FLOWSERVE

May 25, 2006

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Attention: Omid Tabatabai, Reactor Systems Engineer

Subject: PG&E – Diablo Canyon Part 21 Report submitted 3/31/06

Reference: Request for Additional Information (copy attached)

This letter is provided in response to the attached request and the conference call from 5/18/06. The background information is intended to provide a better understanding of the reasoning behind the Flowserve responses that follow.

Background Information

The reported valve is a replacement for valves originally supplied by the Anchor / Darling Valve Company (A/DV) in 1991. A/DV manufactured four 8" Tilting Disc Check (TDC) valves for Diablo Canyon. Two valves were supplied with an inspection port on the left side. Two valves were supplied with an inspection port on the right side. The inspection ports do not affect the valve operability.

The Anchor/Darling Tilting Disc Check (TDC) relies on a counterweight to position the disc for closure. The counterweight is integrally cast to the disc. The basic operation of the TDC is as follows:

- Flow in the direction of the flow arrow rotates the disc open.
- The weight of the counterweight rotates the disc towards the seat as the flow decreases.
- Flow in the direction opposite of the flow arrow drives the disc into the seat and provides the sealing force.

The four TDC's for Diablo Canyon were originally manufactured based on the standard A/DV design. Two valves (one of each inspection port configuration) shipped in January of 1991. The standard design is supplied for a horizontal pipeline application. At the time of the January shipment, the certified drawing (W9023267, Rev. A) included note 4, which read "VALVE TO BE INSTALLED IN HORIZONTAL RUN OF PIPE WITH BONNET ON TOP AND HINGE PINS HORIZONTAL." At a later date, A/DV was informed that the valves were to be installed in a vertical pipeline.

IE19

In a vertical application, the standard Anchor/Darling TDC design has the potential to stay open. When the valve opens fully, the center of gravity of the counterweight travels past the top-dead-center position. Therefore, the weight holds the valve open instead of driving it towards the seat. The typical modification is to alter the counterweight configuration and shift its center of gravity to prevent it from traveling beyond the point of top-dead center when the valve is fully opened.

In this case, two of the valves had already shipped and the remaining valves were nearing completion. The typical modification would have required either a new disc casting or extensive rework. Through discussions with the customer, the problem was resolved by welding an extension to the counterweight. When the disc is rotated fully open, the counterweight contacts the body at a point above the seat ring and acts as a travel stop. The welded extension prevented the counterweight center of gravity from traveling past top-dead-center by limiting the disc rotation. A/DV modified the 2 valves remaining at their facility. The 2 valves that had already shipped were modified in the field by the customer. Note 4 was revised to indicate that the discs were modified for a vertical application resulting in drawing W9023267, Rev. B.

The Anchor Darling Valve Company became Flowserve – Williamsport in 1997. By May of 2003, Flowserve had closed the Williamsport facility and moved all associated engineering and manufacturing activities to Flowserve – Raleigh.

PG&E purchase order 125492 was received by Flowserve – Raleigh in June of 2005. A replacement valve was ordered for the 2 valves that were originally supplied with a right hand inspection port. The purchase order required source inspection and included Source Inspection Plan No.: DEC033005. Section 2 of the source inspection plan included a requirement to verify that the disc is modified per detail C on drawing W9023267, Rev. B.

Flowserve drawing W9023267, Rev. B does not include a detail C. When Flowserve questioned the requirement, the customer provided a copy of the drawing. The supplied drawing included revisions that were performed by the customer. Detail C had been added by the customer and specifically details the dimensions of the counterweight extension presumably as modified at the site. Detail C requires an extension that is 1-3/8 inches long.

The Flowserve Applications Engineer processed the contract to provide exactly what the customer ordered. New casting drawings were generated to provide a disc with the specified dimensions. The engineer believed that valve operability with these dimensions had been confirmed by the customer.

The responses listed below correlate directly to the attached information request.

A. Extent of Condition

1. The reported valve is a similar concept but a totally different design. The Flowserve – Raleigh facility does not manufacture the NAF tilting check valve.

2. The reported valve is unique.

3. The typical modification for a vertical application shifts the counterweight center of gravity without limiting disc rotation. The 4 valves manufactured in 1991 were the only valves modified in this fashion. The reported valve is the only valve ever supplied with the new disc casting manufactured to the detail C dimensions.

4. Numerous Anchor Darling TDC's have been supplied to the nuclear industry, but the four valves supplied in 1991 to Diablo Canyon are the only ones that were modified for a vertical application in a manner similar to the one that was reported. They are S/N's EB539-1-1, EB539-1-2, EB539-3-1, and EB539-3-2.

B. Part 21 Reportability

5. PIOP 36-40-03-06 is attached for your review.

6. Upon receiving word of problems at the site, Flowserve initiated Complaint Report number 4376. As the complaint was evaluated, Flowserve determined that corrective action was necessary, which resulted in the issuance of Quality Program Corrective Action Plan (QPCAP) number 169. The QPCAP process requires a determination of whether or not a Part 21 evaluation is required. Since the valve is 'one-of-a-kind', Flowserve determined that a formal evaluation was not necessary.

   Flowserve representatives that were on-site at the utility indicated that the customer was in agreement with our position. Flowserve was surprised when a Part 21 was issued. Based on the customer's position, Flowserve revisited the question of Part 21 reportability, initiated 10 CFR 21 File No. 22, and again concluded that this was not a reportable instance. Copies of QPCAP 169 and 10 CFR 21 File No. 22 are attached.

7. The incident associated with the Part 21 reported in August of 2001 is not related to this TDC. A swing check valve design is significantly different from a TDC. The issues regarding the 2001 report are significantly different as well.

In February of 1993, BW/IP, in Los Angeles, CA, issued a Part 21 report on 4"-150# bolted bonnet swing check valves. The problem was limited to valves and spare part disc assemblies that were supplied by Borg Warner in 1977 or earlier. Subsequent to the initial report, BW/IP determined that the problem was not limited to 4" 150# swing checks with bolted bonnets but could exist on all Borg Warner 3" and 4" swing check designs supplied in 1977 or earlier. Whether or not this extension of the problem was officially reported is unknown.

The Borg Warner product line was moved to Flowserve – Williamsport in 1998. In May of 2001, a utility contacted Flowserve – Williamsport with the same problem on a 4"-1500# pressure seal swing check valve. Since Flowserve – Williamsport was not sure that the extension of the problem was ever reported, a follow-up report was issued in August of 2001.

A copy of OPER-1, the Flowserve – Williamsport procedure for determining Part 21 reportability, is attached for your review.

8. The issue originally identified in 1993 and again reported in 2001 was applicable to standard designs supplied by Borg Warner in 1977 and earlier. All 3" and 4" swing checks supplied throughout that period had the potential for this problem. The TDC supplied to Diablo Canyon differs in that it is the first and only one ever supplied with the new disc casting that resulted in bonnet interference.

C. Testing

9. Historically, the operability of the Anchor Darling Swing and Tilting Disc Check valves is dependent on whether or not the disc swings through the body without interference. Excess material on the body casting can cause interference and prevent or hinder operability. The procedure allowed the functional test prior to bonnet installation so that areas of interference could be easily identified and corrected. Flowserve is not aware of any other check valves that did not function properly due to interference with the bonnet.

   Swing and Tilting Disc Check valves are the only valves that were tested in this manner. As corrective action, the procedure was revised to require operability verification after assembly is completed.

10. MS 7252 revisions 3 and 4 are attached for your review along with the test report for the reported valve. The valve was tested to revision 3. Section 6.4 was changed in revision 4 as part of the corrective action associated with this incident.

11. MS 7252 is the generic test procedure.

12. MS 7252 is the generic test procedure.

D. Design Change Control

13. PIOP 36-70-03-24 is attached for your review.

14. Since the disc dimensions were specified by the customer, the engineer presumed that they represented the valves as modified by the customer. For this reason, he processed the order as a customer specified requirement and did not recognize it as a design change. He did not layout the design with the new disc dimensions. He simply generated the new drawings based on the customer supplied data.

15. Even though the dimensions were supplied by the customer, the engineer should have recognized that this was a design change and followed the procedure with regard to design verification. The engineer involved in this incident was made aware of this error. A training session with all Design Engineers, Applications Engineers, and Draftsman is scheduled for June of 2006.

Copies of the original purchase order and source inspection plan are enclosed along with the above referenced procedures and other documents. A list of all the attachments is also included. Flowserve does not have a copy of the licensee's root cause investigation report. Please let us know, if anything else is needed.

If you have any questions or comments, please call me at (919) 831-3304.

Rafiq A. Bandukwala, Manager
Quality Assurance
Flowserve – Raleigh Operations
1900 S. Saunders St.
Raleigh, North Carolina 27603
Tel: (919) 831-3304
E-mail: rbandukwala@flowserve.com

FLOWSERVE

List of Attached Documents

1. NRC Request for Additional Information
2. PG&E purchase order 125492 with Source Inspection Plan No.: DEC033005
3. Design Specification 8179, Rev 2N
4. Flowserve drawing W9023267 Rev. B
5. Flowserve drawing W9023267 Rev. B with customer revisions including DETAIL C
6. Quality Program Corrective Action Plan (QPCAP) # 169 including Complaint Report 4376
7. 10 CFR 21 File No. - 22
8. Flowserve test procedure MS 7252 revision 3
9. Flowserve test procedure MS 7252 revision 4
10. Flowserve – Raleigh Part 21 notification procedure 36-40-03-06
11. Flowserve – Williamsport Part 21 evaluation procedure OPER-1
12. Flowserve – Raleigh design control procedure 36-70-03-24

Request for Additional Information
Part 21

On March 31, 2006 Pacific Gas & Electric notified the NRC of a defective component received from Flowserve, Flow Control Division, of Raleigh, North Carolina. The component is an 8-inch tilting disk check valve, vendor Assembly Drawing W9023267, that PG&E received for use in the Residual Heat Removal (RHR) System. During preoperational tests the valve failed to perform its intended safety function of closing, which could have resulted in the loss of one RHR pump, had it been installed. The notification included pictures of the valve, which appears to be similar to a NAF tilting check valve shown on the flowserve.com web site.

A. Extent of Condition

1. Is the defective valve reported by PG&E similar to the NAF tilting check valve?

2. Is the defective valve similar to any other valves offered by Flowserve?

3. If the defective valve is unique, how does it differ from the valve(s) referenced in RAI #s 1, 2 above.

4. Provide a list of valves similar to the reported valve that Flowserve has supplied to nuclear utilities, including applicable procurement information such as procurement ID, date, and nuclear plant.

B. Part 21 Reportability

5. Provide a copy of the Flowserve procedure for determining 10CFR21.21 reportability, in effect when the determination was made for the valve supplied to PG&E.

6. Provide the documented Flowserve evaluation that concluded that the defect was not reportable under 10CFR21.21.

7. A defective swing check valve was previously reported by Flowserve on August 23, 2001. The valve did not fully open during pre-operational testing due to excessive weld buildup between the disk and stud. Provide the same information for this valve as requested in RAI #s 5, 6 above.

8. Provide a discussion as to why Flowserve concluded that the valve reported by PG&E on March 31, 2006 was not reportable as compared to the one Flowserve reported on August 23, 2001.

C. Testing

9. The reported valve failed to open during pre-operational testing by PG&E. Reportedly, the valve failure was not detected by Flowserve because the valve was not fully assembled during functional testing.

   Provide the basis for verifying valve functionality with a partially assembled valve. Is this practice typical for Flowserve valve functional verification testing?

10. Provide the test procedure(s) used for the Flowserve functional verification test. Provide the documentation for testing of the reported valve.

11. Provide the generic test procedure for valve functional verification testing.

12. If this procedure differs from the testing procedure used for the reported valve, provide a discussion of the differences. Explain why other tested valves would not exhibit similar functional deficiencies.

D. Design Change Control

13. Provide the procedure(s) used for controlling design changes.

14. Provide the design change documents applicable to the reported valve.

15. Discuss why the inadequacy of the design changes for the reported valve were not discovered during the design change process.

SO# 35306

PURCHASE ORDER

PACIFIC GAS and ELECTRIC COMPANY
DIABLO CANYON POWER PLANT
P.O. Box 56
Avila Beach, Ca 93424

DATE ISSUED	P O NUMBER	REV.
06/02/05	125492	

PAGE 01

TO:
FLOWSERVE CORP.
ATTENTION : TERESA CHRISTISON
1900 SOUTH SAUNDERS STREET
RALEIGH NC 27602

BUYER: W. LEWIS
(805) 545 - 4890

SUPPLIERS PHONE NUMBER:
(919) 831 - 3207 X

SHIP TO: DCPP RECEIVING - PISMO BEACH
800 PRICE CANYON ROAD
PISMO BEACH CA 93449

BILL TO: PG&E
PO BOX 7760
SAN FRANCISCO, CA
94120-7760
(800) 756-PAID

PAYMENT TERMS: NET 30 DAYS
SHIP VIA :
OR :
FOB TERMS :
FREIGHT TERMS: FREIGHT COLLECT

THIS IS A NON-CONFIRMING ORDER SENT VIA FAX. NO HARD COPY WILL BE MAILED UNLESS REQUESTED.

CONTACT BILL LEWIS @ 805-545-4890 FOR SHIPPING INFO.

REFERENCE QUOTE 13615A FOR PRICE & DELIVERY.

****
ANY DEVIATION TO THE QUALITY OR TECHNICAL REQUIREMENTS OF THIS PURCHASE ORDER SHALL BE BROUGHT TO THE ATTENTION OF THE BUYER.
THE SUPPLIER SHALL NOT PROCEED WITH THE ORDER WITHOUT A CHANGE ORDER APPROVING THE DEVIATION.
****

TERMS & CONDITIONS DCPP GC-2 APPLY TO THIS ORDER.

** CONTINUED NEXT PAGE **

RMS DISTRIBUTION: 1.SUPPLIER 2.MF449 3.PURCHASING 4.SOURCE INSP

PURCHASE ORDER

PACIFIC GAS and ELECTRIC COMPANY
DIABLO CANYON POWER PLANT
P.O. Box 56
Avila Beach, Ca 93424

DATE ISSUED	P O NUMBER	REV.
06/02/05	125492	

ITM	QTY	UNIT	PG&E CODE	DESCRIPTION		UNIT PRICE
01	1	EA	95 7402	VALVE 8" CHECK 600# SS BW ENDS FLOWSERVE # W9023267 ASME SECT III SUB SECT NC MFGR : FLOWSERVE CORP. PART #: W9023267		$56,746.0000
101	1			MISC. CHARGE; SEE COMMENTS	T	$2,600.00

* * *

W/RH INSPECTION PORT AND SCH 40S BW ENDS

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REPLACEMENT FOR SERIAL NUMBERS EB539-3-1 AND EB539-3-2

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VALVE TECHNICAL, QUALITY, DOCUMENTATION PER SPEC 8179 REV 2N, UNLESS OTHERWISE NOTED AND A/D DRAWING W9023267. SUB SECTION ND, 1989 EDITION.

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REF: A/D DWG W9023267
FLOWSERVE TO SUBMIT LATEST REVISION OF THE ABOVE DRAWING TO PACIFIC GAS & ELECTRIC FOR REVIEW AND APPROVAL.
FOR INSTALLATION IN VERTICAL (FLOW-UP) APPLICATIONS INDIVIDUAL COMPONENT TAG NO. PER SECTION 2, PARAGRAPH 2.2.11.C OF SPEC 8179 DOES NOT APPLY.

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$2600.00 MISC CHARGE ADDED FOR DESIGN & SEISMIC REPORT.

- DELIVERY DATE: 12/27/05
- SCHEDULED SHIPPING INFO: 12/23/2005
- SHIPPING POINT: RALEIGH NC

NOT A CONFIRMING ORDER.

ITEM 1 TO BE SUPPLIED IN ACCORDANCE WITH THE FOLLOWING CLAUSES:

# 319	1	MARKING - TAGGING	# 399	1	PACKAGING, HANDLING AND S
# 400	3	DO NOT SUBSTITUTE	# 405	1	P.O. REQUIREMENTS - CERT
# 418	8	SOURCE INSPECTION - SPECI	# 425		MARKING - SERIAL NUMBER I
# 894	3	DOCUMENTATION - TECHNICAL	# 1015	4	VALVE DOCUMENTATION SUBMI
# 4000	5	10CFR21 REQUIREMENTS FOR	# 4002	3	DOCUMENTATION REQUIREMENT
# 5000	2	COMMERCIAL TERMS	# 6761		ASME III - SUBSECTION NC

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PACIFIC GAS and ELECTRIC COMPANY
DIABLO CANYON POWER PLANT
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ITEM 1 TO BE SUPPLIED IN ACCORDANCE WITH THE FOLLOWING CLAUSES: (CONTINUED)
10153 8 FLOWSERVE CORP RALEIGH, N

CLAUSE DEFINITIONS FOLLOW FINAL LINE ITEM

THE GOODS FURNISHED UNDER THIS PURCHASE ORDER ARE SUBJECT TO EXPEDITING BY THE BUYER OR THE BUYER'S DULY AUTHORIZED REPRESENTATIVE. THE BUYER OR THE BUYER'S REPRESENTATIVE SHALL BE PROVIDED WITH FREE ACCESS DURING WORKING HOURS TO THE SELLER'S PLANTS AND THOSE OF ITS SUB-SUPPLIERS FOR EXPEDITING PURPOSES. SELLER SHALL SUPPLY SCHEDULES, PROGRESS REPORTS AND UNPRICED COPIES OF THE SELLER'S PURCHASE ORDERS AS NECCESARY FOR THE BUYER'S USE IN EXPEDITING.
SELLER SHALL NOTIFY BUYER IN WRITING OF ANY ACTUAL OR ANTICIPATED DELAYS IMMEDIATELY UPON THEIR DISCOVERY.
SUCH NOTICE WILL INCLUDE ESTIMATED PERIOD OF DELAY, CAUSE AND CORRECTIVE ACTIONS BEING TAKEN.

CLAUSE #	REV#	CLAUSE TITLE AND DEFINITION
319	1	MARKING - TAGGING ITEM SHALL BE TAGGED OR MARKED FOR SHIPMENT WITH THE FOLLOWING: 1) PG&E PURCHASE ORDER NUMBER 2) PG&E PURCHASE ORDER ITEM NUMBER 3) SUPPLIER'S CATALOGUE, PART AND/OR DRAWING NUMBER 4) MATERIAL SPECIFICATION NUMBER AS APPROPRIATE WHEN THE ABOVE DESIGNATED MARKINGS ARE NOT POSSIBLE, PROVISIONS SHALL BE MADE TO IDENTIFY THE ITEM BY SOME OTHER MEANS; WHICH SHALL BE COMMUNICATED TO THE BUYER PRIOR TO SHIPMENT.
399	1	PACKAGING, HANDLING AND SHIPPING SUPPLIER SHALL PROVIDE THE FOLLOWING: 1) INDIVIDUAL PACKAGING AND TAGGING OF THE ITEM (QUANTITIES OF THE SAME ITEM MAY BE PACKAGED TOGETHER).

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PACIFIC GAS and ELECTRIC COMPANY
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CLAUSE #	REV#	CLAUSE TITLE AND DEFINITION
		2) PACKAGING, HANDLING AND SHIPPING NECESSARY TO ASSURE THAT THE QUALITY OF THE ITEM IS NOT DEGRADED DURING TRANSIT. 3) ANY SPECIAL INSTRUCTIONS REQUIRED FOR HANDLING OR PRESERVATION OF THE ITEM WHILE IN STORAGE.
400	3	DO NOT SUBSTITUTE THERE SHALL BE ABSOLUTELY NO SUBSTITUTIONS WITHOUT PRIOR PG&E BUYER APPROVAL. THE ITEM SUPPLIED MUST BE AS SPECIFIED BY THIS PURCHASE ORDER BY PART NUMBER AND DESCRIPTION. . PG&E RESERVES THE RIGHT TO REFUSE SUBSTITUTE MATERIAL AND RETURN IT AT THE VENDOR'S EXPENSE. . SUBSTITUTIONS INCLUDE CHANGES TO THE FIT, SHAPE, SIZE, MATERIAL MAKE-UP, OPERATING CHARACTERISTICS, OR PART NUMBER.
405	1	P.O. REQUIREMENTS - CERT OF CONFORMANCE SUPPLIER SHALL PROVIDE A CERTIFICATE OF CONFORMANCE STATING ALL REQUIREMENTS SPECIFIED IN THE PURCHASE ORDER HAS BEEN MET
418	8	SOURCE INSPECTION - SPECIAL TEST / GENERAL - NOTIFY NQS SUBJECT TO PG&E SOURCE INSPECTION DURING PRODUCTION ********** AUTHORIZED PG&E SOURCE INSPECTORS SHALL HAVE ACCESS TO SUPPLIER'S AND SUBSUPPLIER'S WORK LOCATIONS. . PG&E INSPECTORS HAVE AUTHORITY TO STOP WORK AND CAN REFUSE RELEASE OF THE ITEM IF PROCUREMENT REQUIREMENTS, INCLUDING THOSE FOR DOCUMENTATION, ARE NOT MET BY THE SUPPLIER OR SUBSUPPLIER. SUPPLIER SHALL REQUIRE SUBSUPPLIERS PERFORMING WORK PURSUANT TO THIS PURCHASE ORDER TO CONFORM TO THE REQUIREMENTS OF THIS CLAUSE. . BEFORE STARTING ANY WORK, SUPPLIER SHALL NOTIFY THE PG&E NUCLEAR QUALITY SERVICES (NQS) SECTION AND PROVIDE THE FOLLOWING INFORMATION: . 1. PG&E PURCHASE ORDER NUMBER 2. FACTORY JOB IDENTIFICATION NUMBER 3. FACTORY ADDRESS AND TELEPHONE NUMBER 4. FACTORY CONTACT NAME

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PURCHASE ORDER

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CLAUSE #	REV#	CLAUSE TITLE AND DEFINITION

5. PRODUCTION STARTING TIME

PACIFIC GAS AND ELECTRIC CO.
NUCLEAR QUALITY SERVICES
P.O. BOX 56
AVILA BEACH, CA 93424
(805)-545-6156
FAX: (805)-545-4514

THE SUPPLIER SHALL OBTAIN A WRITTEN RELEASE FROM THE SOURCE INSPECTOR PRIOR TO SHIPMENT. THE RELEASE SHALL ACCOMPANY THE MATERIAL BEING SHIPPED.

425 MARKING - SERIAL NUMBER IDENTIFICATION
SUPPLIER SHALL TAG, MARK OR IDENTIFY ITEM BY SERIAL NUMBER

894 3 DOCUMENTATION - TECHNICAL INFORMATION
IT IS IMPERATIVE THAT MATERIAL SUPPLIERS NOTIFY PG&E OF ALL CHANGES TO TECHNICAL INFORMATION PERTINENT TO THE DESIGN, MAINTENANCE, AND OPERATION OF THE COMPONENT. IF THE SUPPLIER KNOWS OF SUCH CHANGES, THE TECHNICAL INFORMATION IS TO BE SHIPPED WITH THE MATERIAL TO DIABLO CANYON. ADDITIONALLY, FOR SAFETY RELATED PURCHASES ONLY, A DUPLICATE SET OF TECHNICAL INFORMATION SHALL BE FORWARDED TO:

PACIFIC GAS & ELECTRIC CO
ATTN: LEAD: PROCURE PLANT MATERIALS 115/2
PO BOX 56
AVILA BEACH, CA 93424

EXAMPLES OF TECHNICAL INFORMATION ARE AS FOLLOWS:
A) UPDATES TO OPERATION, CALIBRATION AND MAINTENANCE MANUALS, INSTRUCTIONS OR SERVICE BULLETINS;

B) REVISED TECHNICAL DATA, DESIGN OR OPERATIONAL LIMITS, AND IN-SERVICE OR BENCH TEST PROCEDURES;

C) CHANGES TO REPLACEMENT PARTS LISTS, LUBRICANTS OR RECOMMENDED REPAIR/RECALIBRATION/REPLACEMENT INTERVALS; AND

D) RESULTS OF SUPPLIER EVALUATION OF OPERATING EXPERIENCE,

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CLAUSE #	REV#	CLAUSE TITLE AND DEFINITION
		EQUIPMENT PROBLEMS OR FAILURES, AND QUALIFICATION TESTS.
1015	4	VALVE DOCUMENTATION SUBMITTALS DOCUMENTATION REQUIRED TO BE SUBMITTED FOR APPROVAL PER THE SPEC SHALL BE SENT DIRECTLY TO: PACIFIC GAS & ELECTRIC P.O. BOX 56 -OR- 9 MILES NW OF AVILA BEACH (OTHER THAN U.S. MAIL) AVILA BEACH, CA 93424 ATTN: BUYER (NOTED ON PO) MAIL STOP 115/2 NOTE: OUTLINE DRAWINGS DO NOT NEED TO BE RESUBMITTED FOR APPROVAL IF PREVIOUSLY APPROVED BY PG&E. PO WILL MAKE REFERENCE TO THE APPLICABLE DRAWING NUMBER AND CURRENT REVISION APPROVED FOR FABRICATION BY PG&E.
4000	5	10CFR21 REQUIREMENTS FOR SAFETY RELATED ITEMS THE PROVISIONS OF 10CFR21 APPLY TO THIS ITEM. IF THE SUPPLIER PROVIDES ANY INFORMATION TO THE NRC REGARDING THIS ITEM, THE INFORMATION SHALL ALSO BE PROVIDED, AT THE SAME TIME TO THE MANAGER QUALITY ASSURANCE, PG&E IN C/O THE PG&E PROCUREMENT ASSESSMENT SUPERVISOR @ DCPP, PO BOX 56, AVILA BEACH, CA. 93424, MAILSTOP 115/2. THE SUPPLIER SHALL REPORT ALL NONCONFORMANCES WHICH MAY ADVERSELY AFFECT THE RELIABILITY, PERFORMANCE OR INTERCHANGEABILITY OF THIS ITEM. THIS REPORT SHALL INCLUDE THE TECHNICAL JUSTIFICATION FOR THE NONCONFORMANCE DISPOSITIONS. ALL DISPOSITIONS WHICH DO NOT RETURN THE ITEM TO THE CONDITION STATED IN PG&E APPROVED DRAWINGS OR SPECIFICATIONS, SHALL BE APPROVED BY PG&E PRIOR TO THE SHIPMENT OF THE ITEM.
4002	3	DOCUMENTATION REQUIREMENTS - GENERAL ALL REQUIRED DOCUMENTS SHALL BE REPRODUCIBLE AND IDENTIFY THE PURCHASED ITEM BY PURCHASE ORDER NUMBER AND ANY OTHER INFORMATION NECESSARY TO UNIQUELY ASSOCIATE A DOCUMENT WITH THE ITEM TO WHICH IT APPLIES. ELECTRONIC SUBMITTING OF DOCUMENTS IS PREFERABLE TO HARDCOPY. SUBMITTAL MAY BE ACCOMPLISHED BY E-MAIL ATTACHMENT OR MAILED

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CLAUSE #	REV#	CLAUSE TITLE AND DEFINITION

3-1/2" (1.44MB) DOS FLOPPY DISK OR OPTICAL DISC (CDROM). MULTIPLE DRAWINGS MAY BE PLACED ON THE SAME DISK. SUPPLIER SHALL LABEL THE DISK TO INDICATE CONTENTS. SUPPLIER TO COORDINATE WITH THE PG&E BUYER.

THE ACCEPTABLE ELECTRONIC FORMATS FOR DRAWING IN ORDER OF PRIORITY ARE:

1. INTERGRAPH MICROSTATION VERSION 5 OR HIGHER (DGN, VECTOR)
2. AUTOCAD VERSION 11 OR HIGHER (DWG, VECTOR)
3. FILE FROM OTHER CAD PACKAGES MAY BE CONVERTED TO ANSI DXF FORMAT (VECTOR)
4. RASTER CONFORMING TO CCITT GROUP 4 (TIFF GROUP 4) IS ALSO ACCEPTABLE.

REQUIREMENTS OF HARD COPY SUBMITTALS ARE AS FOLLOWS:
EACH REPRODUCIBLE FURNISHED BY SUPPLIER SHALL BE MADE FROM A CLEAN ORIGINAL TRACING OF MICROFILM QUALITY. THE REPRODUCIBLE SHALL BE RIGHT READING PHOTOGRAPHIC MYLAR FOR DRAWINGS SUBMITTED FOR APPROVAL.
SUBMITTALS 11" X 17" OR SMALLER MAY BE ON 20-POUND WHITE BOND PAPER THAT CAN BE LEGIBLY REPRODUCED ON A COPYING MACHINE.
EVERY DETAIL AND FIGURE SHALL BE LEGIBLE WHEN REPRODUCED FROM A 35-MM MICROFILM COPY.

THE CRITERIA FOR ACCEPTANCE OF REPRODUCIBLE SHALL BE AS FOLLOWS:

1) IMAGE - LINES AND LETTERING SHALL BE UNIFORM IN SHARPNESS AND DENSITY.
2) LETTERING - LETTERING SHALL BE DENSE WITH UNIFORM CHARACTERS THAT ARE OPEN, WELL ROUNDED AND UNCROWDED.
3) BACKGROUND DENSITY - BACKGROUND DENSITIES SHALL BE UNIFORM ACROSS THE ENTIRE DOCUMENT WITH GOOD LINE TO BACKGROUND CONTRAST. IF THE ORIGINAL TRACING WAS CREATED WITH PASTE-UP OR IMAGE TRANSFER MATERIAL THAT NEGATES PRODUCING A GOOD TRANSMITTED LIGHT REPRODUCTION, THE ORIGINAL TRACING SHALL BE PHOTOGRAPHED WITH REFLECTED LIGHT AND THE MYLAR CREATED FROM THE RESULTING NEGATIVE AFTER RETOUCHING.

5000 2 COMMERCIAL TERMS

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CLAUSE #	REV#	CLAUSE TITLE AND DEFINITION

MATERIAL EXPECTATION CLAUSE:
SELLER WARRANTS THAT THE GOODS PROCURED ON THIS PURCHASE SHALL BE FREE FROM DEFECTS IN DESIGN AND SHALL CONFORM IN ALL RESPECTS TO THE TERMS OF THIS PURCHASE ORDER, AND SHALL BE NEW, UNLESS OTHERWISE STATED ON THE ORDER, AND OF BEST QUALITY, IF NO QUALITY IS STATED. WHEN THIS DOES NOT OCCUR, GOODS WILL BE RETURNED TO THE SELLER AT THE SELLERS EXPENSE AND NEW MATERIAL RETURNED OR A CREDIT ISSUED. THIS DIRECTION WILL BE GIVEN TO THE SELLER BY THE BUYER OR HIS REPRESENTATIVE.

6761 ASME III - SUBSECTION NC REQUIREMENTS 1989 EDITION
ITEM SHALL BE FABRICATED IN ACCORDANCE WITH THE ASME BOILER & PRESSURE VESSEL CODE, SECTION III, SUBSECTION NC, 1989 EDITION NO ADDENDA.

SUPPLIER SHALL PROVIDE A CERTIFICATION OF COMPLIANCE TO THE ABOVE STATED REQUIREMENTS.

10153 8 FLOWSERVE CORP RALEIGH, NC OPERATIONS QSL ADDRESS
A QUALITY ASSURANCE PROGRAM, IMPLEMENTED AT THE BELOW ADDRESS, HAS BEEN PREQUALIFIED BY PACIFIC GAS & ELECTRIC. ALL MATERIAL SHALL BE DELIVERED FROM, AND ALL DOCUMENTATION SHALL BE TRACEABLE TO THIS ADDRESS. PG&E SHALL HAVE THE RIGHT OF ACCESS TO ENTER THE PREMISES OF THE SUPPLIER TO WITNESS INSPECTION/TEST ACTIVITIES AND/OR TO CONDUCT SURVEILLANCES OR QUALITY AUDITS. THIS RIGHT SHALL EXTEND TO ALL SUBSUPPLIERS AND SHALL BE COORDINATED THROUGH THE SUPPLIER.

FLOWSERVE CORP.
1900 SOUTH SAUNDERS STREET
RALEIGH, NC 27602

ALL CHECK, GATE, GLOBE, VACUUM RELIEF, BALL AND BUTTERFLY VALVES AND SPARE PARTS FOR SAME SHALL BE PROVIDED IN ACCORDANCE WITH FLOWSERVE CORP RALEIGH OPERATIONS QA MANUAL REV 32, DATED 01/15/05.

NON-ASME SAFETY RELATED PARTS AND SAFETY-RELATED PNEUMATIC

** CONTINUED NEXT PAGE **

PURCHASE ORDER

PACIFIC GAS and ELECTRIC COMPANY
DIABLO CANYON POWER PLANT
P.O. Box 56
Avila Beach, Ca 93424

DATE ISSUED	P O NUMBER	REV.
06/02/05	125492	

CLAUSE #	REV#	CLAUSE TITLE AND DEFINITION

ACTUATORS, MOTOR OPERTORS AND RELATED APPURTENANCES AS PART OF VALVE ASSEMBLIES SHALL BE SUPPLIED IN ACCORDANCE WITH RALEIGH OPERATIONS QA MANUAL REV 32, DATED 01/15/05

THE PROVISIONS OF ASME SECTION III, SUBSECTION NX-2610 PARAGRAPH (B) SHALL NOT BE UTILIZED FOR ASME SECTION III MATERIAL. ASME SUBSUPPLIERS SHALL BE PROHIBITED FROM UTILIZING THE PROVISIONS OF NX2610 (B), UNLESS THE QUALITY OF SUCH MATERIAL IS VERIFIED BY THE SUPPLIER.

** END OF PURCHASE ORDER **

PACIFIC GAS AND ELECTRIC COMPANY
SOURCE INSPECTION PLAN NO.: DEC033005

DESCRIPTION: Flowserve 8" Check Valve

PROJECT: Diablo Canyon Units 1& 2

PC #: 10570 INTERNAL ORDER # ~~2017029~~ wl 6098370

MAT'L. REQN. NO.: ~~402421~~ 412559 wl

P.O. NO.:_____ BUYER: Bill Lewis (805) 545-4890

SUPPLIER: Flowserve

Prepared by: W J Lewis Date: 5-19-05

Approved by: Dennis Cook Date: 5-19-05

Purpose: The purpose of the Inspection Plan is to systematically identify the Inspector's responsibilities and inspection actions to assure that components are manufactured and tested in conformance with contract requirements.

Scope of Inspector's Responsibility: Perform Inspection in accordance with the attached checklist.

References:

PG&E Valve Specification 8179, Rev 2N
A/D dwg W9023267

Special Instructions:

Any deviations from the attached inspection criteria shall be coordinated thru the preparer and/or buyer prior to releasing shipment. Note: Where the words "if applicable appear, the inspector may use "n/a".

Any programmatic problems with regards to Flowserve's Quality Program noted during the inspection process shall be brought to the attention of Nuclear Quality Services, Mr Robert Carvel @ 1-805-545-3268

INSPECTION PLAN NO.: DEC033005

1. Verify the following quality and documentation requirements for valve assemblies have been complied with prior to shipment.

   a. Suppliers on Flowserve's Approved Vendor List have provided the items classified as ASME pressure retaining as identified on the PG&E approved drawing(s) with ASME Sect III and 10CFR21 invoked.

      95-7402 _____

   b. CMTR's for above items meet the applicable material specs and are certified/marked in accordance with ASME Sect III; materials to be per the approved PG&E dig.

      95-7402 _____

   c. Items classified as non-ASME safety related parts as identified on the PG&E approved drawing(s) have been: (1) provided by suppliers on Flowserve's Approved Vendor List with 10CFR21 requirements invoked and/or (2) been dedicated by Flowserve (and/or a supplier on Flowserve's Approved Vendor List in accordance with Flowserve's commercial grade dedication program.

      95-7402 _____

2. Witness the following testing, dimensional checks and weighing activities prior to shipment.

   a. Dimensional verification as indicated on the PG&E approved vendor drawing; body & bonnet wall thickness per Flowserve shop dwg.

      95-7402 _____

   b. Hydrostatic shell per PG&E approved dwg

      95-7402

      _____

   a. Verify disc is modified per detail C on Dwg. W9023267, Rev B

      95-7402 _____

INSPECTION PLAN NO.: DEC033005

d. Seat Leakage per PG&E approved dwg.

95-7402 _____

e. Valve weight shall be within +/- 10% of the weight shown on the PG&E approved dwg. If weight exceeds this limit, Flowserve shall resubmit revised drawing showing the as-built weight.

95-7402 _____

f. Verify all instruments, measuring devices and test equipment used in a thru e above are currently calibrated.

95-7402 _____

3. Review the final documentation package to insure it includes the following prior to valve shipment. Documentation per 8179, Rev 2N

a. CMTR's for pressure retaining items

95-7402 _____

b. Manufacturer's Certification of Compliance to the Purchase Order

95-7402 _____

c. Code data report

95-7402 _____

d. Weld records and post weld heat treat records for ASME pressure retaining items, if applicable

95-7402 _____

e. NDE test results per ASME Sect III, if applicable

95-7402 _____

INSPECTION PLAN NO.: DEC033005

f. Wall thickness records for body & bonnet

95-7402 _____

g. Hydrostatic and seat leakage test reports

95-7402 _____

h. Certificate of cleanliness

95-7402 _____

4. Final Inspection and Preparation for packaging and shipping.

a. Verify valves are marked, stamped and tagged in accordance with ASME Sect III, Article NCA-8000.
95-7402 _____

5. THE RELEASE FOR SHIPMENT FORM AND A COPY OF THIS INSPECTION CHECKLIST IS TO BE FAXED TO: BILL LEWIS, 805-545-4514. PLEASE CALL AND ADVISE FAX IS COMING. A COPY OF THE RELEASE FOR SHIPMENT FORM SHALL ALSO BE PROVIDED TO FLOWSERVE.

INSPECTION COMPLETE
Signed: _____ _____
Inspector Date

ATTACHMENT B

PURCHASE ORDER NO.
INSPECTION PLAN NO.

RELEASE FOR SHIPMENT

TO: **PREPARER:**
Diablo Canyon Power Plant
P.O. Box 56
Avila Beach CA 93424

( ) **COMPLETE RELEASE**

( ) **PARTIAL RELEASE**

FAX: 805 545 4514 Procurement
805 545-3765 QC

FROM: Vendor Quality Control

The intention of this form is to provide DCPP with immediate notification of the status of the items inspected by Vendor Quality Control at a suppliers facility. The final record of acceptance of any source inspected item is based strictly on the associated source inspection plan once it has been completed by the inspector. Please be advised that with regard to the equipment listed below, there may be additional inspections, test or dedication activities required to be performed at DCPP not included in the source inspection plan.

( ) The items described below have been inspected at the suppliers facility and have been released for shipment with no deviations from the inspection plan.

( ) The items described below have been inspected at the suppliers facility and have been released for shipment to DCPP. Any exceptions or deviations have been approved by the responsible organization and documented on the Action Request no. listed below.

Action Request no. _____ .

The preparer of the inspection plan will provide the Action Request no. to the inspector.

In addition to the Action Request no. the deviations will be documented in the associated
Source Inception Report.

( ) The items described below have been inspected at the supplier's facility and have been released for shipment to DCPP. However, these items shall be **placed on hold** by the DCPP Receipt Inspection Section until the following shortages/deviations have been resolved:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

PG&E Inspector **Date** **Phone no.**
FAX no.

THIS FORM AND THE INSPECTION PLAN CHECK LIST IS TO BE FAXED WITH EACH SHIPMENT TO THE PREPARER OF THE INSPECTION PLAN.

919-831 3717

DESIGN CERTIFICATION
FOR
DESIGN SPECIFICATION NO. 8179

DESIGN CERTIFICATION

I, the undersigned, being a registered Professional Engineer and competent in the applicable field of design and related nuclear power plant requirements relative to Pacific Gas and Electric Company's Design Specification No. 8179, Revision No. 2N, certify that Design Specification No. 8179, Revision No. 2N, is correct and complete with respect to the Design and Service Conditions given therein and provides a complete basis for equipment fabrication in accordance with the 1989 Edition of the ASME Boiler and Pressure Vessel code, Section III, Subsection NCA, Article NCA-3250.

Design Specification No. 8179, Revision No. 2N being certified is:

Certified by Kersi J. Dalal P.E.

Registration No. M-16690 State CA Exp. Date 3/31/2000

Signature Kersi J. Dalal

Date 8/14/96

BI 1830 — E2894 (First Use)

ANCHOR DARLING
VALVE COMPANY

Pacific Gas and Electric Company
Diablo Canyon Power Plant
P.O. Box 56
Avila Beach CA 93424

E284A
E644A
ETC ↓
E652T

OCT 23 7 32 AM '96

October 16, 1996

RECEIVED
OCT 23 1996
CONTRACTS

Tom Johnson

Anchor Darling Valve
P.O. Box 3428
Williamsport PA 17701-0428

Subject: PG&E Valve Specification No. 8179 Rev. 2N

Tom,

Per our telephone conversation today, enclosed is subject valve specification.

Should you need any additional information please contact me at the phone and fax nos. listed below.

Jeff Nubbe

Procurement Specialist
Phone 805 545 4805
Fax 805 545 4514

UNCONTROLLED COPY

SPECIFICATION NO. 8179 REV. 2N DISTRIBUTION

W. R. McDowell	123 Mission/1542
M. J. Jacobson	DCPP 115/2
D. E. Cook	DCPP 115/2
K. J. Dalal	DCPP 116/1
D. F. Lashkari	DCPP 115/2
V. K. Juneja	245/814D
K. D. Patel	245/811B
L. Pulley	245/853D
M. Schletz	245/830E
E. P. Nelson	DCPP 115/2
S. Allen	DCPP 116/1
File No.	161.82

Note 1: This Specification Revision to be used for purchase of all new valves and spare parts for valves originally purchased to this Specification. For all new purchases, the requirements stated herein supplant previously issued commitments via RPEs. Any technical or Q.A. exceptions to this document, that are taken by the vendor, must be evaluated by Procurement Engineering via RPEs, prior to issue of the purchase order.

TITLE: SPECIFICATION COVER SHEET

PACIFIC GAS AND ELECTRIC COMPANY
SPECIFICATION COVER SHEET

Specification No.: 8179
Title: Design Specification for Nuclear Service Valves - Manual, Electric Motor and Pneumatic Operated
Project: Diablo Canyon Power Plant, Units 1 & 2 Date: May 31, 1996
Department/ Group: Regulatory and Design Services / Piping Group
Structure, System or Component: Nuclear Service Valves

Type or Purpose of Specification: Furnishing and Delivery of Nuclear Service Valves Complying with ASME Boiler and Pressure Vessel Code, Section III, Classes 1, 2, and 3

No. of Sheets: 5 (COVER SHTS) 45 (BODY) 10 (2 ATTACH) Nuclear Safety Related; 10CFR21 Applies: yes X no
Graded Quality: yes X no

	Signature	Section	Date
PREPARER :	Mark Schlitz	RDS/Piping	5/8/96
VERIFIER :	David Ali	R&DS/PIPING	6/11/96
COORD SECT:	[illegible]	RDS/I&C	7-30-96
COORD SECT:	NA		
SEISMIC APPROVAL:	[illegible]	RDS/Piping	8-7-96
ENVIRON. APPROVAL	[illegible]	RDS/LLDB	8-9-96
LEAD DIR APPROVAL	[illegible]	ES/PIPING	8-14-96

Enter the the registered engineer's full name and registration number, or stamp, or seal and expiration date in this space.

