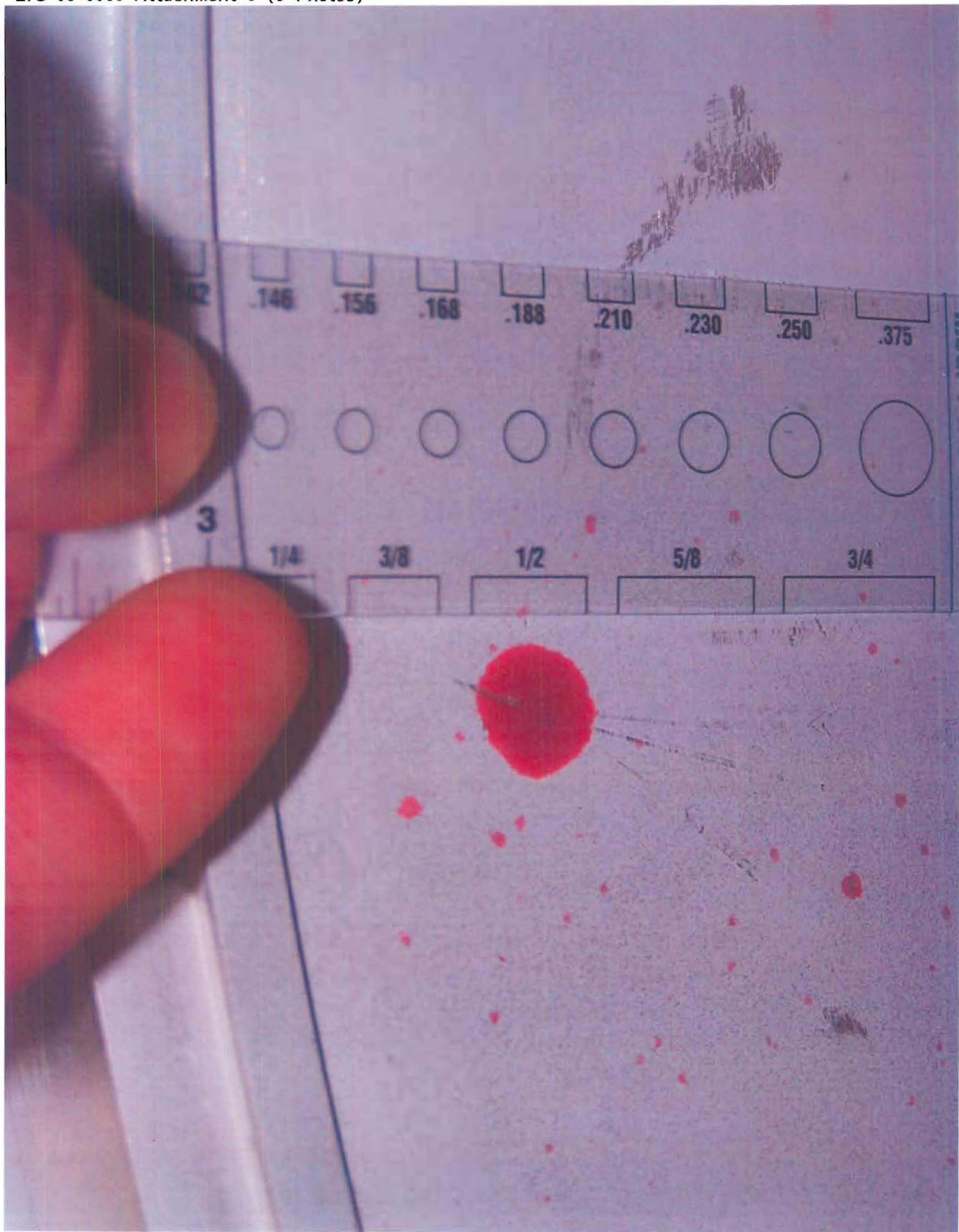
NOTE: NOTE 2 WAS "SECT XIII - GEN'L NOTES AND: NOTE 1 WAS 1170 LBS, NOTES 4 & 5 C. ADD'D. ACTUATOR ORIENT: 3.0° DIA. APPROX. C.G. POINTS NAMED AND (7/16) DIA. APPROX. C.G. POINTS ON FRONT VIEW CHAS'D. 3/16 WAS 3/16, 15/16 WAS 15/16. CHANGED ON EAM 1630 11/14/91 BY JAM/WP