RECORDS OF REVISIONS

Revision Number	Date	Reasons for Revision	Revised By	Verified By	Coord	APPROVAL SQ	EQ	REGIS ENGR	DIR
2N	8/14/96	Upgrade to latest	M.Schlitz	D. Ali	LBP	[illegible]	[illegible]	[illegible]	[illegible]

PACIFIC GAS AND ELECTRIC COMPANY NUCLEAR

SAN FRANCISCO, CALIFORNIA

DEPARTMENT OF ENGINEERING

*BLI-611

Project File No. 161.82

SPECIFICATION NO. 8179
REVISION NO. 1

Nuclear Safety-Related: Yes X No ___

Part 21 of Title 10 of the Code for Federal Regulations (10CFR21) Applies: Yes X No ___
**(Refer Paragraph 5.5 on Sheet 2-1-16)

DESIGN SPECIFICATION
FOR
FURNISHING AND DELIVERING
MANUALLY, ELECTRIC MOTOR AND PNEUMATICALLY OPERATED
STEEL VALVES
COMPLYING WITH THE
ASME BOILER AND PRESSURE VESSEL CODE
SECTION III, DIVISION 1, CLASSES 1, 2 AND 3 (PG&E DESIGN CLASS I)
FOR NUCLEAR SERVICE
AT UNITS 1 AND 2, DIABLO CANYON SITE

BIDDER SIGN HERE TO INDICATE THIS HAS BEEN USED IN PREPARING PROPOSAL

Firm _____

By _____

DATE _____

APPROVED BY ENGINEERING DEPARTMENT

R. C. Myers (HJT, KJD, DFL)

C. A. Tidrick

S. Auer

M. J. Jacobson

K. L. Herman Dictated but not read

M. R. Tresler MRTresler/pga

DATE: June 1989

PREPARED BY: D. F. Lashkari

Q2129A/1

CONTENTS

NOTE:(1) Spec 8179, Rev 2N has been revised in its entirety.
(2) General Conditions will be provided in the Purchase Order

DESIGN CERTIFICATION
FOR
DESIGN SPECIFICATION NO. 8179

DESIGN CERTIFICATION

I, the undersigned, being a registered Professional Engineer and competent in the applicable field of design and related nuclear power plant requirements relative to Pacific Gas and Electric Company's Design Specification No. 8179, Revision No. 2N, certify that Design Specification No. 8179, Revision No. 2N, is correct and complete with respect to the Design and Service Conditions given therein and provides a complete basis for equipment fabrication in accordance with the 1989 Edition of the ASME Boiler and Pressure Vessel code, Section III, Subsection NCA, Article NCA-3250.

Design Specification No. 8179, Revision No. 2N being certified is:

Certified by Kersi J. Dalal P.E.

Registration No. M-16690 State CA Exp. Date 3/31/2000

Signature Kersi J. Dalal

Date 8/14/96

ASME BOILER AND PRESSURE VESSEL CODE, SECTION III
CRITERIA LOCATOR
FOR
DESIGN SPECIFICATION NO. 8179

	Valve Design Specification Criteria	Paragraphs(s)
1	Functions and Boundaries	1.1.1 & 2.1.7
2	Design Requirements	2.1 & 2.2
3	Environmental Conditions	2.1.3 & Att. 2 Figures 1,2,3,4
4	Code Classifications	1.1.1(a)
5	Material Requirements including Impact Testing	3.1 & 3.1.3(b)
6	Operability	2.1.5(c), 2.1.5(h), 4.1, 4.2 & 4.3
7	Effective Code Eddition and Addenda	2.1.1 & Design Certification

SECTION 1

GENERAL INFORMATION AND REQUIREMENTS

1.1 GENERAL

1.1.1 Specification Coverage: This specification covers the design and procurement (furnishing and delivery) requirements for all sizes of manual, electric motor operated and pneumatically operated valves for nuclear service at PG&E's Diablo Canyon Power Plant, Units 1 and 2.

(a) Valves to be supplied under this Specification, hereafter referred to as "valves" if manually operated, or "assemblies" if electric motor or pneumatically operated, shall comply with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsections NB, NC or ND (Class 1, 2, and 3 components, respectively), 1989 Edition, hereafter referred to as the "Code", and the requirements of this Specification. Other requirements or clarifications may be specified in the specific Request for Bid or Purchase Order accompanying this specification in which case the requirements specified in the Request for Bid or Purchase Order shall prevail. (See specific Request for Bid or Purchase order for "Code Class" applicable to each valve).

(b) Valves and/or assemblies supplied under this Specification are commonly referred to as "PG&E Design Class I" equipment by the Buyer.

1.2 EXTENT OF WORK

1.2.1 Work Included:

(a) Furnishing and delivering valves and/or assemblies in accordance with the requirements of this Specification, Request for Bid or Purchase Order, and "Valve Data Sheets" if issued with either document.

(b) Each valve and/or assembly shall be supplied complete and ready for immediate installation and service at design conditions. Actuators and accessories shall be shop-mounted on the valves.

1.3 INFORMATION AND DOCUMENTS TO BE FURNISHED AFTER AWARD

1.3.1 After award, Supplier shall complete and submit to PG&E the Drawings and Data Requirements for PG&E engineering review and approval, in accordance with the

requirements of Paragraphs 1.3.2 through 1.3.5 of this Section. Supplier shall revise and resubmit the drawings incorporating PG&E's comments as necessary.

1.3.2 The Supplier shall submit a certified (by Registered Professional Engineer) outline drawing (1-reproducible) including bill of materials and dimensions which shall, as a minimum, contain the following information:

(a) Separate weight of valve, actuator and accessories and total weight of valve or assembly. These weights shall be within ± 10% tolerance for 2 1/2" and larger valves, and within ± 15% tolerance for 2" and smaller valves from the actual weight of the item. The actual weight of the valve assembly (less shipping materials) shall be determined by weighing prior to shipment. When the valve and assembly weights exceed the above tolerance limits, the supplier's drawings shall specify actual weights at the time of valve shipment and shall be resubmitted to the Buyer.

(b) Location of the center of gravity with respect to all three orthogonal axes shall be provided for the valve/actuator assembly and for each individual major item for which the weight is given (i.e. valve, actuator and accessories).

(c) Final pressure drop across valve at maximum flow rate and the valve full open Cv.

(d) Location of switches, position indicator, bypass piping, manual operator, and other equipment.

(e) Special in-line mounting and/or flange requirements. For instance, disc clearance requirements for butterfly valves mounted between flanges.

(f) Parts lists of valve, actuator and accessories, including material identification, manufacturer's name and model number.

(g) Threaded fasteners including diameter, length, and quantity.

(h) Orientation of actuator relative to valve body, as requested by the Buyer (see Paragraph 2.1.6 and Paragraph 4.1.7).

(i) Welding end preparations.

(j) Valve Design/Service conditions, location, and functional status (e.g. Active Valve).

(k) Hydrostatic test and Seat Closure test pressure, duration and acceptance criteria/allowable leakage.

(l) Minimum wall thickness of valve.

(m) Nondestructive examination requirements (i.e. RT, UT, PT, MT).

(n) Nominal and net port size and port area.

(o) Valve disassembly clearance requirements for both opened/closed positions.

(p) Stroking or closure time from valve closed (0 percent) to open (100 percent) and from valve open (100 percent) to closed (0 percent) under maximum design conditions for electrically or pneumatically actuated valves.

(q) Identification of ASME Code parts and Non-ASME Safety Related parts.

(r) Packing and gasket sizes and materials.

(s) Reference to Purchase Order number, Specification 8179, Rev 2N, Diablo Canyon Site; Unit Number; and valve tag numbers (only if indicated on the Purchase Order).

(t) Installed location intended for valve as indicated on the Valve Data Sheet.

1.3.3 Valve, valve actuator, electric motor and accessories data sheets completed by the manufacturer (Attachment 1).

1.3.4 Schematics and wiring diagram of the power and/or control systems for actuators, and accessories including routing, terminal block locations and enclosures.

1.3.5 Tubing diagrams for pneumatic actuators and schematics and wiring diagrams of the electrical accessories.

1.3.6 In addition to the drawings and documents required in Paragraph 1.3.2 through 1.3.5, this Section, Supplier shall also submit after award 1 copy of the following information and documents unless otherwise specified, for PG&E review, approval and record.

(a) Certified Design Report/Seismic Analysis, in accordance with Paragraph 2.1.5. Seismic Calculations may not be required for Manual Valves without extended topworks (i.e., gear box or actuator).

(b) Environmental qualification report for electrical components and environmentally qualified air operated valves (not required for manual valves), in accordance with Paragraph 2.1.3.

(c) Functional test procedure and method of analysis in accordance with Paragraph 7.2.4.

(d) Installation, operation and maintenance instruction manuals (2 copies).

(e) Valve characteristics curve when specified in the Purchase Order.

(f) Design calculations for the determination of the minimum required and maximum allowable thrusts for verification of torque switch settings of the motor operated valves and supply air for pneumatic operated valves (see Paragraphs 4.2.1(b) and 4.3.1(b)).

(g) Weak link analysis for electric motor and air operated valves that identifies the limiting component/parts, the calculated stress levels and margins compared to Code allowables, and whether component/part is limited by fracture or loss of function per the requirements of Paragraph 2.1.5(f).

(h) With the valve shipment, the Supplier shall furnish for each valve the quality assurance records of Paragraph 10.2, as applicable.

1.4 SUBMITTAL OF SUPPLIER'S DRAWINGS AND DOCUMENTS

1.4.1 General:

One set of Supplier's drawings and documents (including instruction manuals) as requested in this Specification shall be mailed to the Buyer for review and approval, at the address given hereunder:

ATTENTION: Buyer (indicated in the Purchase Order)
Mail Stop 115/2
PACIFIC GAS AND ELECTRIC COMPANY
Diablo Canyon Power Plant
P.O. Box 56
Avila Beach, CA 93424

SECTION 2

DESIGN

2.1 VALVE DESIGN REQUIREMENTS AND CONDITIONS

2.1.1 Additional Design Requirements: In addition to the ASME B&PV Code, Section III requirements specified by Paragraph 1.1.1(a), valves shall comply with the requirements of the other Standards, Standard Practices, etc. referred to in this Specification and accompanying Request for Bide or Purchase Order (e.g. ASME/ANSI, ANSI, MSS, ASTM, NEMA, etc.). The latest editions of these standards shall be used, except for ASME B&PV Code, Section III, in which case the 1989 Edition shall be used.

2.1.2 Design Conditions (Rating): Each valve shall be designed to satisfy the maximum design pressure, temperature, flow and operating pressure drop requirements given in the Request for Bid or Purchase Order. When these specific design conditions are not specified, each valve shall be designed to satisfy the standard "class rating" in accordance with ANSI B16.34. Rating of electrically or pneumatically actuated 2" and smaller gate and globe valves shall not be less than ANSI B16.34 Class 1500. All steel valves specified as ANSI Class 1500 rating may be furnished with an interpolated rating that is suitable for design conditions of 2485 psig at 650 F.

2.1.3 Operating (Service) and Environmental Conditions:

(a) Buyer may operate each valve or assembly on a continuous or intermittent service basis at its given operating or design conditions. Each valve or assembly shall also be capable of withstanding the environmental conditions including the accident conditions referred to in Paragraph 2.1.3(c) hereunder. The intended installation location of each valve is indicated on the Valve Data Sheet.

(b) Each electric motor actuator and valve accessory designated as Class 1E must be qualified to be functional during and after the accident condition stipulated in Paragraph 2.1.3(c) this Section, for its location specified by the Valve Data Sheet (see also Paragraph 4.1.4).

(c) Environmental Qualification: Plant environmental conditions are as follows:

	Outside Containment		Inside Containment	
	Normal Condition	Accident Condition	Normal Condition	Accident Condition
Temperature (F)	110	Att. 2 - Figure 1	120	Att. 2 - Figure 3
Pressure (psia)	14.7	Att. 2 - Figure 2	(-)1.0 to 1.2 psig	Att. 2 - Figure 4
Relative Humidity	20%-100%	100%	20%-100%	100%
Spray Composition	--	--	--	Boric Acid & NAOH Solution
PPM Boron	--	--	--	2500 PPM
PH	--	--	--	8.5 - 10
Spray Duration	--	--	--	24 Hours
Gamma Radiation (Rads)	$2x10^7$* (40 years)	$2.04x10^8$* (T.I.D.)	$5.44x10^7$ (40 years)	$2.04x10^8$ (T.I.D.)
Beta Radiation	--	--	--	$3.3x10^8$

*For valves located in "Gas Decay Tank and CVCS Demineralizer" areas (when so indicated on the Valve Data Sheet), the gamma radiation is $4.2x10^8$ Rads (normal condition) and $4.95x10^8$ Rads (accident condition).

2.1.4 Useful Life: Beginning with the year 1986, Units 1 and 2 of the Diablo Canyon Site have each an expected power generating life of more than 40 years. To minimize operating cost to the Buyer, Supplier shall furnish valves or assemblies which have a 40 year minimum useful life (excluding standard replacement type items such as packings, gaskets, lubrication, etc.) under the service conditions referred to in Paragraphs 2.1.2 and 2.1.3, this Section. The useful life of each

valve or assembly to be supplied or the parts exempted from the 40 year useful life (i.e. elastomeric parts) shall otherwise be stated in Proposal by Supplier.

2.1.5 Seismic Qualification:

(a) Each valve shall be designed to operate, maintain its pressure retaining integrity and remain undamaged when subjected simultaneously to the combination of its normal operating loading (self weight, pressure, etc.) and the seismic loading requirements given hereunder. Evidence of valve design and assembly seismic qualification shall be provided by Supplier to the Buyer's Engineer in accordance with the requirements of Paragraphs 2.1.5(b) through 2.1.5(i), this Section.

(b) Design Calculations for Valves: All valves with or without extended topworks shall be provided with calculations demonstrating compliance with the Code requirements of NX-3510, NX-3520, NX-3530 and NX-3540, including the suitability for (1) design pressure - temperature rating, (2) minimum wall thickness of the valve body, and (3) adequacy of the valve body to withstand piping end loads meeting the Service Loading specified in Paragraph 2.1.5(c)(1) of this Section. Valves with extended topworks/structures also require seismic calculations. Seismic calculations are not required for manual valves without extended topworks. Extended topworks/structures are defined to be a valve or assembly whose center of gravity is located more than one nominal diameter away from the pipe centerline.

(c) Seismic Calculation for Valve or Assembly: Each valve (with extended topworks) or assembly shall be demonstrated capable of withstanding the simultaneous application of the following loads:

(1) The normal operating loads, including pressure, required operating thrust/torque necessary to actuate the valve against the differential pressure, and the weight and inertial effects of the internal components and the valve's topworks (everything above the body). The required operating torque/thrust shall include the hydrodynamic effects of the fluid during stroking of the valve.

(2) A horizontally applied inertial load equivalent to a double design earthquake acceleration of 6g's in the direction that will create the highest stresses in the valve pressure boundary.

(3) A vertically applied inertial load equivalent to a double design earthquake acceleration of 6g's.

(d) Each assembly shall be assumed to be mounted in that orientation in which the loads in Paragraph 2.1.5(c), this Section, give rise to the highest stresses in the valve pressure boundary. Inertial loads shall be assumed to be applied at the center of gravity of the valve topworks and valve parts.

(e) The topworks of the valve assembly shall be designed to have a fundamental frequency of vibration greater than 100 Hz whenever possible. However, in no case shall the first natural frequency be less than 33 Hz. In either case, the first natural frequency shall be reported to the Buyer. If this minimum requirement cannot be obtained the Buyer shall be notified in the bid documents.

(f) Valves with extended topworks and assemblies shall demonstrate compliance with the above requirements by tests and/or analysis. For all valves with extended topworks and assemblies, an analysis shall also be made to verify that the stresses in the valve pressure boundary are within the allowable stress limits specified in Paragraph 2.1.5(h), this Section. A weak link analysis based on the same service levels (load, temperature, etc.) shall also be provided as part of the above analysis, or as a separate evaluation. The weak link analysis shall identify the limiting component, part or connection of the valve assembly and its available margin relative to the Code allowable stress, fracture, loss of function or loss of pressure retaining capability as applicable. Identification of potential critical conditions leading to significant reduction of the weak link margins and recommendations of how to prevent occurrence of those conditions shall be provided. Copies of the test data and/or analyses shall be submitted and approved by Buyer's Engineer prior to acceptance of these valves for shipment.

(g) Seismic Qualification Test for Actuator and Externally Mounted Accessory Designated as Class 1E:

Each electric motor and pneumatic actuator and externally mounted accessory designated as Seismic/Class 1E shall be qualified by a prototype test in accordance with IEEE-344 meeting the seismic loading specified in Paragraph 2.1.5(c), this Section. Mounting brackets for Class 1E limit switches or other electrical devices mounted to the actuator/valve shall be seismically qualified by test or calculation.

(h) Allowable Stress Limits:

(1) Code Class 1 valves shall meet the stress limits specified in Code Subsubarticle NB-3520 for the service limit loading specified in Paragraph 2.1.5(h)(3), this Section. It shall be assumed that the stress in the piping at its points of connection to the valve body inlet and outlet connections is at the maximum value permitted by the Code for the connecting pipe at the design conditions specified on the Valve Data Sheet. The pipe loading combination on the valve ends shall be applied in the direction that will cause the maximum stress on the valve body.

(2) Code Class 2 and 3 valves shall meet the stress limits specified in Code Paragraphs NC-3522 and ND-3522, respectively, for the service limit loading specified in Paragraph 2.1.5(h)(3), this Section.

(3) Service limit loading is as follows:

Design and Service Limit	Loading Combinations
Level A	PD+DW+NO+OL
Level B	PO+DW+NO+OL+DE
Level C	PO+DW+NO+OL
Level D	PO+DW+NO+OL+DDE

PD - Design Pressure

PO - Operating Pressure

DE - Design Earthquake (50% of DDE)

DDE - Double Design Earthquake (includes Hosgri fault requirements). Loading as specified in Paragraph 2.1.5(c), this Section.

DW - Deadweight

NO - Nozzle/Piping Loads

OL - Operating Loads (includes maximum allowable valve actuator thrust)

(i) Supplier's Design/Seismic Analysis Report and Certificate of Compliance.

(1) In accordance with the Code requirements of Subsection NCA, NCA-3351.1, Supplier shall prepare and furnish for Engineer's approval a "Design/Seismic Analysis Report" for each Code Class valve or assembly. The Design/Seismic Analysis Report for all valve sizes shall be certified and dated by a Registered Professional Engineer for each Code Class valve and assembly.

(2) Thermal transients necessary for verifying Code Class 1 valve adequacy for cyclic loading shall be in accordance with PG&E Vendor documents 663219-644 (2" and Smaller Manual Valves); 663219-646 (2-1/2" and Larger Motor Operated Valves) and 696215-1 (Solenoid Operated Globe and Throttle Valves). The valve locations with the applicable transients will be provided with the Purchase Order.

(3) The supplier shall not furnish Design/Seismic Analysis Reports for valves identical to those procured on previous Purchase Orders. However, the supplier shall furnish certification by a Registered Professional Engineer certifying that the valves procured on the specific current Purchase Order (state the P.O. number) are identical to the valves furnished and qualified by existing Buyer approved Design/Seismic Analysis Report (identify Report by number, revision and date and Buyer's document control record number).

2.1.6 Installation: Each valve shall be designed, whenever possible, for installation in any position. Installation position restrictions shall be given by Bidder in Proposal and permanently indicated by the manufacturer on the valve body.

2.1.6 Flow Direction: Each valve shall be designed, whenever applicable, for bi-directional flow. Flow direction restrictions shall be given by Bidder in Proposal and be permanently indicated by the manufacturer on the valve body (i.e. cast-on arrow).

2.1.7 Boundaries: The valve boundary is defined to be the piping connection at the first circumferential welded joint or the face of the first flange in bolted connections.

2.2 GENERAL PHYSICAL DESIGN REQUIREMENTS

2.2.1 Dimensions and thickness: Whenever applicable, valve dimensions and tolerances, including wall thickness shall be in accordance with the requirements of ANSI B16.34, Paragraph 6, unless otherwise specified.

2.2.2 Stem or Shaft Sealing: The Supplier upon completion of the hydrotest shall remove all packing material, clean and dry the stuffing box or packing containment area and shall provide the valve or assembly without any packing. Packing will be installed at the site by PG&E.

2.2.3 Stuffing Box: When specified in the Valve Data Sheet, the valve shall have a stuffing box designed to accommodate a double set of packing rings separated by a lantern ring to provide an interspace leak-off chamber. The leak-off chamber shall include a provision for drain piping.

2.2.4 Stem or Shaft Leak-Off Piping: The leak-off chamber of each valve referred to in Paragraph 2.2.3, this Section, shall be equipped with a 1/2 inch nominal pipe size, seamless, schedule 160, 6 inch long nipple, one end welded to valve and the other closed with a welded cap. Pipe nipple and cap material shall be of the same "P-Number" as the valve material. See ASME Section IX, Article IV, QW-420 for "P-Numbers".

2.2.5 Valve Body Styles: Valve body styles and patterns (i.e. long, short, straight, wye, butt welding ends, flanged, wafer, etc.) shall be as specified in the Request for Bid or Purchase Order.

(a) Butt-welding end preparations of 2-1/2 inch nominal size and larger butt weld end valves shall comply with the requirements of ANSI B16.25 for field welding without backing rings.

(b) Socket weld end dimensions for 2 inch nominal size and smaller socket weld end valves shall be in accordance with the Code and ANSI B16.34.

(c) Flanges of flanged end valves shall comply with the requirements of ANSI B16.34, Paragraphs 2.1 and 2.4. All flanged end valves shall be furnished with raised face flanges, unless otherwise specified in the Request for Bid or Purchase Order.

(d) Globe type control valves shall be cage type unless otherwise specified.

2.2.6 Large Valve Bonnets or Covers: As applicable, bonnets or covers of valves 2-1/2 inch nominal size and larger whose rating or standard "Class Rating" (see

Paragraph 2.1.2, this Section) is, or is higher than ANSI B16.34 Class 600, shall be of the pressure seal (or breach lock) type. Bonnets and covers of valves of lesser rating shall be of the bolted onto body type.

2.2.7 Small Valve Bonnets or Covers: As applicable, bonnets or covers of valves 2 inch nominal size and smaller may be of either the bolted, welded, threaded and seal welded, or pressure seal (or breach lock) type. Bonnetless valves are also acceptable. Union type bonnets are not allowed.

2.2.8 Valves shall be provided with disc position indication when specified in the P.O.

2.2.9 Butterfly and Diaphragm valves shall be provided with an adjustable travel stop device to prevent disc over-travel. Disc position indication is also required.

2.2.10 Valve Manual Operators: Each valve to be supplied shall be equipped with a manual operator. The manual operator shall be either a handwheel, a wrench, or a tee handle. Manual operators requiring more than 80 pounds of coupled operating effort at rim of handwheel or ends of tee handle or 60 pounds of operating effort at end of wrench or handle to open or close the vale while operating under design conditions referred to in Paragraph 2.1.2, this Section, shall be replaced with a gear assisted or an impact/gear assisted manual operator activated with either a handwheel, a crank or a chain drive if specified.

2.2.11 Valve Nameplates and Stamping: Each valve shall bear its manufacturer's Code symbol markings stamped on a nameplate in accordance with the requirements of the Code, Section III, SubArticle NCA-8200. Manufacturer's valve data and identification markings shall be impressed stamped or etched on another nameplate in accordance with the requirements of ANSI B16.34. Nameplate material shall be stainless steel. Low stress stamping may be used for marking on low stress areas of the valves provided the minimum wall thickness is not encroached. The Nameplate method of attachment shall not impair the structural integrity or functioning of the valve. Manufacturer's data and identification shall include the following as a minimum:

(a) Items required in ANSI B16.34

(b) PG&E Purchase Order number and Item number

(c) Valve tag number only if required by the Purchase Order

SECTION 3

MATERIALS

3.1 MATERIAL REQUIREMENTS AND RESTRICTIONS

3.1.1 Pressure Retaining Materials:

(a) Pressure Retaining Items: Pressure retaining items shall be as defined in the Code.

(b) Materials for Pressure Retaining Items: Materials shall be in accordance with the Code requirements.

3.1.2 Non-Pressure Retaining Materials:

(a) Non-pressure retaining materials shall have an ASTM Specification, unless otherwise approved by the Buyer's Engineer to be a non-ASTM material (i.e. non-safety, non-pressure boundary parts such as a handwheel or nameplate). The material type for non-ASTM parts shall be identified on the submitted valve drawing (e.g. carbon steel, stainless steel, brass, etc.).

3.1.3 Special Material Requirements and Tests

(a) Austenitic Stainless Steel: Ferrite content of castings shall be 5 percent minimum (NX-2433.2) as determined by comparison of ladle or check analysis with the Schaeffler or DeLong diagram. Ferrite percentage shall be reported in the "Certified Material Test Report". Austenitic stainless steel material shall be provided in the solution annealed heat treated condition. During valve manufacturing, austenitic stainless steel shall not be heated over 350 degrees F, except for welding, or unless it has received a full solution annealing at the material supplier's recommended temperature and holding period. The annealing shall be followed by quenching below 800 degrees F within 4 minutes after removal from the heat treating oven, or otherwise cooled at a rate shown to be sufficient for a casting of similar size and section thickness to pass the testing requirements of ASTM A262 practices A or E. At time of removal from heat treating oven, material must be within the recommended solution heat treating temperature range. These requirements shall not apply to Non-Code, Non-Safety Related parts.

Alternatively, the seat rings of 2" and smaller globe valves and the backseats of 2" and smaller gate valves may be installed by vacuum furnace brazing at 1950-2000 F followed by water quenching. This heat treatment is intended to provide good corrosion resistance in the valve body. Cooling by means other than water quenching is acceptable only when the cooling rate is sufficiently rapid to prevent sensitization. This determination shall be made in compliance with NRC Regulatory Guide 1.44 by subjecting the material to a suitable intergranular corrosion test. The valve body parts shall pass either practice A or E of ASTM A262. This practice is not applicable to type 630 stainless steel.

(b) Impact Tests for Carbon Steel: These tests shall be as required by the Code. Impact tests shall be performed at 30°F or lower temperature (Lowest Service Metal Temperature). Test results shall be provided in the "Certified Material Test Reports".

(c) Galling and Seizing of Stainless Steel: Provisions to preclude galling or seizing of austenitic stainless steel material surfaces shall be implemented (e.g. bearing and moving contact surfaces).

(d) Age Hardening Stainless Steel: Use of these materials shall be limited to type 630 of either ASTM A564/ASME SA564 (bar stock), ASTM A707 (forgings), or ASTM A747/ASME SA747 type Cb7Cu-1. The type 630 materials shall be solution heat treated at 1900 +/- 25°F for one hour per inch of thickness, not less than 1/2 hour, followed by air, nitrogen or liquid cooling. The type Cb7Cu-1 materials shall be solution heat treated at 1925 +/- 50°F for 1/2 hour per inch of thickness, not less than 1/2 hour, followed by air, nitrogen or liquid cooling. Both grades shall be age hardened at 1100 +/- 25°F for four hours minimum followed by air cooling.

(e) Surface Finish: The finish of pressure boundary items and hardfaced or hardened surfaces of seats and discs shall be such as to permit satisfactory performance and interpretation of the nondestructive examination specified herein.

(f) Hardfacing: Non-cobalt hardfacing materials (NiCr-A, B or C) in accordance with AWS/SFA 5.13 classification shall always be used in radioactive services. However, for motor operated valves/valve parts, the use of non-cobalt hardfacing requires specific acceptance from the Buyer's Engineer. If non-cobalt hardfacing materials are unavailable, stellite hardfacing materials (E or RCoCr-A, B or C) may be used only when approved by the Buyer's Engineer. Military Specifications MIL-P-NiCr-B-2; or MIL-P-CoCr-E-1 or other alternate non-stellite hardfacing materials such as Norem, Deloro or Colmonoy shall be used when specified in the request for Bid or Purchase Order.

(g) Materials for Borated Water Service: These materials (including bolting), shall be austenitic stainless steel, type 316 or stainless steel per Paragraph 3.1.3(d) this Section.

(h) Valve Material Selection for Pressure Retaining Items: As applicable, pressure retaining item materials shall be as follows:

(1) Carbon Steel:

a) Forged - ASME SA-105

b) Cast - ASME SA-216 Grade WCB

c) Plate - ASME SA-515 Grade 70

(2) Stainless Steel:

a) Forged - ASME SA-182 Grade F304/F316 or F304/316L when specified.

b) Cast - ASME SA-351 Grade CF8/CF8M or CF3/CF3M when specified. SA-351 - CF8C is permitted for discs only.

c) Plate - ASME SA-240 Grade 316 or 316L when specified.

(i) Valve Stem, Shaft Materials, and Body to Bonnet Bolting: Valve stem, shaft materials and body to bonnet bolting shall be as specified in Paragraph 3.1.3(d), this Section, or equivalent material approved by Buyer's Engineer on the Supplier's drawings. SA/A-193, Grade B7 bolting is acceptable for carbon steel applications but is not permitted for use on stainless steel valves. Austenitic stainless steel type 316 bolting material may be used in

lieu of SA/A-564 Gr 630, cond H1100 material for body to bonnet bolting only when approved by the Buyer's Engineer.

(j) Other Materials:

(1) Materials other than those specified by this Specification (such as aluminum-bronze, cast iron, bronze, etc.) shall be furnished as specified in the Request for Bid or Purchase Order. The materials furnished shall be of ASME or ASTM material specifications.

(2) Cast iron yokes shall not be used for valves.

(3) Non-metallic items of the valves shall be as specified on the Buyer's Valve Data Sheet. These are selected by the Buyer for the temperature and radiation conditions based on valve location. In cases where the material is not specified, the Supplier shall select and furnish the material based on the design and environmental conditions specified in this Specification and/or Request for Bid or Purchase Order, and is subject to approval by the Buyer's Engineer.

(4) Nitriding or plating of the valve disc is not permitted.

SECTION 4

VALVE ACTUATORS

4.1 GENERAL REQUIREMENTS

4.1.1 Each motor or air operated valve shall be supplied complete with a "mounted-on" actuator. Actuator shall be of the kind and motion specified (Electric motor or pneumatic, linear, or rotary) and its attributes and performance shall be in accordance with the specific requirements given in this Section and the documents referred to in this paragraph. Actuator shall be designed to fully open and shut the respective valve under the maximum differential pressure at the speed specified in the specific Valve Data Sheet. If the actuator or externally mounted accessory is required to be seismically and/or environmentally qualified it will be designated as Seismic or Class 1E on the Valve Data Sheet and shall be qualified in compliance with IEEE-323, IEEE 344, IEEE-382 and 10CFR50.49 as noted in this Section. The specific attributes and performance for the valve actuators not covered by the Specification requirements will be specified in the Request for Bid or Purchase Order or the Valve Data Sheet.

4.1.2 Useful Life: Refer to Paragraph 2.1.4 for useful life of actuators. Buyer requires that each actuator (and its accessories) to be capable to perform not less than 2000 open to close, to open cycles during its useful life, with a maintenance frequency of not less than two years.

4.1.3 Seismic Qualification: Each electric motor actuator, pneumatic actuator and externally mounted accessory designated as Seismic or Class 1E shall be seismically qualified by a prototype test in accordance with IEEE-344. The qualification test shall satisfy the seismic loading specified in Paragraph 2.1.5(c).

4.1.4 Environmental Qualification: Each electric motor actuator and externally mounted accessory designated as Class 1E shall be environmentally qualified by a prototype test in accordance with 10CFR50.49 for use inside or outside containment, as specified in the Valve Data Sheet or purchase order. The qualification test shall satisfy the environmental conditions specified in Paragraph 2.1.3(c). Manually operated valves do not require environmental qualification.

(a) When specified by the Purchase Order, qualified conduit entrance seals shall be supplied for Class 1E electrical equipment. If environmental qualification testing of Class 1E electric equipment was performed with conduit entrances sealed, the manufacturer shall describe in his proposal

the method of sealing used. Additionally, a qualified conduit sealing fitting shall be quoted in the proposal.

(b) The qualification documents/reports shall indicate the differences in materials or configuration between the test specimen and the supplied actuator. A written justification for such differences shall be furnished for Buyer's review and approval.

4.1.5 Identification: Each actuator shall have a permanent noncorrosive manufacturer's identification and mechanical/electrical data plate securely attached to an easily accessible external surface of the enclosure. The plate shall indicate, as applicable, the following as a minimum: actuator type, motor type, model, serial number, voltage, current, horsepower, safe working pressure, Buyer's Purchase Order Number and valve (tag) number.

4.1.6 Selection: Complete responsibility to select, procure, mount, warrant and certify each valve actuator and its accessories shall rest solely with the valve Supplier. Valve Supplier shall warrant and certify that each actuator is suitable for its valve, service conditions and qualifications.

4.1.7 Mounting: Mounting of each actuator on the respective valve shall be performed by the valve Supplier in their own facilities, or at their option, following Buyer's inspection and approval, by others, in their facilities. Mounting costs shall be included in quoted price of each assembly. Buyer will furnish to supplier, at time of or after award, the mounting position of the valve and actuator.

4.1.8 Installation: Each actuator to be supplied shall be designed for indoor installation, to function properly mounted in any position and to satisfy the service or design condition specified on the Valve Data Sheet. Actuators required for outdoor installation will be specified so on the Valve Data Sheet.

4.2 ELECTRIC MOTOR ACTUATORS

4.2.1 Mechanical Requirements:

(a) Electric Motor Actuators shall always be Limitorque and shall be sized by the valve manufacturer subject to review by PG&E. Sizing is to be in accordance with the requirements of NRC Generic Letter 89-10. Safety-related Limitorque actuators shall be environmentally qualified in accordance with L/C Test Reports 600456 dated 12/9/75 and/or B0003 dated 6/7/76. Each actuator and externally mounted accessories designated as Class 1E (Ref. Paragraph 4.1.1, this Section) shall be of the same design as the prototype test actuator used to provide the basis for the

seismic and environmental qualifications. Each actuator to be supplied shall be of the self-contained unit type and incorporate in its physical design the following mechanical features:

(1) A manual override with handwheel designed to be declutched automatically from the drive train when the motor is energized. Return to manual operation shall require operation of a manual clutch control device. The manual override shall permit full opening or closing of the respective valve in a reasonable time. Operating rim effort at maximum required torque shall not exceed 80 pounds. Rotation shall be clockwise to close. Functioning of the override shall not be prevented by failure of the motor or motor drive train. The handwheel shall be at rest any time the motor rotates.

(2) A mounting bracket capable of withstanding without damage any force that the actuator can apply upon it (i.e., stall torque with torque and limit switches disconnected, including seismic stresses).

(3) A lost motion "hammer-blow" action effective on both motor and manual operating modes.

(4) An oil-bathed or grease lubricated reduction gear train complete with thrust bearings.

(5) A stem nut that is field removable to permit repairs or replacement without disassembling the gear train, removing the actuator from the valve, or disconnecting any electrical wiring.

(6) Each actuator shall be designed to provide torque and position limitation in both directions.

(b) The Supplier shall furnish design calculations for the motor operated valves that define (a) the minimum thrust/torque required to open and close the valve against the design/maximum differential pressure. The minimum thrust/torque required shall be shown to envelope any hydrodynamic fluid effects expected during the stroking of the valve. This minimum thrust shall be calculated without considering any effects from the electrical coasting, and (b) the maximum opening and closing thrust/torque which the valve is capable to endure without overstressing the valve's weakest component at 90% of the component material yield strength. The limiting component (s) shall be identified.

(c) The mechanical components of each actuator, except external appurtenances (handwheel, clutch-control device, etc.), shall be housed in a noncorrosive weatherproof and watertight enclosure. Each actuator designated as Class 1E shall be equipped with vent(s) and drain(s) if the actuator was environmentally qualified with them. See the requirements of Paragraph 4.2.2(a)(6), this Section, if a combination of mechanical-electrical enclosure is supplied.

(d) Each actuator shall be safe to maintenance personnel, presenting no danger of accidental release of spring loads or other forces.

(e) Each actuator shall have a stroking speed complying with the requirements of the respective Valve Data Sheet. If the stroking speed is not specified, therein, the minimum rate shall be 30 seconds per 90 degrees rotation for rotary actuation and 12 inches/minute (gate valve) or 4 inches/minute (globe valve) for linear actuation at maximum differential pressure across the disc.

4.2.2 Electrical and Accessory Requirements

(a) Motor and Electrical Accessory Requirements: Each actuator shall be equipped with a 3-phase main electric motor drive, and a terminal compartment. (Note: In special applications identified by the Valve Data Sheet, a direct current (DC) main drive motor may be required) Electrical components and requirements shall be in accordance with the following:

(1) Motor: The motor shall be specifically designed for valve actuator service and shall be high torque, totally enclosed, with motor leads brought into the terminal compartment.

(A) The motor shall be of sufficient size to open or close the valve as specified in the Valve Data Sheet under the maximum differential pressure when voltage to motor terminals is at inrush conditions. The motor duty rating shall be sufficient to allow service for the minimum length of time required without exceeding its temperature rating. The motor shall be prelubricated and bearings shall be of the antifriction type.

(B) Supplier shall specify motor currents at the specified voltage for each actuator corresponding to locked rotor, maximum seating torque and average running load.

(2) Power: Power to each actuator will be a single source of 460 volts with ± 10% variation, 3 phase, 60 hertz unless otherwise specified in the Valve Data Sheet (i.e. DC drive motor). The control system will operate on 90-132 volt, single phase, 60 hertz AC or 90-140 Volt DC.

(3) Switches: Each actuator shall be controlled during valve opening and closing operation by devices (switches) adjustable in the field, which limit travel, thrust or torque to prevent damage to the valve. Switches for actuators designated as Class 1E shall be qualified with the actuator (Ref. Paragraphs 4.1.3 and 4.1.4, this Section). Torque and position limit switches shall be as follows:

(A) Torque Switches: Each actuator shall be equipped with adjustable torque switches, as necessary, wired to shut off the motor in the event that excessive torque is generated in either the opening or closing of the valve.

(B) Position Limit Switches: Each actuator shall be equipped with geared limit switches for open and close direction that are adjustable through the full range of the valve stroke. Switches shall be wired to shut off the actuator at the set valve position limits and to control indicator lights. When required by the Purchase Order, each actuator shall have an externally mounted position switch provided at both or one end of the valve travel. Each switch is to have 2 NO and 2 NC contacts. The additional position switches shall be securely mounted either on the actuator, the actuator support, or the valve and shall be qualified if the actuator has been designated as Class 1E (Ref. Paragraphs 4.1.3 and 4.1.4, this Section).

(C) Minimum rating of switches shall be as follows:

AC: 10 amp noninductive, 5 amp inductive at 120 volts

DC: 5 amp resistive, 1.0 amp inductive at 125 volts

The voltage drop across contacts shall be less than 1/4 volt at rated current.

(D) Switch Adjustment: Switches referred to in Paragraph 4.2.2(a)(3), this Section, shall be adjusted by valve

manufacturer after actuator is mounted on the respective valve.

(4) Position Transmitters: When specified, position transmitters shall be of the two wire type with 4 to 20 ma DC output, into a maximum load of not less than 1,000 ohms, operating from a 48 volt DC supply. Overall accuracy shall be one half of one percent. Position transmitters for actuators designated as Class 1E shall be qualified (Ref. Paragraphs 4.1.3 and 4.1.4, this Section).

(5) Terminal Compartment: Each actuator shall be provided with a separate terminal compartment. Power and control wiring will be brought out to terminal blocks in this compartment for field connection. Terminal block ratings shall be suitable for the voltage and current requirements of the valve circuitry stated in Paragraph 4.2.2(a)(2), this Section and qualified with the actuator (Ref. Paragraph 4.1.3 and 4.1.4, this Section). Not less than three conduit entries shall be provided.

(A) Control and power terminals shall be screw or stud type capable of accepting ring tongue crimp type terminals.

(B) Identical actuators shall have identical external terminal numbering and wiring diagrams.

(6) Housing: The electrical components of each actuator shall be housed in a noncorrosive weatherproof enclosure conforming to NEMA ICS 6-110, Type 4, as a minimum.

4.3 PNEUMATIC ACTUATORS

4.3.1 Mechanical Requirements:

(a) Each actuator designated as Seismic (Ref. Paragraph 4.1.1, this Section) shall be of the same design as the prototype test actuator used to provide the basis for the seismic qualification. Each actuator to be supplied shall be either a pneumatic single acting spring return diaphragm or a piston/cylinder type actuator, designed to be operated with clean, dry, oil free compressed air with maximum pressure of 100 psig. Piston/cylinder actuators shall be heavy duty types. Each actuator shall incorporate as applicable, in its physical design the following mechanical features:

(1) A mounting bracket capable of withstanding without damage any force that the actuator can apply upon it.

(2) A fully closed weatherproof body with provisions made for venting, relieving of excessive pressure, lubrication of internals, and constant safety of personnel.

(3) A spring canister (for piston/cylinder type actuators) designed to fully enclose the return spring and allow its removal from actuator only when safe to personnel and equipment. Clearance between spring O.D. and canister wall I.D. shall not exceed 1/2 inch throughout. Return spring shall be designed to assure a smooth, clatter-free operation. Piston/cylinder type actuators shall not be equipped with EPR, EPDM, or any other elastomeric "O-rings" or component which would swell in contact with oil or petroleum products.

(4) A shaft and shaft bearings designed and located to preclude bending of shaft.

(5) A provision to assure valve return to its required power failure position in the event of loss of air power.

(6) Provisions to prevent corrosion of internals (i.e. electroless nickel plating of all internal surfaces).

(7) A design safety factor of 4 to 1 for the pressure retaining components. If manufacturer's standard components do not satisfy this requirement, it shall be brought to the attention of the Buyer.

(8) A manual override that is capable of fully opening or closing its respective valve under maximum design conditions. The maximum torque required on handwheel rim to move the valve after seat clearing shall be 75 ft-lbs. Seating or unseating torque shall not exceed 150 ft-lbs. An impact type handwheel or a gear box shall be supplied if the torque requirement exceeds the latter.

(9) Actuators shall be equipped with travel stops to prevent valve or actuator overtravel.

(b) The Supplier shall furnish design calculations prepared to size the actuator to fully open, shut, and throttle its respective valve under the maximum design and service conditions given in the Valve Data Sheet. The minimum

thrust/torque required shall be shown to envelope any hydrodynamic fluid effects expected during the stroking of the valve. If tight shutoff is specified (ANSI/FCI 70-2-1991, Class IV or V) actuator shall provide a minimum seating force of 300 lbs per lineal inch of seat diameter in addition to pressure unbalance and friction forces.

(c) Each actuator shall have a stroking speed complying with the requirements of the respective Valve Data Sheet. If the stroking speed is not specified therein, its minimum rate shall be 30 seconds per 90° rotation for rotary actuation and 12 inches/minute (gate valve) or 4 inches/minute (globe valve) for linear actuation at maximum differential pressure across the disk.

(d) Rotary single acting piston/cylinder actuator torque requirements shall be as follows:

(1) Pneumatic Stroke: Valve opening break-away torque (valve fully closed) shall not be less than 1.5 times the end torque (valve fully open) with a mid-travel position torque (valve half open) of not less than 70 percent of the end torque (valve fully open).

(2) Spring Return Stroke: Valve closing break-away torque (valve fully open) shall not be less than 1.5 times the end torque (valve fully closed) with a mid-travel position torque (valve half open) of not less than 70 percent of the end torque (valve fully closed).

(e) Linear single acting piston/cylinder actuator thrust requirements shall be as follows:

(1) Pneumatic Stroke: Valve opening break-away thrust (valve fully closed) shall not be less than 1.5 times the seating thrust, with air pressure at 80 psig.

(2) Spring Return Stroke: Valve closing break-away thrust (valve fully open) shall not be less than 1.5 times the seating thrust, with air pressure at 80 psig.

(f) Each actuator shall be safe to personnel, presenting no danger of accidental release of spring loads or other forces.

4.3.2 Electrical and Accessory Requirements:

(a) Each actuator shall be controlled during opening and closing operations by devices adjustable in the field, which limit travel speed, thrust, or torque.

(b) When required by the Purchase Order, each actuator shall have externally mounted position switches provided at both or one end of the valve travel. Refer to Paragraph 4.2.2(a)(3), this Section for switch requirements.

(c) Unless otherwise indicated in the Valve Data Sheet, the electrical components of each actuator shall be housed in a noncorroding, weatherproof, and watertight enclosure conforming to NEMA ICS 6-110, Type 4, as a minimum.

(d) Control terminals shall be screw or stud type capable of accepting ring tongue crimp type terminals.

(e) Identical actuators shall have identical terminal numbering, compressed air tubing diagrams and wiring diagrams.

(f) Solenoid valves shall be provided with the pneumatic actuators.

4.4 MATERIALS AND RESTRICTIONS

4.4.1 Unless otherwise specified in Paragraphs 4.2 and 4.3, this Section, or in the Request for Bid or Purchase Order, actuator and accessory materials shall be per the manufacturer's requirements, subject to approval by Buyer's Engineer.

4.4.2 Threaded fasteners shall be made of 300 series stainless steel where practical. Bolting for diaphragm actuators shall have a minimum tensile strength equal to SAE Grade 5. Where stainless steel fasteners are judged impractical, epoxy-painted alloy/carbon steel is acceptable. Cadmium plated fasteners are not allowed.

4.4.3 Aluminum materials are not allowed for use inside the containment.

SECTION 5

QUALITY ASSURANCE

5.1 CLASSIFICATION OF PARTS:

5.1.1 General: The Supplier shall identify each material component or part of the valve and actuator that is an ASME Pressure Retaining Part or Non-ASME Safety Related Part. This identification shall be furnished on the Supplier's drawing for review and approval by the Buyer's Engineer. The approved drawing will be construed as acceptance and concurrence by the Buyer's Engineer of the quality classification. The Supplier shall conform to the quality requirements specified in Paragraphs 5.1.2 and 5.1.3, this Section. The bids will be deemed unacceptable if the Supplier fails to conform with these requirements.

5.1.2 ASME Pressure Retaining Parts: The ASME pressure retaining parts of the valve shall be controlled by the Supplier's Quality Assurance Program approved by the Buyer to assure quality when supplying equipment or components in accordance with ASME B&PV Code, Section III, Article NCA-4000 and 10 CFR 50, Appendix B. The parts nomenclature used hereunder in Paragraphs 5.1.2(a), 5.1.3(a) and 5.1.4 may reflect those shown in Code Case N-62.

(a) ASME Pressure Retaining Parts: The ASME Pressure Retaining parts include but are not limited to the following for the valve types specified:

(1) GATE and GLOBE/CONTROL: Body, Bonnet, Gate/Disc/Wedge/Plug, Pressure Seal Gasket Retaining Ring, Body/Bonnet Bolting, Lifting Lug (if permanent attachment to pressure retaining part), Drain Nipple/Cap/Plug.

(2) CHECK: Body, Bonnet Cover/Cap, Bonnet Retainer, Disc, Pressure Seal Gasket Retaining Ring, Body/Bonnet Bolting, Lifting Lug (if permanent attachment to pressure retaining part), Drain Nipple/Cap/Plug, Equalizer Piping.

(3) BALL: Body, Bonnet/Cover End Piece, Ball, Bearing Plate and Bolting, Body/Bonnet/Cover Bolting, Vent Plug.

(4) DIAPHRAGM: Body, Bonnet, Disk, Diaphragm (Code Case N-31), Vent Plug, Body/Bonnet Plate Bolting.

(5) BUTTERFLY: Body, Disc, Shaft Cover/Compression Plate & Bolting, Thrust Adjusting Screw.

5.1.3 Non-ASME Safety Related Parts: The safety related and critical materials, parts or components (non-pressure retaining items not covered by ASME Section III) essential to the function of the valve, shall be in compliance with the requirements of Supplier's Quality Assurance Program for all activities affecting the quality of these items.

(a) Non-ASME, Safety Related Essential to Function Parts: The Non-ASME safety related essential to function parts include but are not limited to the following for the valve types specified.

(1) GATE AND GLOBE/CONTROL: Seat Ring, Backseat Ring, Disc Guide, Stem, Stem Collar/Clamp & Bolting, Disc/Stem Union, Yoke & Yoke/Bonnet Bolting, Cage, Cage Spacer, Upper/Lower Wedge & Retainer (for double-disc gates - excluding pressure retaining wedge), Packing Gland Flange & Bolting/Hinge Pin. Packing Leakoff Pipe/Cap/Plug, Spring, Diaphragm, Spline Bushing, Yoke Nut (only for "Active" electric & air operated valves), Yoke Bushing (only for Globe Valves).

(2) CHECK: Seat Ring, Hinge Arm, Hinge Shaft/Pin, Hinge Support (Bracket) Hinge Pin Cover & Bolting, Hinge and Hinge Pin Bushings, Disc Guide, Disc Nut, Disc Nut Locking Pin, Spring, Counterweight, Soft Seat and Seat Ring Retaining Screw.

(3) BALL: Stem, Trunion, Seat/Sleeve, Seat Spring, Liner, Packing Gland Flange & Bolting.

(4) DIAPHRAGM: Stem/Spindle, Compressor and Compressor Pin, Stem Nut/Bushing (only for "Active" electric and air operated valves), Diaphragm Finger Plate.

(5) BUTTERFLY: Disc Shaft, Disc Pin, Seat, Seat Retainer & Bolting, Body Liner, Packing Gland Flange/Retainer & Bolting.

(b) Actuators and Accessories: Each Actuator (such as electric motor, pneumatic, linear or rotary) and externally mounted accessories (such as pressure regulator air sets, position/torque switches, position transmitters, terminal compartments) designated as Class 1E (seismically and environmentally qualified) shall be controlled by the Supplier's Quality Assurance Program approved by the Buyer and 10 CFR 50, Appendix B.

5.1.4 All Other Parts: The following parts not covered by Quality Requirements of Paragraphs 5.1.2(a), 5.1.3(a) and 5.1.3(b), this Section, do not require any such identification on the Supplier's drawings. These parts for the specified valve types are:

(a) GATE AND GLOBE/CONTROL: Packing Gland Ring (when gland flange is a two piece item), Yoke Nut/Sleeve/Bushing/Cap, Pressure Seal Gasket Spacer Ring, Pressure Seal Bonnet Retainer/Lifting Plate & Bolting, Wedge Spring (for double disc gate), Packing Lantern Ring, Handwheel/Handle, Bushing/Bearing, Secondary Locking Device (washer, pin, locknut, set-screw, key), Name/ID Plate & Screw, Pressure Seal and Other Gaskets, Packing, Grease Fitting, Position Indicator & Bolting.

(b) CHECK: Pressure Seal Cover Retainer/Lifting Plate & Bolting, Pressure Seal Gasket Spacer Rings, Bushing, Packing, Gasket, Washer, Name/ID Plate.

(c) BALL: Stop Collar, Grease Fitting, Bearing/Bushing, Seat Spring Retainer/Cover, Seat Insert, Seal, O-Ring, Gasket, Packing, Handle, Lockwasher, Stem Nut.

(d) DIAPHRAGM: Spacer Nut, Spacer, Handwheel, Bearing, Stem Nuts/Bushing, Gasket, O-Ring, Washer, Locknut.

(e) BUTTERFLY: Disc Pin Washer, Thrust Spacer & Adjustment Bolting, Packing Gland Ring (when gland flange is a two piece item), Bearing/Bushing, Packing, Gasket, O-Ring.

5.1.5 APPLICABILITY OF 10CFR21: The requirements of 10CFR21 apply only to parts covered by Paragraphs 5.1.2(a), 5.1.3(a) and 5.1.3(b), this Section.

5.1.6 DETERMINATION OF OTHER PART CLASSIFICATIONS (FOR PARTS NOT COVERED IN THIS SECTION). If the above lists do not cover a specific part used in the Supplier valve design, then the Supplier will classify the part during the quotation process and obtain concurrence from Buyer's Engineer.

SECTION 6

WELDING

6.1 GENERAL

6.1.1 Whenever required in the manufacturing of the valves to be supplied under this specification, welding and welding related items (i.e. processes, procedures, welder and procedure qualifications, heat treatment, etc.) shall be in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section IX.

6.1.2 Welding, welding filler metal handling and heat treatment procedures for all pressure retaining, hardfacing, repair and other critical welds are not required to be submitted to the Buyer's Engineer for approval prior to their implementation. The Supplier shall be completely responsible for performing welding in compliance with the requirements of the ASME Code and this specification.

6.2 WELDING PROCESSES

6.2.1 The following welding processes are acceptable to PG&E in the manufacturing of valves:

(a) Shielded Metal Arc Welding (SMAW)

(b) Gas Tungsten Arc Welding (GTAW)

(c) Submerged Arc Welding (SAW)

(d) Gas Metal Arc Welding (GMAW)

(e) Flux Cored Arc Welding (FCAW)

(f) Oxy-Acetylene Welding (OAW)

6.3 WELDING ELECTRODES (FILLER METAL)

6.3.1 Low hydrogen type electrodes shall be used in the SMAW process.

6.3.2 Electrode classifications E6012, E6013, E7014 and E7024 shall not be used in the welding of pressure retaining items. They may however be used in the fillet welding of non-pressure retaining items.

6.3.3 Electrodes shall conform to ASME SFA-5.18, classifications E70S-2, E70S-3 or E70S-6 for GMAW.

6.3.4 Electrodes shall conform to ASME SFA-5.20, classifications E70T-1 or E70T-5 for FCAW which shall be done with an external shielding gas.

6.3.5 Electrode deposit chemical composition and mechanical properties shall be within the limits specified for the materials to be joined.

6.3.6 The acceptable Delta Ferrite content limits of austenitic stainless steel welds shall be 5 percent as a minimum (NX-2433.2). These limits shall be managed through the control of the filler metal at procurement time, using the Schaeffler diagram to estimate the percentage of ferrite. The results of the delta ferrite determination shall be included in the Certified Material Test Reports of NX-2130 or NX-4120.

6.4 MISCELLANEOUS WELDING REQUIREMENTS

6.4.1 The root pass of each full penetration butt weld shall be performed by the GTAW process only, unless the reverse side of the weld is accessible for cleaning, repair, and examination to accomplish a sound, uniform and full penetration weld. Back welding may be required after grinding back side of root pass to accomplish a full penetration weld.

6.4.2 Permanent backing rings or strips are not allowed.

6.4.3 Filler metal layer thickness of SAW process welds shall not exceed the following dimensions.

(a) 1/2 inch, when welding carbon or low alloy steel items of 1-1/4 inch or more thickness.

(b) 3/8 inch, when welding carbon or low alloy steel items of less than 1-1/4 inch thickness.

(c) 1/4 inch, when welding austenitic stainless steel items regardless of thickness.

6.4.4 Alloy wire and neutral flux shall be used in SAW process of alloy and austenitic stainless steel.

6.4.5 Removable starting and stopping tabs shall be used in longitudinal SAW process.

6.4.6 Peening is not allowed.

6.4.7 Internal inert gas purging shall be used in the GTAW process of the root pass of austenitic stainless steel. Nitrogen shall not be used as a purging gas.

6.4.8 Each pass of a circumferential weld shall be fully completed around the joint before performing the next pass. Block welding technique is not allowed.

6.4.9 Heat shall not be applied to correct weld distortion and dimensional deviations of austenitic stainless steel.

6.4.10 OAW process for welding and hardfacing are not allowed on pressure retaining austenitic stainless steel, unless welded or hardfaced items are subsequently solution annealed.

6.5 HEAT TREATMENT OF WELDS AND WELDMENTS

6.5.1 Preheating Requirements: Preheating shall be in accordance with the Code and satisfy the following requirements:

(a) Carbon steel shall be preheated to 200° F minimum whenever the base material thickness exceeds 1-1/4 inch, or its carbon content exceeds 0.3 percent.

(b) Preheating and interpass temperature shall not exceed 350°F when welding or hardfacing pressure retaining austenitic stainless steel.

(c) Preheating requirements of Paragraphs 6.5.1(a) and 6.5.1(b), this Section, are applicable to flame and carbon-arc cutting, and tack welding but not to arc-air gouging.

(d) Preheating temperatures shall be measured using contact pyrometers or temperature indicating crayons which do not adversely affect the corrosion resistance of the material whenever used on stainless steel.

6.5.2 Postweld Heat Treatment: Postweld heat treatment shall be in accordance with the Code and satisfy the following requirements:

(a) Postweld heat treatment temperatures shall be measured by attaching thermocouples directly to weldments or to metal heat sink items representing the largest section thickness of the weldment. When postweld heat treating is performed in batch type treatment, thermocouples shall be attached to weldments located in both top and bottom oven layers, or in the oven's hottest and coldest zones. Oven atmosphere temperature recordings are acceptable alternates. Records of calibration status shall be made available for review. The oven atmosphere temperature may be used to control metal temperature if based on a verification run showing a comparison between metal temperature obtained by thermocouples attached to the weldment(s) located in the hottest and coldest zones and the oven temperature. The temperature/time chart developed from this data may be used to control subsequent heat treating oven charges where the volume (tonnage) and/or maximum weldment thickness is equal to or is less than that of the verification run. A re-verification run shall be made approximately every 60 days or when a significant change has been made to the oven.

SECTION 7

NONDESTRUCTIVE EXAMINATION, TESTS, WALL THICKNESS MEASUREMENTS AND INSPECTION

7.1 NONDESTRUCTIVE EXAMINATION

7.1.1 GENERAL

(a) Valves to be supplied under this Specification shall be nondestructively examined in accordance with the requirements of the Code and the additional requirements of this Section.

(b) Supplier's nondestructive examination facilities shall be subject to inspection and approval by the Buyer. The typical nondestructive examinations required for the valves are described in Paragraphs 7.1.2 through 7.1.5, this Section.

(c) Procedures concerning the nondestructive examination and hydrostatic/seat leakage testing of the valves are not required to be submitted to the Buyer for approval prior to their implementation. However, the Supplier shall be completely responsible for compliance with the requirements of the Code and this Specification, and shall submit calculations and procedures as specified in Paragraph 1.3.6.

(d) As applicable, and in addition to the Code requirements, the following examinations shall be performed on the valves:

(1) Nuclear Class 1 and 2 valves manufactured to ANSI B16.34 Special Class requirements shall be examined and repaired in accordance with ANSI B16.34 requirements in accordance with the examination methods and acceptance standards of NX-2500.

(2) For 4" and smaller Nuclear Class 1, 2, and 3 valves, hardfacing and base material adjacent to hardfaced areas shall be examined by the liquid penetrant method. The liquid penetrant examination shall be performed after machining and heat treatment.

7.1.2 Radiographic Examination

(a) The radiographic examination procedures and acceptance standards shall satisfy the Code requirements.

7.1.3 Magnetic Particle Examination

(a) In addition to the Code requirements the magnetic particle examination procedures and acceptance standards shall satisfy the following conditions:

(1) Magnetic particle examinations shall be made with the prod, coil or direct contact method using direct or rectified alternating current. The yoke method may only be used in the supplementary surface examination of arc strikes and machined surfaces.

(2) "As Cast" surfaces may be examined by the wet or dry method.

7.1.4 Liquid Penetrant Examination

(a) In addition to the Code requirements the liquid penetrant examination procedures and acceptance standards shall satisfy the following conditions:

(1) Liquid penetrant examination of machined and welded surfaces shall be made with the solvent removable method or the water washable method.

(2) Liquid penetrant examination of cast and un-machined surfaces may be made with the water washable method or the post emulsification method.

(3) Materials used for liquid penetrant examination of austenitic stainless steel shall be of the low (200 ppm maximum) sulfur and halogen type, approved by the Buyer's Engineer.

7.1.5 Ultrasonic Examination

(a) Ultrasonic examination procedures and acceptance standards shall be in accordance with the Code.

7.1.6 Examination Personnel Qualification

(a) Material and valve nondestructive examinations shall be performed by personnel qualified in accordance with the requirements of the Code and SNT-TC-1A.

7.2 TESTS

7.2.1 General

(a) Valves to be supplied under this Specification shall be tested in accordance with the requirements of the Code and additionally with those of Paragraph 7.2.2, this Section.

(b) Actuators to be supplied under this specification (e.g. assemblies) shall be tested in accordance with the requirements of Paragraphs 7.2.3 and 7.2.4, this Section.

(c) Supplier shall perform tests in their own facilities as required by the Code and this Specification. Supplier's test facilities shall be subject to prior inspection and approval by the Buyer.

(d) Supplier shall repair or replace, at their own expense, any item directly or indirectly damaged by the tests.

7.2.2 Valve Tests

(a) Prior to testing, valves shall be thoroughly cleaned internally and externally, leaving them free of oil, grease, scale, rust, chips, organic matter and other potentially harmful or detrimental materials, debris, etc.

(b) Valve seat leakage (closure test) shall not exceed 2 cc/hr/inch of nominal valve size, or as specified on the Valve Data Sheet.

(c) Seat closure test duration shall not be less than 4 minutes.

(d) Seat closure test pressure for electrically or pneumatically actuated globe valves shall be made at a pressure equal to 110 percent of the operator differential pressure stated in the Valve Data Sheets. The seat closure test of all other power actuated and manual valves shall be performed at a test pressure equal to 110 percent of the body rating at 100 °F.

(e) When the Valve Data Sheet specifies the valve to be a "Containment Isolation Valve", an additional seat leakage test using air at 50 psig shall be required. Pressure shall be applied in the same direction as that when the valve would be required to perform its safety function. Leakage shall not exceed 40 SCCM/inch of nominal valve size. Test duration shall not be less than 4 minutes.

7.2.3 Operational Tests

(a) Following the testing of the respective valve, each manual valve shall be given an operational test consisting of three complete valve operating cycles (from fully open, to fully closed, to fully open).

7.2.4 Functional Tests

(a) Electric motor and pneumatically operated active valves require functional testing.

(b) Active valves will be designated on the Valve Data Sheets included with the Bid Request or Purchase Order accompanying this Specification.

(c) Operability of active valves, during a postulated dynamic occurrence, shall be verified by testing. Test data acquired for a qualified valve may be used to qualify valves of the same type that fall within the range of sizes permitted by Figure 5, Attachment 2, provided geometric similarity is maintained and supporting stress calculations are provided. If the qualified valve is larger than 36 inch nominal size, extrapolation may be made to valves whose nominal size does not vary more than 25 percent from that of the qualified valves. Testing required by this Section is considered to be supplement to any test/analysis used to qualify valves per Paragraph 2.1.5.

(d) Except when an alternative testing procedure has been approved in accordance with Paragraph 7.2.4(e), this Section, an active valve shall be tested as follows:

(1) Valve shall be placed in a suitable test stand. It shall be supported in a manner typical of the actual installation, with the topworks mounted as in normal plant operation.

(2) The valve shall be internally pressurized to the maximum operating differential pressure, as specified in the Valve Data Sheet. A static load shall be applied concurrently in accordance with Paragraphs 2.1.5(c)(2) and 2.1.5(c)(3).

(3) The valve shall be actuated using the proposed valve actuator plant minimum actuation supply as defined in the Valve Data Sheet. Reference Paragraphs 4.2.2(a)(1) and 4.3.1.

(4) Valve must cycle open to close to open within its required operating time limits if defined on the Valve Data Sheet or per

standard speed specified in Paragraphs 4.3.1(c) for pneumatic actuators or 4.2.1(e) for motor actuators.

(5) Valve stroking shall commence from the identical position (i.e. open or closed) as in the actual installation, and at least two full cycles shall be performed.

(e) If the Supplier proposes to demonstrate the operability of active valves by procedures different from those described in Paragraph 7.2.4(d), this Section, it shall submit to Buyer's Engineer for approval a detailed description of his proposed procedure.

(f) After completion of the valve functional test, the seat leakage test, as outlined in Paragraph 7.2.2, this Section, shall be repeated.

(g) Supplier shall submit its proposed functional testing procedure and method of analysis to Buyer's Engineer for approval (Re Paragraph 1.3.6).

(h) Valve stresses associated with the functional test shall be shown by calculations to be within the allowable stress limits specified in Paragraph 2.1.5(h).

7.2.5 Test data and other required records shall be submitted prior to or along with the valve shipment in accordance with the requirements of Paragraph 10.2.

7.2.6 Seismic and Environmental Tests

(a) Refer to Paragraphs 2.1.3 and 2.1.5 for seismic and environmental testing of actuator and externally mounted accessories designated as Class 1E.

7.3 WALL THICKNESS MEASUREMENTS

7.3.1 Measurements of body wall and neck thickness shall be performed by manufacturer on each valve to be supplied. Measurements shall be made in accordance with the requirements of the Code. As applicable, the following minimum measurements shall be taken:

(a) Scan the entire body wall thickness on body inlet and outlet, near the neck, the weld ends or end flanges and record the minimum measurement.

(b) Scan the body neck thickness at the thinnest configuration and record the minimum measurement.

(c) Scan the bonnet wall or cover thickness at the thinnest configuration and record the minimum measurement.

(d) Scan the entire flange thickness of bonnet and body flanges and record the minimum measurement.

7.3.2 Unless coinciding with the measurement points specified in Paragraph 7.3.1, this Section, thickness measurements shall also be taken at suspect locations (i.e. indentations, voids, etc.) and at repaired areas.

7.4 INSPECTION

7.4.1 Valves and/or assemblies to be supplied under this Specification are subject to inspection and test witness by the Buyer's Inspector during and after manufacturing and prior to shipment. For specific cases, when approved by the Buyer's Engineer, the inspection and test witness may be waived by the Purchase Order. PG&E will notify supplier of the tests that are required to be witnessed by PG&E's Inspector.

7.4.2 Supplier shall notify PG&E of testing and dimensional inspection being performed so that arrangements can be made to have Buyer's Inspector present to witness the test and examination. Whether or not Buyer's Inspector is present at time of testing/examination, the certificates of shop tests, examination and required documentation shall be furnished in accordance with the requirements of the Code and this Specification.

7.4.3 Buyer's Inspector may request notification from Supplier for intermediate inspections of fabricated work. A final inspection will be made by Buyer's Inspector before each assembly is shipped and none shall be shipped from Supplier's shop without specific release by the Buyer's Inspector.

7.4.4 Electric actuator motors shall be subject to inspection and tests, to be witnessed at the motor manufacturer's facilities, unless waived by the Purchase Order. The same access and prior notification of tests referred to in Paragraph 7.4.3, this Section, shall be given for the actuator motors. Releases shall be subject to approval by the Buyer's Inspector.

SECTION 8

SHOP CLEANING AND PAINTING

8.1 SHOP CLEANING

8.1.1 Cleaning procedures are not subject to approval by the Buyer's Engineer prior to their implementation.

8.1.2 Valves shall be thoroughly dried after testing and thoroughly cleaned internally and externally before shipping to remove oil, grease, scale, and foreign materials.

8.1.3 Cleaning agents and processes shall not injure finishes, surfaces, or metallurgical properties. Cleaning agents and rinses with demineralized water having more than 1 PPM of chlorides are not allowed for stainless steel parts. Brush cleaning of stainless steel shall be done with stainless steel brushes which have not been previously used on any other material.

8.2 SHOP PAINTING

8.2.1 The external surfaces of each ferritic steel valve shall be protected with a heat resistant inorganic zinc silicate primer coating applied in the shop in accordance with manufacturer's recommendations to a minimum dry film thickness of 0.003 inches.

(a) Surface preparation shall be in accordance with SSPC-SP-10.

(b) The following is an approved commercial reference for inorganic zinc silicate primer for external surfaces:

Carboline Protective Coatings: Carbo Zinc 11
Parkerizing (Zinc Phosphate Coating)

(c) Coating of butt weld end valves shall terminate 1/2 to 3/4 inch away from the weld end preparations.

(d) Weld end preparations shall be cleaned and coated with a corrosion inhibitor. Special Chemical Corporations Deoxaluminate is an approved commercial reference.

8.2.2 External surfaces of stainless steel valves shall not be prepared nor primer coated.

SECTION 9

TAGGING AND SHIPMENT PREPARATION

9.1 GENERAL

9.1.1 Tagging and shipment preparation of valves and/or assemblies to be furnished under this Specification are subject to review, inspection and shipping approval by the Buyer's Inspector, unless the inspection requirements are waived by the Purchase Order (Re Paragraph 7.4). Tagging and shipment procedure is not subject to approval by the Buyer's Engineer prior to implementation.

9.2 SHIPPING

9.2.1 In addition to the requirements of the Code, each valve actuator and accessories shall be tagged before shipping with a stamped metal identification plate mechanically fastened by wire or adequately secured, bearing, as applicable, the following information. Low stress stamps may be used on low stress areas of the valve for heat, serial and RT location numbers.

(a) Valve or instrument number (tag number) only if required by the Purchase Order.

(b) Diablo Canyon Power Plant, Unit Number

(c) Valve manufacturer's name, nominal valve size, service and model number.

(d) Actuator and accessory manufacturer's name and model number.

(e) Buyer's Purchase Order.

9.3 SHIPMENT PREPARATION

9.3.1 Valves and/or assemblies shall be thoroughly protected against damage or corrosion during shipping and storage.

9.3.2 Valve openings shall be closed with protective resilient material caps tightly sealed with weatherproof pressure sensitive, chloride free, plastic tape to assure the integrity of the valves in handling, shipping, and storage (including butt weld ends, flange facings, etc.).

9.3.3 Air tubing and electrical openings of actuators shall be securely sealed and protected with resilient material plugs to guard against damage in handling, shipping, and storage.

9.3.4 To protect valves against moisture and corrosion damage during shipping and storage, a desiccant shall be placed in the body of each 2-1/2" and larger carbon steel valve and a metal tag externally attached to the valve shall indicate its type, quantity, trade name, normal effective life, and date the desiccant was placed in the valve. Desiccant shall be harmless to valves and/or assemblies. Valves 2" and smaller shall be packed/placed in plastic bags with a desiccant in such a way that the valve internals are protected and a metal tag as specified above shall be attached.

9.3.5 Valves and/or assemblies shall be individually shipped in sturdy containers (crates or boxes) or under other types of protective coverings (lumber or metal structures) so as to preclude damage or contamination. Valves 2" and smaller may be shipped in a multi-valve container provided they are packed so as to preclude damage or contamination. Weatherproof exterior identification clearly indicating Diablo Canyon Site name, valve size and service of each assembly therein and Buyer's Purchase Order Number shall be attached to each container.

9.3.6 Each butterfly valve shall be shipped with its disc sufficiently open to avoid circumferential seat contact. Disc shall be blocked with resilient material harmless to valve.

9.3.7 Valves shall be shipped without any stem packing. Packing will be installed at the site by PG&E (Ref. Paragraph 2.2.2). Packing gland flanges/bolting and the valve stem shall be protected to preclude damage during shipment.

SECTION 10

QUALITY ASSURANCE RECORDS

10.1 GENERAL

10.1.1 Each valve to be supplied under this Specification shall comply with the quality assurance record keeping requirements of the Code and of those referred to herein.

10.1.2 To substantiate compliance with the quality assurance required in each valve design, material procurement, manufacturing, examination, testing, etc., Supplier shall forward at time of shipping to Diablo Canyon Site the entire documentation (i.e. certificates, charts, test reports, data, etc.) requested in this Specification or implied herein.

10.2 REQUIRED RECORDS

10.2.1 Supplier shall provide for the pressure retaining items of each valve the following records, as a minimum:

(a) Code Data Report and Certificate of Compliance to this Specification.

(b) Certified material test reports (CMTR) for the valve pressure retaining material and welding electrodes. As applicable, each CMTR shall include impact test results and ferrite content of materials.

(c) Heat treatment temperature time charts. In special cases, where the charts do not reproduce legibly, a record of the data shall be provided with the charts. In lieu of the actual heat treatment temperature/time charts, the Supplier may instead provide a certified listing of the recorded data from the original heat treatment temperature/time charts. These heat treatment charts shall pertain to the Post Weld Heat Treatment performed subsequent to the weld repair work done at the Supplier's facilities and do not apply to the PWHT of forgings and castings required by the Material Specification.

(d) Fabrication and/or repair welding records. Records shall also include heat and/or lot number(s) of the welding electrodes used.

(e) Nondestructive examination records including radiographic films.

(f) Hydrostatic (shell pressure) test results.

(g) Seat leakage (closure) test results.

(h) Functional test results.

(i) Wall thickness measurement records.

(j) Certified motor test reports, as applicable.

SECTION 11

REFERENCED CODES AND STANDARDS

11.1 The following is a listing of the codes, standards, and the references mentioned in this specification. The effective date of each referenced document shall match or be that in effect at the time of, but not later than, the effective date of the 1989 Edition of the ASME Boiler and Pressure Vessel Code, except that for IEEE Standards, for which the date is specified in Paragraph 11.1.5, this Section. The use of NRC approved code editions and addenda by the supplier/manufacturer prior to or subsequent to 1989 edition shall be subject to prior approval by the Buyer.

11.1.1 ASME Boiler and Pressure Vessel Code

Section II--Material Specifications, Part A, B and C

Section III--Subsection NCA-General
Requirements for Divisions 1 and 2

Section III--Division 1
Subsection NB - Class 1 Components
Subsection NC - Class 2 Components
Subsection ND - Class 3 Components

Section V--Nondestructive Examination

Section IX--Welding and Brazing Qualifications

11.1.2 ANSI American National Standards Institute

B16.5	Steel Pipe Flanges, Flanged Valves and Fittings
B16.10	Face to Face and End to End Dimensions of Ferrous Valves
B16.11	Standard for Forged Steel Fittings, Socket Welding and Threaded
B16.25	Standard for Butt-Welding Ends
B16.34	Standard for Steel Valves, Flanged and Butt-Welding Ends

11.1.3 ASTM American Society for Testing and Materials

A262	Practice for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
A564	Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel and Heat-Resisting Steel Bars and Shapes

	E94	Standard Practice for Radiographic Testing
11.1.4	AWS	American Welding Society, Inc.
	A5.13	Specification for Solid Surfacing Welding Rods and Electrodes
11.1.5	IEEE	Institute of Electrical and Electronics Engineers
	323-1974	Qualifying Class 1E Equipment for Nuclear Power Generating Stations
	344-1975	Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations
	382-1980	Qualification of Safety-Related Actuators
11.1.6	NEMA	National Electrical Manufacturers Association
	ICS6	Enclosures for Industrial Controls and Systems
	MG1	Motors and Generators
11.1.7	SSPC	Steel Structures Painting Council
	SP-10	Near-White Blast Cleaning
11.1.8	10CFR50 & 10CFR21	Code of Federal Regulations

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA
DEPARTMENT OF ENGINEERING

ATTACHMENT NO. 1
FOR
DESIGN SPECIFICATION NO. 8179

DATA SHEETS

FURNISHING AND DELIVERING MANUALLY, ELECTRIC MOTOR AND PNEUMATICALLY OPERATED VALVES COMPLYING WITH THE ASME BOILER AND PRESSURE VESSEL CODE SECTION III, DIVISION 1, CLASS 1, 2 AND 3 (PG&E DESIGN CLASS 1) FOR NUCLEAR SERVICE AT UNITS 1 AND 2, DIABLO CANYON SITE

MANUAL VALVE DATA SI :T

8179

VALVE DESCRIPTION	VALVE NUMBER
TYPE_____	
NOMINAL SIZE_____	
RATING_____	ITEM NUMBER
END CONNECTION_____	

COMMERCIAL REFERENCES

PARTS MATERIAL SPECIFICATIONS

BODY_____

BONNET/COVER_____

WEDGE/DISC_____

SEAT_____

STEM_____

BALL/PLUG/DIAPHRAGM_____

YOKE_____

BONNET/COVER GASKET_____

BUSHING(S)_____

PACKING/SEAL(S)_____

PIN(S)/SCREW(S)_____

SPRING(S)_____

OPERATOR MANUAL TYPE(S) ONLY

REMARKS

1. Packing Leak-off piping connection required: Yes_____No_____
2. Valve Location: Inside Containment _____Outside Containment _____
3. Containment Isolation Valve: Yes_____No_____

REV.

PACIFIC GAS AND ELECTRIC CO. -- ENGINEERING DEPARTMENT -- DATA SHEET

VALVE ASSEMBLY DATA SHEET

ITEM NO		Plant/Unit	EMM No.
Tag		Record No.	Sht. No.
Service		File No.	Spec. No.
		Engineer	P.O. No.

SERVICE CONDITIONS

		☐ On/Off ☐ Press ☐ Flow		
FLUID		SIZING CONDITIONS @		
	Units	Min cap.	Nor cap.	Max cap.
Flow Rate				
Inlet Pressure				
Outlet Pressure				
Temperature				
Superheat				
Specific Gravity				
Req'd Cap Coeff				
Rated Cap Coeff				
Shut Off Pressure				
Recovery Coeff				
Line Size		Inlet	Outlet	
Pipe Schedule		Inlet	Outlet	
Noise Level (dBA)		☐ < 85 ☐ _____		

BODY

Manufacturer	
Model	
Type / Size	
ANSI CLASS RATING	☐ 150 ☐ 600 ☐ 1500 ☐ 300 ☐ 900 ☐ 2500
CONNECTION TYPE	☐ Scr'd ☐ S/W ☐ RF Flg ☐ Wafer ☐ B/W ☐ ____
Body Material / Packing Material	

TRIM

MATERIAL	☐ Ball ☐ Plug ☐ Disc ☐ _____	
	☐ Shaft ☐ _____ ☐ Stem	
	☐ Seat ☐ Liner ☐ Seal ☐ _____	
	☐ Cage ☐ _____ ☐ Bushing	
Port Size		
ANSI Class Leakage		☐ II ☐ III ☐ IV ☐ V ☐ VI
☐ Balanced ☐ Unbalanced		Flow to: ☐ Open ☐ Close
Characteristics	☐	Equal % ☐ Linear ☐ Open

ACTUATOR

Manufacturer / Model		
Type		
Available Voltage / Pressure		
Failure Mode		☐ FO ☐ FC ☐ As Is
Handwheel Req'd		☐ Yes ☐ No
Control Signal		☐ 4-20 mA ☐ 3-15 psi ☐ 10-50 mA ☐ _____
POSITIONER		
Required?		☐ Yes ☐ No
Action		☐ Direct ☐ Reverse
Characteristic	☐	Equal % ☐ Linear ☐ Open
Accessories	☐	Bypass ☐ Gauges ☐ Airset

POS. SW.

Manufacturer / Model			
Type			
Contacts Req'd (NO/NC-Normally open/closed)	Open Pos NO:	NC:	Close Pos NO: NC:

NOTES:

1. Packing Leak-off connection required: Yes_____ No_____
2. Valve Location: Inside Containment _____ Outside Containment _____
3. Actuator/Accessory Designated Class 1E (Ref Para. 4.1.3, 4.1.4) Yes _____ No_____
4. Active Valve (Ref Para. 7.2.4) Yes_____ No_____
5. Actuator/Accessory Designated Seismic (Ref Para 4.1.1, 4.1.3) Yes_____ No_____
6. Containment Isolation Valve Yes_____ No_____

** FOR MOTOR ACTUATED VALVES, THE "MOTOR OPERATED VALVE DATA SHEET", ATTACHED SHALL ALSO BE PROVIDED

No	Date	Revision	By

	A		B		C	
	VALVE INFORMATION		**OPERATOR INFORMATION**		**MOTOR INFORMATION**	
1	VALVE EQUIPMENT I.D.		OPERATOR MANUFACTURER		MOTOR MANUFACTURER	
2	SERVICE/SYSTEM P.E.G.		TYPE & SIZE		SERIAL NUMBER	
3	MANUFACTURER		VENDOR SHOP ORDER NO.		POWER SUPPLY (AC/DC VOLTS)	
4	TYPE & SIZE		SERIAL NUMBER		MAX DESIGN RUNNING CURRENT - / LOCKED ROTOR CURRENT -	AMPS / AMPS
5	ANSI RATING		HANDWHEEL GEAR RATIO		RPM (NAMEPLATE) /HORSEPOWER	
6	MODEL NUMBER		UNIT GEAR RATIO		DUTY RATING	
7	STEM TYPE (REVOLVING/NON-REVOLVING)		90° GEARBOX RATIO (ROTARY VALVES ONLY)		INSULATION CLASS	
8	DIRECTION OF FLOW (OVER/UNDER SEAT)		DESIGN SPEED OF OPERATION	SEC	*FRAME SIZE	
9	STEM DIAMETER (AT PACKING / AT THREADS)	IN. / IN.	LIMIT SWITCH TYPE (2 OR 4 ROTOR AND MATERIAL)	LBS	MOTOR NAMEPLATE TORQUE	F S
10	THREAD (PITCH / LEAD)		REQUIRED THRUST SETTINGS (RISING STEM) — MINIMUM REQUIRED	LBS	**REFERENCE DWGS./DOCUMENTS**	
11	STEM NUT MATERIAL		MAX. ALLOWABLE (MANUAL)	LBS	P & ID (COORDINATES)	
12	* STROKE LENGTH MECHANICAL	IN.	MAX. ALLOWABLE (ELEC)	LBS	VENDOR DRAWINGS P.O.&E. NUMBER (VALVE / OPERATOR)	
13	* STROKE TIME- CONTACTOR { O-C / C-O	SEC / SEC	SETTING TORQUE WINDOW (90° ROTATION VALVES) — MINIMUM REQUIRED	FT-LBS	ELECTRICAL LAYOUT DRAWING	
14	SEAT PORT DIAMETER	IN	MAX. ALLOWABLE (MANUAL)	FT-LBS	ELECTRICAL ELEMENTARY DIAGRAM	
15	FLUID MEDIUM		MAX. ALLOWABLE (ELEC)	FT-LBS	ELECTRICAL BREAKER DATA SHEET & BREAKER IDENTIFICATION	
16	MAX. FLOW RATE (OPENING / CLOSING)	CFM/GPM / CFM/GPM	STALLED THRUST	LBS	PHYSICAL LOCATION (BLDG./ ELEV.)	
17	ΔPRESSURE (MAXIMUM) (OPENING / CLOSING)	PSI / PSI	*AS LEFT THRUST AT TORQUE SW TRIP DATE SET-UP	LBS	APPLICABLE STP'S	
18	SYSTEM MAX. PRESS. DURING VLV OPER / MAX. TEMP. DURING VLV OPER	PSI / °F	STALLED TORQUE	FT-LBS	MINIMUM SUPPLY VOLTAGE VALUE SOURCE	
19	MAX. THRUST VALVE CAN WITHSTAND IN NOTED DIRECTION	OPEN LBS / CLOSED LBS	MAX. TORQUE AVAIL. AT MIN. SUPPLY VOLTAGE (UNDERVOLTAGE CONDITION)	FT-LBS / %	REQUIRED STROKE TIME SOURCE	
20	MAX. TORQUE VALVE CAN WITHSTAND IN NOTED DIRECTION	OPEN FT-LBS / CLOSED FT-LBS	MINIMUM CALCULATED HANDWHEEL TORQUE NECESSARY TO TRIP SWITCH	FT-LBS	OPERATOR CALCULATIONS / PACKING CALCULATIONS	
21	NUMBER OF PACKING RINGS / SYSTEM PRESSURE USED FOR PACKING	/ PSI	MAX. HANDWHEEL TORQUE-DESIGN	FT-LBS		
22	PACKING CHAMBER DIAMETER	IN	SPRING PACK NUMBER		**NOTES**	
23	PACKING GLAND STUD SIZE	IN	TORQUE SWITCH SETTING LIMITER PLATE REQUIRED (YES/NO)		1. TRAVEL TERMINATED A-CLOSE DIRECTION ____(TS OR LS) B-OPEN DIRECTION ____(TS OR LS)	
24	GLAND NUT TORQUE	MIN FT-LBS / MAX FT-LBS	* "AS-INSTALLED" TORQUE SWITCH SETTING	OPEN / CLOSED	2. ENVIRONMENTAL QUALIFICATION ASSEMBLY ____ (YES/NO)	
25	PACKING FRICTION FORCE	MIN LBS / MAX LBS	LIMIT SWITCH SETTING-% OF DISC MOVEMENT- DESIGN { ROTOR 1 / ROTOR 2 / ROTOR 3 / ROTOR 4	OPEN / CLOSED	3. UNIT IS LIMITED BY ____ NOT TO EXCEED ____ LBS.	
26			*LIMIT SWITCH SETTING-% OF DISC MOVEMENT- ACTUAL { ROTOR 1 / ROTOR 2 / ROTOR 3 / ROTOR 4	OPEN / CLOSED		
27			GREASE TYPE { GEAR BOX / LIMIT SWITCHES			

* FOR REFERENCE ONLY

REVISION 1
DSG
DWN
CHKD
SUPV
APVD
APVD

MOTOR OPERATED VALVE DATA SHEET

DEPARTMENT OF ENGINEERING

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHT NO OF

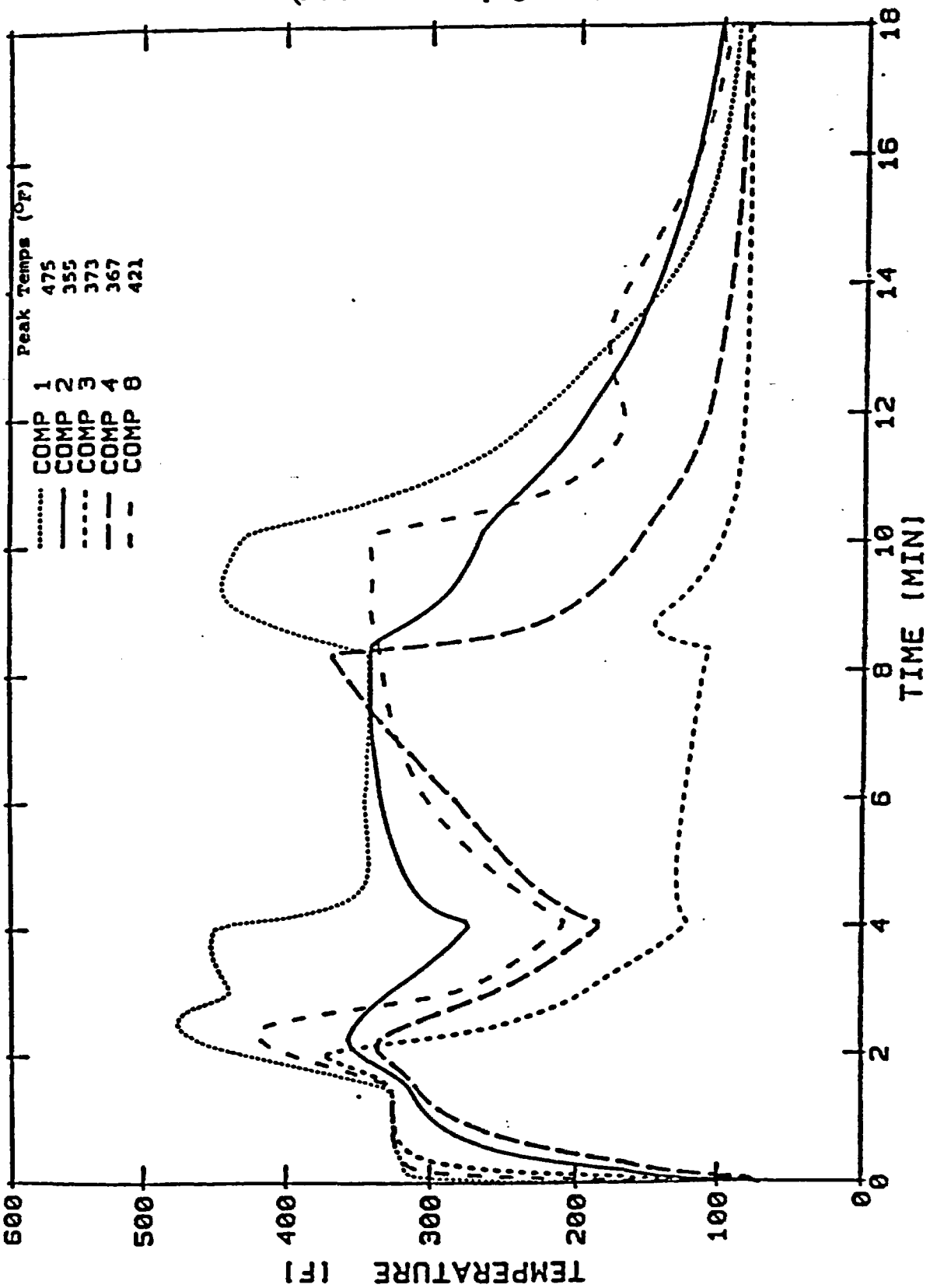
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA
DEPARTMENT OF ENGINEERING