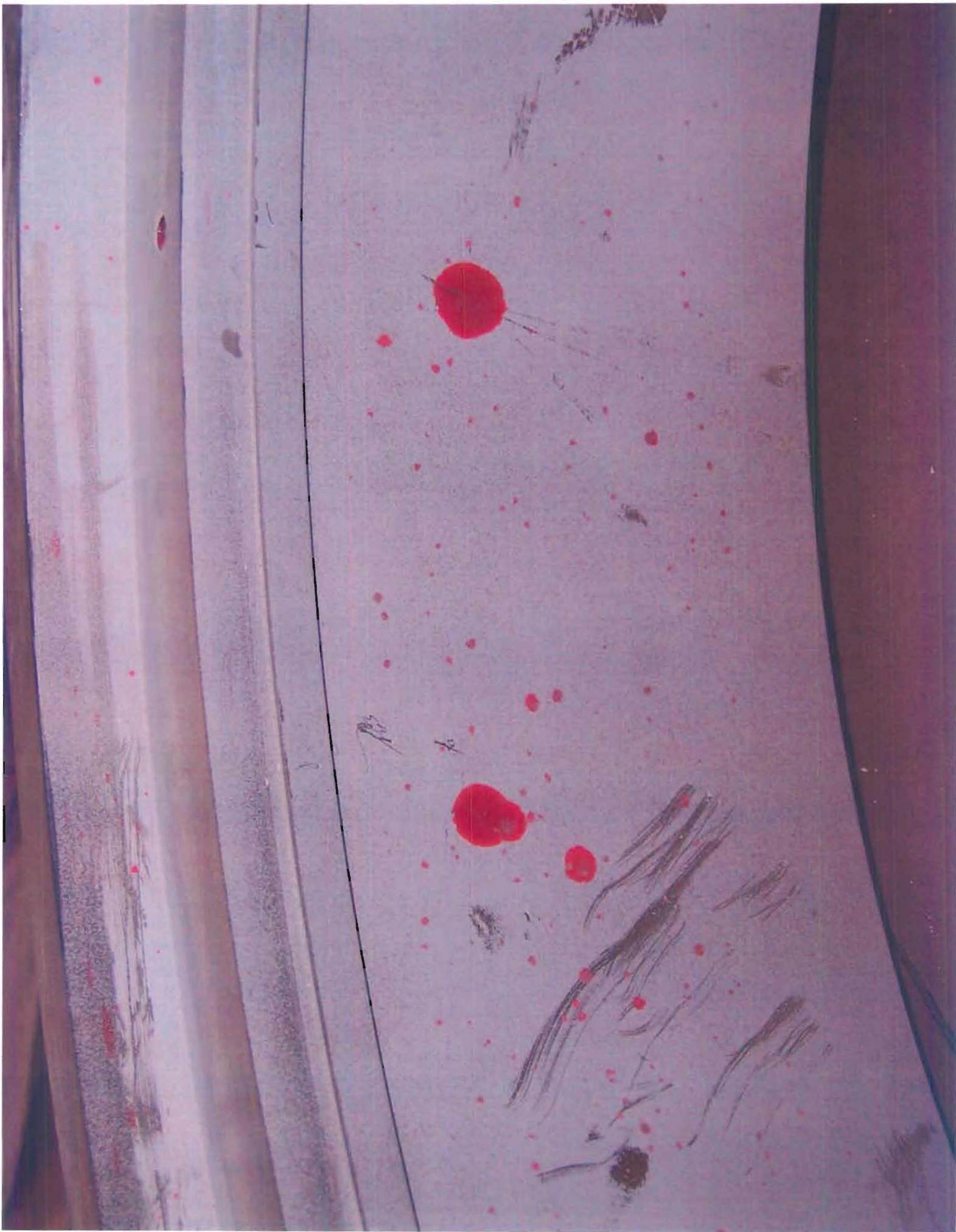


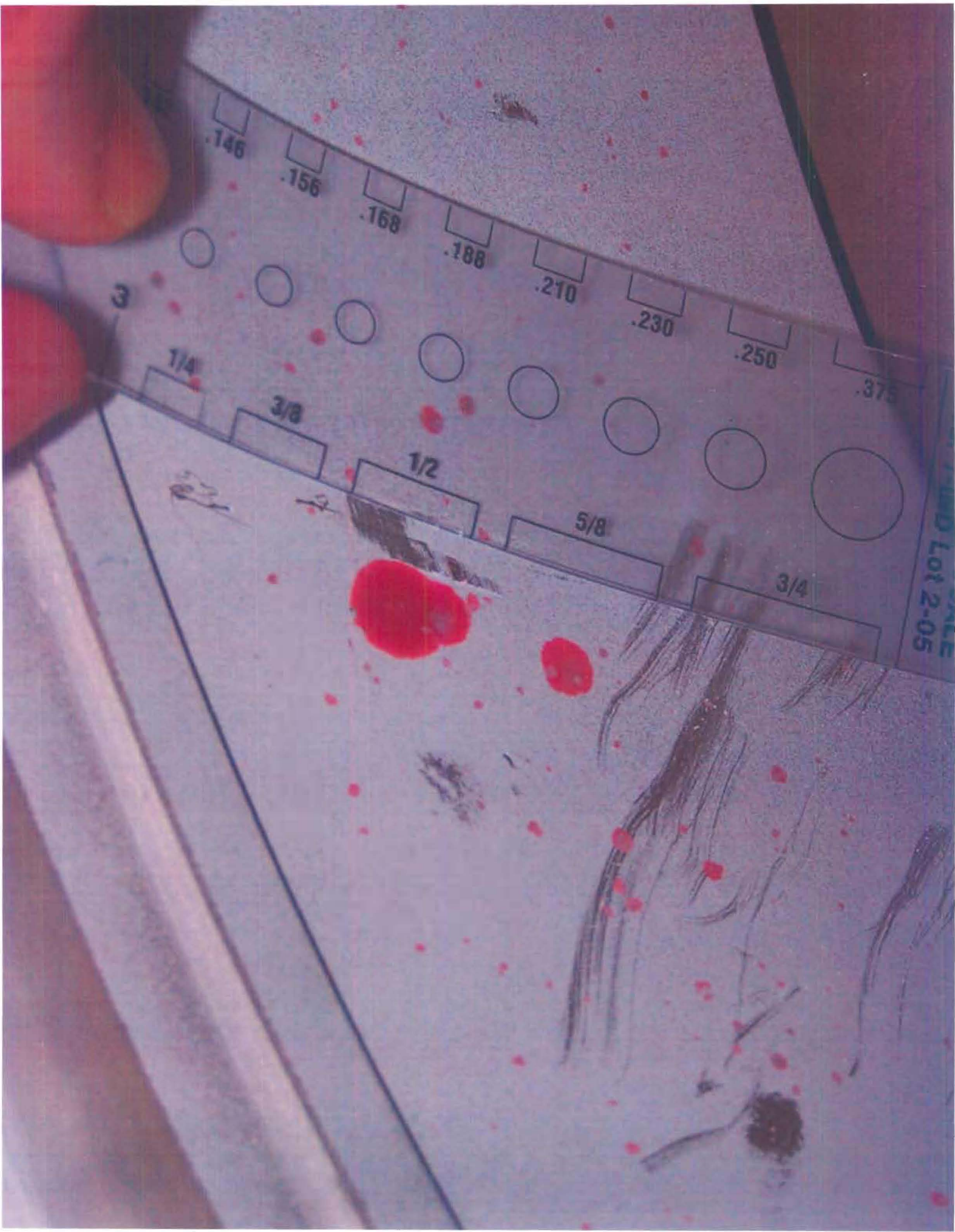
NOMINAL DIA 20" 24"
SCHEDULE STANDARD
NOMINAL THICKNESS 0.375" 0.375"
ALL PIPING HAS LONG SEAMS, ELBOWS
HAVE TWO.

AUX. BLDG.
ROOM 21 EL. 971' -0"
ROOM 22 EL. 971' -0"
ROOM 23 EL. 971' -0"

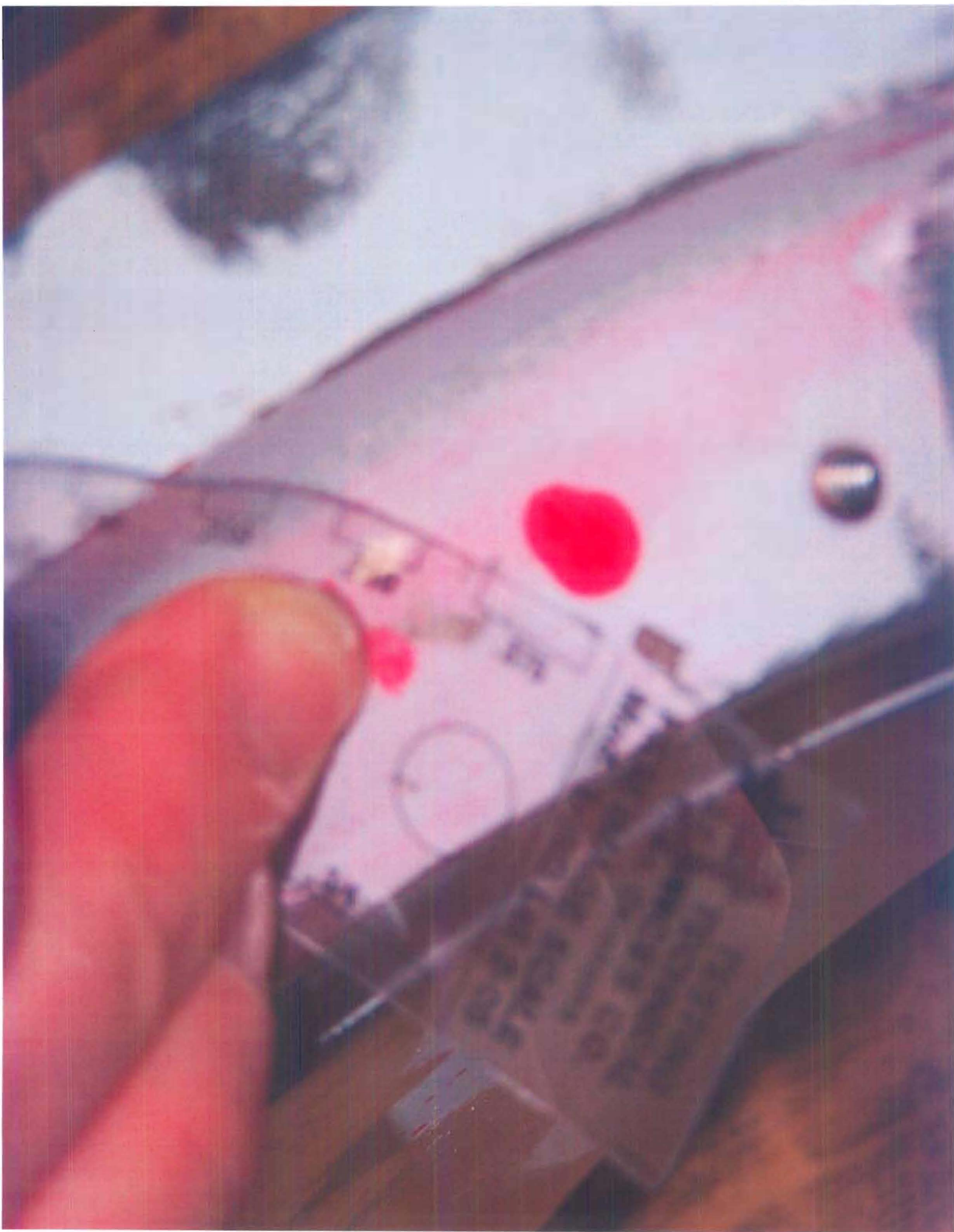
FORT CALHOUN STATION		
I.S.I. ISOMETRIC B-37		
DWG. FIGURE B-37, SH. 1		
REV. SH. 21296	APVD DSM 4-20-06	REV 8
FILE 23423		