ATTACHMENT NO. 2
FOR
DESIGN SPECIFICATION NO. 8179

ENVIRONMENTAL/SEISMIC
QUALIFICATION AND FUNCTIONAL TEST FIGURES

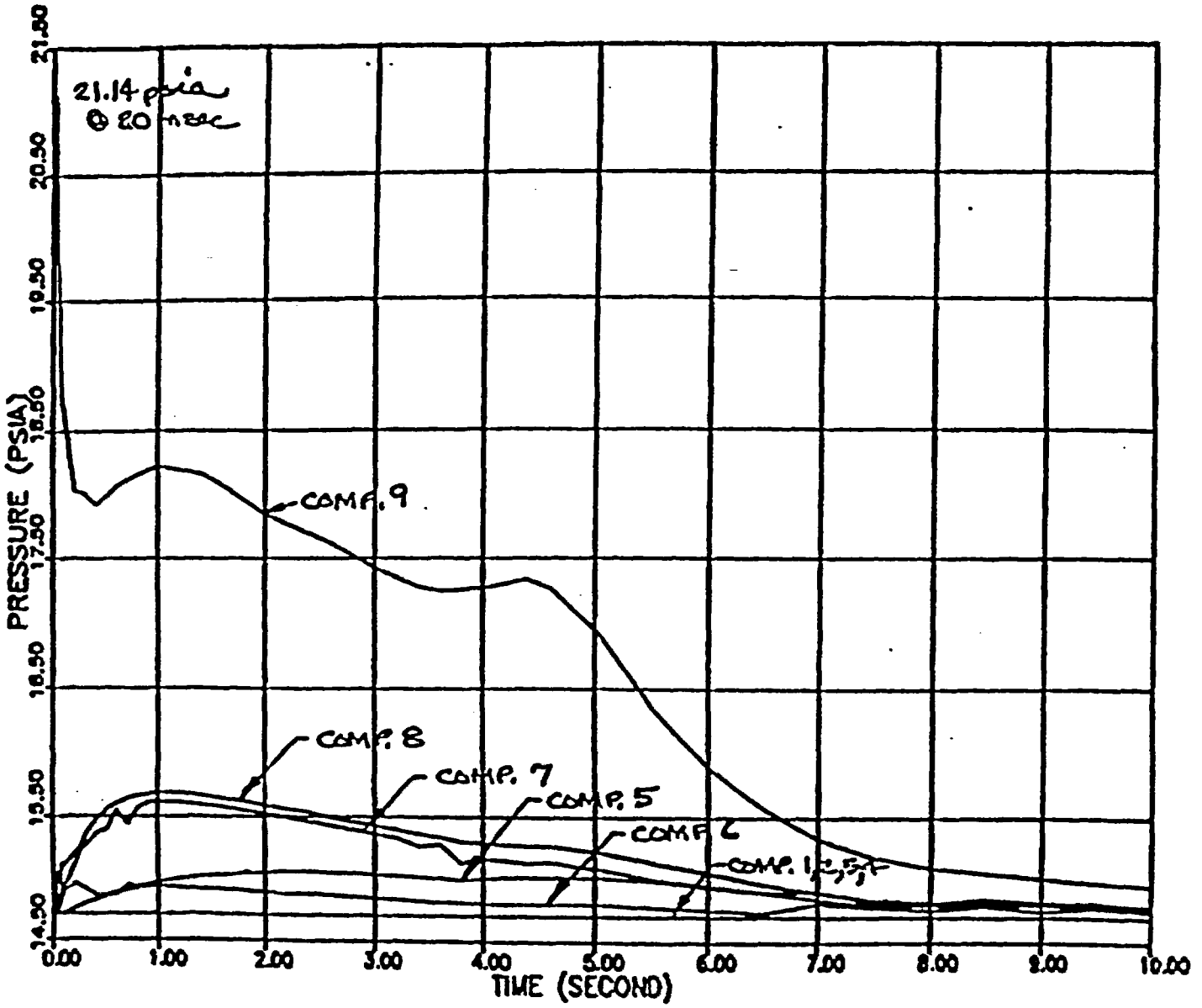
FURNISHING AND DELIVERING
MANUALLY, ELECTRIC MOTOR AND PNEUMATICALLY OPERATED
VALVES
COMPLYING WITH THE
ASME BOILER AND PRESSURE VESSEL CODE
SECTION III, DIVISION 1, CLASS 1, 2 AND 3 (PG&E DESIGN CLASS 1)
FOR NUCLEAR SERVICE
AT UNITS 1 AND 2, DIABLO CANYON SITE

FIGURE 1
OUTSIDE CONTAINMENT TEMPERATURE VS TIME RESPONSE
(Note: Use enveloping values)



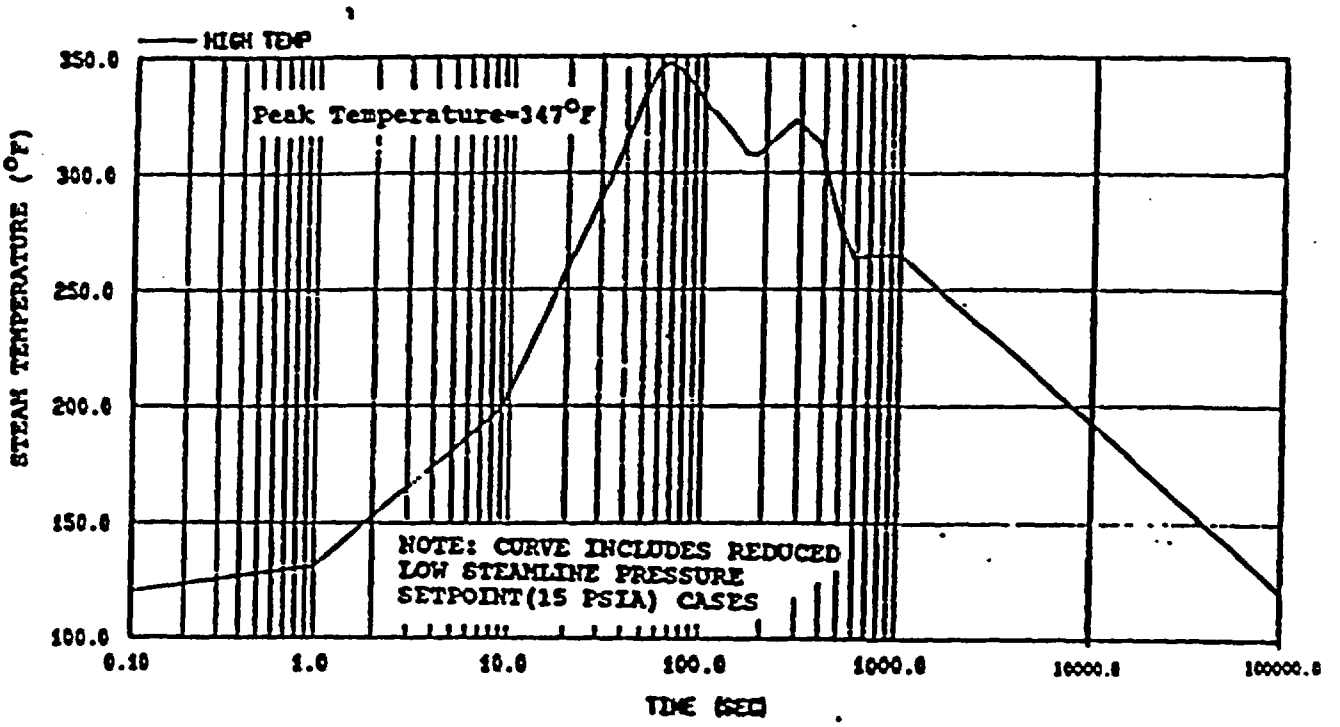
EXCERPT FROM DCM T-12, REV 1, FIG 4-23a

FIGURE 2
OUTSIDE CONTAINMENT PRESSURE VS TIME RESPONSE
(Note: Use Comp 9)



EXCERPT FROM DCM T-12, REV 1, FIG 4-24

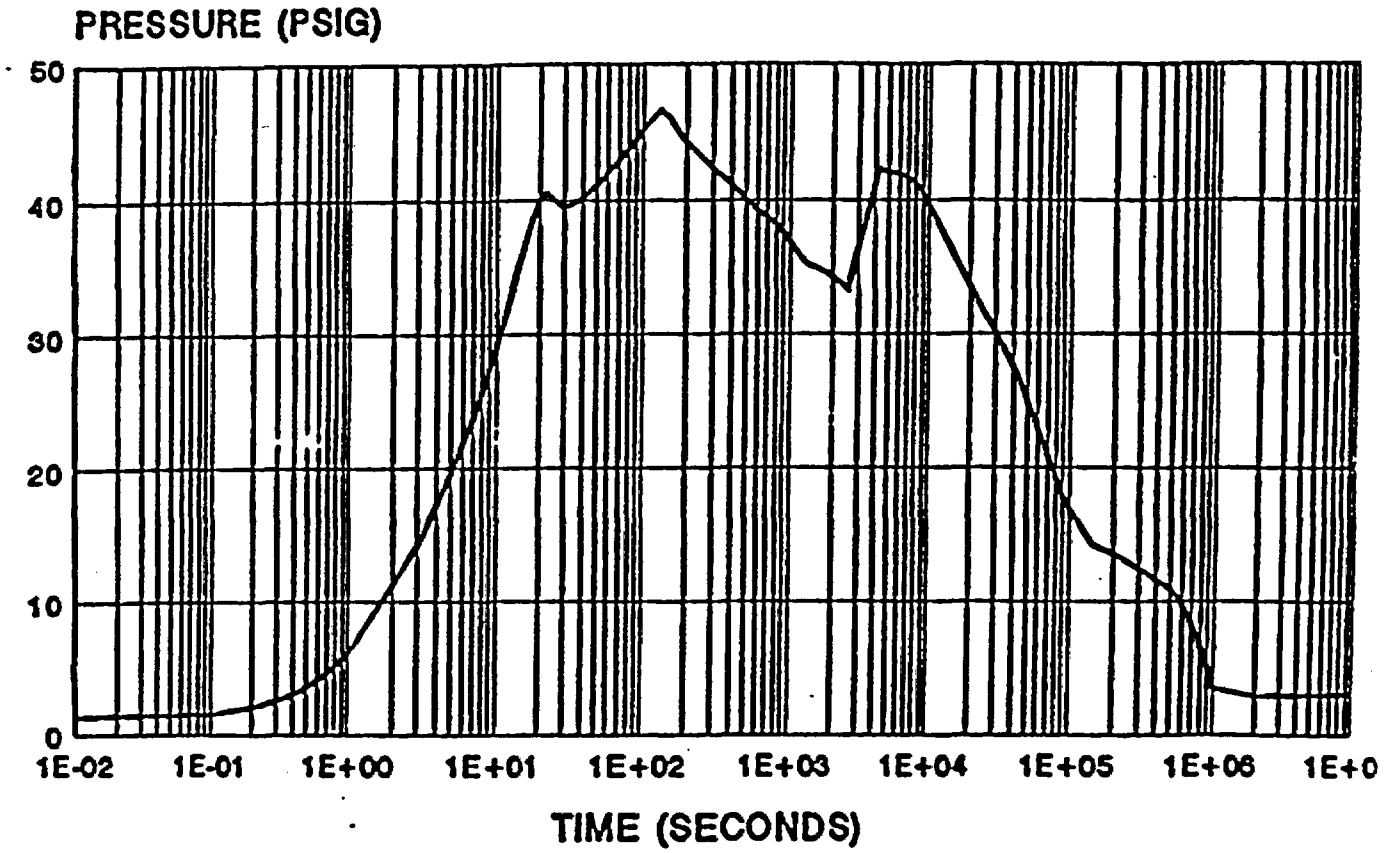
FIGURE 3
INSIDE CONTAINMENT TEMPERATURE VS TIME RESPONSE



EXCERPT FROM DCM T-20, APP A, REV 1, FIG A3.2-4

FIGURE 4
INSIDE CONTAINMENT PRESSURE VS TIME RESPONSE

Peak: 46.6 psig at 133 secs.



EXCERPT FROM DCM T-20, APP A, REV 1, FIG A3.2-1

FIGURE 5

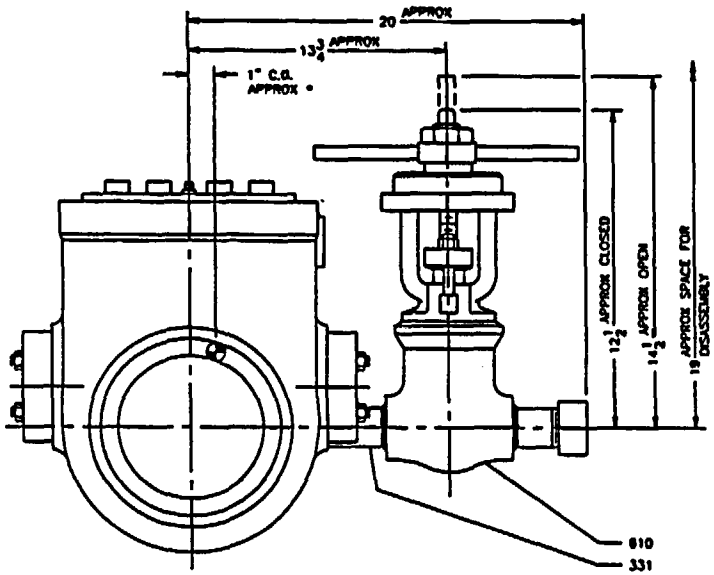
Nominal Size of Qualified Valve (inches)

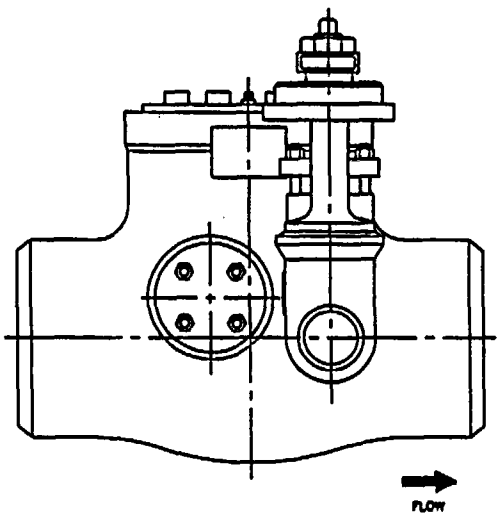
Qualification Extends to Valves of the following Nominal Size (inches):

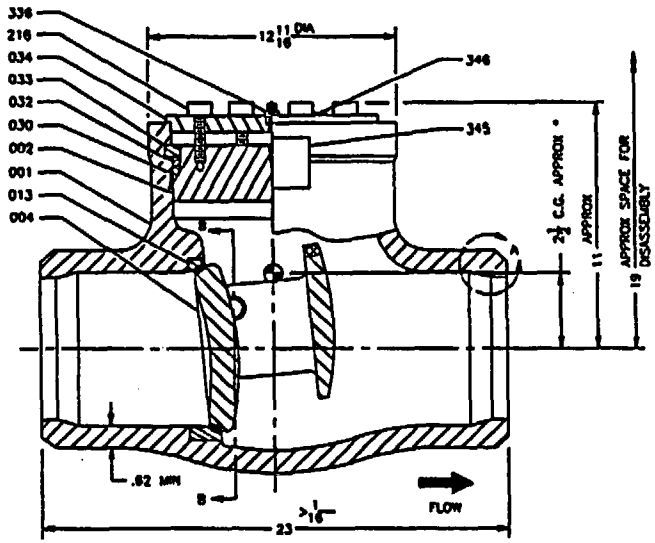
	1/2	3/4	1	1-1/2	2	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30	36
1/2	X	X	X																		
3/4	X	X	X																		
1	X	X	X	X																	
1-1/2			X	X	X																
2				X	X	X															
3				X	X	X															
4						X	X	X													
6							X	X	X												
8								X	X	X	X										
10									X	X	X	X									
12									X	X	X	X	X								
14										X	X	X	X	X	X						
16											X	X	X	X	X	X					
18												X	X	X	X	X	X				
20												X	X	X	X	X	X	X			
22													X	X	X	X	X	X	X		
24														X	X	X	X	X	X	X	
26															X	X	X	X	X	X	X
28															X	X	X	X	X	X	X
30																X	X	X	X	X	X
36																		X	X	X	X
	1/2	3/4	1	1-1/2	2	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30	36

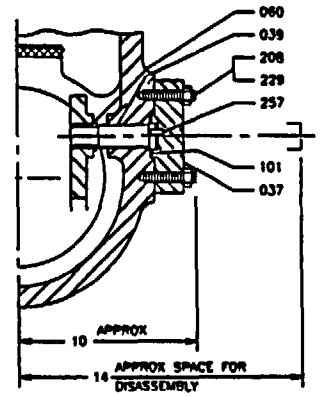
Note: Test data acquired for a qualified valve may be used to qualify valves of the same type within the ranges noted above, provided geometric similarity is maintained and supported by stress analyses provided to the buyer.

REV	REVISIONS	BY DATE	APP'D BY DATE
	FOR REVISIONS SEE SHEET 2		









SECTION B-B

* C.G. INCLUDES INSPECTION PORT VALVE ASSEMBLY

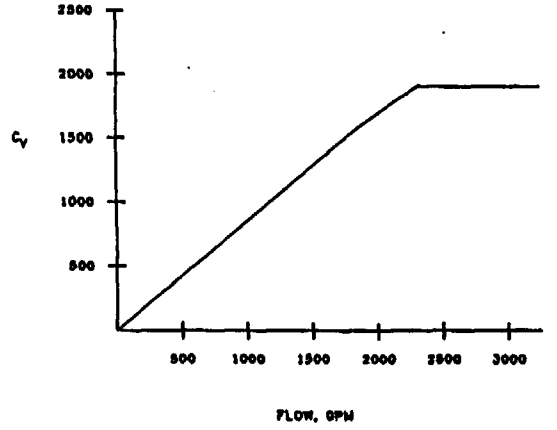
PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON POWER PLANT, UNIT NO. 1
CUST. P.O. NO.: 037211 ITEM 02
SPECIFICATION NO.: 8179 REV. 1
ANCHOR/DARLING S.O. E9539-3

ANCHOR/DARLING VALVE COMPANY

8"-600 WELD ENDS STAINLESS STEEL TILT DISC CHECK VALVE WITH RH INSPECTION PORT

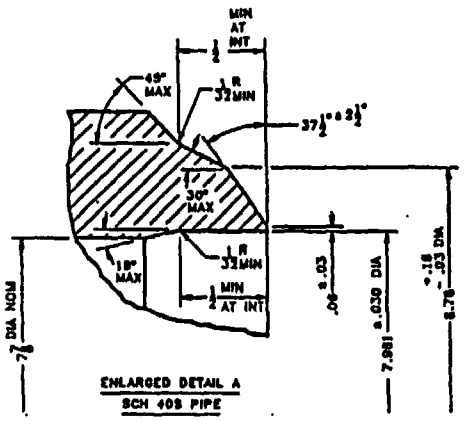
SHEET 1 OF 2

DWN BY: ACW	DATE: 5-24-90	DRAWING TYPE CCA			REV
CHK BY: ACM	DATE: 5-25-90	W	9	0 2 3 2 6 7	B
APD BY: RHM	DATE: 6-14-90	1 2 3 4 5 6 7 8			9



PART NO	QTY	DESCRIPTION	MATERIAL	MATL NOTE
001	1	BODY	SA351-CF8M	6C
002	1	BONNET	SA240-316	6C
004	1	DISC	SA351-CF8M WITH COCR	6C
013	1	SEAT RING	SA240-316L WITH COCR	6C
030	1	PRESSURE SEAL GASKET	304L STAINLESS STEEL	6A
032	1	SPACER RING	A240-316	
033	1	GASKET RETAINER	SA240-316	6C
034	1	BONNET RETAINER	A240-316	
037	2	HINGE PIN COVERS	SA479-316	6C
038	2	HINGE PINS	A564-630-1100	6B
060	2	BUSHINGS WITH SHOULDER	NICR	6B
101	2	GASKETS (H.P. COVER)	304SS AND GRAPHITE	6A
208	8	COVER STUDS 1/2 DIA	SA564-630-1100	6C
216	8	BONNET CAPSCREWS 5/8 DIA	AISI 316	
229	8	COVER NUTS	SA194-8M	6C
257	2	ANTI-ROTATION PINS	A479-316	
331	1	PIPE (INSPECTION PORT)	SA312-TP316 (1-1/2" SCH 40S)	6C
338	1	PIPE PLUG	A182-F316	
345	1	NAMEPLATE	AISI 304	
346	1	IDENTIFICATION PLATE	AISI 304	
810	1	GATE VALVE (1.5-1700-DD)	ANCHOR/DARLING DWG NO. W9023268	

QTY	REVISIONS	BY DATE	APP'D BY DATE
A	SPEC. NO.1 ADDED REV. 1. SHEET 1:ADDED = C.G. NOTE. SHEET 2:ADDED NOTES 8 AND 10. NOTE 2: ADDED 8"-600 VALVE WT. DETAIL A: ADDED 7-7/8 DIA NOM. PARTS LIST MAT'L NOTE: 8 WAS 1	ACW 8-90	RHM 8-90
B	SHEET 2: PART NO. 208: ADDED 1/2 DIA. PART NO. 216: ADDED 5/8 DIA. NOTE 3: 1800 WAS 2100. NOTE 4 WAS VALVE TO BE INSTALLED IN HORIZONTAL RUN OF PIPE WITH BONNET ON TOP AND HINGE PINS HORIZONTAL	HLD 5-91	Khm 5/17 91



ENLARGED DETAIL A
SCH 40S PIPE

NOTES

1. VALVE IS ASME CLASS 2 PER 1986 ASME SECTION III
2. APPROX VALVE WEIGHT= 456 LBS INCLUDING 1-1/2"-1700 VALVE, PIPES AND CAP
   APPROX 8"-600 VALVE ALONE = 416 LBS
3. APPROX C_V = 1800 (FULL OPEN)
4. DISC FOR S/N E8539-3-2 MODIFIED AT A/DV
   FOR INSTALLATION IN VERTICAL (FLOW UP)
   PIPELINE. DISC FOR S/N E8539-3-1 SIMILARLY
   MODIFIED AT JOBSITE
5. ANCHOR/DARLING SERIAL NO'S: E8539-3-1, E8539-3-2
6. A. DENOTES RECOMMENDED SPARE PARTS
   B. DENOTES PARTS COVERED BY "SP-1-PARTS"
   C. DENOTES PARTS COVERED BY "SP-1-2"
7. MODEL/FIGURE NO.: W9023267
8. OPERATING CONDITIONS:

	MIN	MAX (ACCIDENT)	MAX (NORMAL)
FLOW (GPM)	1300	4900 (RUN OUT)	3000
TEMP (DEG F)	AMB.	280	350
PRESS (PSIA)	185	130	600

9. VALVE LOCATION: OUTSIDE CONTAINMENT
10. VALVE SERVICE: BORATED WATER

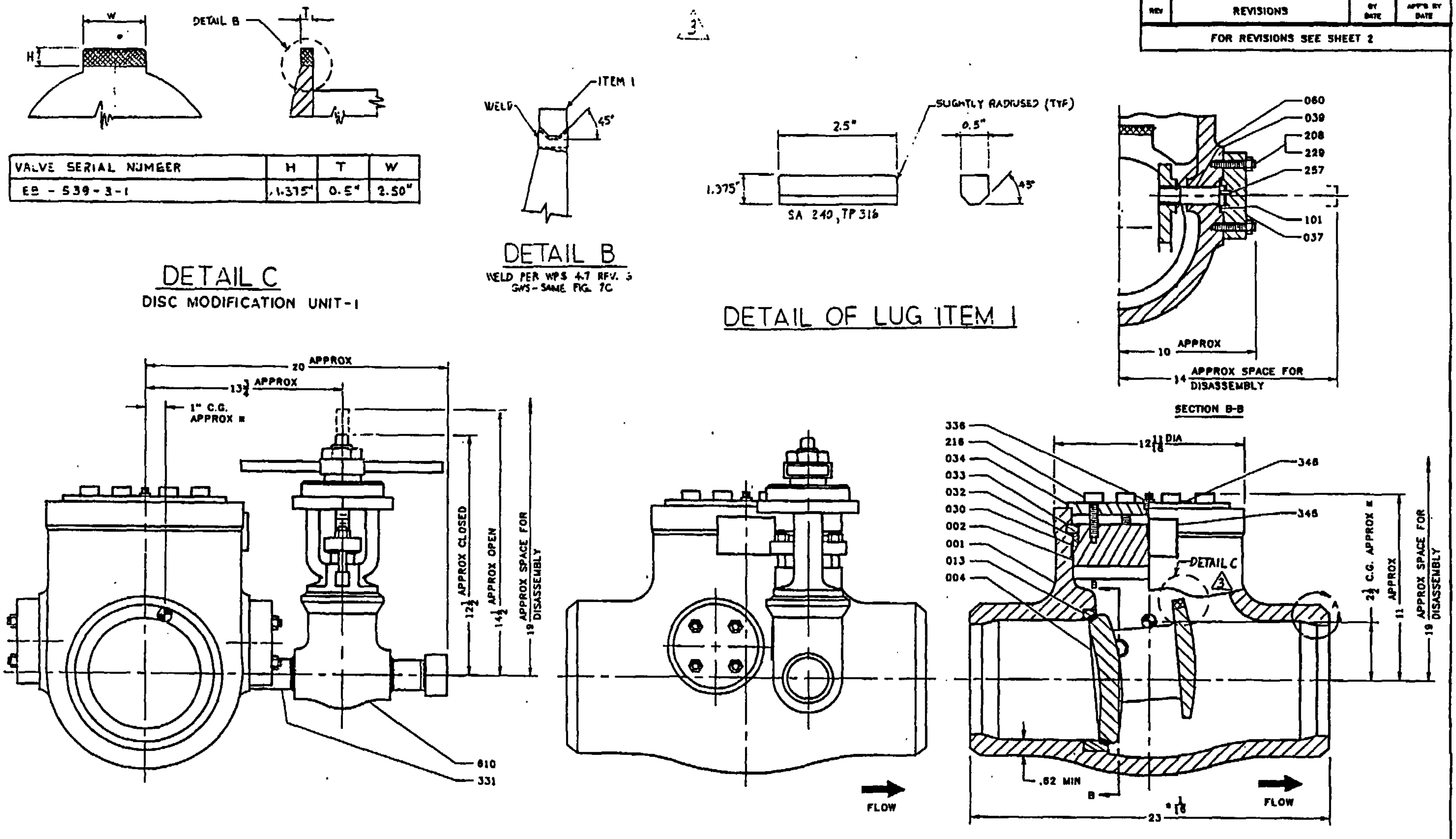
PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON POWER PLANT, UNIT NO. 1
CUST. P.O. NO.: 037211 ITEM 02
SPECIFICATION NO.: 8170 REV. 1
ANCHOR/DARLING S.O. E8539-3

ANCHOR/DARLING VALVE COMPANY

8"-600 WELD ENDS STAINLESS STEEL TILT DISC CHECK VALVE WITH RH INSPECTION PORT

SHEET 2 OF 2

DWN BY:	ACW	DATE:	8-24-90	DRAWING TYPE CCA	REV
CHK BY:	ACM	DATE:	8-25-90	W 9 0 2 3 2 6 7	B
APP'D BY:	RHM	DATE:	9-14-90	1 2 3 4 5 6 7 8	9



VALVE SERIAL NUMBER	H	T	W
EB - 539-3-1	1.375"	0.5"	2.50"

REV	REVISIONS	BY DATE	APP'D BY DATE
	FOR REVISIONS SEE SHEET 2		

* C.G. INCLUDES INSPECTION PORT VALVE ASSEMBLY

PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON POWER PLANT, UNIT NOS 1 & 2
CUST. P.O. NO.: 037211 ITEM 02
SPECIFICATION NO.: 8179 REV. 1
ANCHOR/DARLING S.O. EB539-3
(SEE DWG. 6006473-276 FOR SHT. 2 OF 2)

ANCHOR/DARLING VALVE COMPANY

8"-600 WELD ENDS STAINLESS STEEL TILT DISC CHECK VALVE WITH RH INSPECTION PORT

SHEET 1 OF 2

				DRAWING TYPE	CCA	REV
DWN BY:	ACW	DATE:	5-24-80	W90232867		B
CHK BY:	ACM	DATE:	5-25-80			
APP'D BY:	RHM	DATE:	6-14-80			

RM. INCLUDED REV. 3

PAGE 1

NO	DATE	DESCRIPTION	DWN	CHKD	SUPV	RESP ENGR	SUPV ENGR	SUPV ENGR
3	12-11-92	REVISED PER FCT-14469 & DCN DC1-EP-45955 REV. 0.	E11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	5/30/91	REVISED - VENDOR INITIATED CHG.	PID	PE	[illegible]	[illegible]	[illegible]	[illegible]

P G & E REVISIONS

LAST CERTIFIED VENDOR'S ISSUE WAS REVISION B

RECORD NUMBER	SH	REV
DC 6006473	259	3

REV	REGISTERED ENGINEER	SIGNATURE	CERTIFICATE	EXP. DATE
3	KERSI J. DALAL	[signature]	M16690	3-31-96

DWG TYPE | DWG SUBJECT | DRAWING TITLE | UNIT (S) | PROJECT LOCATION | INSTALLATION TYPE | DIVISION NAME | MISC. | DG CODE | MAN HOURS | CHGD | DRAWING SOURCE

FLOWSERVE™

1900 South Saunders Street
P.O. Box 1961
Raleigh, North Carolina 27603

N°. 169

QUALITY PROBLEM CORRECTIVE ACTION PLAN

DATE: 3/16/06
SIZE & FIGURE NO.: 8.0 600 SC
PART / VALVE NAME: Swing Check Valve
PART / VALVE NUMBER: 04001011-35306-01

TRACEABILITY NO.: AY777 REJECT TICKET NO.: N/A RESPONSIBLE DEPT.: Eng./QA/Manf.

INITIATED BY: Eric Fletcher

PROBLEM (to be completed by QA or responsible Department) ☐ Not Required – Reject Ticket Attached

The customer discovered that the disc was hanging up on the cover when installed due to a design error. Upon further inspection, undercut and splatter was found on the bypass to valve weld. They also found indications and porosity on the valve itself.

B. Shaw 3-16-06
[signature] 3/16/06.

Part 21 evaluation required ☐ Yes ☒ No Department Manager Signature: [signature] Date: 3-16-06

ROOT CAUSE and PROPOSED CORRECTIVE ACTION within 30 days, which is 4/13/06 :

There was not enough operational space for the disc to function properly inside the valve due to a design error. Secondly, the undercut and splatter were overlooked by the welder and the inspector, along with the P.T. indication and porosity.

By: [signature] Date: 3/16/06

CORRECTIVE ACTION will be completed by 4/13/06 (to be completed by responsible Department):

The design and test procedure has since been changed (ref. attached procedure) to reflect the necessary changes. A repair plan has been submitted to repair the valve and indications. The responsible engineer, welder and inspector have been made aware of the discrepancies.

By: [signature] Date: 3/16/06.

REVIEW/TRAIN RESPONSIBLE INDIVIDUAL (If Applicable)

[signature] 3-16-06 (welder)
[signature] 3-16-06 (inspector)
[signature] 3/16/06 (engineer)

Name of Responsible Individual Signature Date By: Date:

CONFIRMATION OF CORRECTIVE ACTION TAKEN to be verified by Q.A within 15 days of completion date, which is 4/13/06. :

Engineering Report (Attachment I – 4 pages) defines conclusion of disc design error and test procedure error. MS 7252 test procedure (Attachment II – 1 page) revised to require final operation test after bonnet installed. PT indication and weld undercut reviewed with inspector and welde

CORRECTIVE ACTION REVIEWED BY: [signature] Date: 3/17/06.

Form No. 36-A-171 (03/06) Manager, Quality Assurance or Designee

FLOWSERVE

Flow Control Division

Attachment I
4 pages.

PLANT NAME	Diablo Canyon	VALVE QUANTITY	1
CUSTOMER NAME	Pacific Gas & Electric	SIZE	8 – 600 Tilting Disc Check Valve
CUSTOMER'S ADDRESS	800Price Canyon Rd., Prismo Beach, CA 93449		
OUR COMPLAINT REPORT NO.	4376	FLANGE	Butt Weld Ends
NATURE OF COMPLAINT	Valve will not fully open, disc hangs up on bonnet.	BM NO./SERIAL NO.	040010113530601
RECEIVING REPORT NO.	-	DATE MFG.	Shipped 1/30/06

CONDITION RECEIVED

☐ FULLY ASSEMBLED
☐ DISMANTLED
☐ CLEANED
☐ OPEN POSITION
☐ CLOSED POSITION
☐ THROTTLED
☐ LESS OPERATOR

REMARKS

DESCRIPTION OF DEFECT

☐ FRACTURE ☐ DESIGN ☐ LEAKAGE ☐ WORKMANSHIP ☐ OTHER

REMARKS

As shipped, the disc will not fully open. The disc contacts the bonnet prior to full rotation (at approximately 50% open).

REASON OR CAUSE FOR FAILURE

The disc design was modified for vertical installation by extending the counter balance to reduce the disc rotation. The cast disc counterweight extension design was not checked with a valve assembly layout due to a previous shipment from Flowserve-Williamsport of a similar design with a weld build-up. After the custom called in the complaint, the new disc was added to a valve layout and confirmed the disc design error.

The valve was tested per MS7252 which requires the disc to be cycled fully open and closed to confirm freedom of movement. This did not identify the disc /bonnet interference as the test procedure allows the disc cycle to be completed without the bonnet installed.

CONCLUSION

Disc design error and test procedure error. When valve components design are modified, the new design should be checked against the valve layout. MS7252 should be revised to require the disc cycle test to be completed with the bonnet installed.

REPORT BY	Floyd A. Bensinger 3/10/06	DATE OF REPORT	3/10/06
PRODUCT ENG. APPROVAL	DATE 3-13-06	QA APPROVAL	DATE 3/13/06

FLOWSERVE

Flow Control Division
Anchor/Darling Valves
BW/IP Valves
Edward Valves
Valtek Control Products
Worcester Valves

March 16, 2006

PG&E, Diablo Canyon
FAX 805-545-2614

Attention: **Paul Grable**

Subject: **Repairs to 8" 600 Tilting Disc Check Valve, Revision to Referenced Letters**

Reference:
1. **Valve Assembly Drawing W9023267**
2. **Flowserve Letters 3/13/06, 3/14/06 and 3/15/06**
3. **Telecon 3/14/06**
4. **Valve S/N AY777**
5. **Body Heat Number 05260-X551**
6. **Flowserve SO 35306**

Gentlemen:

The subject repairs to correct the disc operational space shall include the following:

1. Evaluate disc for full open to close rotation.
2. Remove bonnet
3. Add a 1/8" x 45° chamfer on the front of the disc counterweight to clear the bonnet. (Do not disassemble disc from body.)
4. Polish the bonnet to cleanup disc contact marks (bonnet min. thickness is 1.283").
5. Thoroughly clean valve and parts.
6. Reassemble bonnet to valve.
7. Confirm a minimum clearance of 0.010" between disc counterweight and bonnet for full disc rotation.
8. Grind the disc counterweight stop (tang) and body casting (approximately 1/8") to mate at the stop for a wider contact (I").
9. Blue check to verify contact.

The subject repairs to correct the disc closing when full open shall include the following:

1. Per the attached sketch remove material from the disc counterweight. As this is a non-pressure boundary area of the disc casting no NDE is required on the new surface.
2. After disc counterweight material removal, with the valve assembly in the "vertical" orientation verify that the disc with not hang-up in the open position.
3. For added margin, the verification step 2 can be repeated with the valve oriented 3° off "vertical" with the disc oriented in the more adverse position than that of step 2.
4. If both steps 2 and 3 are completed successfully, the material removal is complete and acceptable. If not successful, remove additional disc counterweight material in the same general area as step 1 and repeat steps 2 and 3 until successfully completed.

Note – The sketch is a rough illustration that does not require exact compliance. The real acceptance is in the steps 2 and 3, disc operational verification.

The undercut in the inspection port weld repairs shall include the following:

1. Liquid Penetrant examine weld.
2. Weld up undercut area.
3. Polish weld
4. Liquid Penetrant examine weld.

Flowserve U S Inc
Flow Control Division

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www.flowserve.com

The casting porosity repairs shall include the following:

1. Liquid Penetrant examine the porous area of the casting.
2. Grind area (if necessary) and weld porous area.
3. Polish weld.
4. Liquid Penetrant examine the porous area of the casting.
5. Do not exceed minimum casting finish standards.

This repair plan is to be implemented by DCPP personnel, under the direction provided by an on-site Flowserve service technician. Performance of the described repairs does not invalidate any nuclear quality (N-Stamp) certifications or warranties associated with this valve.

The newly supplied disc includes a cast stop area on the counterweight. This was added to the casting, in lieu of a weld build-up, since the last supply of this valve design. It is dimensionally different than the previous disc due to casting tolerances and final fit-up of the disc. The disc final fit-up, as addressed above, will assure proper valve function and final length of the disc counterweight stop.

Valve installation orientation shall be horizontal pipe to vertical pipe with the bonnet above the valve up to vertical. Based on the above disc operation adjustments (step 3), the valve can be installed up to 3° beyond vertical, but the operational margin will be reduced.

If you have any questions on the above, please feel free to contact us.

F.A. Bensinger, PE
Senior Product Manager

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Flow Control Division

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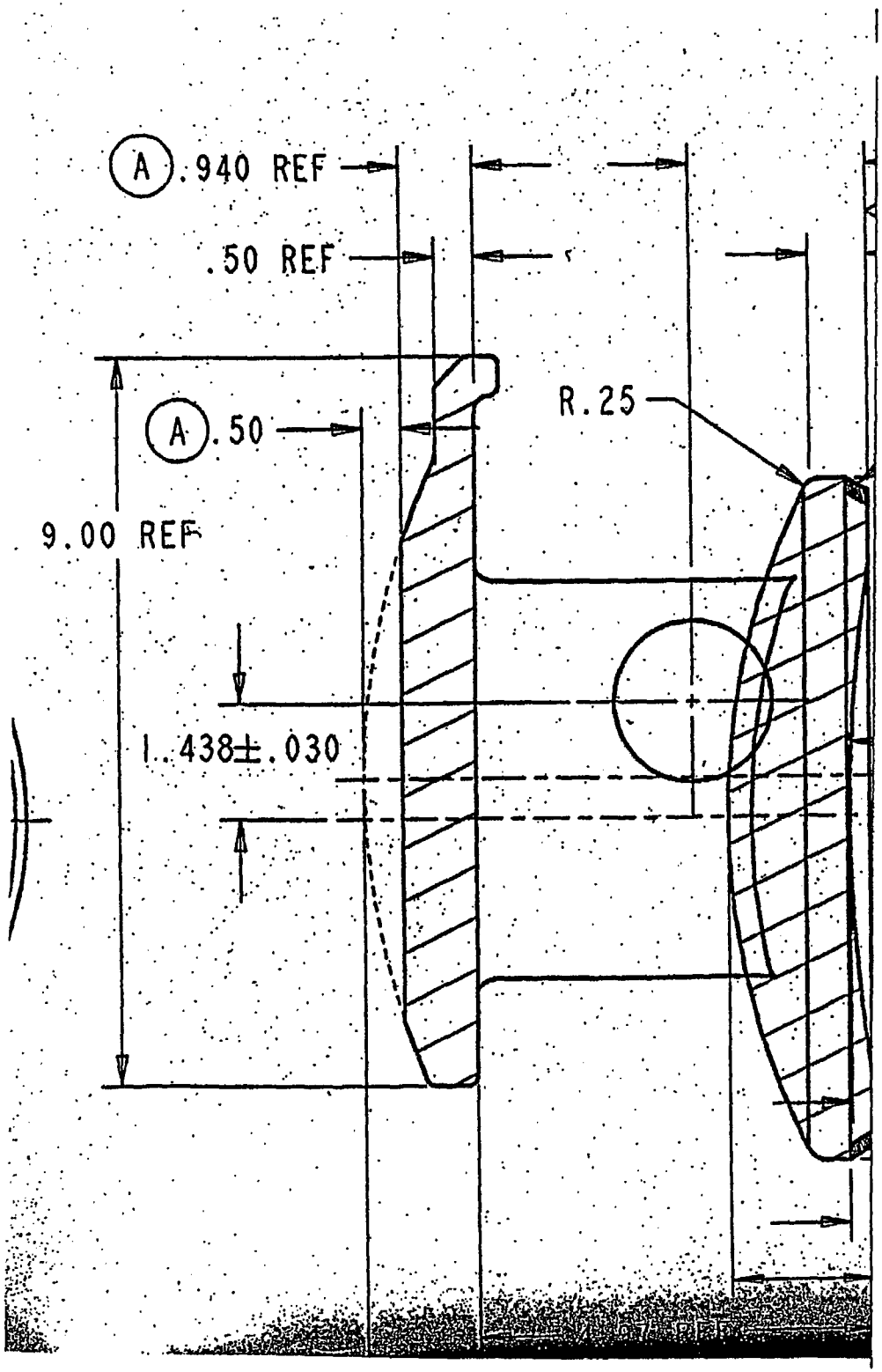


DISC SKETCH

8" TDC

3/16/06

6.2.3 When present, leakage shall be measure in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

6.3 Seat Leakage Test

6.3.1 The valve shall be given a hydrostatic seat test by applying pressure behind the disc and measuring leakage from the opposite port. Valves with resilient seats shall be given a high and low pressure hydrostatic seat test.

6.3.2 With the valve in the closed position apply and maintain the seat test pressure for the required duration and note any leakage.

6.3.3 When present, leakage shall be measured in a graduate, standpipe or other such graduated device. Leakage must be less than the specified allowable (see Section 7).

6.3.4 "Check valves" with a resilient seat shall also be given an air seat test using water displacement measurement or equivalent method (See para. 3.7)

6.4 Operational Test

6.4.1 The disc shall be manually repositioned from the close to the fully open positions then allowed to slowly close to assure free movement (non-binding) of the parts. The hinge shall be evaluated for proper body contact when the disc is in the full open position in the swing check valves only. For tilting disc check valves, the disc operational test shall confirm it fully opens without contacting the bonnet or body until it is fully open. R4

6.4.2 Proper body contact of the valve internal parts with the disc full open and non-binding slow closure of the disc shall be documented on the test report.

6.4.3 The disc operational test detailed in 6.4.1 and 6.4.2 may be performed at the start of the testing prior to bonnet installation on the valve. For tilting disc check valves, the final operational test shall be performed with the bonnet installed.

7.0 ACCEPTANCE CRITERIA

7.1 Hydrostatic Shell Test

The valve being tested shall show no leakage resulting from the hydrostatic test. However, leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.2 Backseat Test

The valve shall show no leakage resulting from the backseat test. However leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

FLOWSERVE

10 CFR 21 EVALUATION COMMITTEE SUMMARY SHEET	10 CFR 21 FILE NO. - 22

This form is for internal use only. It will be used to summarize the main points of any investigation of internal reports for delivered nuclear facility components which may have a deviation from technical requirements that could potentially cause a nuclear safety hazard.

COMPONENT DESCRIPTION

8"- 600 Class - Tilting Disc Check Valve
P/N 04001011-35306-01
Valve S/N AY777
Shipped 1/30/06

DELIVERED TO: (Customer, P. O., Date)

Pacific Gas & Electric
Diablo Canyon Power Plant
Purchase Order 125492, Item 1

SALES ORDER DATA

Sales Order 35306 Item 1

DESCRIPTION OF DEVIATION

Customer receipt inspection discovered that the disc did not open fully and tended to 'stick' open. The valve is in a vertical application and has a modified disc counterweight to prevent over-travel. The valve was previously supplied by Flowserve - Williamsport with the modification obtained by weld build-up. With S/N AY777, the disc casting was revised to provide the modification. Casting tolerances resulted in excess material that caused interference with the Bonnet. Two factors prevented Flowserve from identifying the problem. 1) The Engineer did not do a valve layout because it was based on an existing Williamsport design. 2) The test procedure allowed the disc operation to be verified prior to installing the Bonnet.

CORRECTIVE ACTION (Action taken/ planned to correct deviation)

The procedure does not require a design layout for existing designs but does require a layout, if there is a modification to the existing design. The Engineer was trained accordingly.

Test procedure MS7252 was revised to require final operational testing with the Bonnet installed.

No other valves were ever supplied with this disc casting, which is not representative of the standard TDC design. No further corrective action or customer notifications are necessary.

CUSTOMER NOTIFIED?

☒ Yes
☐ No

(If yes, cite notification date/method.)

The customer identified the problem on 3/2/06 and notified Flowserve on 3/8/06. Flowserve provided a repair plan to resolve the issue on 3/16/06. The modified disc casting resulted in the interference. Since this was the first time the disc casting was supplied, Flowserve originally concluded that a Part 21 evaluation was not necessary. The customer must not have understood that this situation was isolated and issued a Part 21 report on 3/31/06.

EVALUATION

Could this deviation cause a substantial safety hazard as defined in 10 CFR 21?

☒ Yes — The valve as supplied may not close properly, if it wedges at the Bonnet.
☐ No
☐ Requires Customer Evaluation

Is this deviation reportable by FLOWSERVE to NRC under 10 CFR 21?

☐ Yes
☒ No

The issue is only applicable to Valve S/N AY777. The corrective actions will prevent recurrence.

COMMITTEE CONCURRENCE WITH EVALUATION

Member Signature	Date	Agree	Disagree
Manager, Q.A.	4/6/06	✓	
Manager, Engineering	4-6-06	✓	
Manager, Sales	4/6/06	✓	

Form 36-Q-277

TITLE: HYDROSTATIC AND OPERATIONAL TESTING FOR GATE, GLOBE, AND CHECK VALVES.

1.0 SCOPE

1.1 This specification provides a standard that will insure that hydrostatic testing is in accordance with the imposed edition of the ASME Section III or B16.34 code.

- Double Disc Gate (DD), Parallel Slide Gate (PS) and Flex Wedge Gate (FW) Valves
- Globe (GB), Y-Globe (YGB) and Stop Check Globe (GB) Valves
- Piston Check (PC) and Swing Check (SC) Valves

Note: Bellows Valves and valves 2" and smaller are not included in this specification.

2.0 EXHIBITS AND TABLES

Table 1: ASME Section III 1971 Edition up to and including Winter 1972 Addenda

Table 2: ASME Section III 1971 Edition, Summer 1973 Addenda

Table 3: ASME Section III 1971 Edition, Winter 1973 Addenda up to and including ASME Section III 1977 Edition, Summer 1977 Addenda

Table 4: ASME Section III 1977 Edition, Winter 1977 Addenda up to and including ASME Section III 1989, 1989 Addenda, and B16.34

EXHIBIT 1: Hydrostatic/Traceability Report

3.0 GENERAL TEST REQUIREMENTS

3.1 Demineralized water shall meet the requirements of MS 8260, L.R.

3.1.1 All valves shall be flushed with demineralized water after testing.

3.1.2 Water used for rinsing carbon steel valves shall contain a suitable rust inhibitor.

3.2 Testing shall be at the pressures and for the time durations specified on the test data tables (Tables 1-4) for the applicable valve pressure class, material, and ASME Section III code year. The acceptance criteria or allowable leakage is provided in Section 7. Non-standard tests requirements will be provided in the QAP.

3.2.1 Test requirements shall be in accordance with the applicable specifications and code requirements.

3.2.2 Valves that have actuators or closure members which are subject to damage at rated pressures shall have differential pressures across the closure member limited to 110% of the maximum specified differential pressure.

3.2.3 Unless noted, pressures are given in psig, durations in minutes, and allowable leakage in cc/hr.

Note: Operational testing of the valves should be performed at the pressures and for the time durations specified in the QAP.

3.3 External surfaces of the valve body shall be cleaned and dried prior to the shell test.

3.4 Valve body, bonnet, disc, body/bonnet bolting or other pressure boundary parts shall not be painted before the shell pressure test is completed. Re-test may be performed in the painted condition.

3.5 The valve shall be purged of air prior to conducting shell and seat tests with water.

3.6 Time duration for testing the valve is defined as the time period after the valve is fully prepared and under the required test pressure.

3.7 Low pressure seat tests (less than 100 PSIG air, water, nitrogen, etc.) shall be performed after the hydrostatic shell, valve disc closures and operational tests are complete.

3.8 The packing test may be performed concurrently with the hydrostatic shell providing the required test pressures are the same.

3.9 The valve closure test and seat leakage test may be combined when the test pressures are the same.

R/3 3.10 Bolt torque information shall be in accordance with TA-160 for Non-Pressure Boundary bolting and TA-108 for Pressure Boundary bolting. Torque requirements for gland and bonnet retainer (pressure seal valves) bolting shall be in accordance with the sales drawing or route card, as specified in the QAP.

3.11 All gauges used will be calibrated under the system described in the Flowserve Quality Assurance Manual. Gauge numbers and calibration date shall be recorded on the test report form.

3.12 Record data on the test report form.

4.0 PROCEDURE FOR GATE VALVES

4.1 Hydrostatic Shell Test[1,2]

4.1.1 The valve shall be given a hydrostatic shell test in the partially open position with the valve ends closed. Leakage through the stem packing is not cause for rejection.

4.1.2 Pressurize the valve body to the shell test pressure.

4.1.3 Maintain the shell test pressure for required duration and inspect the valve for leakage.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

4.2 Valve Closure Test

4.2.1 The valve shall be given a closure test with the disc in the fully closed position and the test pressure applied as a differential pressure across the valve disc. The test pressure shall be applied successively on each side of the closed disc.

4.2.2 Maintain the closure test pressure for the required duration and note any leakage.

4.2.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than specified allowable (see Section 7).

4.3 Seat Test

4.3.1 The valve shall be given a seat leakage test by applying fluid pressure successively to each side of the closed disc and measuring leakage from the opposite port.

4.3.2 Maintain the seat test pressure for the required duration and note any leakage.

4.3.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

4.3.4 When required by the contract (as noted in the QAP), double disc gate valves shall be given an additional low pressure seat test at 50 psig per para. 4.3.1 to 4.3.3 (see para. 3.7)

4.4 Backseat Test

4.4.1 The valve shall be given a backseat leakage test with the valve in the backseated position, pressure applied to the body with the packing gland loosened.

4.4.2 Maintain the backseat pressure for the required duration and note any leakage.

4.4.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

4.5 Packing Test

4.5.1 The valve shall be given a packing leakage test with the backseat removed from contact, the packing drawn down and pressure applied below the packing.

4.5.2 Maintain the packing pressure for required duration and note any leakage. Leakage must be less than the specified allowable (see Section 7).

4.6 Operational Test

4.6.1 The valve shall be operated through the full valve stroke (opened and closed) to ensure smooth operation and movement.

4.6.2 Open and close valve against the specified differential pressure. The valve should operate without requiring excessive force.

5.0 PROCEDURE FOR GLOBE VALVES

5.1 Hydrostatic Shell Test[1,2]

5.1.1 The valve shall be given a hydrostatic shell test in the partially open position with the valve ends closed. Leakage through the stem packing is not cause for rejection.

5.1.2 Pressurize the valve body to the shell test pressure.

5.1.3 Maintain the shell test pressure for required duration and inspect the valve for leakage.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conduction the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

5.2 Valve Closure Test

5.2.1 The valve shall be given a closure test with the valve plug in the fully closed position and differential test pressure applied in the normal flow direction across the valve plug.

5.2.2 Valve is closed and test pressure is applied upstream of the valve. Maintain the closure test pressure for the required duration and note any leakage.

5.2.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

5.3 Seat Leakage Test[1]

5.3.1 The valve shall be given a seat leakage test by applying pressure downstream of the plug, unless noted otherwise to measure leakage at the opposite port.

5.3.2 Valve is closed and test pressure is applied downstream of the plug. Maintain the closure test pressure for the required duration and not any leakage.

5.3.3 Valves with actuators, mechanical, fluid or electrical, shall be limited to testing with the test pressure at 110% of the maximum specified differential pressure to avoid subjecting closure members to damage.

5.3.4 When present, leakage shall be measured in a graduated cylinder, standpipe or other such calibrated device. Leakage must be less than the specified allowable (see Section 7).

[1] For stop check globe valves make sure the stem is in the open position to ensure no loading interference during the seat test.

5.4 Backseat Test

5.4.1 The valve shall be given a backseat leakage test with the valve in the backseated position, pressure applied to the body with the packing gland loosened.

5.4.2 Maintain the backseat pressure for the required duration and note any leakage. Leakage must be less then the specified allowable.

5.4.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

5.5 Packing Test

5.5.1 The valve shall be given a packing leakage test with the backseat removed from contact, the packing drawn and pressure applied to the valve.

5.5.2 Maintain the pressure on packing for the required duration and note any leakage. Leakage must be less then the specified amount (see Section 7).

5.6 Operational Test

5.6.1 The valve shall be operated through the full valve stroke (opened and closed) to ensure smooth operation and movement.

5.6.2 Open and close valve against the specified differential pressure. The valve should operate without requiring excessive force.

6.0 PROCEDURE FOR CHECK VALVES

6.1 Hydrostatic Shell Test[1,2]

6.1.1 The valve shall be given a hydrostatic shell test with the valve ends closed and pressure applied in the flow open direction.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

6.2 Valve Closure Test

6.2.1 The valve shall be given a disc closure test with the valve disc in the fully closed position and the test pressure applied behind the valve disc.

6.2.2 With the valve in the closed position apply and maintain the closure test pressure for the required duration and note any leakage.

6.2.3 When present, leakage shall be measure in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

6.3 Seat Leakage Test

6.3.1 The valve shall be given a hydrostatic seat test by applying pressure behind the disc and measuring leakage from the opposite port. Valves with resilient seats shall be given a high and low pressure hydrostatic seat test.

6.3.2 With the valve in the closed position apply and maintain the seat test pressure for the required duration and note any leakage.

6.3.3 When present, leakage shall be measured in a graduate, standpipe or other such graduated device. Leakage must be less than the specified allowable (see Section 7).

6.3.4 "Check valves" with a resilient seat shall also be given an air seat test using water displacement measurement or equivalent method (See para. 3.7)

6.4 Operational Test

6.4.1 The disc shall be manually repositioned from the close to the fully open positions then allowed to slowly close to assure free movement (non-binding) of the parts. The hinge shall be evaluated for proper body contact when the disc is in the full open position in the swing check valves only.

6.4.2 Proper body contact of the valve internal parts with the disc full open and non-binding slow closure of the disc shall be documented on the test report.

6.4.3 The disc operational test detailed in 6.4.1 and 6.4.2 may be performed at the start of the testing prior to bonnet installation on the valve.

7.0 ACCEPTANCE CRITERIA

7.1 Hydrostatic Shell Test

The valve being tested shall show no leakage resulting from the hydrostatic test. However, leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.2 Backseat Test

The valve shall show no leakage resulting from the backseat test. However leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.3 Packing Test

The valve shall show no leakage resulting from the packing test. However leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.4 Closure and Seat Leakage Tests

The allowable leakage resulting from the closure and seat leakage tests shall be no more than 10 cc/in/hr. When supplemental values are stated in the contract, this value shall be superseded by those stated in the QAP.

8.0 RECORDING OF TEST DATA

8.1 All test data shall be recorded on Exhibit I. Test Data Sheet forms shall be available through Q.A. documentation technician.

Prepared by: F. A. Bensinger, Manager Inside Sales & Application Engineering — Date 3/14/05

Approved by: J. P. Tucker, Manager , Engineering — Date 3-15-05

Approved by: R. A. Bandulwala, Manager, Quality Assurance — Date 3/15/05

TABLE 1

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1971 EDITION UP TO AND INCLUDING THE WINTER 1972 ADDENDA

TABLE 1A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2] (1)	SHELL[2] (2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1400	1100	750	750	750	750
600	2800	2175	1500	1500	1500	1500
900	4175	3250	2200	2200	2200	2200
1500	6975	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2] (1)	SHELL[2] (2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1400	1100	750	750	750	750
600	2800	2175	1500	1500	1500	1500
900	4175	3250	2200	2200	2200	2200
1500	6975	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2] (1)	SHELL[2] (2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1275	1100	750	750	750	750
600	2575	2175	1500	1500	1500	1500
900	3850	3250	2200	2200	2200	2200
1500	6425	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2] (1)	SHELL[2] (2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1075	775	750	750	750	750
600	2150	1550	1500	1500	1500	1500
900	3200	2325	2200	2200	2200	2200
1500	5350	3850	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).

Note 2: The test pressure for the hydrostatic shell test is dependent on whether the valve is a class 1, 2 or 3. The classes are denoted by ( ).

TABLE 2

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH THE ASME SECTION III 1973 EDITION WITH THE 1973 SUMMER ADDENDA

TABLE 2A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1000	775	750	750	750	750
600	2000	1550	1500	1500	1500	1500
900	3000	2325	2200	2200	2200	2200
1500	5025	3850	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).
Note 2: The test pressure for the hydrostatic shell test is dependent on whether the valve is a class 1, 2 or 3. The classes are denoted by ( ).

TABLE 3

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1973 EDITION, WINTER 1973 ADDENDA UP TO AND INCLUDING ASME SECTION III 1977, SUMMER 1977 ADDENDA

TABLE 3A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1000	670	750	750	750
600	2000	1336	1500	1500	1500
900	3000	2005	2200	2200	2200
1500	5025	3345	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).
Note 2: Notice that the hydrostatic test pressure is no longer dependent upon the nuclear class of the valve.

TABLE 4

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1977 EDITION, WINTER 1977 ADDENDA UP TO AND INCLUDING ASME SECTION III 1989, WITH THE 1989 ADDENDA AND B16.34.

TABLE 4A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	450	315	315	315	315
300	1125	825	825	825	825
600	2225	1650	1650	1650	1650
900	3350	2450	2450	2450	2450
1500	5575	4075	4075	4075	4075
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	450	320	320	320	320
300	1125	825	825	825	825
600	2250	1650	1650	1650	1650
900	3375	2475	2475	2475	2475
1500	5625	4125	4125	4125	4125
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	310	310	310	310
300	1100	800	800	800	800
600	2175	1600	1600	1600	1600
900	3250	2400	2400	2400	2400
1500	5400	3975	3975	3975	3975
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	350	310	310	310	310
300	900	800	800	800	800
600	1800	1600	1600	1600	1600
900	2700	2400	2400	2400	2400
1500	4500	3975	3975	3975	3975
Duration (minutes)	(See note 1)	3	5	5	5

Note 1: If the applicable Code year is earlier than the Summer Addenda of 1981 then the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall. If the applicable code is the summer of 1981 Addenda or later then the test duration is a minimum of 10 minutes (see QAP for specific duration).

FLOWSERVE

MS 7252
Revision 3

Sales Order - Line Item

EXHIBIT 1: TRACEABILITY/ HYDRO REPORT

HYDRO TEST MS/REV _____

VALVE DESC. _____

CUSTOMER _____

TEST OPERATION	GAGE NO.	CALIB.	PSI (MPa)	MIN.	ALLOWABLE LEAKAGE
Backseat					
Shell					
Seat					

VALVE SERIAL NO.	BODY	BONNET/COVER	STEM	DISK		ACTUAL LEAKAGE	TESTER NO.	DATE	CUSTOMER INSPECTOR

FLOWSERVE INSPECTOR: _____ Date

CUSTOMER INSPECTOR: _____ Date

FLOWSERVE

METHOD SPECIFICATION

Flow Control Division
Raleigh, North Carolina

MS	7252
REVISION	4
EFFECTIVE	3/15/2006
SUPERSEDES	1/27/03
ORIGINAL DATE	1/27/03
PAGE	1 of 12

TITLE: HYDROSTATIC AND OPERATIONAL TESTING FOR GATE, GLOBE, AND CHECK VALVES.

1.0 SCOPE

1.1 This specification provides a standard that will insure that hydrostatic testing is in accordance with the imposed edition of the ASME Section III or B16.34 code.

- Double Disc Gate (DD), Parallel Slide Gate (PS) and Flex Wedge Gate (FW) Valves
- Globe (GB), Y-Globe (YGB) and Stop Check Globe (GB) Valves
- Piston Check (PC) and Swing Check (SC) Valves

Note: Bellows Valves and valves 2" and smaller are not included in this specification.

2.0 EXHIBITS AND TABLES

Table 1: ASME Section III 1971 Edition up to and including Winter 1972 Addenda

Table 2: ASME Section III 1971 Edition, Summer 1973 Addenda

Table 3: ASME Section III 1971 Edition, Winter 1973 Addenda up to and including ASME Section III 1977 Edition, Summer 1977 Addenda

Table 4: ASME Section III 1977 Edition, Winter 1977 Addenda up to and including ASME Section III 1998 Edition, 2000 addenda and B16.34 – 1988. R4

EXHIBIT 1: Hydrostatic/Traceability Report

3.0 GENERAL TEST REQUIREMENTS

3.1 Demineralized water shall meet the requirements of MS 8260, L.R.

3.1.1 All valves shall be flushed with demineralized water after testing.

3.1.2 Water used for rinsing carbon steel valves shall contain a suitable rust inhibitor.

3.2 Testing shall be at the pressures and for the time durations specified on the test data tables (Tables 1-4) for the applicable valve pressure class, material, and ASME Section III code year. The acceptance criteria or allowable leakage is provided in Section 7. Non-standard tests requirements will be provided in the QAP.

3.2.1 Test requirements shall be in accordance with the applicable specifications and code requirements.

3.2.2 Valves that have actuators or closure members which are subject to damage at rated pressures shall have differential pressures across the closure member limited to 110% of the maximum specified differential pressure.

3.2.3 Unless noted, pressures are given in psig, durations in minutes, and allowable leakage in cc/hr.

Note: Operational testing of the valves should be performed at the pressures and for the time durations specified in the QAP.

3.3 External surfaces of the valve body shall be cleaned and dried prior to the shell test.

3.4 Valve body, bonnet, disc, body/bonnet bolting or other pressure boundary parts shall not be painted before the shell pressure test is completed. Re-test may be performed in the painted condition.

3.5 The valve shall be purged of air prior to conducting shell and seat tests with water.

3.6 Time duration for testing the valve is defined as the time period after the valve is fully prepared and under the required test pressure.

3.7 Low pressure seat tests (less than 100 PSIG air, water, nitrogen, etc.) shall be performed after the hydrostatic shell, valve disc closures and operational tests are complete.

3.8 The packing test may be performed concurrently with the hydrostatic shell providing the required test pressures are the same.

3.9 The valve closure test and seat leakage test may be combined when the test pressures are the same.

3.10 Bolt torque information shall be in accordance with TA-160 for Non-Pressure Boundary bolting and TA-108 for Pressure Boundary bolting. Torque requirements for gland and bonnet retainer (pressure seal valves) bolting shall be in accordance with the sales drawing or route card, as specified in the QAP.

3.11 All gauges used will be calibrated under the system described in the Flowserve Quality Assurance Manual. Gauge numbers and calibration date shall be recorded on the test report form.

3.12 Record data on the test report form.

4.0 PROCEDURE FOR GATE VALVES

4.1 Hydrostatic Shell Test[1,2]

4.1.1 The valve shall be given a hydrostatic shell test in the partially open position with the valve ends closed. Leakage through the stem packing is not cause for rejection.

4.1.2 Pressurize the valve body to the shell test pressure.

4.1.3 Maintain the shell test pressure for required duration and inspect the valve for leakage.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

4.2 Valve Closure Test

4.2.1 The valve shall be given a closure test with the disc in the fully closed position and the test pressure applied as a differential pressure across the valve disc. The test pressure shall be applied successively on each side of the closed disc.

4.2.2 Maintain the closure test pressure for the required duration and note any leakage.

4.2.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than specified allowable (see Section 7).

4.3 Seat Test

4.3.1 The valve shall be given a seat leakage test by applying fluid pressure successively to each side of the closed disc and measuring leakage from the opposite port.

4.3.2 Maintain the seat test pressure for the required duration and note any leakage.

4.3.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

4.3.4 When required by the contract (as noted in the QAP), double disc gate valves shall be given an additional low pressure seat test at 50 psig per para. 4.3.1 to 4.3.3 (see para. 3.7)

4.4 Backseat Test

4.4.1 The valve shall be given a backseat leakage test with the valve in the backseated position, pressure applied to the body with the packing gland loosened.

4.4.2 Maintain the backseat pressure for the required duration and note any leakage.

4.4.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

4.5 Packing Test

4.5.1 The valve shall be given a packing leakage test with the backseat removed from contact, the packing drawn down and pressure applied below the packing.

4.5.2 Maintain the packing pressure for required duration and note any leakage. Leakage must be less than the specified allowable (see Section 7).

4.6 Operational Test

4.6.1 The valve shall be operated through the full valve stroke (opened and closed) to ensure smooth operation and movement.

4.6.2 Open and close valve against the specified differential pressure. The valve should operate without requiring excessive force. The differential pressure shall be the pressure class, i.e. 150, 300 etc. unless stated otherwise in the QAP. R4

5.0 PROCEDURE FOR GLOBE VALVES

5.1 Hydrostatic Shell Test[1,2]

5.1.1 The valve shall be given a hydrostatic shell test in the partially open position with the valve ends closed. Leakage through the stem packing is not cause for rejection.

5.1.2 Pressurize the valve body to the shell test pressure.

5.1.3 Maintain the shell test pressure for required duration and inspect the valve for leakage.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conduction the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

5.2 Valve Closure Test

5.2.1 The valve shall be given a closure test with the valve plug in the fully closed position and differential test pressure applied in the normal flow direction across the valve plug.

5.2.2 Valve is closed and test pressure is applied upstream of the valve. Maintain the closure test pressure for the required duration and note any leakage.

5.2.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

5.3 Seat Leakage Test[1]

5.3.1 The valve shall be given a seat leakage test by applying pressure downstream of the plug, unless noted otherwise to measure leakage at the opposite port.

5.3.2 Valve is closed and test pressure is applied downstream of the plug. Maintain the closure test pressure for the required duration and not any leakage.

5.3.3 Valves with actuators, mechanical, fluid or electrical, shall be limited to testing with the test pressure at 110% of the maximum specified differential pressure to avoid subjecting closure members to damage.

5.3.4 When present, leakage shall be measured in a graduated cylinder, standpipe or other such calibrated device. Leakage must be less than the specified allowable (see Section 7).

[1] For stop check globe valves make sure the stem is in the open position to ensure no loading interference during the seat test.

5.4 Backseat Test

5.4.1 The valve shall be given a backseat leakage test with the valve in the backseated position, pressure applied to the body with the packing gland loosened.

5.4.2 Maintain the backseat pressure for the required duration and note any leakage. Leakage must be less then the specified allowable.

5.4.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

5.5 Packing Test

5.5.1 The valve shall be given a packing leakage test with the backseat removed from contact, the packing drawn and pressure applied to the valve.

5.5.2 Maintain the pressure on packing for the required duration and note any leakage. Leakage must be less then the specified amount (see Section 7).

5.6 Operational Test

5.6.1 The valve shall be operated through the full valve stroke (opened and closed) to ensure smooth operation and movement.

5.6.2 Open and close valve against the specified differential pressure. The valve should operate without requiring excessive force. The differential pressure shall be the pressure class, i.e. 150, 300 etc., unless stated otherwise in the QAP. R4

6.0 PROCEDURE FOR CHECK VALVES

6.1 Hydrostatic Shell Test[1,2]

6.1.1 The valve shall be given a hydrostatic shell test with the valve ends closed and pressure applied in the flow open direction.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

6.2 Valve Closure Test

6.2.1 The valve shall be given a disc closure test with the valve disc in the fully closed position and the test pressure applied behind the valve disc.

6.2.2 With the valve in the closed position apply and maintain the closure test pressure for the required duration and note any leakage.

6.2.3 When present, leakage shall be measure in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

6.3 Seat Leakage Test

6.3.1 The valve shall be given a hydrostatic seat test by applying pressure behind the disc and measuring leakage from the opposite port. Valves with resilient seats shall be given a high and low pressure hydrostatic seat test.

6.3.2 With the valve in the closed position apply and maintain the seat test pressure for the required duration and note any leakage.

6.3.3 When present, leakage shall be measured in a graduate, standpipe or other such graduated device. Leakage must be less than the specified allowable (see Section 7).

6.3.4 "Check valves" with a resilient seat shall also be given an air seat test using water displacement measurement or equivalent method (See para. 3.7)

6.4 Operational Test

6.4.1 The disc shall be manually repositioned from the close to the fully open positions then allowed to slowly close to assure free movement (non-binding) of the parts. The hinge shall be evaluated for proper body contact when the disc is in the full open position in the swing check valves only. For tilting disc check valves, the disc operational test shall confirm it fully opens without contacting the bonnet or body until it is fully open. R4

6.4.2 Proper body contact of the valve internal parts with the disc full open and non-binding slow closure of the disc shall be documented on the test report.

6.4.3 The disc operational test detailed in 6.4.1 and 6.4.2 may be performed at the start of the testing prior to bonnet installation on the valve. For tilting disc check valves, the final operational test shall be performed with the bonnet installed.

7.0 ACCEPTANCE CRITERIA

7.1 Hydrostatic Shell Test

The valve being tested shall show no leakage resulting from the hydrostatic test. However, leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.2 Backseat Test

The valve shall show no leakage resulting from the backseat test. However leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.3 Packing Test

The valve shall show no leakage resulting from the packing test. However leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.4 Closure and Seat Leakage Tests

The allowable leakage resulting from the closure and seat leakage tests shall be no more than 10 cc/in/hr. When supplemental values are stated in the contract, this value shall be superseded by those stated in the QAP.

8.0 RECORDING OF TEST DATA

8.1 All test data shall be recorded on Exhibit I. Test Data Sheet forms shall be available through Q.A. documentation technician.

Prepared by: F.A. Bensinger / AJH — F. A. Bensinger, Senior Product Manager — Date 3/17/06

Approved by: J. P. Tucker, Manager, Engineering — Date 3-17-06

Approved by: R. A. Bandukwala, Manager, Quality Assurance — Date 3/17/06.

TABLE 1

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1971 EDITION UP TO AND INCLUDING THE WINTER 1972 ADDENDA

TABLE 1A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1400	1100	750	750	750	750
600	2800	2175	1500	1500	1500	1500
900	4175	3250	2200	2200	2200	2200
1500	6975	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1400	1100	750	750	750	750
600	2800	2175	1500	1500	1500	1500
900	4175	3250	2200	2200	2200	2200
1500	6975	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1275	1100	750	750	750	750
600	2575	2175	1500	1500	1500	1500
900	3850	3250	2200	2200	2200	2200
1500	6425	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1075	775	750	750	750	750
600	2150	1550	1500	1500	1500	1500
900	3200	2325	2200	2200	2200	2200
1500	5350	3850	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).
Note 2: The test pressure for the hydrostatic shell test is dependent on whether the valve is a class 1, 2 or 3. The classes are denoted by ( ).

TABLE 2

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH THE ASME SECTION III 1973 EDITION WITH THE 1973 SUMMER ADDENDA

TABLE 2A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1000	775	750	750	750	750
600	2000	1550	1500	1500	1500	1500
900	3000	2325	2200	2200	2200	2200
1500	5025	3850	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).
Note 2: The test pressure for the hydrostatic shell test is dependent on whether the valve is a class 1, 2 or 3. The classes are denoted by ( ).

TABLE 3

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1973 EDITION, WINTER 1973 ADDENDA UP TO AND INCLUDING ASME SECTION III 1977, SUMMER 1977 ADDENDA

TABLE 3A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1000	670	750	750	750
600	2000	1336	1500	1500	1500
900	3000	2005	2200	2200	2200
1500	5025	3345	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).
Note 2: Notice that the hydrostatic test pressure is no longer dependent upon the nuclear class of the valve.

TABLE 4

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1977 EDITION, WINTER 1977 ADDENDA UP TO AND INCLUDING ASME SECTION III 1998, WITH THE 2000 ADDENDA AND B16.34 - 1998. R4

TABLE 4A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	450	315	315	315	315
300	1125	825	825	825	825
600	2225	1650	1650	1650	1650
900	3350	2450	2450	2450	2450
1500	5575	4075	4075	4075	4075
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	450	320	320	320	320
300	1125	825	825	825	825
600	2250	1650	1650	1650	1650
900	3375	2475	2475	2475	2475
1500	5625	4125	4125	4125	4125
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	310	310	310	310
300	1100	800	800	800	800
600	2175	1600	1600	1600	1600
900	3250	2400	2400	2400	2400
1500	5400	3975	3975	3975	3975
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	350	310	310	310	310
300	900	800	800	800	800
600	1800	1600	1600	1600	1600
900	2700	2400	2400	2400	2400
1500	4500	3975	3975	3975	3975
Duration (minutes)	(See note 1)	3	5	5	5

Note 1: If the applicable Code year is earlier than the Summer Addenda of 1981 then the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall. If the applicable code is the summer of 1981 Addenda or later then the test duration is a minimum of 10 minutes (see QAP for specific duration)+

FLOWSERVE

MS 7252
Revision 3

Sales Order - Line Item

EXHIBIT 1: TRACEABILITY/ HYDRO REPORT

HYDRO TEST MS/REV _____

VALVE DESC. _____

CUSTOMER _____

TEST OPERATION	GAGE NO.	CALIB.	PSI (MPa)	MIN.	ALLOWABLE LEAKAGE
Backseat					
Shell					
Seat					

VALVE SERIAL NO.	BODY	BONNET/COVER	STEM	DISK		ACTUAL LEAKAGE	TESTER NO.	DATE	CUSTOMER INSPECTOR

FLOWSERVE INSPECTOR: _____ Date

CUSTOMER INSPECTOR: _____ Date

FLOWSERVE

METHOD SPECIFICATION

Flow Control Division
Raleigh, North Carolina

MS	7252
REVISION	4
EFFECTIVE	3/15/2006
SUPERSEDES	1/27/03
ORIGINAL DATE	1/27/03
PAGE	1 of 12

TITLE: HYDROSTATIC AND OPERATIONAL TESTING FOR GATE, GLOBE, AND CHECK VALVES.

1.0 SCOPE

1.1 This specification provides a standard that will insure that hydrostatic testing is in accordance with the imposed edition of the ASME Section III or B16.34 code.

- Double Disc Gate (DD), Parallel Slide Gate (PS) and Flex Wedge Gate (FW) Valves
- Globe (GB), Y-Globe (YGB) and Stop Check Globe (GB) Valves
- Piston Check (PC) and Swing Check (SC) Valves

Note: Bellows Valves and valves 2" and smaller are not included in this specification.

2.0 EXHIBITS AND TABLES

Table 1: ASME Section III 1971 Edition up to and including Winter 1972 Addenda

Table 2: ASME Section III 1971 Edition, Summer 1973 Addenda

Table 3: ASME Section III 1971 Edition, Winter 1973 Addenda up to and including ASME Section III 1977 Edition, Summer 1977 Addenda

Table 4: ASME Section III 1977 Edition, Winter 1977 Addenda up to and including ASME Section III 1998 Edition, 2000 addenda and B16.34 – 1988.

R4

EXHIBIT 1: Hydrostatic/Traceability Report

3.0 GENERAL TEST REQUIREMENTS

3.1 Demineralized water shall meet the requirements of MS 8260, L.R.

3.1.1 All valves shall be flushed with demineralized water after testing.

3.1.2 Water used for rinsing carbon steel valves shall contain a suitable rust inhibitor.

3.2 Testing shall be at the pressures and for the time durations specified on the test data tables (Tables 1-4) for the applicable valve pressure class, material, and ASME Section III code year. The acceptance criteria or allowable leakage is provided in Section 7. Non-standard tests requirements will be provided in the QAP.

3.2.1 Test requirements shall be in accordance with the applicable specifications and code requirements.

3.2.2 Valves that have actuators or closure members which are subject to damage at rated pressures shall have differential pressures across the closure member limited to 110% of the maximum specified differential pressure.

3.2.3 Unless noted, pressures are given in psig, durations in minutes, and allowable leakage in cc/hr.

Note: Operational testing of the valves should be performed at the pressures and for the time durations specified in the QAP.

3.3 External surfaces of the valve body shall be cleaned and dried prior to the shell test.

3.4 Valve body, bonnet, disc, body/bonnet bolting or other pressure boundary parts shall not be painted before the shell pressure test is completed. Re-test may be performed in the painted condition.

3.5 The valve shall be purged of air prior to conducting shell and seat tests with water.

3.6 Time duration for testing the valve is defined as the time period after the valve is fully prepared and under the required test pressure.

3.7 Low pressure seat tests (less than 100 PSIG air, water, nitrogen, etc.) shall be performed after the hydrostatic shell, valve disc closures and operational tests are complete.

3.8 The packing test may be performed concurrently with the hydrostatic shell providing the required test pressures are the same.

3.9 The valve closure test and seat leakage test may be combined when the test pressures are the same.

3.10 Bolt torque information shall be in accordance with TA-160 for Non-Pressure Boundary bolting and TA-108 for Pressure Boundary bolting. Torque requirements for gland and bonnet retainer (pressure seal valves) bolting shall be in accordance with the sales drawing or route card, as specified in the QAP.

3.11 All gauges used will be calibrated under the system described in the Flowserve Quality Assurance Manual. Gauge numbers and calibration date shall be recorded on the test report form.

3.12 Record data on the test report form.

4.0 PROCEDURE FOR GATE VALVES

4.1 Hydrostatic Shell Test[1,2]

4.1.1 The valve shall be given a hydrostatic shell test in the partially open position with the valve ends closed. Leakage through the stem packing is not cause for rejection.

4.1.2 Pressurize the valve body to the shell test pressure.

4.1.3 Maintain the shell test pressure for required duration and inspect the valve for leakage.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

4.2 Valve Closure Test

4.2.1 The valve shall be given a closure test with the disc in the fully closed position and the test pressure applied as a differential pressure across the valve disc. The test pressure shall be applied successively on each side of the closed disc.

4.2.2 Maintain the closure test pressure for the required duration and note any leakage.

4.2.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than specified allowable (see Section 7).

4.3 Seat Test

4.3.1 The valve shall be given a seat leakage test by applying fluid pressure successively to each side of the closed disc and measuring leakage from the opposite port.

4.3.2 Maintain the seat test pressure for the required duration and note any leakage.

4.3.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

4.3.4 When required by the contract (as noted in the QAP), double disc gate valves shall be given an additional low pressure seat test at 50 psig per para. 4.3.1 to 4.3.3 (see para. 3.7)

4.4 Backseat Test

4.4.1 The valve shall be given a backseat leakage test with the valve in the backseated position, pressure applied to the body with the packing gland loosened.

4.4.2 Maintain the backseat pressure for the required duration and note any leakage.

4.4.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

4.5 Packing Test

4.5.1 The valve shall be given a packing leakage test with the backseat removed from contact, the packing drawn down and pressure applied below the packing.

4.5.2 Maintain the packing pressure for required duration and note any leakage. Leakage must be less than the specified allowable (see Section 7).

4.6 Operational Test

4.6.1 The valve shall be operated through the full valve stroke (opened and closed) to ensure smooth operation and movement.

4.6.2 Open and close valve against the specified differential pressure. The valve should operate without requiring excessive force. The differential pressure shall be the pressure class, i.e. 150, 300 etc. unless stated otherwise in the QAP. R4

5.0 PROCEDURE FOR GLOBE VALVES

5.1 Hydrostatic Shell Test[1,2]

5.1.1 The valve shall be given a hydrostatic shell test in the partially open position with the valve ends closed. Leakage through the stem packing is not cause for rejection.

5.1.2 Pressurize the valve body to the shell test pressure.

5.1.3 Maintain the shell test pressure for required duration and inspect the valve for leakage.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conduction the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

5.2 Valve Closure Test

5.2.1 The valve shall be given a closure test with the valve plug in the fully closed position and differential test pressure applied in the normal flow direction across the valve plug.

5.2.2 Valve is closed and test pressure is applied upstream of the valve. Maintain the closure test pressure for the required duration and note any leakage.

5.2.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

5.3 Seat Leakage Test[1]

5.3.1 The valve shall be given a seat leakage test by applying pressure downstream of the plug, unless noted otherwise to measure leakage at the opposite port.

5.3.2 Valve is closed and test pressure is applied downstream of the plug. Maintain the closure test pressure for the required duration and not any leakage.

5.3.3 Valves with actuators, mechanical, fluid or electrical, shall be limited to testing with the test pressure at 110% of the maximum specified differential pressure to avoid subjecting closure members to damage.

5.3.4 When present, leakage shall be measured in a graduated cylinder, standpipe or other such calibrated device. Leakage must be less than the specified allowable (see Section 7).

[1] For stop check globe valves make sure the stem is in the open position to ensure no loading interference during the seat test.

5.4 Backseat Test

5.4.1 The valve shall be given a backseat leakage test with the valve in the backseated position, pressure applied to the body with the packing gland loosened.

5.4.2 Maintain the backseat pressure for the required duration and note any leakage. Leakage must be less then the specified allowable.

5.4.3 When present, leakage shall be measured in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

5.5 Packing Test

5.5.1 The valve shall be given a packing leakage test with the backseat removed from contact, the packing drawn and pressure applied to the valve.

5.5.2 Maintain the pressure on packing for the required duration and note any leakage. Leakage must be less then the specified amount (see Section 7).

5.6 Operational Test

5.6.1 The valve shall be operated through the full valve stroke (opened and closed) to ensure smooth operation and movement.

5.6.2 Open and close valve against the specified differential pressure. The valve should operate without requiring excessive force. The differential pressure shall be the pressure class, i.e. 150, 300 etc., unless stated otherwise in the QAP. R4

6.0 PROCEDURE FOR CHECK VALVES

6.1 Hydrostatic Shell Test[1,2]

6.1.1 The valve shall be given a hydrostatic shell test with the valve ends closed and pressure applied in the flow open direction.

[1]Under the test conditions the valve shall show no leakage, however leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

[2]The applicable code year influences the duration of the hydrostatic test, please see QAP for specific duration times.

6.2 Valve Closure Test

6.2.1 The valve shall be given a disc closure test with the valve disc in the fully closed position and the test pressure applied behind the valve disc.

6.2.2 With the valve in the closed position apply and maintain the closure test pressure for the required duration and note any leakage.

6.2.3 When present, leakage shall be measure in a graduated cylinder, standpipe or other such graduated measure. Leakage must be less than the specified allowable (see Section 7).

6.3 Seat Leakage Test

6.3.1 The valve shall be given a hydrostatic seat test by applying pressure behind the disc and measuring leakage from the opposite port. Valves with resilient seats shall be given a high and low pressure hydrostatic seat test.

6.3.2 With the valve in the closed position apply and maintain the seat test pressure for the required duration and note any leakage.

6.3.3 When present, leakage shall be measured in a graduate, standpipe or other such graduated device. Leakage must be less than the specified allowable (see Section 7).

6.3.4 "Check valves" with a resilient seat shall also be given an air seat test using water displacement measurement or equivalent method (See para. 3.7)

6.4 Operational Test

6.4.1 The disc shall be manually repositioned from the close to the fully open positions then allowed to slowly close to assure free movement (non-binding) of the parts. The hinge shall be evaluated for proper body contact when the disc is in the full open position in the swing check valves only. For tilting disc check valves, the disc operational test shall confirm it fully opens without contacting the bonnet or body until it is fully open. R4

6.4.2 Proper body contact of the valve internal parts with the disc full open and non-binding slow closure of the disc shall be documented on the test report.

6.4.3 The disc operational test detailed in 6.4.1 and 6.4.2 may be performed at the start of the testing prior to bonnet installation on the valve. For tilting disc check valves, the final operational test shall be performed with the bonnet installed.

7.0 ACCEPTANCE CRITERIA

7.1 Hydrostatic Shell Test

The valve being tested shall show no leakage resulting from the hydrostatic test. However, leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.2 Backseat Test

The valve shall show no leakage resulting from the backseat test. However leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.3 Packing Test

The valve shall show no leakage resulting from the packing test. However leakage of temporary seals installed for the purpose of conducting the test is permitted unless the leakage exceeds the capacity to maintain system test pressure for the required time. If leakage from temporary seals is masking the valve surfaces then it must be directed away so as to avoid masking leaks from the valve.

7.4 Closure and Seat Leakage Tests

The allowable leakage resulting from the closure and seat leakage tests shall be no more than 10 cc/in/hr. When supplemental values are stated in the contract, this value shall be superseded by those stated in the QAP.

8.0 RECORDING OF TEST DATA

8.1 All test data shall be recorded on Exhibit I. Test Data Sheet forms shall be available through Q.A. documentation technician.

Prepared by: F.A. Bensinger / AJA — F. A. Bensinger, Senior Product Manager — Date 3/17/06

Approved by: — J. P. Tucker, Manager , Engineering — Date 3-17-06

Approved by: — R. A. Bandukwala, Manager , Quality Assurance — Date 3/17/06.

TABLE 1

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1971 EDITION UP TO AND INCLUDING THE WINTER 1972 ADDENDA

TABLE 1A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1400	1100	750	750	750	750
600	2800	2175	1500	1500	1500	1500
900	4175	3250	2200	2200	2200	2200
1500	6975	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1400	1100	750	750	750	750
600	2800	2175	1500	1500	1500	1500
900	4175	3250	2200	2200	2200	2200
1500	6975	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1275	1100	750	750	750	750
600	2575	2175	1500	1500	1500	1500
900	3850	3250	2200	2200	2200	2200
1500	6425	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 1D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2] (1)	(2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1075	775	750	750	750	750
600	2150	1550	1500	1500	1500	1500
900	3200	2325	2200	2200	2200	2200
1500	6350	3850	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).
Note 2: The test pressure for the hydrostatic shell test is dependent on whether the valve is a class 1, 2 or 3. The classes are denoted by ( ).

TABLE 2

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH THE ASME SECTION III 1973 EDITION WITH THE 1973 SUMMER ADDENDA

TABLE 2A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2] (1)	SHELL[2] (2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2] (1)	SHELL[2] (2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2] (1)	SHELL[2] (2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1125	1100	750	750	750	750
600	2250	2175	1500	1500	1500	1500
900	3375	3250	2200	2200	2200	2200
1500	5625	5400	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

TABLE 2D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2] (1)	SHELL[2] (2/3)	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	425	300	300	300	300
300	1000	775	750	750	750	750
600	2000	1550	1500	1500	1500	1500
900	3000	2325	2200	2200	2200	2200
1500	5025	3850	3600	3600	3600	3600
Duration (minutes)	(See note 1)		3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).
Note 2: The test pressure for the hydrostatic shell test is dependent on whether the valve is a class 1, 2 or 3. The classes are denoted by ( ).

TABLE 3

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1973 EDITION, WINTER 1973 ADDENDA UP TO AND INCLUDING ASME SECTION III 1977, SUMMER 1977 ADDENDA

TABLE 3A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1125	750	750	750	750
600	2250	1500	1500	1500	1500
900	3375	2250	2200	2200	2200
1500	5625	3750	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 3D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL[2]	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	275	300	300	300
300	1000	670	750	750	750
600	2000	1336	1500	1500	1500
900	3000	2005	2200	2200	2200
1500	5025	3345	3600	3600	3600
Duration (minutes)	(See note 1)	3	5	5	5

Note 1: According to the referenced code above the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall (see QAP for specific duration).
Note 2: Notice that the hydrostatic test pressure is no longer dependent upon the nuclear class of the valve.