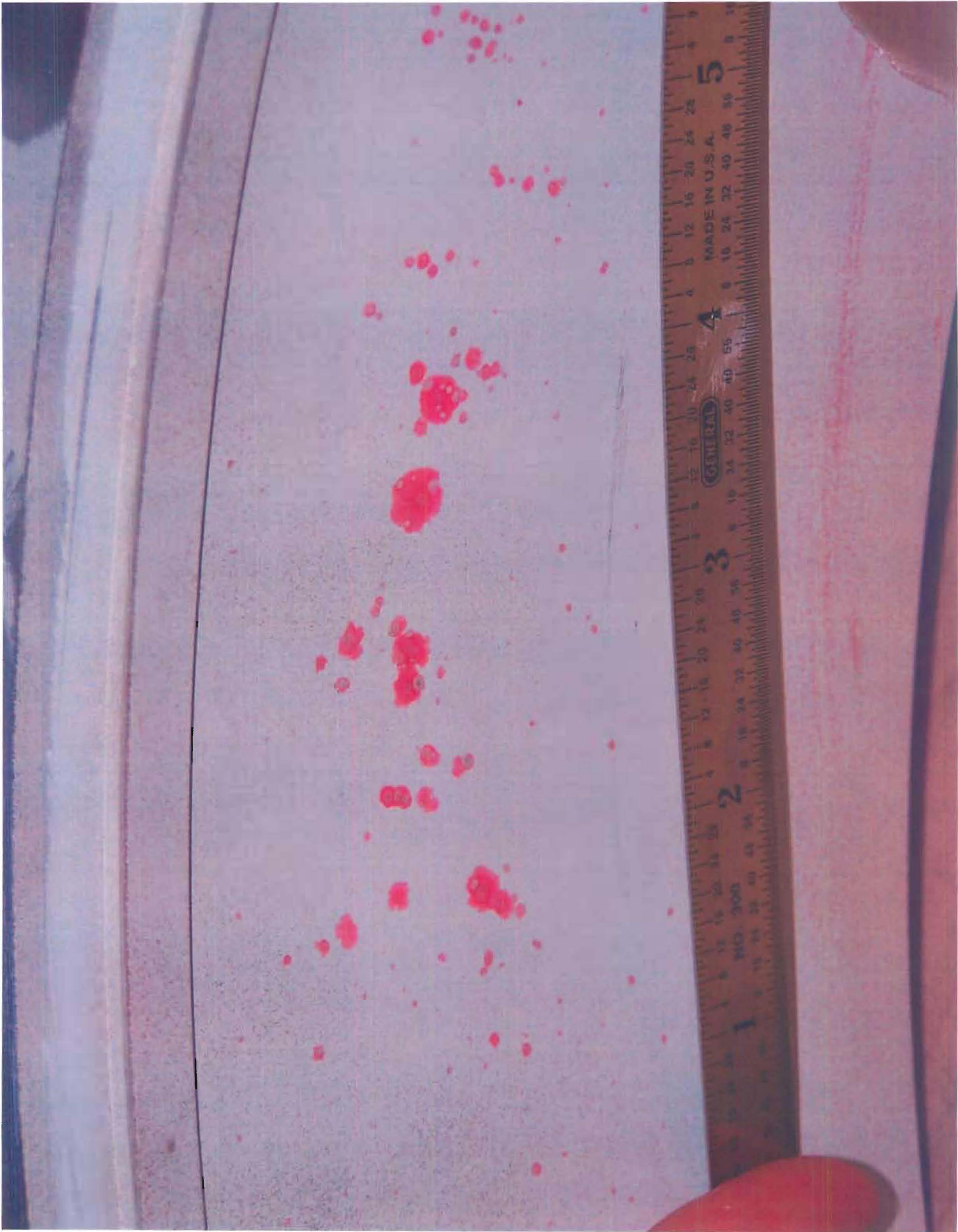




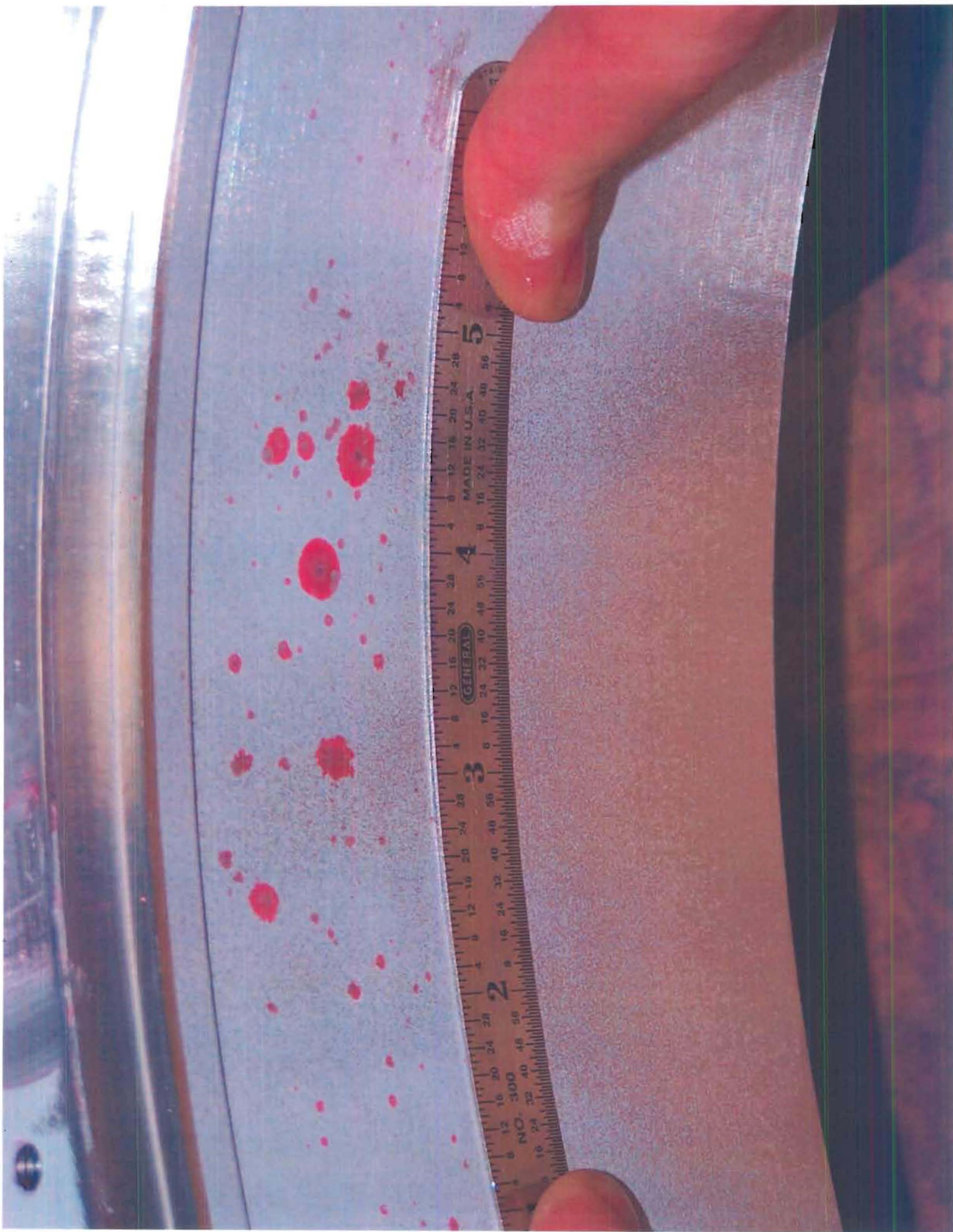


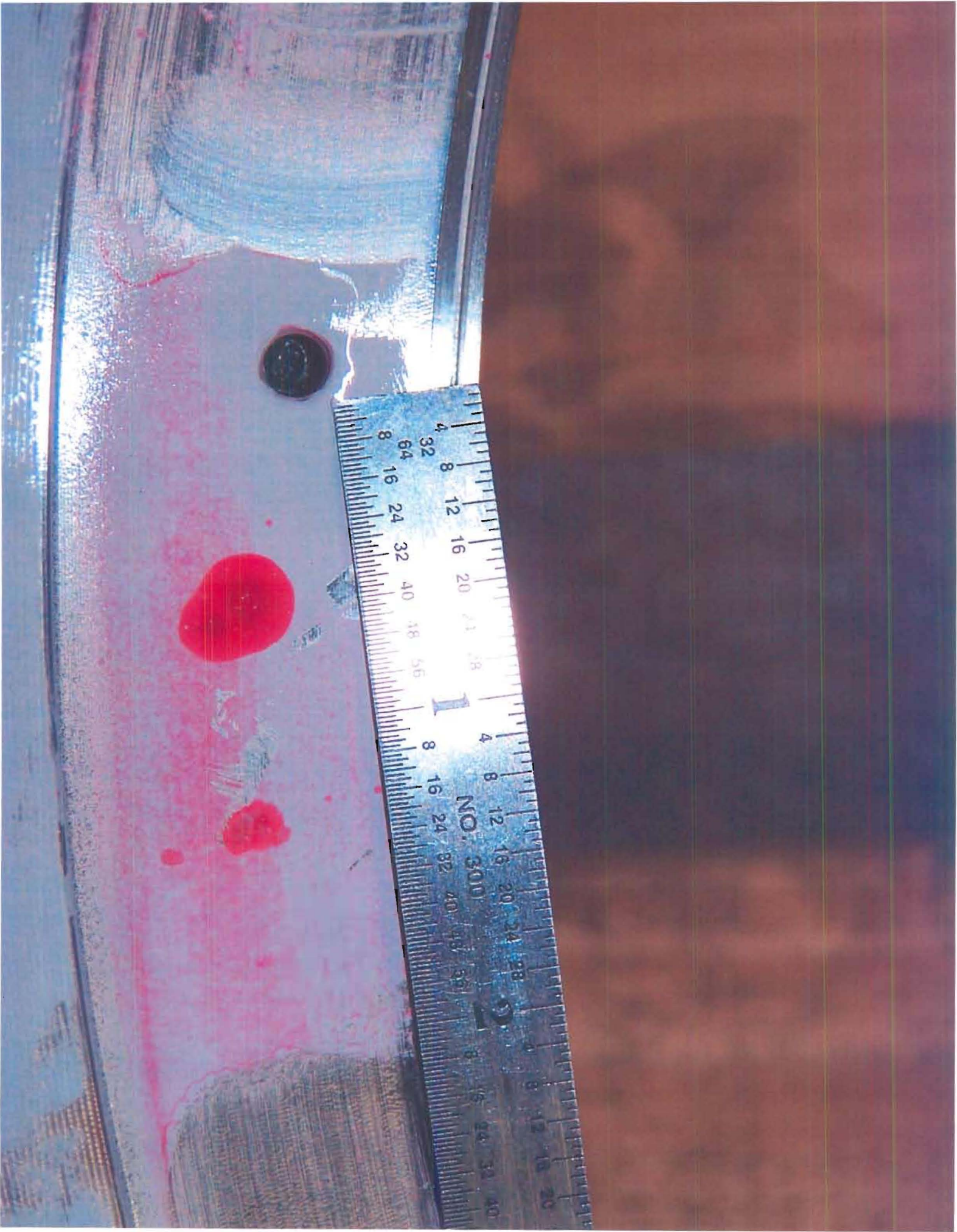
Lot 2-05

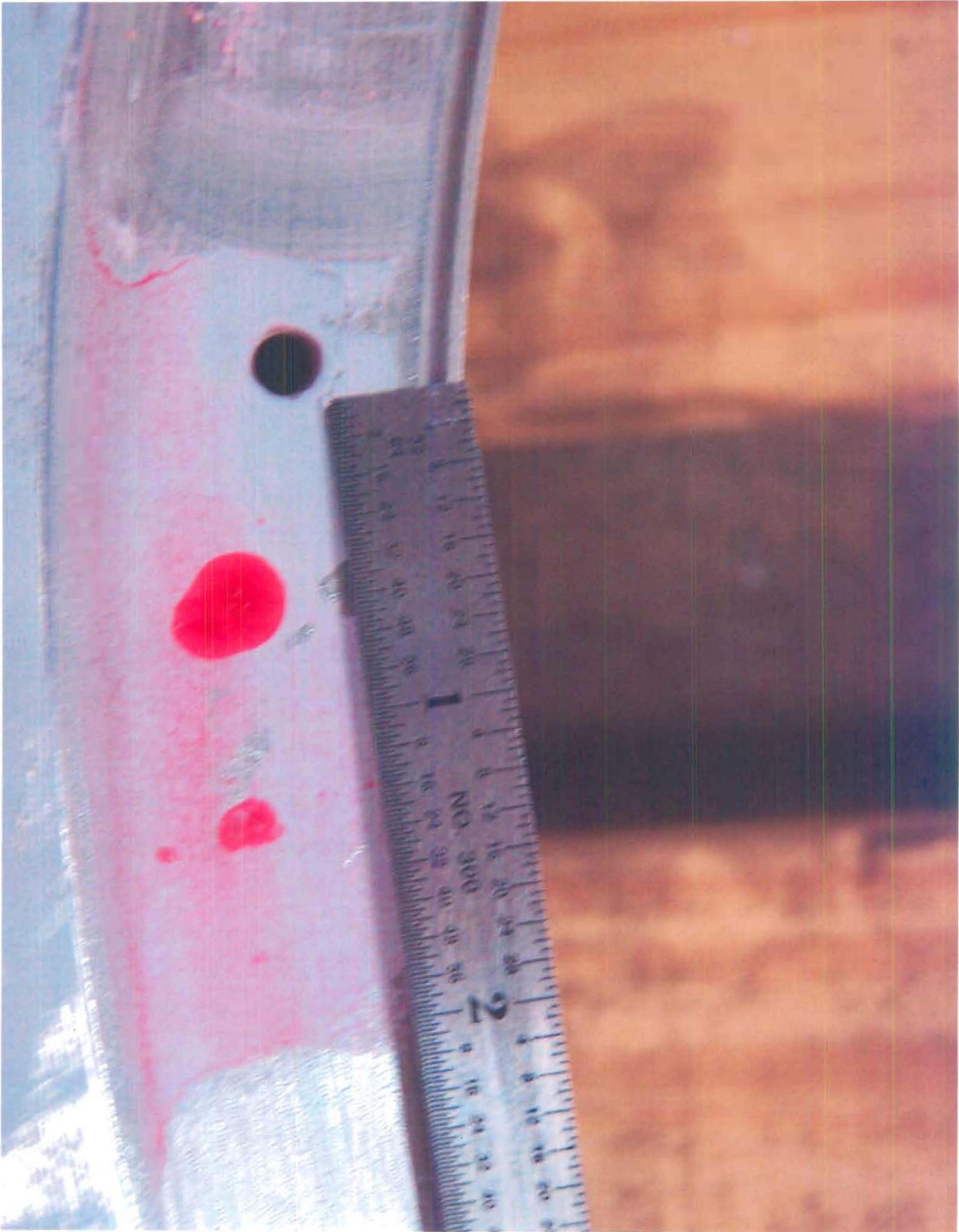












Product Bulletin

21.1:A31A

October 2005

A31A Valve

POSI-SEAL[®] Type A31A High-Performance Butterfly Valve

The POSI-SEAL[®] Type A31A High Performance Butterfly Valve (figure 1) provides outstanding performance under extreme pressure and temperature conditions. The Type A31A valve maintains tight shutoff and is available in a fire-tested version.

The Type A31A valve is available as either a flangeless (wafer style) design or as a single-flange (lugged) design. A keyed drive shaft combines with a variety of hand levers, hand wheels, or pneumatic piston diaphragm actuators to make the Type A31A a reliable, high-performance butterfly valve for a variety of on-off applications in the various process industries.

The Type A31A valve can be supplied with one of several dynamic seals (figure 2) that can be used in a variety of demanding applications. With the appropriate seal selection and materials of construction, the pressure-assisted seal provides excellent shutoff against the full ANSI class pressure range for the specific valve type.

Unless otherwise noted, all NACE references are to NACE MR0175-2002.

Note

Neither Emerson[®], Emerson Process Management, Fisher[®], nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use and maintenance of any product remains with the purchaser and end-user.

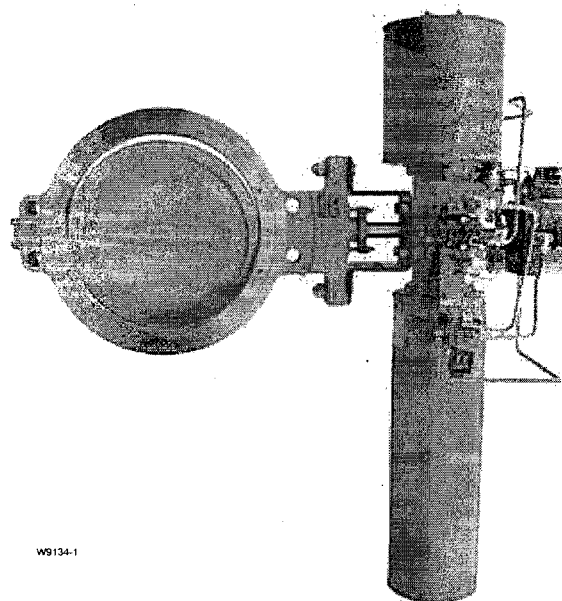


Figure 1. Type A31A Valve with Bettis[®] Actuator and DVC6020 Digital Valve Controller



Specifications

Valve Sizes⁽¹⁾

■ 14-, ■ 16-, ■ 18-, ■ 20-, and ■ 24-inch

Available Valve Configurations

■ Flangeless (wafer) style or ■ single-flange (lugged) control valve with a one-piece valve body, a two-component seal/backup O-ring, and a keyed drive shaft

End Connection Style

■ Flangeless style or ■ single flange valve body designed to fit between raised-face mating flanges per ASME B16.5 Class 150 or 300

Valve Body Classification

Face-to-face dimensions are in compliance with MSS SP68 and API 609 standards; valve bodies are designed for installation between ASME B16.5 Class 150 or 300 raised-face flanges

Maximum Inlet Pressure/Temperature⁽²⁾

Consistent with ANSI Class ■ 150 and ■ 300 pressure/temperature ratings per ASME B16.34. Also, see figure 3 for additional information

Available Seal Configurations

See figure 2 and table 1

Standard Construction Materials

See table 1

Disc Coating

Hardcoating (also see table 1)

■ Standard when used with NOVEX™ seal or Phoenix III® seal.