TABLE 4

HYDROSTATIC TEST PRESSURES AND DURATIONS IN ACCORDANCE WITH ASME SECTION III 1977 EDITION, WINTER 1977 ADDENDA UP TO AND INCLUDING ASME SECTION III 1998, WITH THE 2000 ADDENDA AND B16.34 - 1998. R4

TABLE 4A: CARBON STEEL SA216-WCB/SA105

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	450	315	315	315	315
300	1125	825	825	825	825
600	2225	1650	1650	1650	1650
900	3350	2450	2450	2450	2450
1500	5575	4075	4075	4075	4075
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4B: LOW ALLOY CARBON STEEL SA217-WC9/SA182 F22

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	450	320	320	320	320
300	1125	825	825	825	825
600	2250	1650	1650	1650	1650
900	3375	2475	2475	2475	2475
1500	5625	4125	4125	4125	4125
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4C: STAINLESS STEEL SA351-CF8M/SA479-316

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	425	310	310	310	310
300	1100	800	800	800	800
600	2175	1600	1600	1600	1600
900	3250	2400	2400	2400	2400
1500	5400	3975	3975	3975	3975
Duration (minutes)	(See note 1)	3	5	5	5

TABLE 4D: STAINLESS STEEL SA351-CF3M/SA479-316L

STANDARD PRESSURE CLASS	SHELL	VALVE CLOSURE	SEAT LEAKAGE	BACKSEAT	PACKING
150	350	310	310	310	310
300	900	800	800	800	800
600	1800	1600	1600	1600	1600
900	2700	2400	2400	2400	2400
1500	4500	3975	3975	3975	3975
Duration (minutes)	(See note 1)	3	5	5	5

Note 1: If the applicable Code year is earlier than the Summer Addenda of 1981 then the test duration requirement is a minimum of 10 minutes or 15 minutes per inch of the design min wall. If the applicable code is the summer of 1981 Addenda or later then the test duration is a minimum of 10 minutes (see QAP for specific duration)+

FLOWSERVE

MS 7252
Revision 3

Sales Order - Line Item

EXHIBIT 1: TRACEABILITY/ HYDRO REPORT

HYDRO TEST MS/REV _____

VALVE DESC. _____

CUSTOMER _____

TEST OPERATION	GAGE NO.	CALIB.	PSI (MPa)	MIN.	ALLOWABLE LEAKAGE
Backseat					
Shell					
Seat					

VALVE SERIAL NO.	BODY	BONNET/COVER	STEM	DISK		ACTUAL LEAKAGE	TESTER NO.	DATE	CUSTOMER INSPECTOR

FLOWSERVE INSPECTOR: _____ Date

CUSTOMER INSPECTOR: _____ Date

FLOWSERVE

Raleigh, NC

Procedure No.	36-40-03-06
Effective Date	12/12/77
Revision Date	8/25/04

TITLE
METHODS FOR REPORTING TO NRC DEFECTS CREATING SUBSTANTIAL SAFETY HAZARDS

PLANT INTERNAL OPERATING PROCEDURE

PURPOSE:

To describe the method which assures compliance to the Nuclear Regulatory Commission (NRC) Rules and Regulations contained in Title 10, Code of Federal Regulations, Part 21 (10CFR21) for reporting of potential problems involving delivered valves, actuator control systems, and/or parts.

EXHIBITS:

I. Section 206 of the Energy Reorganization Act of 1974
II. Notice to Employees on "N" Stamp Orders
III. Safety Deviation Report (Form No. 36-Q-276)
IV. 10CFR21 Eval. Committee Summary Sheet (Form No. 36-Q-277)
V. Flow Chart

DEFINITIONS:

Basic Component - A plant structure, system, component, or part thereof necessary to assure 1) the integrity of the reactor coolant pressure boundary, 2) the capability to shut down the reactor and maintain a safe shut down condition, or 3) the capability to prevent or mitigate the consequences of accidents which could result in potential off-site exposures.

Deviation - A departure from the technical requirement included in a purchase order. A deviation exists when a basic component is delivered to a purchaser for use in a facility, and the basic components on the basis of evaluation, could create a substantial safety hazard.

Substantial Safety Hazard - A loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety.

GENERAL:

A. This procedure provides means for identifying, analyzing, and reporting to NRC, any newly discovered potential problems involving delivered valves, actuator control systems, and/or parts which are intended for critical applications, where the potential problems might prevent proper valve function or otherwise cause a safety hazard to the nuclear system, or to the general public. This will be accomplished by:

1. Posting informative data at Flowserve and office locations regarding the need for knowledgeable people at all levels to bring suspected problems or deviations to the attention of responsible Flowserve management personnel.

APPROVALS: GENERAL MANAGER _____ 8/25/04 DEPARMENT MANAGER _____ 8/25/04

2. Identification of responsible persons to investigate all matters relating to this procedure and 10CFR21, in order to decide for each evaluated case whether or not the matter is "reportable".

3. Documenting "reportable" cases according to the rules of 10CFR21 and promptly informing the Flowserve General Manager.

4. Informing the NRC according to 10CFR21 and informing other concerned parties, as directed by the General Manager of Flowserve - Raleigh.

5. Identifying which components are safety-related and specifying the need to comply to 10CFR21 on appropriate purchase orders and requisitions, where applicable.

6. Creating properly organized files of all pertinent documents, including the transactions of the special investigative/reporting team formed to comply to this procedure.

B. The General Manager of Flowserve - Raleigh is responsible for assigning and informing appropriate persons under his management of conformance requirements to this procedure and is responsible for their conformance thereto.

C. At Flowserve the following data will be permanently posted at sites that are customarily seen by persons involved in work on nuclear products:

1. A Notice which informs all employees that it is their duty to discuss with their supervisor any suspected defect or deficiency in items covered by this procedure and to report the subject in writing to the person named in the Notice.

2. Section 206 of the Energy Reorganization Act of 1974. (Exhibit I)

D. Copies of 10CFR21 are available in the Quality Assurance Department for review by interested individuals.

APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

PROCEDURE:

1.0 Department Responsibilities

1.1 The Manager, Inside Sales and Marketing shall:

1.1.1 Notify in writing, the Manager, Engineering and the Manager, Quality Assurance, when conformance to requirements of 10CFR21 are invoked on inquiries and customer orders.

1.1.2 Provide suitable file information for each actual order to the Manager, Quality Assurance for all pertinent matters involving 10CFR21 compliance for the reference of the 10CFR21 Evaluation Committee.

1.1.3 For all assemblies which require conformance to 10CFR21, mark each Bill of Material, or supply information when requested for incorporation into other applicable documents (e.g., Quality Assurance Plan (QAP)), to positively identify all parts that have critical function in terms of the definitions in 10CFR21 Section 21.3.

1.2 The Manager, Engineering shall:

1.2.1 For all assemblies which require conformance to 10CFR21, mark each Bill of Material, or supply information when requested for incorporation into other applicable documents (e.g., Quality Assurance Plan (QAP)), to positively identify all parts that have critical function in terms of the definitions in 10CFR21 Section 21.3.

1.2.2 Serve as member of the 10CFR21 Evaluation Committee.

1.3 Manufacturing Operations (Purchasing) personnel shall:

1.3.1 State in their purchase orders for critical components (as identified in the QAP) that conformance with 10CFR21 is required.

1.3.2 If problems of material procurement justify, Purchasing personnel will initiate action to obtain exemptions under Section 21.7 of 10CFR21.

1.4 The Manager, Quality Assurance shall:

1.4.1 Post "Notice, Employees on Nuclear Orders" (Exhibit II) identifying himself as the person to be notified in writing of any possible problem or noncompliance.

APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

1.4.2 Create record files for all transactions and documents involving conformance to 10CFR21 in compliance with Section 21.5 of 10CFR21.

1.4.3 Serve as Chairman of the 10CFR21 Evaluation Committee.

1.4.4 Report evaluation to the General Manager when required.

2.0 10CFR21 Evaluation Committee

2.1 The 10CFR21 Evaluation Committee shall consist of:

2.1.1 Manager, Quality Assurance (Chairman)

2.1.2 Manager, Engineering

2.1.3 Manager, Sales & Marketing

2.2 The 10CFR21 Evaluation Committee shall:

2.2.1 Review all Safety Deviation Reports (Exhibit III) and/or supplier requests for evaluation of a deviation.

2.2.2 Confer on every notification of a suspected error, deviation, or other nonconformance of items for which title has been transferred to the customer which might be reportable under Section 21.21 of 10CFR21.

2.2.3 Determine if the internal reported deviation and/or the supplier request for evaluation is a defect. When applicable, request customer assistance in the evaluations. This shall be through the Sales and Marketing Department.

2.2.4 Evaluate internal and supplier deviations to determine whether they constitute defects (i.e., deviation) which would create a substantial safety hazard, and are reportable to the NRC in accordance with 10CFR21.

2.2.5 Determine whether a defect has been reported under other NRC regulations (i.e., the Technical Specifications of a Reactor Operating License) and therefore is exempt from 10CFR21.

2.2.6 Determine whether the supplier, Flowserve, or the customer should report the defect to the NRC.

2.2.7 Document all conversations and all transactions of the Evaluation Committee using the 10CFR21 Evaluation Committee Summary Sheet (Exhibit IV) as the file folder summary sheet.

2.2.8 When it is the unanimous opinion of the Evaluation Committee that a case is reportable, have the Manager, Quality Assurance (the Committee Chairman) notify the General Manager of Flowserve.

2.2.9 The Chairman shall prepare a written report for transmittal to the NRC by the General Manager which shall include but need not be limited to the following information:

a) Name and address of the individual or individuals informing the Commission.

b) Identification of the basic component supplied within the United States which is believed to be deficient or defective.

c) Identification of the firm supplying the basic component which is believed to be deficient or defective.

d) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

e) The date on which the information regarding the deficiency or detect was transmitted to the General Manager.

f) In the case of a basic component suspected of being deficient or defective, the number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations of 10CFR21.

g) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

h) Any advice related to the deficiency or defect that has been, is being, or will be given to purchasers or licensees.

3.0 Notification

3.1 Evaluation of each Safety Deviation Report to determine if there is a reportable defect or failure to comply shall be completed within sixty (60) days of discovery of the deviation.

APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

3.2 If the evaluation noted in 3.1 above cannot be completed within the sixty (60) day period, an interim report shall be prepared and submitted to the NRC via the General Manager of Flowserve. The report is to identify the deviation/failure to comply being evaluated and should state when the evaluation is expected to be completed. This interim report is to be submitted to the NRC, in writing, within sixty (60) days of discovery of the deviation.

3.3 The General Manager of Flowserve shall be notified as soon as is practicable, and in all cases within five (5) working days after completion of the evaluation and determining that a defect or a failure to comply situation exists.

3.4 If a Safety Deviation Notice contains information which cannot be evaluated capably by Flowserve personnel and it is determined that it is better to refer it to the customer for evaluation, then the customer must be notified of the potential problem within five (5) working days of that determination.

3.5 Notification to the NRC by the General Manager of Flowserve (paragraph 2.2.9 above) shall be made once the determination that a defect or failure to comply exists which poses a substantial safety hazard. This initial notification shall be made either by FAX or by phone within two (2) days following receipt of this information by the General Manager. (Phone and FAX numbers are listed in 10CFR21.) Verification that Faxes have been received should be made by calling NRC.

3.6 Written notification to the NRC of defects shall be made within thirty (30) days following receipt of the information that such defects exists by the General Manager.

4.0 Records

4.1 Records of all evaluations of defects/failures to comply shall be retained for five (5) years after the evaluations have been completed.

4.2 Records of all correspondence related to the notification of purchasers of basic components of defects/failures to comply for a period of five (5) years after the notification.

4.3 Records of the purchasers of basic components shall be retained for a period of ten (10) years after delivery of the basic component(s).

APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

FLOWSERVE

Raleigh, NC

EXHIBIT I

Procedure No.	36-40-03-06
Effective Date	12/12/77
Revision Date	8/25/04

TITLE
SECTION 206 OF THE ENERGY REORGANIZATION ACT OF 1974

PLANT INTERNAL OPERATING PROCEDURE

Section 206 of the Energy Reorganization Act of 1974 as amended, reads as follows:

"NONCOMPLIANCE

Sec. 206 (a) Any individual director, or responsible officer of a firm constructing, owning, operating, or supplying the components of any facility or activity which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended, or pursuant to this Act, who obtains information reasonably indicating that such facility or activity or basic components supplied to such facility or activity —

(1) Fails to comply with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license of the Commission relating to substantial safety hazards, or

(2) Contains a defect which could create a substantial safety hazard, as defined by regulations which the Commission shall promulgate, shall immediately notify the Commission of such failure to comply, or of such defect, unless such person has actual knowledge that the Commission has been adequately informed of such defect or failure to comply. . . . . .

(b) Any person who knowingly and consciously fails to provide the notice required by subsection (a) of this section shall be subject to a civil penalty to be imposed upon the person provided by section 234 of the Atomic Energy Act of 1954, as amended. . . . . .

(c) The requirements of this section shall be prominently posted on the premises of any facility licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended.

(d) The Commission is authorized to conduct such reasonable inspection and other enforcement activities as needed to insure compliance with the provisions of this section."

TYPICAL

APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

FLOWSERVE

Raleigh, NC

EXHIBIT II

Procedure No.	36-40-03-06
Effective Date	12/12/77
Revision Date	8/25/04

TITLE
NOTICE TO EMPLOYEES ON "N" STAMP ORDERS

PLANT INTERNAL OPERATING PROCEDURE

PERMANENT NOTICE

TO EMPLOYEES ON NUCLEAR ORDERS

Flowserve must report to the Nuclear Regulatory Commission, any previously unreported defects or deficiencies in nuclear service valves or actuators, which may be potential safety hazards. This action is required by Section 206 of Pub. L, 93-438, reprinted below:

NONCOMPLIANCE

Sec. 206. (a) Any individual director, or responsible officer of a firm constructing, owning, operating, or supplying the components of any facility or activity which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended, or pursuant to this Act, who obtains information reasonably indicating that such facility or activity or basic components supplied to such facility or activity -

(1) fails to comply with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license of the Commission relating to substantial safety hazards, or

(2) contains a defect which could create a substantial safety hazard, as defined by regulations which the Commission shall promulgate.

shall immediately notify the Commission of such failure to comply, or of such defect, unless such person has actual knowledge that the Commission has been adequately informed of such defect or failure to comply.

(b) Any person who knowingly and consciously fails to provide the notice required by subsection (a) of this section shall be subject to a civil penalty in an amount equal to the amount provided by Section 234 of the Atomic Energy Act of 1954, as amended.

(c) The requirements of this section shall be prominently posted on the premises of any facility licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended.

(d) The Commission is authorized to conduct such reasonable inspections and other enforcement activities as needed to insure compliance with the provisions of this section.

If you know of any defects or deficiencies that have not been previously reported, consult your supervisor, write up your thoughts, and send or deliver them to:

R. A. BANDUKWALA, EXT. 8304

Your report will be investigated, and will be transmitted to higher authority if appropriate under the Rules and Regulations of Title 10, Code of Federal Regulations, Part 21 (10 CFR 21).

You can examine 10 CFR 21 and our written procedures for these matters by consulting:

QUALITY ASSURANCE DEPARTMENT

APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

FLOWSERVE™

Raleigh, NC

EXHIBIT III

Procedure No.	36-40-03-06
Effective Date	12/12/77
Revision Date	8/25/04

TITLE
SAFETY DEVIATION REPORT (FORM NO. 36-Q-276)

PLANT INTERNAL OPERATING PROCEDURE

FLOWSERVE

TYPICAL

SAFETY DEVIATION REPORT

TO MANAGER, QUALITY ASSURANCE:

I am reporting what I believe is a potential problem which could exist on delivered valves/actuators/parts, and could possibly cause a substantial safety hazard.

The condition exists as follows:

_____

_____

_____

_____

_____

_____

_____

_____ _____

Reporting Individual (Not Required to Sign) Date

Form 36-Q-276 (Rev. 2 – 8/25/04)

P.O. Box 1961, Raleigh, N.C. 27602 • 1900 South Saunders Street, Raleigh, N.C. 27603 • 919-832-0525

APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

FLOWSERVE

Raleigh, NC

EXHIBIT IV

Procedure No.	36-40-03-06
Effective Date	12/12/77
Revision Date	8/25/04

TITLE
10CFR21 EVA. COMMITTEE SUMMARY SHEET (FORM NO. 36-Q-277)

PLANT INTERNAL OPERATING PROCEDURE

FLOWSERVE **TYPICAL**

10 CFR 21 EVALUATION COMMITTEE SUMMARY SHEET	10 CFR 21 FILE NO.
This form is for internal use only. It will be used to summarize the main points of any investigation of internal reports for delivered nuclear facility components which may have a deviation from technical requirements that could potentially cause a nuclear safety hazard.	
COMPONENT DESCRIPTION	
DELIVERED TO: (Customer, P. O., Date)	SALES ORDER DATA
DESCRIPTION OF DEVIATION	
CORRECTIVE ACTION (Action taken/ planned to correct deviation)	CUSTOMER NOTIFIED? ☐ Yes ☐ No (If yes, give notification date/method.)

EVALUATION	COMMITTEE CONCURRENCE WITH EVALUATION			
	Member Signature	Date	Agree	Disagree
Could this deviation cause a substantial safety hazard as defined in 10 CFR 21? ☐ Yes ☐ No ☐ Requires Customer Evaluation	Manager, QA			
Is this deviation reportable by Edward Valves, Inc. to NRC under 10 CFR 21? ☐ Yes ☐ No	Manager, PE			
	Manager, Sales & Marketing			

Form 36-Q-277 (7/90)

APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

FLOWSERVE

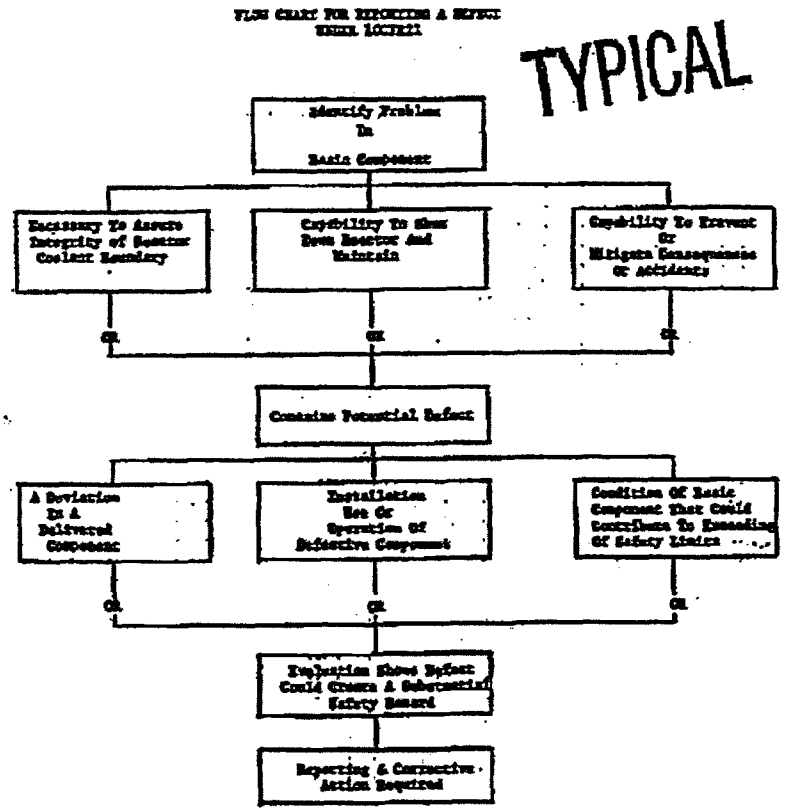
Raleigh, NC

EXHIBIT V

Procedure No.	36-40-03-06
Effective Date	12/12/77
Revision Date	8/25/04

TITLE
FLOW CHART

PLANT INTERNAL OPERATING PROCEDURE



APPROVALS: GENERAL MANAGER_____ DEPARMENT MANAGER _____

FLOWSERVE CORP. Williamsport, Pennsylvania	STANDARD PROCEDURE INSTRUCTION	SPI No. OPER-1
		Page 1 of 6

Designation	Prepared By – Date	Distribution Key	Revision
Operations	JRS 5/70	See Below	T
Subject	**Approved By –Date**	**Review Date**	**Effective Date**
Notification and Resolution of Abnormal Occurrences Report	WAB 5/78	7/2004	7/2002

1.0 OBJECTIVE

The objective of this instruction is to provide for the timely notification, evaluation and resolution of all abnormal occurrences relating to Flowserve Corporation - Williamsport facility.

2.0 SCOPE

This instruction covers all abnormal occurrences pertaining to Flowserve Corporation - Williamsport facility equipment, (hardware and software) constructed for the nuclear industry which has been delivered to the plant site.

3.0 POLICY AUTHORIZATION, IMPLEMENTATION AND MAINTENANCE

Policy authorization originates with the General Manager of Flowserve Corporation - Williamsport facility.

Revisions

Reviewed – No Change 5/75 WAB
Reviewed Para. 6.5: Added 6.6 1/76 WAB
Reviewed – No Change 6/77 WAB
A. General Revision in consideration of 10CFR21 1/78 WGK
B. General Revision, All Pages 5/78 JRS
C. Revised All Pages 12/78 WGK
D. Revised Paras. 5.4, 5.5, 5.6, 6.2, 6.3, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13.1, 6.13.3 9/79 WGK
Reviewed – No Change 8/80 WGK
E. Revised Paras. 4.0, 6.1, 6.3, 6.7; Added Form OPER-1-2 2/81 WGK
Reviewed - No Change 2/82 JRS
F. Revised Para. 4.0 and 6.14 8/82 WGK
Reviewed – No Change 2/83 WGK
G. Revised Paras. 5.6, 6.3, 6.5 12/84 WGK
H. Revised Para. 6.12: Corrected Titles 12/85 WGK
J. Revised Para. 6.3 – Sales Mgr. 1/87 WGK
K. Revised Paras. 5.1 thru 5.5, 6.1, 6.1, 6.13; Deleted 5.6, 6.2, 6.5, 6.9 thru 6.12 10/90 WGK
Reviewed – No Change 10/93 WGK
L. Revised Paras. 6.2, 6.6.1, Form OPER-1 12/95 WGK
M. Revised Form heading; Paras. 1.0, 2.0, 3.0, 5.2, 6.1, 6.2 6.5, 6.7.1, 6.7.2, Forms OPER-1-1 and OPER-1-2
N. Revised Paras. 5.1, 6.6 and OPER-1-1 4/97 WGK
P. Revised Title to General Manager, Updated titles, Paras. 6.5, 6.6, 6.6.1, and 6.8 9/98 WGK
R. Revised Form heading to Flowserve 10/2000 GWK
S. Revised 6.2; Renumbered and revised 6.8 to 6.9; Added new 6.8 7/2001 GWK
T. Revised Paras. 6.1 and 6.5 7/2004 GWK

DISTRIBUTION

Human Resources
Paragraph 6.2

4.0 MAJOR FORMS

All abnormal occurrences shall be written up and reported on Form OPER-1 attached.

All abnormal occurrences shall be evaluated and documented on Form OPER-1-2.

Section 206 of the Energy Reorganization Act of 1974.

5.0 RESPONSIBILITY

5.1 The General Manager is responsible for assuring that all facility personnel provide whatever assistance is necessary to resolve the problem.

5.2 The Contract Administration Manager is responsible for providing assistance in determining the extent of Flowserve Corporation - Williamsport facilitys contractual obligations and for reporting any potential substantial safety hazard that comes to his attention.

5.3 The Quality Assurance Manager is responsible for providing any inspection or materials documentation pertaining to the problem and for reporting any potential substantial safety hazard that comes to his attention.

5.4 The Field Service Engineers are responsible for gathering all the necessary information to assist in reporting and evaluating potential substantial safety hazards reported to or discovered by them.

5.5 The Technical Director and Engineering Manager are responsible for evaluating the problem and formulating a recommended solution. They are also responsible for reporting any potential substantial safety hazard that may come to their attention. The Technical Director is also responsible for evaluating or causing to be evaluated each and every abnormal occurrence to determine if it could create a "substantial safety hazard". In addition, if it is determined that the abnormal occurrence could create a "substantial safety hazard", the Technical Director is responsible for preparing a formal notification to the NRC.

6.0 PROCEDURE

6.1 Information pertaining to an abnormal occurrence shall be documented on Form OPER-1.

It is recognized that when the initial indication of a possible abnormal occurrence is received from a utility, specific data, facts and information may be difficult to obtain. However, without this information it may not be possible to determine that a deviation, defect or failure to comply actually exists. The notified person must use judgement on when information is adequate to issue a useful OPER-1-1. It should be issued as soon as possible but always within sixty (60) days of initial notification by the customer.

In addition to a report of trouble from the plant site, the utility, the AE or the NSS supplier, an abnormal occurrence may be identified as a result of information generated within Flowserve Corporation. Any employee possessing such information shall immediately transmit it to the Quality Assurance Manager (See CGS-5) or prepare a Form OPER-1.

6.2 Copies of completed Form OPER-1 shall be distributed as soon as possible to the following personnel:

General Manager
Director Sales and Marketing
Technical Manager
Controller
Manufacturing Manager
Field Service Manager
Engineering Manager
Purchasing Manager
Contracts Manager
Quality Assurance Manager
Regional Managers

6.3 Forms OPER-1 are to be numbered as follows:

EXAMPLE: W - 78 - 1
(1) (2) (3)

1. The facility producing the valve (W - Williamsport).

2. The last two digits of the year in which the report was received.

3. A number controlled and assigned to each report starting with 1 and continuing sequentially for the remainder of the year. A new sequence starting with 1 shall be initiated in each succeeding year.

6.0 **PROCEDURE** (Continued)

6.4 In addition to the specific information needed to complete Form OPER-1 the person notified should attempt to obtain as much supplementary information as possible - such as actual operating pressure, temperature, flow, valve orientation, system in which valve is installed, purpose of the valve in the system, frequency of past operation, number of times valve has been disassembled, etc.

6.5 Upon notification of the existence of an abnormal occurrence, the Technical Director shall initiate an investigation to determine if the occurrence could create a "substantial safety hazard." All employees are directed to provide the Technical Director with whatever assistance he requests in his investigation and to regard such requests as top priority.

If the evaluation concludes that a substantial safety hazard exists, the Technical Manager must notify the NRC of the problem and identify what products may be impacted and where they may be installed.

This notification shall be completed within sixty (60) days of determination that a substantial safety hazard exists. If the investigation cannot be completed within sixty (60) days the Technical Director shall prepare an interim report describing the abnormal occurrence that may be a substantial safety hazard and submit it to the NRC. This interim report shall identify when the evaluation is expected to be completed.

If the determination is positive, the Technical Director shall notify the General Manager or another responsible officer of Flowserve Corporation - Williamsport facility. and prepare the NRC notification.

Each abnormal occurrence report shall be evaluated and documented on Form OPER-1-2. For each AOR that requires NRC notification the evaluation report will be distributed per paragraph 6.2. Also, for those cases in which Flowserve Corporation - Williamsport facility cannot determine the safety implications the customer will be notified and advised that we have not reported under 10CFR21. This action will be noted on OPER-1-2 and distribution will be per paragraph 6.2.

The OPER-1-2 forms shall be attached to the OPER-1 forms and maintained by Tech Staff.

6.6 The Technical Director, upon determination that an abnormal occurrence may create a "substantial safety hazard" shall prepare a formal notification, obtain the concurrence of the General Manager and submit it to the Nuclear Regulatory Commission within two (2) days by FAX or telephone. Written notification shall follow within thirty (30) days.

6.6.1 The notification to the Document Control Desk, USNRC shall include, but not be limited to, the following information:

6.6.1.1 Name and address of the individual or individuals informing the Commission.

6.0 **PROCEDURE** (Continued)

6.6.1.2 Identification of the facility, the activity, or the basic component supplied for such facility or such activity within the United States which fails to comply or contains a defect.

6.6.1.3 Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.

6.6.1.4 Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

6.6.1.5 The date on which the information of such defect or failure to comply was obtained.

6.6.1.6 In the case of a basic component which contains a defect or fails to comply, the number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations in this part.

6.6.1.7 The corrective action which has been, is being or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

6.6.1.8 Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

6.7 The following guidelines shall be adhered to in any discussions concerning a field problem:

6.7.1 Only those personnel as directed by the General Manager, shall convey the Company position to personnel outside Flowserve Corporation - Williamsport facility.

6.7.2 No hypothesis shall be presented to anyone outside Flowserve Corporation - Williamsport facility until a position has been established by Flowserve Corporation - Williamsport facility management.

6.7.3 No commitment shall be made concerning field service personnel, parts, or liability, without the concurrence of the General Manager.

6.7.4 Personnel are specifically cautioned against making statements that can be construed to indicate knowledge of similar problems at other sites.

6.0 **PROCEDURE** (Continued)

6.8 Records shall be prepared and maintained as described below.

6.8.1 Reports of abnormal occurrences, from OPER-1-1, reports of evaluations, form OPER-1-2 and all supporting records and documentation shall be maintained for five (5) years after the date of OPER-1-2.

6.8.2 Copies of correspondence to purchasers of the affected basic component shall be maintained for five (5) years after the date of OPER-1-2.

6.8.3 Records of purchases of basic components shall be maintained for ten (10) years after delivery.

6.8.4 The Technical Manager is responsible for maintenance of the records described in 6.8.1 and 6.8.2. The Contracts Manager is responsible for maintenance of records described in 6.8.3 (ref. SS-7).

6.9 Copies of this instruction, along with Section 206 of the Energy Reorganization Act of 1974 and 10CFR Part 21 shall be posted in a conspicuous position in the facilities.

ABW-01-

NUMBER

DATE

NOTIFICATION AND RESOLUTION OF ABNORMAL OCCURRENCES

NAME (CALLER)	POSITION	
COMPANY	TELEPHONE NUMBER & AREA CODE	
PLANT SITE WHERE INSTALLED		
UTILITY		
VALVE TYPE	SIZE»	RATING
ORIGINAL PURCHASER		
ORIGINAL ORDER NUMBER AND DATE		
ORDER NUMBER	VALVE SERIAL NUMBER	

VALVE SERVICE

DELIVERED	INSTALLED
PLANT CRITICAL FIRST TIME	PLANT COMMERCIAL OPERATION

ABNORMAL OCCURRENCE

COMMENTS

BY SIGNATURE -

Form OPER-1-1, Rev. N

ABNORMAL OCCURRENCE REPORT DISPOSITION

AOR NUMBER

DATE

Evaluation of AOR

Disposition By: _____

Action to be taken:

NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE

ENERGY REORGANIZATION ACT OF 1974

SECTION 206 – Noncompliance

SEC. 206 (a) ANY INDIVIDUAL DIRECTOR OR RESPONSIBLE OFFICER OF A FIRM CONSTRUCTING, OWNING OPERATING, OR SUPPLYING THE COMPONENTS OF ANY FACILITY OR ACTIVITY WHICH IS LICENSED OR OTHERWISE REGULATED PURSUANT TO THE ATOMIC ENERGY ACT OF 1954 AS AMENDED, OR PURSUANT TO THIS ACT WHO OBTAINS INFORMATION REASONABLY INDICATING THAT SUCH FACILITY OR ACTIVITY OR BASIC COMPONENTS SUPPLIED TO SUCH FACILITY OR ACTIVITY.

(1) FAILS TO COMPLY WITH THE ATOMIC ENERGY ACT OF 1954, AS AMENDED, OR ANY APPLICABLE RULE, REGULATION, ORDER OR LICENSE OF THE COMMISSION RELATING TO SUBSTANTIAL SAFETY HAZARDS OR

(2) CONTAINS A DEFECT WHICH WOULD CREATE A SUBSTANTIAL SAFETY HAZARD, AS DEFINED BY REBULATIONS WHICH THE COMMISSION SHALL PROMULGATE, SHALL IMMEDIATELY NOTIFY THE COMMISSION OF SUCH FAILURE TO COMPLY, OR OF SUCH DEFECT, UNLESS SUCH PERSON HAS ACTUAL KNOWLEDGE THAT THE COMMISSION HAS BEEN ADEQUATELY INFORMED OF SUCH DEFECT OR FAILURE TO COMPLY.

(b) ANY PERSON WHO KNOWINGLY AND CONSCIOUSLY FAILS TO PROVIDE THE NOTICE REQUIRED BY SUBSECTION (a) OF THIS SECTION SHALL BE SUBJECT TO A CIVIL PENALTY IN AN AMOUNT EQUAL TO THE AMOUNT PROVIDED BY SECTION 234 OF THE ATOMIC ENERGY ACT OF 1954, AS AMENDED.

(c) THE REQUIREMENTS OF THIS SECTION SHALL BE PROMINENTLY POSTED ON THE PREMISES OF ANY FACILITY LICENSED OR OTHERWISE REGULATED PURSUANT TO THE ATOMIC ENERGY ACT OF 1954, AS AMENDED.

(d) THE COMMISSION IS AUTHORIZED TO CONDUCT SUCH REASONABLE INSPECTIONS AND OTHER ENFORCEMENT ACTIVITIES AS NEEDED TO INSURE COMPLIANCE WITH THE PROVISIONS OF THIS SECTION.

NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE

Revised August 1983

FLOWSERVE
Flow Control Division

	Procedure No. 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Design Control	

PLANT INTERNAL OPERATING PROCUDURE

PURPOSE:

The purpose of this procedure is to provide a set of guidelines for conducting design activities in a planned, controlled and orderly manner. It describes the processing of various types of orders through the Engineering Department and the various design control measures required to ensure complete and adequate designs. This procedure addresses both high specification and commercial type design activities.

REFERENCES:

1. ANSI N45.2 Quality Assurance Program Requirements for Nuclear Power Plants.
2. Appendix B to 10CFR50 Quality Assurance Criteria for Nuclear Power Plants.
3. AEC Regulatory Standard Review Plan Section 17.1
4. Quality Assurance Manual, Flowserve Corp. - Flow Control Division
5. ISO 9001, Quality Systems, Model for quality assurance in design development, production, installation and servicing.

EXHIBITS:

EXHIBIT	TITLE	Reference Paragraphs
I	Sales Order Control (SOC) Sheet (Form 36-N-13)	2.2
II	SOFTRAK	5.6, 5.7
III	Sales Drafting Work Order	5.1
IV	Detail Drafting Work Order	5.2
V	Nuclear Design Interface Control Checklist	6.3, 6.17
VI	Nuclear Design Control Checklist for (N) valve orders	6.2
VII	Nuclear Design Control Checklist for (NPT) parts orders	6.2
VIII	Nuclear Design Verification Checklist	6.3, 7.3
IX	Quality Assurance Plan (QAP)	4.5.1
X	Bill of Materials (B/M)	5.2
XI	Design Review Board Meeting Report	7.7.2
XII	Design Report Review Confirmation Form	6.8.2, 6.11
XIII	Engineering QAP Input Form for N Valve Orders (Form 36-E-92)	4.5.2
XIV	Engineering QAP Input Form for NPT Parts Orders (Form 36-E-89)	4.5.2
XV	NQA-1 Design Verification Checklist	6.3, 7.5

Rev. 23

APPROVALS:

General Manager

Manager, Engineering

EXHIBIT	TITLE	Reference Paragraphs
XVI	Certification of Design For NPT Orders (Form 36-E-93)	6.2, 6.6
XVII	Professional Engineer Certification Sheet (Form 36-E-94)	6.8.1
XVIII	Review of Nuclear Design Specification and Order Requirements	6.5, 7.2.1
XIX	Design Report Reconciliation Form	6.9.4, 10.3.2
XX	Part Number/Material Change Advisement Form	4.9.1
XXI	Sales Order Routing Sequence	2.3
XXII	Design Plan Checklist for Sales Orders	3.1.1
XXIII	Design Plan Checklist for Development Projects	3.1.1
XXIV	Typical Report Documentation	6.10

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ABBREVIATIONS AND DEFINITIONS:

AE	Application Engineer
ANI	Authorized Nuclear Inspector
ASME	American Society of Mechanical Engineers
B/M	Bill of Materials
CAD	Computer Aided Drafting/Design
CODE	ASME Boiler and Pressure Vessel Code
DRB	Design Review Board
ECN	Engineering Change Notice
(N)	Valve sales order traceability code indicating requirement for Code compliance and N stamp.
N Stamp	The ASME Code Stamp for valves made to Section III requirements.
NDE	Non Destructive Examination
(NPT) Parts	sales order traceability code indicating requirement for Code compliance and NPT stamp.
NPT Stamp	The ASME Code Stamp for parts made to Section III requirements.
PIOP	Plant Internal Operating Procedure
PNCA	Part Number/Material Change Advisement Form.
P.O.	Purchase Order
PP Stamp	The ASME Code Stamp for valve and/or pipe weldments made to Section I requirements.
QA	Quality Assurance
QAP	Quality Assurance Plan
(S)	Sales order traceability code indicating a standard order with no special requirements and not requiring a QAP
S.O.	Sales Order
SOC	Sales Order Control
SOFTRAK	A computerized system for tracking S.O. software action items
SOI	Standard Operating Instruction
(T)	Sales order traceability code indicating a requirement for traceability at the part purchasing and/or processing level.

T4	A valve figure number suffix indicating that the valve conforms to all requirements of the Code except for application of the N Stamp.
T5	A valve figure number suffix indicating that the valve is Nuclear Safety Related and 10CFR21 is invoked, but ASME Section III construction is not required.
U Stamp	The ASME Code Stamp for actuators made to Section VIII requirements
(X)	Sales order traceability code indicating a special requirement affecting assembly, test and/or shipping
(X1)	Sales order traceability code used only for Cast Steel valves indicating special requirement for tagging, certifications, customer inspection, etc. for which a QAP is not required.

1.0 RESPONSIBILITIES

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1.1 The responsibility for the design of the product, including the selection of materials, the implementation of design control measures, and the development of the bill of materials lies with the Manager, Engineering.

1.2 Individuals specified herein are delegated the authority to review and approve design documents as designees of the Manager, Engineering.

1.3 Engineering shall be responsible for orders and inquiries as follows:

1. Valve sizes - pressure classes for which basic design layouts and calculations have not been prepared
2. New product lines requiring research, development and/or design work
3. Most cost reduction and product improvement projects.
4. P-P stamp valves
5. Main Steam and Feedwater Isolation valves for nuclear service
6. Motor operated valves (MOVs) for critical nuclear services
7. Elbow Down Valves
8. A-Actuator designs
9. Failure Analysis (weak-link) customer reports
10. Class 4500 cast steel valves

1.4 In addition, sales orders requiring eight hours or more of shop drafting should normally be sent to Engineering. Orders should not be split, unless necessary, between Engineering and Marketing to avoid inefficiencies and miscommunications.

1.5 Marketing shall be responsible for inquiries and orders not identified in 1.3 and 1.4. Appropriate approvals of layouts, ECN's and other design control procedures as described here-in must be maintained.

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1.6 The assigned Engineer or AE has the technical responsibility for the life of a sales order. This includes monitoring all engineering requirements, hardware and software that are required to accomplish timely shipment. It is his/her responsibility to identify problems and provide timely and appropriate resolutions.

2.0 SALES ORDER ROUTING

2.1 Upon receipt of a customer order, Marketing shall classify the order by type within one of the following categories: Nuclear (N or NPT), Traceable (T), Traceable (X), Traceable (XI), or Standard (S). A detailed description of order classification is described in Plant Internal Operating Procedure (PIOP) 36-40-13.

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2.2 Marketing shall forward all orders that require Engineering review per paragraph 1.3 and 1.4 to Engineering via the Sales Order Control Sheet (SOC). For orders outside the scope of 1.3 and 1.4, the SOC shall be forwarded to the responsible AE for processing. The SOC shall consist of the Sales Order Control Sheet (Exhibit I), and any other information needed, such as customer specifications, quotes, correspondence, etc. The SOC shall request the type of work required such as Bills of Material (B/M), Sales Drawings, Technical review, etc. A duplicate SOC will be forwarded to the QA Planner for review as applicable.

2.3 Engineering SOC's will be forwarded to Engineering for processing. For new orders the Engineering Supervisor shall establish an engineering file folder by sales order number and color code as described in SOI 70-12. A routing (Exhibit XXI) shall be shown on the front of the folder designating the Engineering assignments and sequencing for the order.

2.4 Orders and related SOC's for standard category (S) valves or parts not requiring design planning per paragraph 3.0 can be processed by the Engineering Supervisor.

2.5 SOC's for existing traceable (X), (T), (N) and (NPT) orders will be forwarded to the assigned Engineer or AE for appropriate disposition.

3.0 DESIGN PLANNING

3.1 As defined in 3.1.1 or 3.1.2, orders regardless of category or engineering projects requiring a major design effort shall have a design plan prepared by the Manager, Engineering or his designee. Nuclear orders also require the appropriate nuclear checklists. A design plan is required for:

3.1.1 New products that are to be developed and introduced into production (Exhibit XXIII).

3.1.2 Sales orders involving significant engineering content such as design modifications, stress analyses or project specific requirements (Exhibit XXII).

Standard application engineering activities, e.g., material changes, product modifications or accessories required to meet minor requirements for an order are exempt from design plans. Sales orders for parts are normally exempt from design planning.

3.2 The plan shall be prepared at the beginning of the project and shall identify those segments required to successfully complete the project.

3.3 The design plan is documented on one of two design plan checklists.

3.3.1 Design Plan Checklist for Sales Orders (Exhibit XXII)

3.3.2 Design Plan Checklist for Development Projects (Exhibit XXIII).

3.4 The personnel to be assigned to the project shall be named along with their assignments. All personnel must be technically qualified and have adequate resources to perform their task(s).

3.5 Design plans shall be kept current and updated as necessary as the design evolves, or as project requirements change.

3.6 Project schedules shall be developed for major design projects and development projects which identify each major task, the individual assigned the task, and with important milestones noted. Schedules will be updated monthly.

3.7 The plan shall include all design control activities required to implement the project, as identified in the relevant sections of this PIOP. Examples for sales orders include customer specification review, design input development, design report preparation, layout and sales drawing development and design verification. Each Plan will be tailored to the project requirements and may or may not include all the items in this example.

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3.8 In the initial stages of a project that involves new product development, a product specification objective (PSO) shall be prepared that defines the goals to be achieved. The PSO will be prepared by Engineering and requires relevant input from Marketing, Operations and Quality Assurance to assure that new designs satisfy all corporate objectives.

3.9 New product development projects shall have a product specification design (PSD) prepared that contains the basic design rules for the product line. The PSD will be developed following successful completion of the concept/prototype evaluation phases and serve as a guide for the creation of design layouts and detail drawings.

4.0 PROCESSING OF ORDERS

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4.1 The assigned Engineer or AE shall be responsible for thoroughly reviewing the customer's order and specifications in a timely manner to ensure all applicable design inputs are identified and documented. The selected inputs shall be approved and controlled by the Manager, Engineering or his designee. Any changes to the approved design inputs, including the reason for the changes, shall be processed in the same manner as the initial review. The Engineer or AE shall determine the need for calculations, reports, pre-drafting review, etc. They shall also ensure that all design inputs have been correctly translated into the applicable design documents.

4.1.1 In addition to the requirements of this section, all Nuclear (N & NPT) orders and traceable (T) orders with "U" stamp actuators, "PP" stamp welds, T4 or T5 suffix valves must also be subjected to the requirements of Section 6.0.