Shaft Extension Lengths

■ None required for temperatures less than 343°C (650°F), ■ 152.4 mm (6 inches) for temperatures from 343 to 538°C (650 to 1000°F), or ■ 304.8 mm (12 inches) for temperatures above 538°C (1000°F)

Shutoff Classification per ANSI/FCI 70-2 and IEC 60534-4

Standard Soft Seal: Bidirectional bubble-tight shutoff

NOVEX Seal: Unidirectional shutoff Class V (preferred flow direction only⁽³⁾)

Phoenix III Seal: Bidirectional bubble-tight

Phoenix III Seal for Fire Tested Applications: Shutoff per FCI 70-2 Class VI. Fire Tested per API 607 Rev. 4. Contact your Fisher sales office for more information.

Flow Characteristic

Modified equal percentage

Flow Coefficients and Noise Levels

See the section titled Coefficients in this bulletin and Catalog 12

Available Actuators

Handlever, handwheel, or pneumatic piston

Disc Rotation

Clockwise (CW) to close

Valve Dimensions and Approximate Weights

See figures 6, 7, 8 and 9

Options

ENVIRO-SEAL® PTFE or graphite packing system provides improved sealing, guiding, and transmission of loading force to control liquid and gas emissions. See Bulletin 59.3:041 ENVIRO-SEAL Packing Systems for Rotary Valves for more information.

Cryogenic extension and seal provides service down to -234°C (-425°F). See Bulletin 21.1:Cryogenic-Rotary for more information.

1. The valve sizes listed in this bulletin refer to Nominal Pipe Size (NPS).

2. The pressure/temperature limits in this bulletin (figure 3), and any application code or standard limitation, should not be exceeded.

3. For optimum seal performance, the preferred valve orientation at shutoff is with the retaining ring downstream from the high pressure side of the valve.

Features

- **Economical Tight Shutoff**—The pressure-assisted seal design provides tight shutoff and permits the use of smaller, less expensive actuators in applications requiring full ASME B16.34 shutoff capabilities.

- **Excellent Shutoff Integrity**—Concentric rotation helps to ensure that the valve disc remains in the closed position in spite of line pressure surges or actuator failure.

- **True Bi-directional Shutoff Performance**—Valve design helps to ensure that the torque necessary to open and close the valve is the same regardless of the direction in which the differential pressure is applied.

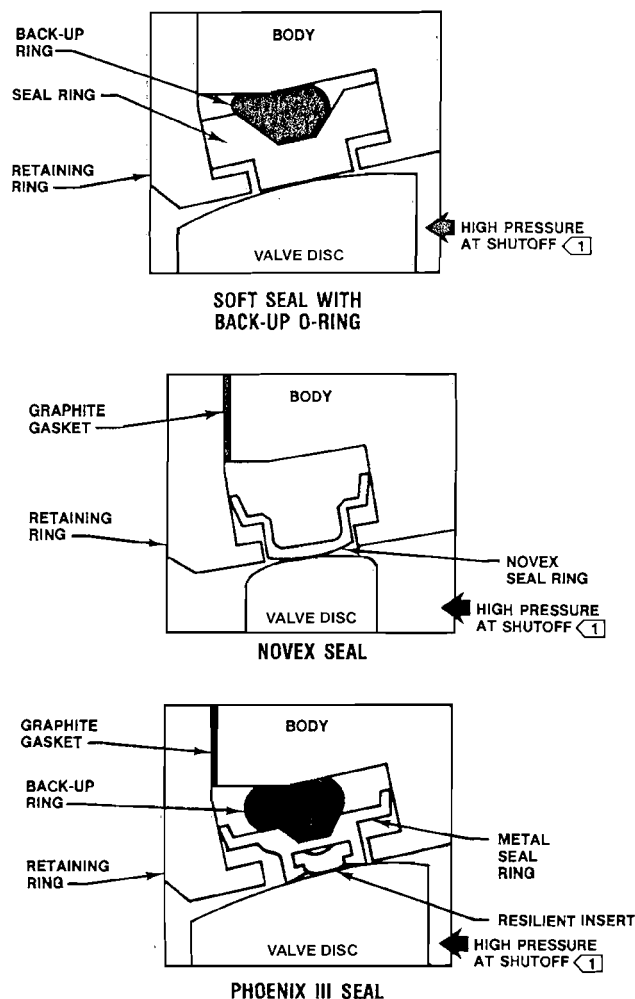
- **Safety**—Shaft blowout protection is designed into the Type A31A valve (figure 4). The anti-blowout gland fits securely over the valve shaft which has been turned down to form a circumferential shoulder that contacts the anti-blowout gland.

- **Ease of Maintenance**—Interchangeability of all parts including shafts and discs simplifies service and reduces maintenance costs.

- **Improved Environmental Capabilities** — The optional ENVIRO-SEAL packing system is designed with improved sealing, guiding, and loading force transmission. The ENVIRO-SEAL packing system can control emissions to below the EPA (Environmental Protection Agency) limit of 500 ppm (parts per million) for valves.

- **Reliable Flange Gasketing Surface**—Seal retainer screws are located so there is no interference with the sealing function of either flat sheet or spiral wound line flange gaskets.

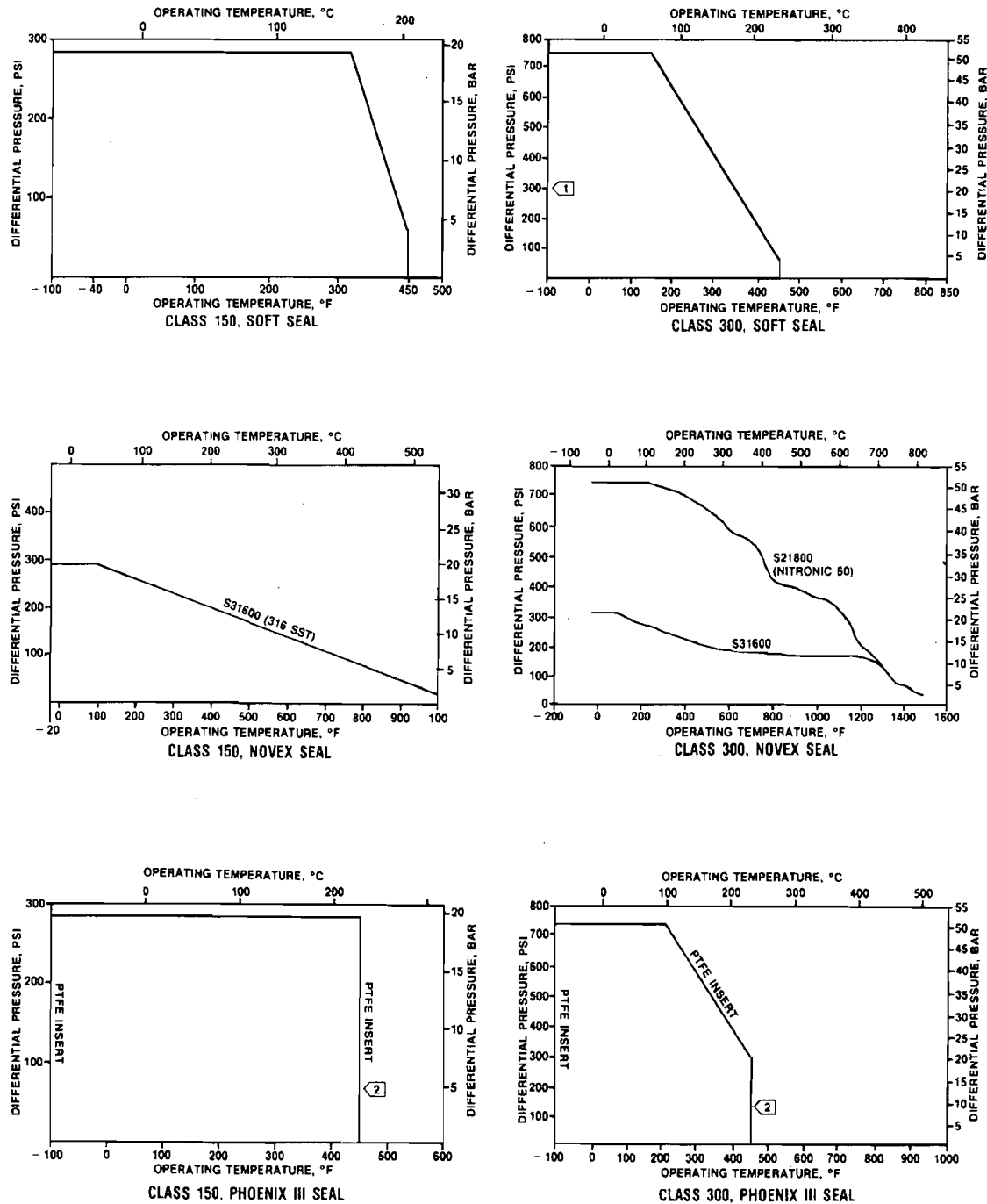
- **Easy Installation**—The valve body self-centers on the line flange bolts as a fast, accurate means of centering the valve in the pipeline.