4.2 If an order requires a new design or modification to an existing design, a design layout may be required. Design layouts shall be completed by or under the supervision of a responsible designee competent in the design requirements of all applicable codes and standards. He/she shall have available and use of all applicable documented information such as the PS/D, SDP and Engineering Standards Manual, and shall apply sound engineering design practices.

4.2.1 A set of engineering design calculations shall be developed in support of the design layout when required by applicable codes and/or deemed necessary by the assigned designee. Such calculations shall analytically justify the particular design. Calculations of all pressure containing components shall be done to show the design is safe.

4.3 Layouts for orders of the types listed in paragraph 4.1.1 shall be subjected to a formal design review per the requirements of section 7.0 of this procedure. An informal design review may be called at the discretion of the Manager, Engineering or his designee for the review and approval of layouts for orders other than those covered in paragraph 4.1.1. Informal design review meetings shall consist of individuals deemed appropriate by the responsible party. Meeting reports shall not be required for informal design reviews.

4.4 A pre-drafting design review shall be held if deemed necessary to communicate the full intent of the design to the Drafting or B/M groups. It is also for the purpose of obtaining Drafting and B/M group input into the design. The meeting will consist of the responsible designee assigned to the order, the Engineering Supervisor, a B/M representative, an Operations representative, and the Product Drafter, if assigned. Formal meeting reports shall not be required.

4.5 Traceable Orders

4.5.1 While Traceable orders are being reviewed by the Engineer or AE, a similar process is taking place concurrently by the QA Planner for the development of the Quality Assurance Plan (QAP) (Exhibit IX), as described in PIOP 36-40-07.

4.5.2 The assigned Engineer or AE must review the order for the required engineering information to be incorporated into the QAP and submit this information to the QA Planner. Engineering input for (N) valve orders shall be on the QAP input form shown in Exhibit XIII. Input for (NPT) parts orders shall be on the QAP input form shown in Exhibit XIV. Input for other traceable orders may be on other forms as appropriate.

4.6 A copy of the QAP input, any special B/M and Drafting instructions or other pertinent information shall be inserted into the order folder. The folder shall then be forwarded to the next station indicated on its routing.

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4.7 Upon completion of the QAP, it must be approved by the Manager, QA or his designee and by the Manager, Engineering or his designee. In the case of orders processed in Marketing, the AE must approve the QAP after it is approved by QA. When possible, the QAP should be reviewed and approved by the Engineer or AE who made the original QAP input.

4.8 If the order includes an actuator purchased from an outside agency, an Actuator Specification Sheet shall be prepared by the Engineering or AE group. The Specification Sheet shall be checked and approved by a qualified individual other than the preparer. Actuator Specification Sheets shall be issued and controlled in accordance with PIOP 36-70-06. The responsible Engineer or AE shall be notified if there are any changes in the specified actuator that would impact drafting work and B/M's.

4.9 An effective interface with the customer is essential in order to convey and receive meaningful information. The primary means of communication concerning the valve design is the sales drawings. These drawings are prepared for an individual customer to convey interface information, such as weight, outline dimensions, flow characteristics, quantities of parts, types of material, NDE, pressure ratings, electrical connections, etc.

4.9.1 If parts supplied for a parts order differ from the customer P.O. in either part number or material, a Part Number/Material Change Advisement form (Exhibit XX) or equivalent will be completed by the assigned Engineer or AE. This information shall be submitted by Marketing to the customer.

4.9.2 Other documents such as design calculations, Design Reports, seismic calculations, test procedures, and method specifications are also submitted when required by the customer order or specification.

4.10 Customer approvals of documents shall be maintained in the Order Files. Obtaining the customer approvals shall be the responsibility of the Sales & Marketing Group.

5.0 BILLS OF MATERIAL AND DRAWINGS

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5.1 Upon receipt of the SOC folder, the Engineering Supervisor, AE or designee shall schedule B/M's and drawings. They shall also prepare, as applicable, the Sales Drafting work orders (Exhibit III).

5.2 For orders sent to Engineering, the assigned B/M writer shall begin to generate a Bill of Materials (Exhibit X), and shall prepare detail drawing work orders (Exhibit IV) as necessary. A description of the B/M development and issue process is contained in PIOP 36-70-10.

5.2.1 In cases of new designs, the B/M is dependent on the release of the design layout which is the basic drawing from which all of the product detail drawings and the B/M are derived. For orders where delivery requirements do not allow completion of all layouts and drawings before placing long lead time raw materials on order, a partial B/M may be issued. In this case, the Engineer shall work closely with the Engineering Supervisor to ensure that the proper requirements are specified by the partial B/M.

5.2.2 B/M's for traceable orders will not normally be issued in partial or final form until the QAP has been issued. For short lead time orders a partial B/M can be generated based on the Engineering QAP input prior to QAP issue. In such cases care must be exercised to assure that the final B/M is complete and per the QAP.

5.3 Standard and X traceable B/M's shall be reviewed and approved by an individual other than who originally prepared the B/M. Bills written in Marketing shall also be approved by either the Engineering Supervisor or the Product Design Manager.

5.4 B/M's for traceable (T), (N), and (NPT) orders and B/M's for new designs or extensive modification to existing designs shall be approved by the Manager, Engineering or his designee and the QA Planner who developed the QAP. The B/M shall be initialed and dated by each individual prior to issue.

5.5 Once the design layout has been approved (see para. 7.8), the product detail and assembly drawings are generated. The product detail drawings are the basic production shop drawings required to manufacture the various valve parts.

5.5.1 Upon receipt of a Product Detail Work Order, the Engineering Supervisor assigns the task to a Drafter. Upon completion of the detail drawings, they are checked, approved and issued.

5.6 Upon completion of the B/M, either in final or partial form, the B/M Editor shall input the information into SOFTRAK (Exhibit II).

5.7 Upon completion of the assembly drawings and/or weld end details, a transmittal form shall be prepared for the drawings. The submittal packages shall then be submitted to the customer and a submittal entry made in SOFTRAK (Exhibit II).

5.8 New drawings having the appropriate approval signatures shall be issued by the Engineering print room in accordance with PIOP 36-70-06. All drawings shall be stored and controlled by the print room personnel. Procurement of drawings is described in SOI 70-15.

6.0 SPECIAL PROCESSING REQUIREMENTS FOR NUCLEAR AND HIGH SPEC TRACEABLE ORDERS

6.1 The requirements of this section must be applied as appropriate to all Nuclear (N & NPT), and all traceable (T) orders for "U" stamp actuators, "PP" stamp welds, and T4 or T5 suffix valves. It does not apply to other (T) orders.

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6.2 Except for the provisions contained in 6.3, 6.5 and 6.6, the Manager, Engineering or responsible designee shall establish a nuclear design control checklist for each sales order line item for (N) valves (Exhibit VI). For NPT parts orders a design control checklist (Exhibit VII) shall be generated for valves larger than size 4 unless the following is applicable:

6.2.1 The part is a direct replacement

6.2.2 The only change is the Code Edition/Addenda or a material change that requires no modification of the design.

If the criteria listed in 6.2.1 or 6.2.2 applies, a Certification of Design for NPT Orders (Exhibit XVI) shall be completed and attached to the order folder.

6.3 A design control checklist (Exhibits V through VIII and XV) shall be established, as required, for (N) or (NPT) line items for valves size 4 and smaller if one or more of the following conditions exist:

a) A new valve design layout is required.

b) New design calculations are required.

c) NQA-1 is invoked and the valve design has not been verified.

d) Interface between outside consulting services is required.

If none of the above applies refer to paragraphs 6.5 and 6.6.

6.4 The nuclear design control checklist shall be completed by the individuals denoted. The appropriate individual shall circle "Y" for (yes, completed), "N/A" for not applicable, and "A" for action required. When items are checked "A" requiring an action to be completed, the "Y" for yes shall also be circled at the completion of all work required to satisfy the requirement. At the end of the order, the checklist for each valve/part line item shall be reviewed and all items must have a "Y" or "N/A" circled. The checklist shall be attached to the engineering file folder inside cover by metal tabs or staples.

6.5 Valve orders size 4 and smaller which do not require a checklist per paragraph 6.3 shall have a Nuclear Design Specification Review Sheet (Exhibit XVIII) completed and attached to the order folder.

6.6 Parts orders for size 4 and smaller valves that are outside the scope of paragraph 6.3 shall have a Certification of Design for NPT Orders (Exhibit XVI) completed and attached to the order folder.

6.7 Code Design Reports

6.7.1 Design reports must be prepared in accordance with the Code of reference specified in the customer's P.O. or Certified Design Specification. Design reports shall be prepared when specified in the customer P.O. or as follows.

6.7.2 For Code of Reference prior to Summer 1978 Addenda:

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a) All Class 1 valves require design reports.

b) Certification (PE Seal) per paragraph 6.8 for design reports is required, and submittal to the customer per paragraph 6.8.2.

6.7.3 For Code of Reference Summer 1978 Addenda upto but not including the Winter 1982 Addenda:

a) All Class 1, 2 and 3 valves require design reports.

b) Certification (PE Seal), per paragraph 6.8, is required for Class 1 reports and Class 2 and 3 reports when designed to service loadings greater than design loadings.

c) Customer submittal and review per paragraphs 6.8 and 6.11 is required prior to stamping for all Class 1 reports, and Class 2 and 3 when designed to service loadings greater than design loadings.

6.7.4 For Code of Reference Summer 1982 Addenda upto the present:

a) All Class 1, 2 and 3 valves require design reports.

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b) Certification (PE Seal) and Customer submittal, per paragraph 6.8, is required for Class 1 reports and Class 2 and 3 reports when designed to service loadings greater than design loadings.

c) Customer submittal and review per paragraph 6.11 is required for all reports prior to stamping.

6.8 Certified Design Reports shall be prepared as follows:

6.8.1 When a Certified Design Report is required, the report shall be prepared under the direction of a Registered Professional Engineer other than the one who certified the Design Specification. Upon completion, it shall be checked by a qualified individual under the direction of the Registered Professional Engineer. The Registered Professional Engineer shall seal and certify the certification sheet (Exhibit XVII) upon satisfactory review and approval. The Registered Professional Engineer shall be qualified to certify Design Reports in accordance with SOI 70-23.

6.8.2 Certified Design Reports shall be submitted to the customer, along with a Design Report Review Certification Form (Exhibit XII). The customer shall review the report for compliance with the applicable Design Specification per the Code. After review, the customer is to complete the certification form, or a substitute form of his, which is then returned to Flowserve and filed with the original Certified Design Report. It must be made available to the ANI prior to stamping the valve.

6.9 Design Reports must meet the requirements listed below:

6.9.1 Be reviewed by someone other than the originator, and signed by the originator, the reviewer, and the approver.

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6.9.2 Must reference the applicable Bill of Material number including the issue date and, except as permitted in paragraph 6.9.6, the applicable Sales/Assembly Drawing number including the revision level that were used in the preparation of the report.

6.9.3 Must reference the applicable layout number and revision level that was used in the preparation of the report.

6.9.4 If required by 10.3, a Design Report Reconciliation Form (Exhibit XIX) shall be attached to the inside back cover of the file copy

6.9.5 Must have all pages numbered consecutively.

6.9.6 If the design report does not reference the Sales/Assembly Drawing number and revision level, the Sales/Assembly Drawing must reference the Design Report number and revision level.

6.9.7 When Design Report results are based on computer calculations for which verification reports are required per SOI 70-38, the Design Report shall identify the computer (make, model and serial number) used to perform the calculations. The calculations shall have been performed by the same computer used to perform the verification problems. Reference to the verification document shall be provided in the Report, along with the bases (or reference thereto) supporting application of the computer program to the specific physical problem, per SOI 70-38.

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6.9.8 Regardless of the Code of Reference, if the requirements of paragraph 6.10 are met, the issue date of the Bill of Material and the Sales/Assembly Drawing revision level are not required. If the Design Report number is referenced on the Sales/Assembly Drawing (paragraph 6.9.6), the Design Report revision level is not required.

6.10 Design Reports where the code of reference is Summer 1978 and later, in addition to 6.9, require the following: (Typical example is shown in Exhibit XXIV.)

6.10.1 Include an objective of the report.

6.10.2 Identify the design inputs including but not limited to the design specification number and revision, the design conditions, and code and addenda of reference.

6.10.3 Identify the design source)s) e.g., the customer purchase order number.

6.10.4 Include the results of any literature searches or other background information.

6.10.5 List all assumptions, if any, and indicate any that must be verified as the design proceeds.

6.10.6 List the machining drawing numbers and revisions of all pressure retaining components used during fabrication as well as their RMC numbers and ASME/ASTM specification numbers.

6.11 When customer submittal of Code design reports is required, a Design Report Confirmation Form (Exhibit XII) shall be included. The confirmation form, or its equivalent, is to be returned to Flowserve and filed with the Design Report. It must be made available to the ANI prior to stamping the valve.

6.12 The Engineer shall review the order for the applicability of federal laws 10CFR21 and 10CFR50. The Engineer shall identify any parts affected and include this information in the QAP input for incorporation into the QAP. A detailed description of this process is provided in SOI 70-14.

6.12.1 Individuals who have knowledge of any potential problems in nuclear valves or parts that have been shipped from this plant which could constitute a safety hazard as defined shall prepare a safety deviation report (form 36-Q-276). This form shall be submitted to the Manager, Quality Assurance for review. A detailed description of this process is provided in PIOP 36-40-03. A copy of this form and all pertinent correspondence concerning its resolution shall be maintained in Engineering file 35-04.

6.13 Product detail drawings must be approved by the individual responsible for the original design, and the Manager, Engineering, Engineering Supervisor or their designees.

6.14 Sales/Assembly drawings for (S), (X), and (T) orders must be approved by the Engineering Supervisor or AE.

6.15 Sales/Assembly drawings for (N), (NPT), (U), (PP), (T4) and (T5) orders must be signed by the responsible Engineer, Product Design Supervisor, Manager, Engineering and Manager, Quality Assurance.

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Previously approved Sales/Assembly drawings that have been transferred to Raleigh Design Control from a facility which had an approved ASME QA Program and a valid ASME N-Stamp Authorization are exempt from the above requirements. If resubmittal of these drawings is required, then the above requirements shall be met.

6.16 All Engineering procedures, specifications, Stress Reports and check lists which pertain to items intended for Code compliance shall be available for review by the ANI.

6.17 If an order requires interface with an outside design organization, such as outside consulting firms or vendors supplying complex parts, the interface control requirements of section 9.0 of this procedure shall be met, and the interface control checklist (Exhibit V) shall be attached to the order folder and completed.

7.0 DESIGN VERIFICATION

7.1 Design verification is the process of demonstrating that a finished valve design satisfies the customer design requirements. Design Verification is accomplished through Design Reviews, review of design documents prior to release to the customer, use of alternate design calculations or by the performance of a suitable testing program.

7.2 Nuclear Valve & Parts Design Verification

Designs shall be verified for each application regardless of the degree of standardization or similarity of previously proven designs.

7.2.1 Valve Orders

The assigned Engineer shall review the design, and as a minimum for valve orders intended for Nuclear Code compliance, the Certified Design Specification shall be reviewed to ensure that the specifications meet all the applicable design requirements of the ASME Code, Section III, Division 1. The cover page of each Design Specification shall be signed and dated by the assigned Project Engineer, or a Nuclear Design Specification Review Sheet (Exhibit XVIII) completed and attached to the order folder, indicating such review has been completed. The Certified Design Specification must contain the following items:

a) Functions and boundaries of items covered.

b) Design requirements, including overpressure protection

c) Environmental conditions, including radiation

d) Code Class (1, 2 or 3)

e) Material requirements, including impact tests

f) Operation requirements (when applicable)

g) Code Edition and Addenda (W'77 or later)

h) Code Cases (if applicable)

7.2.2 Parts Orders

Review of nuclear parts (NPT) orders shall include verification that the customer's Certified Design Specification and the Code Edition and Addenda referenced in the purchase order are identical to those for the original valve order. If not, all differences must be resolved either by obtaining a revision to the P.O. or by determining that they are acceptable.

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7.2.3 In addition, the material intended for use in the parts order shall be compared to the original material for the valve order. Any differences shall be evaluated by the Manager, Engineering or his designee to determine material acceptability for both the application and the customer.

7.3 Formal Design Verification

If any one of the criteria given in paragraphs 7.3.1 - 7.3.5 below apply to an (N) valve or (NPT) parts order, a formal design verification is required, all requirements of section 7.0 of this procedure must be applied to the order, and the design verification checklist (Exhibit VIII) must be attached to the order folder and completed.

7.3.1 A new design or revised design layout is required or an existing layout is utilized which has not previously been subjected to a formal review. (A previously reviewed valve must have had a Design Review conducted by a DRB, meeting minutes filed, and all the requirements of this PIOP satisfied.)

7.3.2 A revision to a previously reviewed layout is required due to changes in the design of pressure boundary parts or critical to function parts.

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7.3.3 A Code Edition, Addenda or Class is specified which differs from those covered by the original design review and require a modification in the design.

7.3.4 The materials utilized for pressure boundary parts (including the stem for Class 1 valves larger than size 4) differ from those covered by the original design review and require a modification in the design.

7.3.5 Materials are utilized for critical (essential to function) parts which have inferior chemistry or mechanical properties to those covered by the original review.

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7.4 If a formal design verification is not required in accordance with the criteria of section 7.3, this will be documented on the check list or on the certification forms required by paragraph 6.2, 6.5 or 6.6.

7.5 When NQA-1 design verification is required by Code Edition, or specifically invoked by the purchase order, the Manager, Engineering or his designee shall assign design verification to an Engineer other than the one who performed the original design. This design verification shall be complete and thorough, and as a minimum documented to the extent delineated in the checklist for NQA-1 design verification (Exhibit XV). The checklist shall be attached to the order folder and completed.

7.6 Engineering calculations, equipment purchase specifications, instruction manuals, computer input and related documents as described in SOI 70-10 shall be checked by a qualified individual other than the preparer. The documents shall be assigned a specific control number and shall be subject to revision control as described in Section 9.0 of this procedure.

7.6.1 Calculations shall be prepared, checked and approved as described in SOI 70-10. All reports shall be well organized and detailed as to purpose, assumptions made, methods of analysis, design inputs, references and units, so that a qualified person can review, understand and verify results without recourse to the originator.

7.6.2 Nuclear (N) orders shall have, as a minimum, a set of minimum wall calculations of the body. Code design reports are required per 6.7. Orders with "U" stamp actuators and orders with "PP" stamp valve/pipe weldments shall have a set a minimum wall calculations.

7.6.3 Additionally, for valves larger than 4", a stress analysis of all pressure retaining parts shall be made verifying that these parts are within Code allowable stress limits. The stem shall also be analyzed for Class 1 nuclear valves larger than size 4, or if required by the customer P.O. or design specification.

7.6.4 Calculations other than those required by the Code should be made at the discretion of the Manager, Engineering or his designee. Such calculations shall meet the checking and approval requirements of SOI 70-10.

7.7 The design layout review can be used as an effective design control measure to ensure the adequacy of a particular design. The design layout review for nuclear, high spec traceable orders and new valve design of all categories, shall be conducted by a Design Review Board (DRB). Other categories do not require DRB.

7.7.1 The Design Review Board (DRB) shall consist of a chairman, an administrator and reviewer. The Chairman shall be the Manager, Engineering or his designee. The Chairman shall be responsible for conducting the design layout review and assuring that definitive conclusions are reached or action items assigned. The reviewers shall consist of the Manager, Engineering, Manager, Quality Assurance, Manager, Operations or their respective designees, and any other members deemed necessary by the Chairman. The Engineer or AE responsible for the design shall present the overall design concept and answer any questions posed by the DRB.

7.7.2 The DRB Chairman shall appoint a DRB Administrator who shall be an Engineer other than the person who conceived the original design. The Administrator shall set up the meeting and document the meeting minutes in the DRB report (Exhibit XI) at the direction of the DRB Chairman. Subsequent DRB meetings shall be called if required until the members of the DRB are satisfied with the adequacy of the design. The meeting reports shall be distributed to all individuals on the DRB and to the Engineer or AE responsible for the design. The original of the meeting report shall be filed under the valve type and layout number per SOI 70-11.

7.8 Design layouts shall be signed by the individual who made the drawings, the Engineering Design Manager and/or the Engineer responsible for the design, and the Manager, Engineering.

7.8.1 For N, NPT and T4 orders, in addition the Manager, Quality Assurance shall sign the layout, or his designee.

7.9 In those cases where the adequacy of a design is to be verified by test, the Engineer responsible shall develop a test plan. The results of the test shall be summarized in a formal report and assigned a control number. These reports shall be checked by another Engineer and approved by the Manager, Engineering or his designee.

7.10 If the design process and verification procedures themselves are the cause for any design revisions, then these procedures shall be reviewed and revised as necessary.

8.0 DESIGN VALIDATION

8.1 Design validation is the process of demonstrating that a finished valve assembly operates as designed, and is normally performed on completed valve assemblies by testing. Examples of Design Validation include hydrostatic testing and functional testing at actual field conditions where practical.

8.2 Design Validation is typically accomplished by any of the following:

8.2.1 Testing to the appropriate standards as those established by organizations such as ASME, MSS or ANSI.

8.2.2 Testing in accordance with Method Specifications written to validate operation of other valve features.

8.2.3 Actual in service monitoring of product performance shall be addressed by the Complaint Report System.

9.0 DESIGN INTERFACE CONTROL

9.1 The design control center for all valve designs is the Raleigh Engineering Department. Interface design organizations are those such as consulting firms and vendors.

9.2 Except for the provisions contained in 9.3, when layouts and design calculations are transferred to Raleigh design control, the designs shall be subjected to a formal design verification per the requirements of section 7.0 of this procedure.

9.2.1 Layouts shall be assigned a Raleigh control drawing number if the original number does not comply with Raleigh policy. Calculation documents shall be kept on file in the Raleigh Engineering Department.

9.2.2 All layouts and documents shall be approved in accordance with this procedure prior to use.

9.3 "N" or "NPT" orders involving an existing design from a facility which had an approved ASME QA program and held a valid ASME stamp authorization may be processed and shipped from the Raleigh facility without the need for a Layout, Design Review or Design Verification providing the following restrictions and requirements are met.

a) A final B/M must have been released under the original system or a new B/M must be issued that duplicates the requirements of the original B/M.

b) A copy of the B/M and all applicable engineering documents must be available for review and use.

c) A QAP shall be developed, reviewed and approved as outlined in section 4.0 of this procedure. It shall be used to identify and control the special requirements necessary for compliance with customer and Code requirements.

d) Approval of the QAP shall document that the proper reviews have been made and that the design is acceptable.

9.4 Outside consulting firms that prepare reports, analyses and studies for Flowserve which effect the valve design shall be controlled by the implementation of suitable design control measures. These measures shall be invoked through the use of engineering specifications which clearly define the job requirements. These specifications shall be checked, approved and a control number assigned per SOI 70-10. Documents, reports, studies, etc., done by outside consulting firms shall be reviewed and approved prior to acceptance by the Manager, Engineering or his designee.

9.5 Vendors which supply components that effect the overall valve design and performance shall be controlled by the implementation of suitable design control measures. These measures shall be invoked through the use of engineering specifications which clearly define the job requirements. A control number shall be assigned to each specification. Vendor's documents shall be reviewed and approved, prior to acceptance of the equipment design, by the Manager, Engineering and Manager, Quality Assurance or his designee, when applicable.

10.0 ENGINEERING DOCUMENT CHANGE CONTROL

10.1 It is the intent of this procedure that design changes be reviewed and approved by the individuals who performed the original design, review and approval.

10.2 In the event that it is not practical for the original individuals to perform the required review and approval of revisions, other responsible individuals may be designated by the Manager, Engineering provided the individuals have access to pertinent background information, have demonstrated competence in the specific design area of interest, and have adequate understanding of the requirements and intent of the original design.

10.3 Revision of design layouts, product detail drawings, bills of material and sales drawings shall be controlled by ECN's in accordance with PIOP 36-70-02. In cases where the sales drawing is affected by the ECN, the Engineer or AE shall receive a copy of the approved ECN immediately following its approval and shall then issue a sales drawing work order documenting the changes required.

10.3.1 All ECN's issued for "N" or "NPT" order documents (N or NPT is checked in the code stamp block) must be reviewed for impact on the Design Report (if applicable). This review will be documented by the Engineer's checking the appropriate block on the ECN: "Yes" should be checked if the ECN is for a part covered in the Design Report. If the part is not covered in the Design Report, or if there is no Design Report, "No" should be checked. The Engineer will then sign the Design Report Section as verification of the review.

10.3.2 If "Yes" is checked, then an entry must be made on the Design Report Reconciliation Form (Exhibit XIX), which is to be attached to the Design Report. The Design Report shall be revised and resubmitted when the reconciliation indicates such revision is required.

10.4 Revision of B/M's shall be in accordance with PIOP's 36-70-02 and 36-70-04.

10.5 Revisions to other engineering design documents shall be made in accordance with SOI 70-10. Certified Design Report revisions shall be approved by a Registered Professional Engineer. A detailed description of the revision process is described in SOI 70-10.

10.6 Revisions to QAP's shall be in accordance with PIOP 36-40-07.

11.0 RETENTION AND DISPOSITION OF ENGINEERING DOCUMENTS

11.1 Control of the retention and disposition of engineering documents is necessary in order to maintain an accurate history of a particular valve design. Control measures shall be implemented for the proper collection, filing, storing, maintaining and disposing of engineering documents.

11.2 The retention and disposition of the engineering sales order file documents shall be as described in SOI 70-12.

11.3 The retention and disposition of other engineering design documents shall be as described in SOI 70-11.

11.4 Transfer of engineering records to storage facilities shall be in accordance with PIOP's 36-30-05, 36-30-06 and 36-40-16.

FLOWSERVE
Flow Control Division

EXHIBIT NO. 1	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: SALES ORDER CONTROL (SOC) SHEET (FORM 36-N-13)	

PLANT INTERNAL
OPERATING PROCEDURE

SALES ORDER CONTROL SHEET (SOC) SALES ORDER 74782 } ENGINEERING
Sales Order Traceability Code: S X-1 X (T) N NPT PP CE
(Circle the applicable code)
SHEET A

SOC NO	SOC DATE	DOCUMENT DESCRIPTION	DOCUMENT DATE	SOFTWARE ACTIONS REQUIRED QA	SOFTWARE ACTIONS REQUIRED PE	ACTION ITEMS	DATE
1	10/29	ACKNOWLEDGEMENT	10/29	(X)	(X)	B/M LT.	
		OIS	10/29			LINE ITEMS 1 & 2	11/4
		PO 408875	10/25			QAP	
		QUOTE M02-1677	6/25			TAGS	11/4
						01 ACTUATOR DRAWING	
2	10/31	Confirming PO 408875		X	X	03 ASSEMBLY DRAWING	
		General Conditions				08 DESIGN REPORT	
		Procurement Engineering Spec.				10 DDR	
		Design Spec Cover Sheet Attachment 2				11 OMI	
		Attachment 4.2				13 PROCEDURES	
		Attachment 4.3				14 SEISMIC CALCULATIONS	
		For your review				16 SHIPPING INSTRUCTIONS	
						17 CUSTOMER INSPECTION	
						18 WELD END DRAWING	
						21 CREDIT HOLD	
						24 SPARE PARTS	
						29 CUSTOMER TAG NOS	
						30 TORQUE REQUIREMENTS	
						31 WEEK LINK ANALYSIS	
						32 DATA REPORT	
						33 STRESS CALCULATIONS	
						56 PNCA	

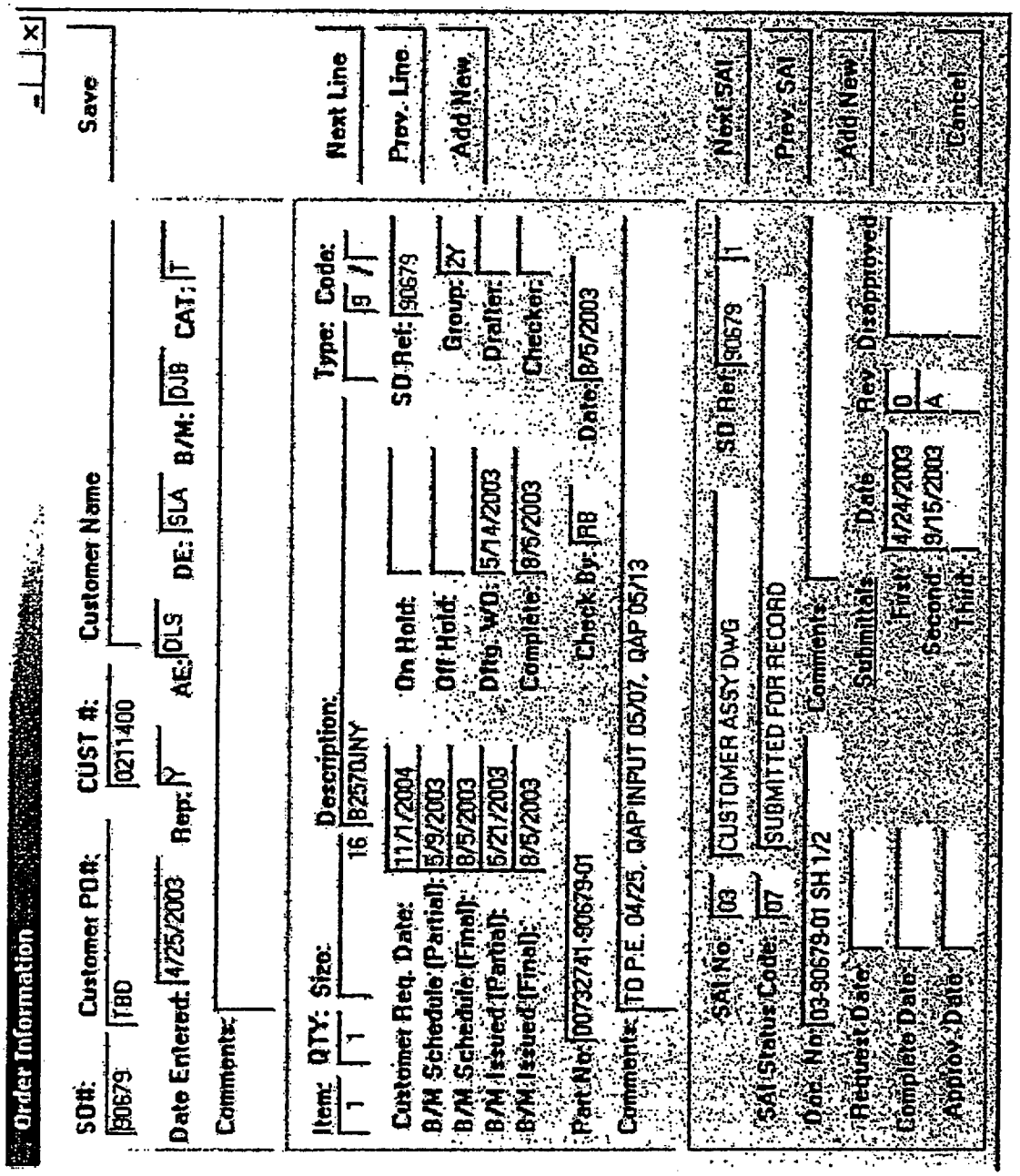
PERSON PROCESSING THE SOC SHEET IS TO INITIAL UNDER THE DATE

CONTRACT ADMIN:	COMMENTS:
GAIL CREIGHTON	

FLOWSERVE
Flow Control Division

EXHIBIT NO. II	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: SOFTRAK	

PLANT INTERNAL
OPERATING PROCEDURE



FLOWSERVE
Flow Control Division

EXHIBIT NO. III	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Sales Drafting Work Order	

PLANT INTERNAL
OPERATING PROCEDURE

SHEET 1 OF 2

SALES DRAFTING WORK ORDER

ORDER NO. 631-13382

SCC 142 CAT. 5

SCHD SCHEDULED 5-9-90

CUST. SHIP DATE 7-1-90

SCC RECD. IN P.E. 5-15-90

COMMENTS:

DRAWING REQUIREMENTS:

ASSEMBLY DRAWING	NEW	REV.
WELD END DRAWING	NEW	REV.
TAG SHEET	NEW	REV.
	NEW	REV.

(SEE ORDER SET FOR CUSTOMER P.O., TAG NO'S., ETC.)

I.L.I. 01	VALVE SIZE 1	FIGURE NO. 536224		
I.L.I. 03	VALVE SIZE .75	FIGURE NO. 1		
I.L.I. 02	VALVE SIZE 1.5	FIGURE NO. 2		
ASS'Y. D30-13382-01	SHT 1 OF 1	REV. A		
M.E.	SHT __ OF __	REV. __		
TAG SHEET	SHT __ OF __	REV. __		
I.L.I. 04	VALVE SIZE 1	FIGURE NO. 536224 CD		
I.L.I. 05	VALVE SIZE 1.5	FIGURE NO. 2		
I.L.I.	VALVE SIZE	FIGURE NO.		
ASS'Y. D30-13382-01	SHT 1 OF 1	REV. A		
M.E.	SHT __ OF __	REV. __		
TAG SHEET	SHT __ OF __	REV. __		
I.L.I. 06	VALVE SIZE .5	FIGURE NO. 536224 (ESW)		
I.L.I. 08	VALVE SIZE 2	FIGURE NO. 4		
I.L.I.	VALVE SIZE	FIGURE NO.		
ASS'Y. D30-13382-01	SHT 1 OF 1	REV. A		
M.E.	SHT __ OF __	REV. __		
TAG SHEET	SHT __ OF __	REV. __		
I.L.I. 07	VALVE SIZE .5	FIGURE NO. 536174 (ESW)		
I.L.I.	VALVE SIZE	FIGURE NO.		
I.L.I.	VALVE SIZE	FIGURE NO.		
ASS'Y. D30-13382-07	SHT 1 OF 1	REV. A		
M.E.	SHT __ OF __	REV. __		
TAG SHEET	SHT __ OF __	REV. __		

SALES REP. DAD DESIGN ENGR. — ORDER EDITOR MLS DRAFTER RMJ 5-15-90

CERTIFIED DRAWING REQUIREMENTS: APPROVAL RECORD TO Q.A.

PACKAGE 1 OF 1	2 PRINTS A F	1 SEPIAS A	__ MYLAR R	
PACKAGE __ OF __	__ PRINTS A F	__ SEPIAS A	__ MYLAR R	
PACKAGE __ OF __	__ PRINTS R F	__ SEPIAS R	__ MYLAR R	

OTHER REQUIREMENTS:

DRAWING WORK REQUEST

Size and Figure No.	Sales Order / Lab Item
FIG 2603-CC-E-SL	128C1-01

BOI Entered	BOI Schedule	Drafting Schedule
1-29-90	2-26-90	2-22-90

Part Name	Part Number	Drawing Number	ESC
Body	169847	C-169847	01124
Bonnet	164720	D-164720	01112
Ball/Seat Assy	169849	E-164295	[illegible]
Coupling Assy	169850	A-169850	01111
Coupling	169851	A-169851	01111
Pin	169852	A-169852	01111
Extension Stem	169853	A-169853	01792
[illegible]	169854	A-169854	02540
[illegible]	169856	B-169856	02540

CAT: I (II) | FEDE: [illegible] | CROSS CLK

DRAFTING REQUIREMENTS:

NEED [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] 167798 [illegible] OTHER [illegible] [illegible]
[illegible] [illegible]

NO. OF DETAILS	TIME RECORD				SOURCE FILED UPDATED
	DETAIL	CHECK	REWORK	RECHECK	
NO. OF HOURS SPENT	[illegible] 2-15-90			—	
INITIAL & DATE	[illegible]				

DATE DWGS. ISSUED: 2-26-90 | BOI GROUP REVIEW: [illegible] 2-26-90

FLOWSERVE
Flow Control Division

EXHIBIT NO. V	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Nuclear Design Interface Control Checklist	

PLANT INTERNAL
OPERATING PROCEDURE

NUCLEAR DESIGN INTERFACE CONTROL CHECKLIST

S.O. #: _____ L/I: _____

PROJECT ENGINEER

6.2	HAVE ALL DESIGN LAYOUTS MADE BY OTHER DESIGN ORGANIZATIONS BEEN REVIEWED BY A DESIGN REVIEW BOARD?	Y N/A A
6.2.2	HAS THE APPROVAL OF SUCH LAYOUTS BEEN INDICATED BY THE PROPER SIGNATURES ON THE LAYOUT?	Y N/A A
6.2.2	HAVE DESIGN CALCULATIONS AND OTHER DESIGN DOCUMENTS BEEN APPROVED IN ACCORDANCE WITH THIS PROCEDURE?	Y N/A A
6.4	HAVE REPORTS AND STUDIES MADE BY OUTSIDE ORGANIZATIONS BEEN REVIEWED AND ACCEPTED BY THE PROJECT ENGINEER AND APPROVED BY THE PRODUCT DESIGN MANAGER?	Y N/A A
6.5	HAVE ENGINEERING SPECIFICATIONS BEEN GENERATED PER SOI 70-10 FOR ISSUE TO OUTSIDE CONSULTING FIRMS AND VENDORS WHO ARE DOING CONTRACT WORK?	Y N/A A
7.6	HAVE SUCH SPECIFICATIONS BEEN CHECKED AND APPROVED PER SOI 70-10?	Y N/A A
6.5	HAVE VENDOR DRAWINGS, PROCEDURES, ETC. BEEN REVIEWED AND APPROVED BY THE PROJECT ENGINEER, PRODUCT DESIGN MANAGER AND, WHEN APPLICABLE, THE VICE PRESIDENT, QA OR HIS DESIGNEE PRIOR TO ACCEPTANCE OF THE EQUIPMENT DESIGN?	Y N/A A Y N/A A

COMPLETED BY: _____ DATE: _____

REFERENCE: PARAGRAPH 6.15

FLOWSERVE
Flow Control Division

EXHIBIT NO. VI	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Nuclear Design Control Checklist for (N) valve orders	

PLANT INTERNAL
OPERATING PROCEDURE

NUCLEAR DESIGN CONTROL CHECKLIST FOR (N) VALVE ORDERS

SIZE FIGURE S.O.# U/I

S.O. RECEIVED BY: (PRODUCT DESIGN MANAGER) DATE: S.O. ASSIGNED TO: (PROJECT ENGINEER) DATE:

	1. PROJECT ENGINEER	
2.2	ARE COPIES OF ALL SOC REFERENCED DOCUMENTS INCLUDED IN THE SOC PACKAGE?	Y N/A A
2.3	HAS AN ORANGE CODED ENGINEERING FOLDER BEEN ESTABLISHED?	Y N/A A
7.2.1	HAS THE CERTIFIED DESIGN SPECIFICATION BEEN REVIEWED AND THE COVER PAGE SIGNED OR EXHIBIT XVIII COMPLETED?	Y N/A A
4.5.2	HAS THE QAP INPUT BEEN FORWARDED TO THE QA PLANNER IN WRITING?	Y N/A A
6.11	DOES 10CFR21 AND/OR 10CFR50 APPLY AND IF SO, HAVE ALL APPLICABLE PARTS BEEN IDENTIFIED IN THE QAP INPUT?	Y N/A A
7.0	IS A NEW FORMAL DESIGN VERIFICATION REQUIRED, & IF SO, HAS THE DESIGN VERIFICATION CHECKLIST BEEN ATTACHED?	Y N/A A
7.4	IF FORMAL DESIGN VERIFICATION IS NOT REQUIRED, HAS THIS BEEN INDICATED ON THE ORDER REVIEW FORM? (EXHIBIT XVII)	Y N/A A
6.7	IS A CERTIFIED DESIGN REPORT REQUIRED?	Y N/A A
6.8.1	HAS THE CERTIFIED REPORT BEEN PREPARED & CHECKED UNDER THE DIRECTION OF, & SEALED BY, A REGISTERED PROFESSIONAL ENGINEER?	Y N/A A
6.9	DOES THE DESIGN REPORT REFERENCE THE CERTIFIED DESIGN SPECIFICATION, B/M AND LAYOUT AND THEIR RESPECTIVE REVISION LEVELS? HAS A RECONCILIATION FORM BEEN ATTACHED TO THE FILE COPY OF THE REPORT?	Y N/A A
6.8.1	DOES THE DESIGN REPORT REFERENCE THE APPLICABLE SALES DRAWING NO. & REVISION? IF NOT, DOES THE SALES DRAWING REFERENCE THE DESIGN REPORT NUMBER AND REVISION?	Y N/A A
6.8.1	HAS THE VICE PRESIDENT, QA APPROVED THE PAGES CONCERNING MATERIAL VERIFICATION (VALVES LARGER THAN SIZE 4 ONLY)?	Y N/A A
6.8.2	HAS THE DESIGN REPORT BEEN SUBMITTED TO THE CUSTOMER ALONG WITH A REVIEW CONFIRMATION FORM?	Y N/A A
6.8.2	HAS THE REVIEW CONFIRMATION FORM BEEN RETURNED BY THE CUSTOMER AND PROPERLY FILED?	Y N/A A
6.7	IS AN UNCERTIFIED DESIGN REPORT REQUIRED? IF SO, HAS IT BEEN COMPLETED?	Y N/A A
6.7	IS SUBMITTAL REQUIRED? IF SO, HAS THE REPORT BEEN SUBMITTED TO THE CUSTOMER ALONG WITH A REVIEW CONFIRMATION FORM?	Y N/A A
6.10	HAS THE REVIEW CONFIRMATION FORM BEEN RETURNED BY THE CUSTOMER AND PROPERLY FILED?	Y N/A A
7.5	IS NQA-1 DESIGN VERIFICATION REQUIRED? IF YES, HAS THE NQA VERIFICATION CHECKLIST (EXHIBIT XV) BEEN ATTACHED?	Y N/A A
6.10	DOES THE ORDER REQUIRE INTERFACE WITH A DESIGN ORGANIZATION OUTSIDE THE RALEIGH BUSINESS UNIT? IF YES, HAS THE DESIGN INTERFACE CHECKLIST BEEN ATTACHED?	Y N/A A
4.7	HAS THE QAP BEEN APPROVED BY THE ASSIGNED PROJECT ENGINEER OR THE PRODUCT DESIGN MANAGER, AND THE AE IF APPLICABLE?	Y N/A A
9.3	HAVE REVISIONS TO DESIGN LAYOUTS, DRAWINGS AND B/M'S BEEN MADE IN ACCORDANCE WITH PDP 36-70-022	Y N/A A
9.3.1	HAVE ALL ECN REVISIONS BEEN RECONCILED WITH THE DESIGN REPORT AND PROPERLY ENTERED ON THE RECONCILIATION FORM?	Y N/A A
9.5	HAVE REVISIONS TO OTHER DESIGN DOCUMENTS BEEN MADE IN ACCORDANCE WITH SDI 70-10?	Y N/A A
9.6	HAVE REVISIONS TO QAP'S BEEN MADE IN ACCORDANCE WITH PDP 36-40-07?	Y N/A A

COMPLETED BY: DATE:

REFERENCE: PARAGRAPH 6.2

FLOWSERVE
Flow Control Division

EXHIBIT NO. VI	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Nuclear Design Control Checklist for (N) valve orders	