NOTE:
① FOR OPTIMUM SEAL PERFORMANCE, THE PREFERRED VALVE ORIENTATION AT SHUTOFF IS WITH THE RETAINING RING DOWNSTREAM FROM THE HIGH PRESSURE SIDE OF THE VALVE.

82334-1 / IL

Figure 2. Available Seal Configurations



NOTE:

① DO NOT THROTTLE PTFE SEALS AT DIFFERENTIAL PRESSURES GREATER THAN 21 BAR (300 PSID) AT DISC ANGLES LESS THAN 20° OPEN. THROTTLING PIPE SEALS UNDER SUCH CONDITIONS MAY CAUSE EROSION AND SEAL FAILURE.

NOTE:

② TEMPERATURE LIMITATIONS DO NOT ACCOUNT FOR THE ADDITIONAL LIMITATIONS IMPOSED BY THE BACKUP O-RING USED WITH THIS SEAL. TO DETERMINE THE EFFECTIVE TEMPERATURE LIMITATION OF THE APPROPRIATE SEAL/BACKUP O-RING COMBINATION, REFER TO TABLE 2.

00759-2 / IL

Figure 3. Maximum Pressure/Temperature Ratings

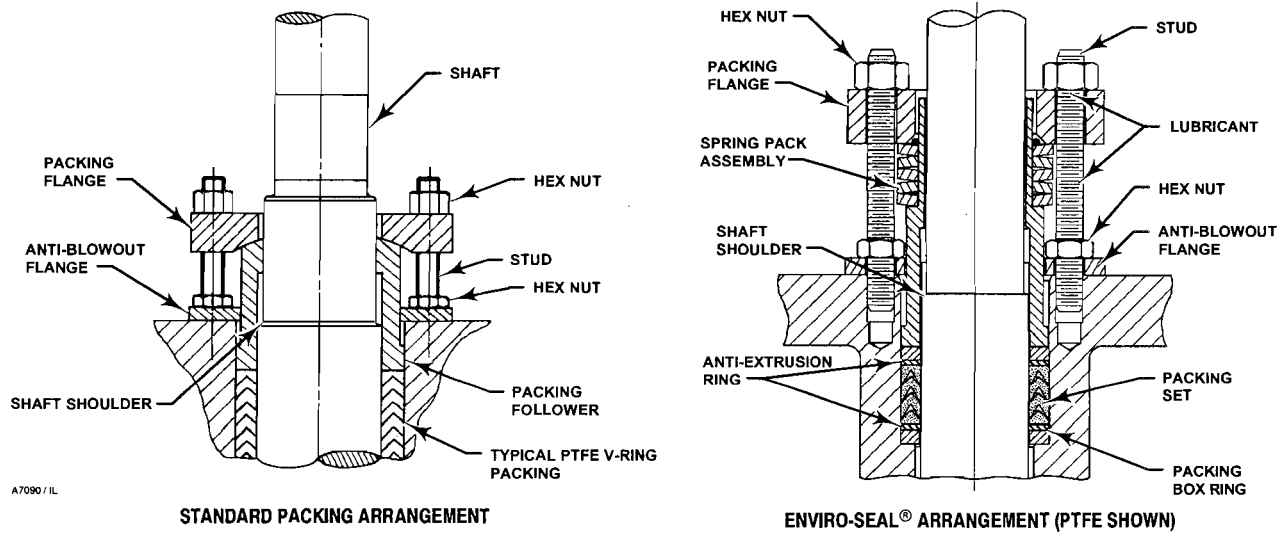


Figure 4. Blowout Protection

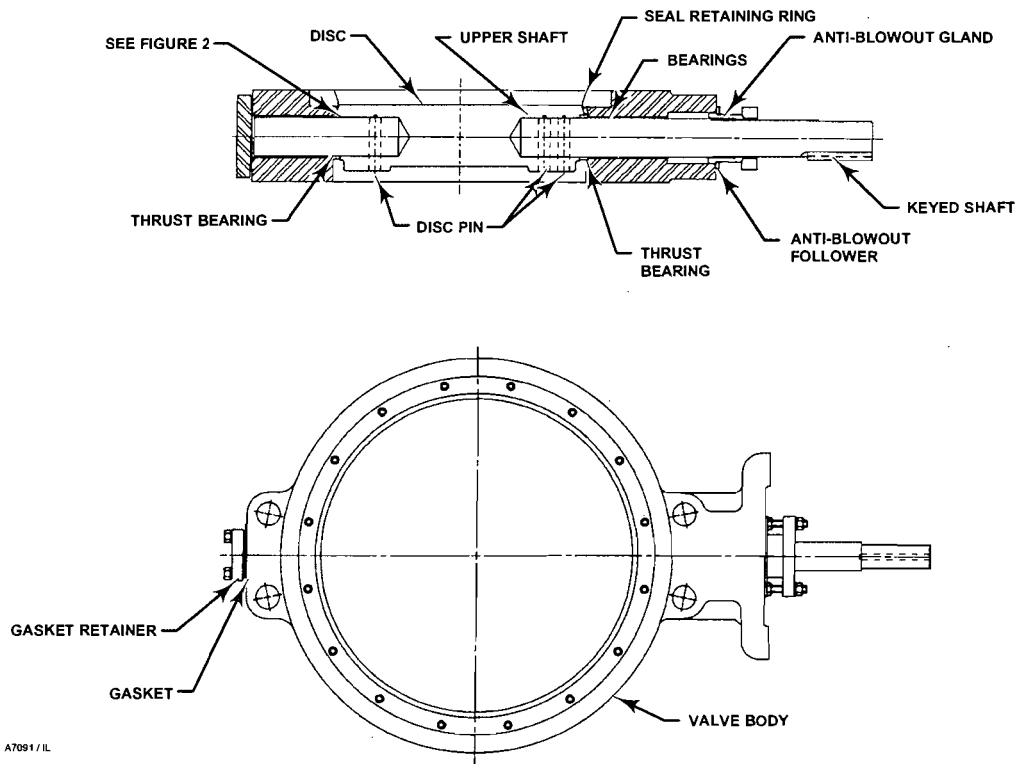


Figure 5. Typical Valve Assembly

A31A Valve

Product Bulletin

21.1:A31A
October 2005

Table 1. Materials of Construction and Temperature Ratings

COMPONENT AND MATERIAL OF CONSTRUCTION ⁽¹⁾		TEMPERATURE RANGE	
		°C	°F
Valve Body⁽²⁾			
Carbon steel (WCC or SA 517-70) ⁽⁸⁾		–29 to 427	–20 to 800
CF8M (316 SST) ANSI Class 150 and 300		–198 to 538	–325 to 1000
CF8M ⁽³⁾ FMS 20B16 a Fisher material standard (0.04% min carbon) Class 300		over 538 to 816	over 1000 to 1500
Disc			
WCC carbon steel, for sizes 14 through 24-inch		–29 to 427	–20 to 800
CF8M (316 SST)		–198 to 538	–325 to 1000
CF8M ⁽³⁾ FMS 20B16 a Fisher material standard (0.04% min carbon) Class 300		over 538 to 816	over 1000 to 1500
Disc Coating			
CoCr-A (Alloy 6)		–198 to 916	–325 to 1500
Hard Coating ⁽⁷⁾ (Standard with NOVEX or Phoenix III Seals)		–254 to 538	–425 to 1000
Shaft			
S20910 (Nitronic 50)		–198 to 538	–325 to 1000
S17400 (17-4 pH 1025)		–73 to 427	–100 to 800
S17400 (17-4 pH H1150M)		–196 to 427	–320 to 800
N07718 (Inconel 718)		–254 to 704	–425 to 1300
N07750 (Inconel 750)		over 593 to 816	over 1100 to 1500
Bearings⁽⁶⁾			
PEEK (standard)		–73 to 260	–100 to 500
S31600 ⁽⁴⁾		–198 to 816	–325 to 1500
R30006 (Alloy 6)		–198 to 816	–325 to 1500
Bronze		–254 to 302	–425 to 575
Packing			
PTFE Packing and PTFE ENVIRO-SEAL Packing		–148 to 232	–325 to 450
Graphite packing		–198 to 916	–325 to 1500
Graphite packing with oxidizing media		–198 to 538	–325 to 1000
Graphite ENVIRO-SEAL Packing		–148 to 315	–325 to 600
Seal Ring and Backup Ring	PTFE Seal Ring		
	Nitrile Backup O-Ring	–29 to 93	–20 to 200
	Neoprene Backup O-Ring	–43 to 149	–45 to 300
	EPR Backup O-Ring	–54 to 182	–65 to 360
	Fluoroelastomer Backup O-Ring	–29 to 204	–20 to 400
	PTFE Backup O-Ring	–73 to 204	–100 to 400
	UHMWPE⁽⁵⁾ Seal Ring (Class 150 Only)		
	Nitrile Backup O-Ring	–29 to 93	–20 to 200
	Neoprene Backup O-Ring	–43 to 93	–45 to 200
Seal Ring	Phoenix III and/or Fire Tested Construction		
	S31600 and PTFE Seal Ring with Nitrile Backup O-Ring	–40 to 149	–40 to 300
	Neoprene Backup O-Ring	–54 to 149	–65 to 300
	EPR Backup O-Ring	–62 to 204	–80 to 400
	Fluoroelastomer Backup O-Ring	–40 to 232	–40 to 450
	NOVEX S31600 Seal ⁽⁴⁾ Ring (Class 150)	–29 to 816	–20 to 1500
	NOVEX S31600 Seal ⁽⁴⁾ Ring (Class 300)	–29 to 816	–20 to 1500
	NOVEX S21800 Seal ⁽⁴⁾ Ring (Class 300)	–29 to 816	–20 to 1500

1. NACE trim constructions are available; consult your Fisher sales office.

2. Special gasket retainer bolts are required for over 482°C (900°F).

3. Special retaining ring screws for single flange valves over 538°C (1000°F).

4. For a complete material description, contact your Fisher sales office.

5. UHMWPE stands for ultra high molecular weight polyethylene.

6. Special thrust bearings are required for high temp. applications over 343°C (650°F) (with 6 and 12-inch shaft extensions). Constructions with carbon steel valves and SST discs may require special thrust bearings at temps. less than 343°C (650°F).

7. The material for hard coating on the disc is either Hard Chrome Plating or Electroless Nickel Coating (ENC), depending upon availability.

8. Cast or wrought/plate grades used interchangeably, depending on availability, unless specified by customer.

Product Bulletin

21.1:A31A

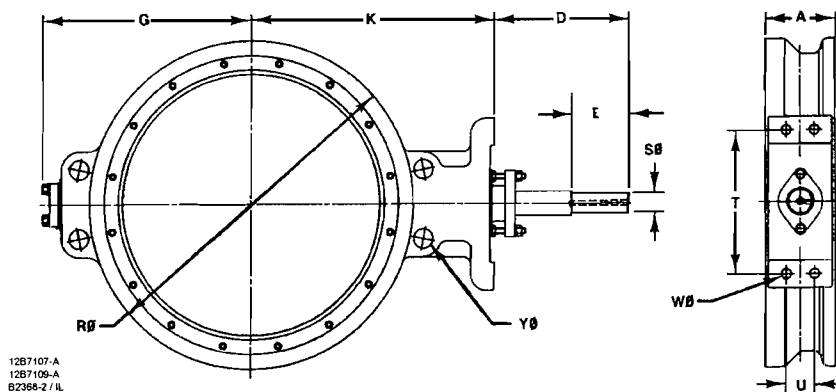
October 2005

A31A Valve

Table 2. Dimensions and Weights, Wafer Style Valves, ANSI Class 150

Valve Size, Inches	A ⁽¹⁾	D	E	G	K	M ⁽²⁾ Min. I.D.	R	S (Shaft Dia at Keyway)	Key SQ Size	T	U	W	Y	Approx Weight
mm														kg
14	91.9	146	63.5	295	327	331	422	30.2	6.35	235	46.0	17.5	---	72
16	102	146	63.5	318	371	375	470	31.8	6.35	235	46.0	17.5	28.4	94
18	114	229	79.50	349	400	419	533	38.1	9.53	273	50.8	20.6	31.8	139
20	127	229	79.50	381	432	464	584	44.5	9.53	273	50.8	20.6	31.8	167
24	154	254	104.9	438	492	581	692	57.2	12.7	337	76.2	23.9	35.1	255
Inches														Pounds
14	3.62	5.75	2.5	11.62	12.88	13.04	16.62	1-3/16	0.25	9.25	1.81	0.69	---	158
16	4.00	5.75	2.5	12.50	14.62	14.77	18.50	1-1/4	0.25	9.25	1.81	0.69	1.12	207
18	4.50	9.00	3.13	13.75	15.75	16.49	21.00	1-1/2	0.375	10.75	2.00	0.81	1.25	307
20	5.00	9.00	3.13	15.00	17.00	18.27	23.00	1-3/4	0.375	10.75	2.00	0.81	1.25	368
24	6.06	10.00	4.13	17.25	19.38	22.87	27.25	2-1/4	0.5	13.25	3.00	0.94	1.38	563

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.
2. Minimum I.D. is the minimum pipe or flange I.D. required for disc swing clearance.



NOTE: THE KEYWAY IS SHOWN ON THIS SIDE OF THE SHAFT FOR REFERENCE PURPOSES ONLY.

Figure 6. Dimensions and Weights, Wafer Style Valves, ANSI Class 150 (also see table 2)

A31A Valve

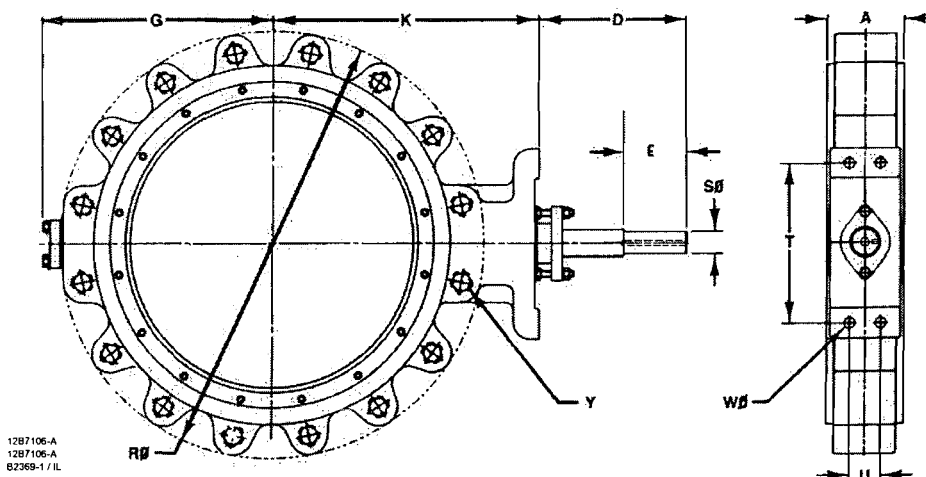
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Table 3. Dimensions and Weights, Single Flange Valves, ANSI Class 150

Valve Size, Inches	A ⁽¹⁾	D	E	G	K	M ⁽²⁾ Min. I.D.	R	S (Shaft Dia at Keyway)	Key SQ Size	T	U	W	Y	Approx Weight
mm														kg
14	91.9	146	63.5	295	327	331	531	30.2	6.35	235	46.0	17.5	---	95
16	102	146	63.5	318	371	375	607	31.8	6.35	235	46.0	17.5	---	138
18	114	229	79.50	349	400	419	645	38.1	9.53	273	50.8	20.1	---	178
20	127	229	79.50	381	432	464	696	44.5	9.53	273	50.8	20.1	---	224
24	154	254	104.9	438	492	581	822	57.2	12.7	337	76.2	23.9	---	315
Inches														Pounds
14	3.62	5.75	2.5	11.62	12.88	13.04	20.88	1-3/16	0.25	9.25	1.81	0.69	1-8 12 Holes	209
16	4.00	5.75	2.5	12.50	14.62	14.77	23.88	1-1/4	0.25	9.25	1.81	0.69	1-8 16 Holes	304
18	4.50	9.00	3.13	13.75	15.75	16.49	25.38	1-1/2	0.38	10.75	2.00	0.81	1-1/8-8 16 Holes	393
20	5.00	9.00	3.13	15.00	17.00	18.27	27.38	1-3/4	0.38	10.75	2.00	0.81	1-1/8-8 20 Holes	493
24	6.06	10.00	4.13	17.25	19.38	22.87	32.38	2-1/4	0.5	13.25	3.00	0.94	1-1/4-8 20 Holes	773

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.
2. Minimum I.D. is the minimum pipe or flange I.D. required for disc swing clearance.



NOTE: THE KEYWAY IS SHOWN ON THIS SIDE OF THE SHAFT FOR REFERENCE PURPOSES ONLY.

Figure 7. Dimensions and Weights, Single Flange Valves, ANSI Class 150 (also see table 3)

Installation

Recommended installation for the Type A31A valve is with the shaft upstream of the seal (retaining ring downstream from the high pressure side of the valve).