PLANT INTERNAL
OPERATING PROCEDURE

NUCLEAR DESIGN CHECKLIST FOR (N) VALVE ORDERS

S.O. # _____ LR _____

	E. ENGINEERING SUPERVISOR	
6.2.2	WAS THE LATEST REVISION OF THE QAP USED TO WRITE THE B/M?	Y N/A A
6.4	HAS THE B/M BEEN PROPERLY CHECKED, AND APPROVED BY THE ASSIGNED PROJECT ENGINEER OR PRODUCT DESIGN MANAGER AND THE QA PLANNER?	Y N/A A
6.11	HAVE THE SALES DRAWINGS BEEN PROPERLY CHECKED, AND APPROVED BY THE ASSIGNED PROJECT ENGINEER OR PRODUCT DESIGN MANAGER AND VICE PRESIDENT, ENGINEERING AND VICE PRESIDENT, QA?	Y N/A A
6.12	HAVE ALL REQUIRED DETAIL DRAWINGS BEEN PROPERLY CHECKED, AND APPROVED BY EITHER THE PRODUCT DESIGN MANAGER OR THE ENGINEERING SUPERVISOR?	Y N/A A
6.3	HAVE REVISIONS TO DETAIL DRAWINGS BEEN MADE PER PIOP 36-70-02?	Y N/A A
8.3	HAVE ANY ECN'S REQUIRED REVISIONS TO SALES DRAWINGS, AND IF SO, HAVE THE SALES DRAWINGS BEEN REVISED AND REVISIONS APPROVED BY THE INDIVIDUALS LISTED IN 6.13 ABOVE?	Y N/A A
8.3	HAVE REVISIONS TO SALES DRAWINGS BEEN RESUBMITTED TO THE CUSTOMER USING A SALES DRAWING CHANGE NOTICE?	Y N/A A
8.4	HAVE REVISIONS TO B/M'S BEEN MADE IN ACCORDANCE WITH PIOP 36-70-02 AND 36-70-04?	Y N/A A
	COMPLETED BY: _____ DATE: _____	

	M. DISPOSITION OF ENGINEERING DOCUMENTS	
10.2	HAS THE RETENTION AND DISPOSITION OF ENGINEERING SALES ORDER FILES BEEN MADE IN ACCORDANCE WITH SOI 70-122	Y N/A A
	HAVE ALL REQUIRED CHECKLISTS BEEN ATTACHED TO THE ORDER FOLDER AND COMPLETED?	Y N/A A
	HAVE THE DESIGN ENGINEERING DOCUMENTS BEEN FILED PER THE REQUIREMENTS OF SOI 70-111	Y N/A A
	COMPLETED BY: _____ DATE: _____	
8.4	HAVE ARRANGEMENTS BEEN MADE FOR TRANSFER OF ENGINEERING RECORDS TO THE PLANT VAULT IN ACCORDANCE WITH PIOP'S 36-30-05, 36-30-06 & 36-40-15?	Y N/A A
	HAVE ALL REQUIRED CHECKLISTS BEEN ATTACHED TO THE ORDER FOLDER?	Y N/A A
	HAVE ALL CHECKLISTS BEEN PROPERLY COMPLETED, INITIALED AND DATED?	Y N/A A
	COMPLETED BY: _____ DATE: _____	

PAGE 2 OF 2

FLOWSERVE
Flow Control Division

EXHIBIT NO. VII	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Nuclear Design Control Checklist for (NPT) parts orders	

PLANT INTERNAL
OPERATING PROCEDURE

NUCLEAR DESIGN CONTROL CHECKLIST FOR (NPT) PARTS ORDERS

PART NAME:_____ S.O.#:_____ LI:_____
ORIGINAL S.O._____ SIZE_____ FIGURE_____

S.O. RECEIVED BY:_____ DATE:_____ S.O. ASSIGNED TO:_____ DATE:_____
PRODUCT DESIGN MANAGER PROJECT ENGINEER

	1. PROJECT ENGINEER	
7.2	ARE COPIES OF ALL SOC REFERENCED DOCUMENTS INCLUDED IN THE SOC PACKAGE?	Y N/A A
7.3	HAS AN ORANGE CODED ENGINEERING FOLDER BEEN ESTABLISHED?	Y N/A A
7.2.2	DOES THE CUSTOMER P.O. IDENTIFY THE APPLICABLE DESIGN SPECIFICATION BY NO., REVISION AND DATE?	Y N/A A
7.2.2	IS THE SPECIFICATION THE SAME AS FOR THE ORIGINAL ORDER? IF NOT, ARE ALL DIFFERENCES ACCEPTABLE?	Y N/A A
7.2.2	ARE THE CODE REQUIREMENTS THE SAME AS THE ORIGINAL ORDER? IF NOT, HAVE ALL DIFFERENCES BEEN RESOLVED?	Y N/A A
7.2.3	ARE THE PART NO.'S AND MATERIALS IDENTICAL TO THE ORIGINAL ORDER? IF NOT HAVE CHANGES BEEN CUSTOMER APPROVED?	Y N/A A
6.5.2	HAS THE QAP INPUT BEEN FORWARDED TO THE QA PLANNER IN WRITING?	Y N/A A
8.11	DOES 10CFR21 AND/OR 10CFR50 APPLY AND IF SO, HAVE ALL APPLICABLE PARTS BEEN IDENTIFIED IN THE QAP INPUT?	Y N/A A
7.2	IS A NEW FORMAL DESIGN VERIFICATION REQUIRED DUE TO A CHANGE IN MATERIAL, GEOMETRY, CODE ADDENDA OR CLASS? IF YES, HAS THE DESIGN VERIFICATION CHECKLIST BEEN ATTACHED?	Y N/A A Y N/A A
7.4	IF FORMAL DESIGN VERIFICATION IS NOT REQUIRED, HAS A CERTIFICATION OF DESIGN FOR NPT ORDERS WITH NO DESIGN CHANGES FROM THE ORIGINAL ORDER BEEN COMPLETED, APPROVED AND PROPERLY FILED?	Y N/A A
6.8	IS A REVISION TO A CERTIFIED DESIGN REPORT REQUIRED?	Y N/A A
6.8.1	HAS THE REVISION BEEN PREPARED & CHECKED UNDER THE DIRECTION OF, & SEALED BY, A REGISTERED PROFESSIONAL ENGINEER?	Y N/A A
6.9	DOES THE DESIGN REPORT REFERENCE THE CERTIFIED DESIGN SPECIFICATION, BM AND LAYOUT AND THEIR RESPECTIVE REVISION LEVELS? HAS A RECONCILIATION FORM BEEN ATTACHED TO THE FILE COPY OF THE REPORT?	Y N/A A Y N/A A
6.9.1	DOES THE DESIGN REPORT REFERENCE THE APPLICABLE SALES DRAWING NO. & REVISION? IF NOT, DOES THE SALES DRAWING REFERENCE THE DESIGN REPORT NUMBER AND REVISION?	Y N/A A
6.8.1	HAS THE VICE PRESIDENT, QA APPROVED THE PAGES CONCERNING MATERIAL VERIFICATION (VALVES, LARGER THAN SIZE 4 ONLY)?	Y N/A A
6.8.2	HAS THE DESIGN REPORT BEEN SUBMITTED TO THE CUSTOMER ALONG WITH A REVIEW CONFIRMATION FORM?	Y N/A A
6.8.2	HAS THE REVIEW CONFIRMATION FORM BEEN RETURNED BY THE CUSTOMER AND PROPERLY FILED?	Y N/A A
6.7	IS A REVISION TO AN UNCERTIFIED DESIGN REPORT REQUIRED? IF SO, HAS IT BEEN COMPLETED?	Y N/A A
6.7	IS SUBMITTAL REQUIRED? IF SO, HAS THE REPORT BEEN SUBMITTED TO THE CUSTOMER ALONG WITH A REVIEW CONFIRMATION FORM?	Y N/A A Y N/A A
6.10	HAS THE REVIEW CONFIRMATION FORM BEEN RETURNED BY THE CUSTOMER AND PROPERLY FILED?	Y N/A A
7.8	IS NQA-1 DESIGN VERIFICATION REQUIRED? IF YES, HAS THE NQA VERIFICATION CHECKLIST (EXHIBIT XVI) BEEN ATTACHED?	Y N/A A
8.10	DOES THE ORDER REQUIRE INTERFACE WITH A DESIGN ORGANIZATION OUTSIDE THE RALEIGH BUSINESS UNIT? IF YES, HAS THE DESIGN INTERFACE CHECKLIST BEEN ATTACHED?	Y N/A A
6.7	HAS THE QAP BEEN APPROVED BY THE ASSIGNED PROJECT ENGINEER OR THE PRODUCT DESIGN MANAGER, AND THE AE IF APPLICABLE?	Y N/A A
9.2	HAVE REVISIONS TO DESIGN LAYOUTS, DRAWINGS AND BM'S BEEN MADE IN ACCORDANCE WITH PDP 36-70-02?	Y N/A A
6.8.1	HAVE ALL ECN REVISIONS BEEN RECONCILED WITH THE DESIGN REPORT AND PROPERLY ENTERED ON THE RECONCILIATION FORM?	Y N/A A
9.5	HAVE REVISIONS TO OTHER DESIGN DOCUMENTS BEEN MADE IN ACCORDANCE WITH SOI 70-10?	Y N/A A
9.6	HAVE REVISIONS TO QAP'S BEEN MADE IN ACCORDANCE WITH PDP 36-60-07?	Y N/A A

COMPLETED BY:_____ DATE:_____

REFERENCE PARAGRAPH 6.2

FLOWSERVE
Flow Control Division

EXHIBIT NO. VII	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Nuclear Design Control Checklist for (NPT) parts orders	

PLANT INTERNAL
OPERATING PROCEDURE

NUCLEAR DESIGN CHECKLIST FOR (NPT) PARTS ORDERS

S.O. # VII

E. ENGINEERING SUPERVISOR

5.2.2	WAS THE LATEST REVISION OF THE QAP USED TO WRITE THE BM?	Y N/A A
5.4	HAS THE BM BEEN PROPERLY CHECKED, AND APPROVED BY THE ASSIGNED PROJECT ENGINEER OR PRODUCT DESIGN MANAGER, AND THE QA PLANNER?	Y N/A A
6.14	HAVE THE SALES DRAWINGS BEEN PROPERLY CHECKED, AND APPROVED BY THE ASSIGNED PROJECT ENGINEER OR PRODUCT DESIGN MANAGER AND VICE PRESIDENT, ENGINEERING AND VICE PRESIDENT, QA?	Y N/A A
6.12	HAVE ALL REQUIRED DETAIL DRAWINGS BEEN PROPERLY CHECKED, AND APPROVED BY EITHER THE PRODUCT DESIGN MANAGER OR ENGINEERING SUPERVISOR?	Y N/A A
8.3	HAVE REVISIONS TO DETAIL DRAWINGS BEEN MADE PER PIOP 36-70-02?	Y N/A A
8.3	HAVE ANY ECN'S REQUIRED REVISIONS TO SALES DRAWINGS, AND IF SO, HAVE THE SALES DRAWINGS BEEN REVISED AND REVISIONS APPROVED BY THE INDIVIDUALS LISTED IN 6.13 ABOVE?	Y N/A A
8.3	HAVE REVISIONS TO SALES DRAWINGS BEEN RESUBMITTED TO THE CUSTOMER USING A SALES DRAWING CHANGE NOTICE?	Y N/A A
8.4	HAVE REVISIONS TO BM'S BEEN MADE IN ACCORDANCE WITH PIOP 36-70-02 AND 36-70-04?	Y N/A A

COMPLETED BY: _____ DATE: _____

III. DISPOSITION OF ENGINEERING DOCUMENTS

10.2	HAS THE RETENTION AND DISPOSITION OF ENGINEERING SALES ORDER FILES BEEN MADE IN ACCORDANCE WITH SOI 70-12?	Y N/A A
	HAVE ALL REQUIRED CHECKLISTS BEEN ATTACHED TO THE ORDER FOLDER AND COMPLETED?	Y N/A A
	HAVE THE DESIGN ENGINEERING DOCUMENTS BEEN FILED PER THE REQUIREMENTS OF SOI 70-11?	Y N/A A

COMPLETED BY: _____ DATE: _____

9.4	HAVE ARRANGEMENTS BEEN MADE FOR TRANSFER OF ENGINEERING RECORDS TO THE PLANT VAULT IN ACCORDANCE WITH PIOP'S 36-20-05, 36-30-06 & 36-40-10?	Y N/A A
	HAVE ALL REQUIRED CHECKLISTS BEEN ATTACHED TO THE ORDER FOLDER?	Y N/A A
	HAVE ALL CHECKLISTS BEEN PROPERLY COMPLETED, INITIALED AND DATED?	Y N/A A

COMPLETED BY: _____ DATE: _____

PAGE 2 OF 2

FLOWSERVE
Flow Control Division

EXHIBIT NO. VIII	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Nuclear Design Verification Checklist	

PLANT INTERNAL
OPERATING PROCEDURE

NUCLEAR DESIGN VERIFICATION CONTROL CHECKLIST

S.O. # _____ LI(_____

	I. PROJECT ENGINEER	
7.7.2	HAS AN ADMINISTRATOR OF THE DESIGN REVIEW BOARD BEEN ASSIGNED WHO IS AN ENGINEER OTHER THAN THE ONE WHO CONCEIVED THE ORIGINAL DESIGN?	Y N/A A
7.7.2	HAVE THE MINUTES OF THE DRB MEETING BEEN REVIEWED AND ACTION ASSIGNMENTS MADE?	Y N/A A
7.7.2	HAVE SUBSEQUENT MEETINGS BEEN HELD TO RESOLVE ALL ACTION ITEMS?	Y N/A A
7.7.1	WERE THE VICE PRESIDENT, QA, ENGINEERING SUPERVISOR AND VICE PRESIDENT, OPERATIONS OR THEIR DESIGNEES PRESENT FOR ALL MEETINGS?	Y N/A A
	COMPLETED BY: _____ DATE: _____	

	II. PROJECT ENGINEER	
7.8.1	HAS THE DESIGN LAYOUT BEEN SIGNED BY THE ORIGINATOR, THE RESPONSIBLE PROJECT ENGINEER, THE PRODUCT DESIGN MANAGER, THE VICE PRESIDENT, ENGINEERING AND THE VICE PRESIDENT, QA?	Y N/A A
7.8.2	ARE BODY MIN. WALL CALCULATIONS IN PLACE FOR ALL VALVES?	Y N/A A
7.8.3	ARE STRESS ANALYSES OF ALL PRESSURE RETAINING PARTS IN PLACE FOR VALVES LARGER THAN SIZE 4?	Y N/A A
7.8.3	IS A STEM STRESS ANALYSIS IN PLACE FOR ALL CLASS I VALVES LARGER THAN SIZE 4?	Y N/A A
7.8.4	HAVE ALL REQUIRED CALCULATIONS AND OTHER DESIGN DOCUMENTS BEEN ASSIGNED A CONTROL NUMBER, AND HAVE THEY BEEN PROPERLY CHECKED AND APPROVED?	Y N/A A
7.8.4	HAVE SUPPORTING DESIGN CALCULATIONS OTHER THAN THOSE REQUIRED BY THE CODE BEEN COMPLETED, CHECKED AND APPROVED?	Y N/A A
7.7.2	HAVE THE DRB MINUTES BEEN PROPERLY FILED UNDER THE VALVE LAYOUT NUMBER PER SOI 70-11?	Y N/A A
7.9	IN CASES WHERE ADEQUACY OF A DESIGN IS TO BE VERIFIED BY TESTS, HAVE TEST PLANS BEEN DEVELOPED?	Y N/A A
7.9	HAVE FORMAL REPORTS SUMMARIZING THE TEST RESULTS BEEN ASSIGNED A CONTROL NUMBER PER SOI 70-10?	Y N/A A
7.9	HAVE THE REPORTS BEEN CHECKED BY A SECOND ENGINEER AND APPROVED BY THE PRODUCT DESIGN MANAGER?	Y N/A A
	COMPLETED BY: _____ DATE: _____	

REFERENCE: PARAGRAPH 7.0

FLOWSERVE
Flow Control Division

EXHIBIT NO. IX	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Quality Assurance Plan (QAP)	

PLANT INTERNAL
OPERATING PROCEDURE

UNCONTROLLED COPY

QAP NO.02-74782 Rev. 0
PAGE: 1 OF 12
CREATED BY: CRH 11/11/02

CUSTOMER: CONSTELLATION NUCLEAR/BALTIMORE GAS AND ELECTRIC CO.

QAP NO.01-74782 Rev. 0

1.0 PART TABULATION

Part Name	Item No.	Qty.
A-180 Actuator (Serial No. STAB-) National Board # Tag # 2-CV-4043OP	1	1
A-180 Actuator (Serial No. STAB-) National Board # Tag # 2-CV-4048OP	2	1

2.0 GOVERNING SPECIFICATION

2.1 Constellation Nuclear (Baltimore Gas & Electric Co.) p.o. 4048875 for Calvert Cliffs.

2.2 ASME Boiler and Pressure Vessel Code, Section VIII, 1983 Edition, including Summer 1985 Addenda. Code Stamping and ANI is required.

2.3 Reference previous S.O. 36-33753-A for actuators (original S.O. 36-60300, SEI 381). "U" Stamped Actuators, Repair & Return. Procurement Spec. 5092 Rev. 15 and attachments and design Spec. SP-528 Rev. 1.
Same requirements as previous re-build 50623, 74140, 74176, 74197 & 74232.

FLOWSERVE

Flow Control Division

EXHIBIT NO. X	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Bill of Materials (B/M)	

PLANT INTERNAL
OPERATING PROCEDURE

14 APR 03 02:06PM [illegible]

Sorted Multi-Level Bill of Material - EVI

Page 1

1 Drawing No	2 Drawing No.	3 Drawing No.	4 Drawing No.	5 Drawing No.	6 Drawing No.	7 Drawing No.
L-00029246 R-	- R-	- R-	- R-	- R-	- R-	- R-

Description: SEAL KIT #3 RESERVOIR ASSEMBLY A-290 ACTUATOR [illegible]

RMC

Level	Item Nbr	Description	UOM	Quantity	PK	M/P	RMC	Drawing
0	00380121SHELF00	SEAL KIT #3 RESERVOIR ASSEMBLY	EA			M		L-00380146 REV-
1	00175712	[illegible] ELEMENT #110516	EA	1.000000		P	55555	A-00175712 REV-A
1	00872256SHELF00	GASKET TANK	EA	1.000000		M	50395	C-00872256 REV-B
2	00154259SHELF00	GASKET (36"X72"X.062X VITON)	SI	360.000000		P	50395	- REV-
1	00872438SHELF00	GASKET (VITON)	EA	2.000000		M	50395	A-00872438 REV-B
2	00154259SHELF00	GASKET (36"X72"X.062X VITON)	SI	2.250000		P	50395	- REV-
1	00914203SHELF00	O-RING 2-289 (EPR)	EA	1.000000		P	05032	00-10010303 REV-0
1	00916280SHELF00	O-RING 2-222 (EPR)	EA	2.000000		P	05032	00-10010303 REV-0
1	00957151SHELF00	O-RING 2-906 (EPR)	EA	1.000000		P	05032	00-10010304 REV-0

Nameplate: Part or B/M No: 00380121SHELF00

Fig/Figure/Ref: 1911

Pressure Class:

CWP:

Matls of Const: Body:

Stem:

ASME Section III Class:

Size: (1) (2) 20.000 (3)

Applicable Standard:

Service Limits: Pressure: Temp:

Bonnet/Cover: Dsk/Gt/Plg/Bll:

Seat (Body): Seat (Disk/Gate):

Delta P:

FLOWSERVE
Flow Control Division

EXHIBIT NO. XI	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Design Review Board Meeting Report	

PLANT INTERNAL
OPERATING PROCEDURE

FLOWSERVE
Flow Control Division

COMMITTEE: Design Review

FILE: KN44-0621
Page 1 of 2

MEETING NO.: 1

MEETING DATE: 02/21/03

STARTED: 9:00 AM

ADJOURNED: 9:15 AM

CHAIRMAN: S. L. Adams

REPORTED BY: E. T. Graham

COMMITTEE POSITION: Administrator

REPORT DATE: 02/21/03

PRESENT: S. L. Adams R. A. Bandukwala J. C. Mason E. T. Graham

SUBJECT: SIZE 3/4 FIG. 444469QESW

LAYOUT NO: KN44-0621 Rev. D

SALES DWG. NO: KN44-0621 Rev. D & KN44-0621S Rev. J

ORDER NO: EADS P.O. 6-166371
TXU P.O. S-0392192-6S2
FLOWSERVE S.O. 22532

DESIGN SPECIFICATION: CPES-M-1087 Rev. 2

APPLICABLE CODE: ASME SECTION III, 1989 EDITION, NO ADDENDA, CLASS 3

PRESSURE CLASS: 300

DESIGN CONDITIONS: 150 psi @ 125° F (Chilled Water)
50 psi @ 300°F (Steam)

The original valves were furnished for EADS P.O 6-63126/TXU S-0192957-6D2 and EADS P.O. 6-74069/TXU S-0226360-6D2 on Canadian Worcester Controls orders N96-0040 and N97-0041

The layout drawing has been reviewed against all original documents and current P.O. requirements and found to be acceptable for provision of replacement valves.

FLOWSERVE
Flow Control Division

EXHIBIT NO. XII	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Design Report Review Confirmation Form	

PLANT INTERNAL
OPERATING PROCEDURE

FLOWSERVE
Flow Control Division

DESIGN REPORT REVIEW DOCUMENTATION

Design Report Number: RAL-2559 Rev. 0

Valve Size and Figure Number: Size 2 1/2 Figure 458669HEBW80

Valve Identification: 0000143784

Design Specification Number: 546B8925 Rev. 6

Owner: ONTARIO POWER GENERATION

Power Plant Name: DARLINGTON NGS

I hereby document that I have conducted a review of the subject Design Report in accordance with Paragraph NCA-3260 of Section III of the ASME Boiler and Pressure Vessel Code and have determined that the Design Report is based on design and operating conditions that meet or exceed the design and operating conditions stated in the referenced Design Specification. I further document that I am a responsible party in the employ of the Owner or Owner's Agent.

Signature: _____

Title: _____

Company: _____

Company's Responsibility: _____
(Owner or Owner's Agent)

(This document must be completed and returned to Edward Valves prior to valve shipment.)

Post Office Box 1961, Raleigh, NC 27602 USA 1900 South Saunders Street Raleigh, NC 27603 USA Telephone: 919.832.0525, 800.225.5969 Facsimile: 919.831.3369

FLOWSERVE
Flow Control Division

EXHIBIT NO. XIII	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Engineering QAP Input Form for Valve Orders (Form 36-E-92)	

PLANT INTERNAL
OPERATING PROCEDURE

ENGINEERING QAP INPUT: VALVES

DEVELOPED BY: _____
DATE INITIAL ISSUE: _____
REVISION No. ___ BY: _____
REVISION DATE: _____
PAGE ___ OF ___

S.O. No: _____ L/I: _____

ORDER CODE: ☐ X ☐ T ☐ N ☐ CE Cat: _____

Original S.O. No: _____ Size _____ Figure _____

Original: Code _____ B/M _____ Sales Drawing _____

New: Code _____ B/M _____ Sales Drawing _____

Design Conditions: _____ psi @ _____ °F or Pressure Class _____

Actuator Type: _____ Code Class _____ Code Cases _____

Design Spec. # _____ Rev. ___ Cert. by: _____ P.E. St. _____ Reg. # _____

Design Rept. # _____ Rev. ___ Cert. by: _____ P.E. St. _____ Reg. # _____

Pressure Retaining Parts				Critical Parts		
Part Name	RMC	Min. Thk.	Nom. Thk.	Part Name	RMC	Comment
				Note: An asterisk indicates parts traceable to the lowest level. Otherwise it is dedicated at assembly.		

If charpies are required: Report nominal part thickness (for each part requiring charpies) and nominal connecting pipe thickness: _____

INDICATE HARDFACING MATERIAL IF OTHER THAN STELLITE 21: _____

Applicable Method Specifications		
M.S. No.	Description	Comments

Comments:

Form 36-E-92 (10/02)

PNCA Applicable: ☐ Yes ☐ No

FLOWSERVE
Flow Control Division

EXHIBIT NO. XIV	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Engineering QAP Input Form for Parts Orders (Form 36-E-89)	

PLANT INTERNAL
OPERATING PROCEDURE

ENGINEERING QAP INPUT: PARTS

DEVELOPED BY: _____
DATE INITIAL ISSUE: _____
REVISION No: ____ BY: _____
REVISION DATE: _____
PAGE ___ OF ___

S.O. No: _____

ORDER CODE: ☐ X ☐ T ☐ NPT

Original S.O. No: _____ Size _____ Figure _____

Original: Code _____ B/M _____ Sales Drawing _____

New: Code _____ B/M _____ Sales Drawing _____

Design Conditions: _____ psi @ _____ °F or Pressure Class _____

Code Class _____ Code Cases _____

Design Spec. # _____ Rev. ___ Cert. by: _____ P.E. St. _____ Reg. # _____

Design Rept. # _____ Rev. ___ Cert. by: _____ P.E. St. _____ Reg. # _____

DWG. PC. NO.	S.O. ITEM NO.	PART NAME	THICKNESS		PART NUMBER(1)		RMC (1)		REASON (2)
			MIN.	NOM.	ORIGINAL	NEW	ORIG.	NEW	

NOTES: (1) An asterisk means the Part Number and/or RMC is different than the customer order.
(2) Reason Codes: PI - Product Improvement DC - Design Change
MA - Material Availability O - Other _____
CE - Code Edition and/or Addenda _____

S.O. Items pressure retaining (Procured as safety related.): _____

S.O. Items 10CFR21/10CFR50 traceable to the lowest level (procured as safety related.): _____

S.O. Items procured as commercial grade and dedicated at Raleigh to 10CFR21 (Part no. trailer "DEDCA-TD"): _____

S.O. Items that are non-safety related: _____

S.O. Items with other requirements: _____

Indicate any hardfacing materials other than Stellite 21: _____

Form 36-E-89 (10/02) PNCA APPLICABLE: ____ yes ____ no

FLOWSERVE
Flow Control Division

EXHIBIT NO. XV	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: NQA-1 Design Verification Checklist	

PLANT INTERNAL
OPERATING PROCEDURE

NUCLEAR NQA-1 DESIGN VERIFICATION CHECKLIST

S.O.# ____ J.I. ____

DESIGN VERIFICATION ENGINEER

1. PROJECT ENGINEER

7.5	WAS THE DESIGN BEEN VERIFIED BY INDEPENDENT DESIGN REVIEWS, USE OF ALTERNATE CALCULATIONS OR THE PERFORMANCE OF QUALIFICATION TESTS?	Y N/A A
	WAS THE VERIFICATION METHOD BY DESIGN REVIEW? IF SO:	Y N/A A
a)	WERE THE DESIGN INPUTS PROPERLY SELECTED? CODE: DESIGN SPECIFICATION AND REVISION: PURCHASE ORDER: NUCLEAR CLASS: DESIGN PRESSURE: DESIGN TEMPERATURE: DESIGN SEISMIC CONDITIONS: SEISMIC CATEGORY: OTHER DESIGN REQUIREMENTS:	Y N/A A
b)	ARE ASSUMPTIONS ADEQUATELY DESCRIBED AND REASONABLE?	Y N/A A
c)	WAS AN APPROPRIATE DESIGN METHOD USED? DESIGN REPORT: SEISMIC REPORT: PERFORMANCE OPERABILITY REPORT: OTHER REPORTS:	Y N/A A
d)	WERE THE ABOVE REPORTS REVIEWED FOR COMPLETENESS AND CONCURRENCE WITH ASSUMPTIONS, METHODS, AND RESULTS?	Y N/A A
e)	WERE THE DESIGN INPUTS CORRECTLY INCORPORATED? LAYOUT: BILL OF MATERIAL: SALES DRAWINGS: OTHER:	Y N/A A
f)	HAVE THE ABOVE DOCUMENTS BEEN REVIEWED FOR COMPLETENESS AND VERIFIED CORRECT?	Y N/A A
g)	IS THE DESIGN OUTPUT REASONABLE COMPARED TO THE DESIGN INPUT? REMARKS: INTERFACING ORGANIZATIONS:	Y N/A A
	WAS THE VERIFICATION METHOD BY ALTERNATE CALCULATIONS?	Y N/A A
	WAS THE VERIFICATION METHOD BY QUALIFICATION TEST? IF SO:	Y N/A A
a)	HAVE THE TESTS BEEN CLEARLY DEFINED, DOCUMENTED AND EVALUATED? LIST QUALIFICATION TEST REPORTS:	Y N/A A
b)	IF THE TEST IS INTENDED TO VERIFY ONLY SPECIFIC DESIGN FEATURES, HAVE THE OTHER FEATURES BEEN VERIFIED?	Y N/A A
c)	WERE ANY MODIFICATIONS DOCUMENTED AND VERIFIED?	Y N/A A
d)	IF MODELS WERE USED, WERE SCALING LAWS ESTABLISHED, VERIFIED AND SUBJECT TO ERROR ANALYSIS WHERE APPLICABLE?	Y N/A A

COMPLETED BY: ____ DATE: ____

REFERENCE: PARAGRAPH 7.5

FLOWSERVE
Flow Control Division

EXHIBIT NO. XVI	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Certification of Design for NPT Orders (Form 36-E-93)	

PLANT INTERNAL
OPERATING PROCEDURE

CERTIFICATION OF DESIGN FOR NPT ORDERS
WITH NO DESIGN CHANGES FROM ORIGINAL ORDER

Sales Order: _____ Layout No. _____

Code Addenda: _____ (Original) Sales Dwg. No. _____

_____ (New) Original S.O. No. _____

S.O. Line Item Description

The above parts are a duplicate designs of the parts furnished on the original order. The materials selected are equal to or better than originally supplied. The difference in Code/Addendas (if any) does not affect the design. If Class 1 and addenda is different, the design report has been modified. Because the parts are virtual duplicates of the original order, a formal Design Review Meeting is not required.

Project Engineer: _____

File: S.O. File

FORM 36-E-93 Rev. 2

FLOWSERVE
Flow Control Division

EXHIBIT NO. XVII	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Professional Engineer Certification Sheet (Form 36-E-94)	

PLANT INTERNAL
OPERATING PROCEDURE

FLOWSERVE
Flow Control Division

RAL-2559 Rev. 0
DESIGN REPORT

ONTARIO POWER GENERATION

Size 2.5 Figure 456669HEBW80

Drawing No. KN59-0090

P. E. CERTIFICATE

"I, the undersigned, A Registered Professional Engineer experienced in the design of valves, verify that to the best of my knowledge, information and belief, this design report complies with the requirements of the ASME Code for Nuclear Power Plant Components Section III dated 1980 Edition, Summer 1980 Addenda and the Design Specifications. Pursuant to paragraph NCA-3350 of said Code, this certification is solely for the purpose of complying with paragraph NB-3560 of said Code and is not to be construed as involving, modifying of changing contractual relationships or legal liabilities."

CERTIFIED BY: _____ DATE: 3/20/03

NORTH CAROLINA SEAL 4187 ENGINEER ALATHIEL LIELL ADAMS

Post Office Box 1961 Raleigh, NC 27602 USA 1900 South Saunders Street Raleigh, NC 27603 USA Telephone: 919.832.0525, 800.225.6989 Facsimile: 919.831.3369

FLOWSERVE
Flow Control Division

EXHIBIT NO. XVIII	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Review of Nuclear Design Specification and Order Requirements	

PLANT INTERNAL
OPERATING PROCEDURE

REVIEW OF NUCLEAR DESIGN SPECIFICATION AND ORDER REQUIREMENTS

EDWARD SALES ORDER NUMBER: 23641

CUSTOMER PURCHASE ORDER NUMBER: 00170128

DESIGN SPECIFICATION NUMBER: 546B8925 REV. 6

CODE EDITION/ADDENDA INVOKED: 1980 EDITION, Summer 1980 ADDENDA

DESIGN SPECIFICATION MEETS THE REQUIREMENTS OF:

___ NA-3252 FOR WINTER 1976 AND EARLIER ADDENDA

✓ NCA-3252 FOR SUMMER 1977 AND LATER ADDENDA

DESIGN SPECIFICATION IS CERTIFIED BY: PJK NO.: ___ STATE: OUT

✓ OWNER OR OWNER'S AGENT

EDWARD VALVES (WINTER 1975 AND LATER ADDENDA ONLY)
(NOTE: If certified by Edward, a different PE must certify any applicable Design Reports.)

DESIGN VERIFICATION:

___ DESIGN HAS BEEN VERIFIED PREVIOUSLY PER PARAGRAPH 7.7

✓ DESIGN VERIFICATION REQUIRED PER SECTION 7.0

✓ VERIFICATION COMPLETED AND FILED 3-17-05

✓ DESIGN REPORT REQUIRED: ITEM NUMBER(S): 01

DESIGN REPORT NUMBER(S): EAL-2559 Rev 1

n/a SEISMIC REPORT REQUIRED: ITEM NUMBER(S): ___

SEISMIC ACCELERATIONS: ___ g HORZ. ___ g HORZ. ___ g VERT.

SEISMIC REPORT NUMBER(S): EWCLF100

SPECIAL REQUIREMENTS: (ATTACH ADDITIONAL PAGE IF REQUIRED)

SIGNATURE OF REVIEWER: [signature] DATE: ___

FLOWSERVE

Flow Control Division

PLANT INTERNAL
OPERATING PROCEDURE

EXHIBIT NO. XIX	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04

TITLE: Design Report Reconciliation Form

DESIGN REPORT RAL-________
RECONCILIATION FORM

ECN________ Description of change________
Does this impact Design Report? ___ Yes ___ No
If yes, specify impact on design report________
Reviewer:________ Date:________

ECN________ Description of change________
Does this impact Design Report? ___ Yes ___ No
If yes, specify impact on design report________
Reviewer:________ Date:________

ECN________ Description of change________
Does this impact Design Report? ___ Yes ___ No
If yes, specify impact on design report________
Reviewer:________ Date:________

ECN________ Description of change________
Does this impact Design Report? ___ Yes ___ No
If yes, specify impact on design report________
Reviewer:________ Date:________

ECN________ Description of change________
Does this impact Design Report? ___ Yes ___ No
If yes, specify impact on design report________
Reviewer:________ Date:________

ECN________ Description of change________
Does this impact Design Report? ___ Yes ___ No
If yes, specify impact on design report________
Reviewer:________ Date:________

ECN________ Description of change________
Does this impact Design Report? ___ Yes ___ No
If yes, specify impact on design report________
Reviewer:________ Date:________

ECN________ Description of change________
Does this impact Design Report? ___ Yes ___ No
If yes, specify impact on design report________
Reviewer:________ Date:________

10/5/88

FLOWSERVE
Flow Control Division

EXHIBIT NO. XX	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Part Number/Material Change Advisement Form (PNCA)	

PLANT INTERNAL
OPERATING PROCEDURE

FLOWSERVE
Flow Control Division

EDWARD VALVES
RALEIGH, NC

Control No: PNCA
Rev. No: ___ Date: ___
Page 1 Of 1

PART NUMBER/MATERIAL CHANGE ADVISEMENT

Customer Name and Address: _____

Customer RFQ Number: _____
Flowserve Quotation Number: _____

Line Item	Valve/Part Description	Original Mod. No.	New Mod. No.	Original Material	New Material	Reason Code

		Dimension Description	Original Dimension	New Dimension	
		A – End to End AA – End Hub Dia. BP – H/L Clearance CF – Center to End G – Handwheel Diameter E – Center to top of HW Cv – Flow Coefficient Weight, lbs (Viv only)			

* The following reason(s) are applicable as to why Edward Valves is furnishing a component/replacement part with a part number different from that on your referenced inquiry or that originally furnished:

Reason Codes:
PI - Product Improvement
MA - Material Availability
CE - Code Edition and/or Addenda
DC - Design Change
NC - No Change
O - Other

Form, fit and function will not be affected and the part(s) being furnished comply with the inquiry specifications and is(are) equal to or better than the corresponding part(s) specified or originally furnished.

It is recommended you issue a change/amendment to your purchase order identifying the new part number(s) that will be supplied in order to facilitate the use of these references in receiving and inspecting the product.

Project Engineer _____ Date _____ Contracts Administrator _____ Date _____

FLOWSERVE
Flow Control Division

EXHIBIT NO. XXI	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Sales Order Routing Sequence	

PLANT INTERNAL
OPERATING PROCEDURE

SALES ORDER ROUTING SEQUENCE

S.O. No. ____ - _____

Order Code _____

SOC No. _____

	Design Engineer	Actuator Engineer	B/M Editor Production	Sales Drawings	File
Sequence					
Received Date & Initial					
Released Date & Initial					

Special Notes: _____

FLOWSERVE
Flow Control Division

EXHIBIT NO. XXII	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04
TITLE: Design Plan Checklist for Sales Orders	

PLANT INTERNAL OPERATING PROCEDURE

DESIGN PLAN CHECKLIST FORMAT FOR SALES ORDERS
Complete for all orders requiring design per 3.1.1

SIZE_____ FIGURE_____ S.O.#_____ I/T_____

S.O. RECEIVED BY_____ DATE:_____ S.O. ASSIGNED TO_____ DATE_____
PRODUCT DESIGN MGR PROJECT ENGINEER

PLAN ACTIVITIES[1]	RESPONSIBLE PERSON[2]			
Review Customer P.O.	PROJECT ENGINEER	Y	N/A	A
Review Customer Specification	PROJECT ENGINEER	Y	N/A	A
GSP Input Developed for traceable orders	PROJECT ENGINEER	Y	N/A	A
GSP APPROVED & ISSUED	PROJECT ENGINEER	Y	N/A	A
GSP REVISION	PROJECT ENGINEER	Y	N/A	A
Design Inputs Identified	PROJECT ENGINEER	Y	N/A	A
Inputs Documented	PROJECT ENGINEER	Y	N/A	A
Input Conflicts Resolved	PROJECT ENGINEER	Y	N/A	A
Interfaces Identified				
Purchasing	PROJECT ENGINEER	Y	N/A	A
QA (other than GSP)	PROJECT ENGINEER	Y	N/A	A
Production	PROJECT ENGINEER	Y	N/A	A
Outside Design Organization	PROJECT ENGINEER	Y	N/A	A
Other_____	PROJECT ENGINEER	Y	N/A	A
Design Outputs Developed				
Performance Report	PROJECT ENGINEER	Y	N/A	A
Seismic Report	PROJECT ENGINEER	Y	N/A	A
First Partial B/M	ENG. DRAFT TECH.	Y	N/A	A
Second Partial B/M	ENG. DRAFT TECH.	Y	N/A	A
Final B/M	ENG. DRAFT TECH.	Y	N/A	A
Assembly Drawings	DRAFTER	Y	N/A	A
Revision	DRAFTER	Y	N/A	A
Layout	DRAFTER	Y	N/A	A
Revision	DRAFTER	Y	N/A	A
Detail Drawings	DRAFTER	Y	N/A	A
Revision	DRAFTER	Y	N/A	A
Actuator Selection	PROJECT ENGINEER	Y	N/A	A
Other_____		Y	N/A	A
Design Verification (to be performed by other(s))				
Design Review	DESIGN MANAGER	Y	N/A	A
Tests_____	PROJECT ENGINEER	Y	N/A	A
Alternate Calculations	PROJECT ENGINEER	Y	N/A	A
Comparison to similar proven design	PROJECT ENGINEER	Y	N/A	A

Footnote:

1. Actual tasks may vary, depending of the nature and scope of a project. The descriptions and the sequence shall be used as a guideline in preparing specific design plan checklists.

2. Name of actual assigned individual shall be used when a specific design plan checklist is prepared in accordance with this format.

FLOWSERVE
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EXHIBIT NO. XXIII	Procedure No.: 36-70-03-24
	Effective Date: 10-12-76
	Revision Date: 10-12-04
TITLE: Design Plan Checklist for Development Projects	

PLANT INTERNAL
OPERATING PROCEDURE

DESIGN PLAN CHECKLIST FORMAT FOR DEVELOPMENT PROJECTS
Complete for all development projects requiring design per 3.1.1
Page 1 of 2

TASK DESCRIPTION:	RESPONSIBILITY:	STATUS
Establish general scope of project for new product or major product improvement.	Staff	Y N/A A
Initiate steps for preparation of product specification objective (PSO) interfacing with person(s) delegated by Marketing VP.	Research Mgr.	Y N/A A
Assign Development Project Engineer	Research Mgr.	Y N/A A
Prepare Project Schedule:	Project Engr.	Y N/A A
Complete PSO	Project Engr.	Y N/A A
Obtain approval of PSO interfacing with persons delegated by Marketing, Operations, and QA VPs.	Research Mgr.	Y N/A A
Prepare preliminary design drawings in accordance with PSO and established Edward drawing control and CAD SOIs.	Project Engr. Development Tech.	Y N/A A
Conduct Engineering Design Review of preliminary design.	Engineering VP Research Mgr.	Y N/A A
Complete design drawings for prototypes for proof testing.	Project Engr. Development Tech.	Y N/A A
Conduct design review or prototype designs in accordance with PROP 36-70-03, paragraph 6.4, interfacing with persons delegated by Marketing, Operations, and QA VPs.	Engineering VP Research Mgr.	Y N/A A
Finalize prototype designs and arrange manufacture.	Project Engr. Development Tech.	Y N/A A

DESIGN PLAN CHECKLIST FORMAT FOR DEVELOPMENT PROJECTS
Complete for all development projects requiring design per 3.1.1
Page 2 of 2

TASK DESCRIPTION	RESPONSIBILITY	STATUS
Prepare test procedures and obtain required approvals.	Project Engr.	Y N/A A
Conduct proof tests and write preliminary report.	Project Engr. Development Tech.	Y N/A A
Review test results and compare with PSO, interfacing with persons delegated by Marketing, Operations, and QA VPs.	Engineering VP Research Mgr.	Y N/A A
Prepare technical report on design development and test results in accordance with PIOP 36-70-14.	Project Engr.	Y N/A A
Decision on putting the new product or major design improvement into production.	Staff	Y N/A A
If the project leads to production, prepare Product Specification Design (PSD) with basic design rules for the new product line or major design improvement.	Project Engr.	Y N/A A
Provide assistance to other Engineering Department personnel and Operations during the production valve introduction program.	Research Mgr. Project Engr.	Y N/A A
Provide assistance to Marketing personnel in preparing accurate technical material for catalogs and supporting technical papers.	Research Mgr. Project Eng.	Y N/A A

FOOTNOTE:

1. Actual tasks may vary, depending of the nature and scope of a development project. The descriptions and the sequence shall be used as a guideline in preparing specific design plan checklists.
2. Name of actual assigned individual shall be used when a specific design plan checklist is prepared in accordance with this format.

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PLANT INTERNAL
OPERATING PROCEDURE

EXHIBIT NO. XXIV	Procedure No.: 36-70-03-24
	Effective Date: 10-08-76
	Revision Date: 10-12-04

TITLE: Typical Report Documentation

FLOWSERVE

Flow Control Division

REPORT NO.: RAL-2559
REV. 0
DATE: 03/14/03
PAGE 1 of 3

NOTE: This Design Report is intended to supplement CWCL Seismic and Stress Report No. 100 Rev. 2, providing additional data required for Raleigh Plant Design Control. The Calculations provided by Report 100 Rev. 2 will also apply to valves covered by this Design Report.

DESIGN SOURCE: Ontario Power Generation Purchase Orders

DESIGN INPUTS:

ASME SA-182 Gr. F316
Design Specification: 54SB8925 Rev. 6
Design Conditions: 1400 psi @ 200°F
ASME Section III, 1980 Edition, Summer 1980 Addenda, Class 1
ASME B16.34-1977, Pressure Class 900

LITERATURE SEARCHES: Not Applicable

ASSUMPTIONS: None

COMPUTER CALCULATIONS/PROGRAMS: None

VALVE DATA:

Size 2 1/2 Figure 45885OHEBW80
Layout No.: KN59-0090 Rev. F
Sales Drawing: KN59-0090 Rev. F

PRESSURE RETAINING PARTS:

PART NAME	PART No.	DRAWING No.	REV.	RMC No.	ASME/ASTM SPEC.
BODY	671814	CN-3173	B	02721	SA182 GR. F316
PIPE END	671815	CN-3172	B	02721	SA182 GR. F316
BALL	671816	CN-3291	D	02721	SA182 GR. F316
CAPSCREW	671817	AN-0659	0	01795	SA564 T630 H1075

REVIEW AND APPROVAL:

PREPARED BY: [signature] DATE: 3-14-03

REVIEWED BY: [signature] DATE: 3-19-03

APPROVED BY: [signature] DATE: 3-20-03