The standard soft seal offers bubble-tight, bidirectional shutoff. To meet the performance requirements of many of today's fire-tested requirements, a Phoenix III valve must be installed in

the preferred valve orientation. The NOVEX seals are uni-directional and should be installed with the shaft upstream of the seal.

For assistance in selecting the appropriate combination of actuator action and open valve position, consult your Fisher sales office.

Dimensions and weights for wafer-style and single-flange valves are shown in figures 6, 7, 8 and 9.

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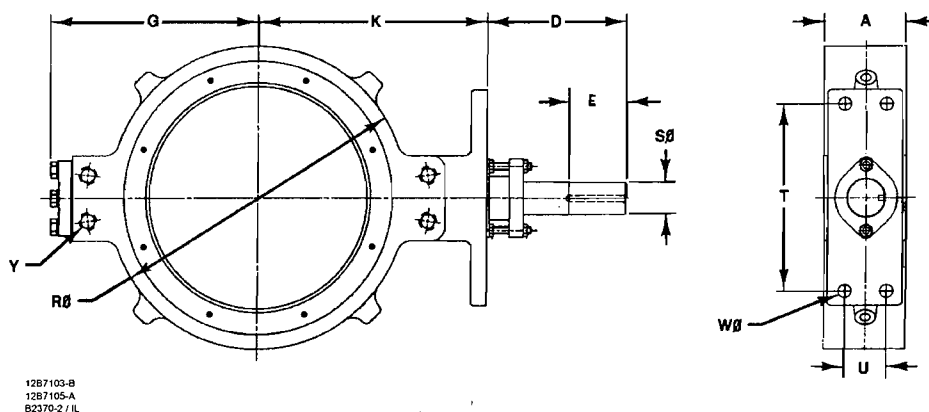
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Table 4. Dimensions and Weights, Wafer Style Valves, ANSI Class 300

Valve Size, Inches	A ⁽¹⁾	D	E	G	K	M ⁽²⁾ Min. I.D.	R	S (Shaft Dia at Keyway)	Key SQ Size	T	U	W	Y	Approx Weight
mm														kg
14	117	229	79.50	319	364	304	437	44.5	9.53	273	50.8	20.6	---	121
16	133	229	79.50	353	397	346	498	44.5	9.53	273	50.8	20.6	---	183
18	149	254	104.9	384	419	389	556	57.2	12.7	337	76.2	23.9	---	227
20	159	273	124.0	416	483	442	605	69.9	15.88	337	76.2	23.9	---	364
24	181	273	124.0	483	546	523	716	69.9	15.88	337	76.2	23.9	---	469
Inches														Pounds
14	4.62	9.00	3.13	12.56	14.31	11.98	17.19	1-3/4	0.375	10.75	2.00	0.81	1-1/8-8 4 Holes	266
16	5.25	9.00	3.13	13.88	15.62	13.63	19.62	1-3/4	0.375	10.75	2.00	0.81	1-1/4-8 4 Holes	403
18	5.88	10.00	4.13	15.12	16.50	15.32	21.88	2-1/4	0.5	13.25	3.00	0.94	1-1/4-8 4 Holes	500
20	6.25	10.75	4.88	16.38	19.00	17.40	23.81	2-3/4	0.625	13.25	3.00	0.94	1-1/4-8 4 Holes	802
24	7.12	11.75	4.88	19.00	21.50	20.59	28.19	2-3/4	0.625	13.25	3.00	0.94	1-1/2-8 4 Holes	1035

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.
2. Minimum I.D. is the minimum pipe or flange I.D. required for disc swing clearance.



NOTE: THE KEYWAY IS SHOWN ON THIS SIDE OF THE SHAFT FOR REFERENCE PURPOSES ONLY.

Figure 8. Dimensions and Weights, Wafer Style Valves, ANSI Class 300 (also see table 4)

A31A Valve

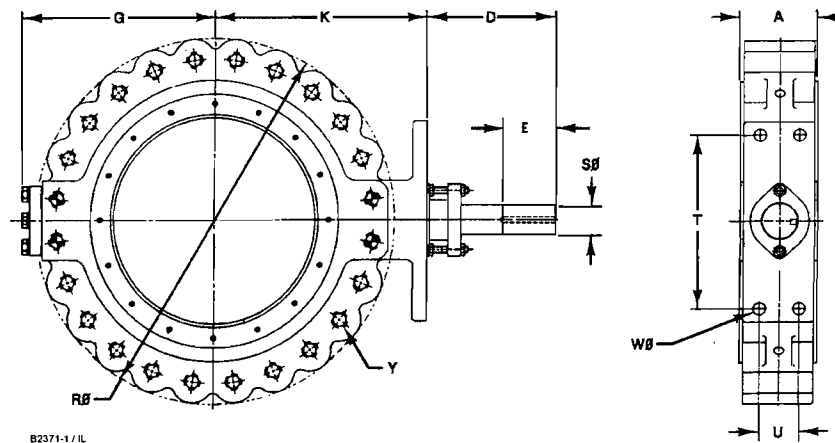
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Table 5. Dimensions and Weights, Single Flange Valves, ANSI Class 300

Valve Size, Inches	A ⁽¹⁾	D	E	G	K	M ⁽²⁾ Min. I.D.	R	S (Shaft Dia at Keyway)	Key SQ Size	T	U	W	Y	Approx Weight
mm														kg
14	117	229	79.50	319	364	304	594	44.5	9.53	273	50.8	20.6	---	227
16	133	229	79.50	353	397	346	657	44.5	9.53	273	50.8	20.6	---	294
18	149	254	104.9	384	419	389	721	57.2	12.7	337	76.2	23.9	---	402
20	159	273	124.0	416	483	442	784	69.9	15.88	337	76.2	23.9	---	544
24	181	292	124.0	483	546	523	924	69.9	15.88	337	76.2	23.9	---	821
Inches														Pounds
14	4.62	9.00	3.13	12.56	14.31	11.98	23.38	1-3/4	0.375	10.75	2.00	0.81	1-1/8-8 16 Holes	500
16	5.25	9.00	3.13	13.88	15.62	13.63	25.88	1-3/4	0.375	10.75	2.00	0.81	1-1/4-8 20 Holes	649
18	5.88	10.00	4.13	15.12	16.50	15.32	28.38	2-1/4	0.5	13.25	3.00	0.94	1-1/4-8 24 Holes	886
20	6.25	10.75	4.88	16.38	19.00	17.40	30.88	2-3/4	0.625	13.25	3.00	0.94	1-1/4-8 24 Holes	1200
24	7.12	11.50	4.88	19.00	21.50	20.59	36.38	2-3/4	0.625	13.25	3.00	0.94	1-1/2-8 24 Holes	1810

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.
2. Minimum I.D. is the minimum pipe or flange I.D. required for disc swing clearance.



NOTE: THE KEYWAY IS SHOWN ON THIS SIDE OF THE SHAFT FOR REFERENCE PURPOSES ONLY.

Figure 9. Dimensions and Weights, Single Flange Valves, ANSI Class 300 (also see table 5)

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A31A Valve**Coefficients***Table 6. Class 150, Reverse Flow*

Coefficients	Valve Size, Inches	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C _v	14	95	316	695	1200	1900	2840	3980	5120	6320
K _v		82.2	273	601	1038	1643	2457	3443	4429	5467
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X _T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C _v	16	129	430	946	1640	2580	3870	5420	6970	8600
K _v		112	372	818	1419	2232	3348	4688	6029	7439
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X _T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C _v	18	166	553	1220	2100	3320	4970	6960	8950	11,050
K _v		144	478	1055	1817	2872	4299	6020	7742	9558
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X _T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C _v	20	208	692	1520	2630	4160	6230	8730	11,220	13,850
K _v		180	599	1315	2275	3598	5389	7551	9705	11,980
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X _T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C _v	24	322	1080	2370	4080	6450	9670	13,540	17,410	21,500
K _v		277	934	2050	3529	5579	8365	11,712	15,060	18,598
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X _T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23

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Table 7. Class 300, Reverse Flow

Coefficients	Valve Size, Inches	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C _v	14	136	341	704	1200	1860	2680	3450	4050	4550
K _v		118	295	609	1038	1609	2318	2984	3503	3936
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X _T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C _v	16	169	422	873	1490	2310	3320	4280	5010	5630
K _v		146	365	755	1289	1998	2872	3702	4334	4870
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X _T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C _v	18	247	617	1280	2180	3370	4860	6260	7330	8230
K _v		214	534	1107	1886	2915	4204	5415	6340	7119
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X _T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C _v	20	286	714	1480	2520	3910	5620	7240	8480	9530
K _v		247	618	1280	2180	3382	4861	6263	7335	8243
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X _T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C _v	24	375	938	1940	3320	5130	7380	9510	11,140	12,510
K _v		324	811	1678	2872	4437	6384	8226	9636	10,821
F _d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F _L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X _T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23

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