



P.O. BOX 1625, IDAHO FALLS, IDAHO 83415

50-317
50-318

March 22, 1982

DISTRIBUTION

TRIP REPORT - VISIT TO NRC-NRR AND TO CALVERT CLIFFS PWR POWER PLANT,
WORK ORDER 20-81-165 - RGB-3-82

On Monday, February 7, 1982, C. Toole and I met with Mr. Warren Minners and Mr. Ron Emrit of NRC-NRR at the Phillips Building in Bethesda, MD to discuss generic problems which possibly could be tasks for EG&G Idaho to solve. Mr. Minners gave us a list of problems which had been categorized by priorities. Thirteen high priority problems were identified. Ron Emrit supplied task descriptions and supporting documents for six of the tasks, and promised to send additional information on the remaining ones. Minners asked that EG&G prepare draft statements of work to 1) study the problems and prepare feasible alternate solutions, 2) prepare cost estimates for alternates with recommendations for most reasonable solutions and 3) prepare and submit a summary letter report to NRC-NRR. C. Toole and I committed to submitting a set of draft Statements of Work by the end of February.

On February 8, 9 and 10, I met with personnel of Baltimore Gas and Electric (BGE). Tuesday, February 8, I obtained drawings and a procurement specification for a feedwater isolation valve. Wednesday, February 9, I met with instruments and controls personnel to obtain cost data on control room modifications. Thursday, February 10, I visited the Calvert Cliffs plant and obtained cost and scheduling data from plant personnel. The results of my discussions with BGE personnel are summarized below:

1. The two main feedwater control valves are located in the turbine building which is not designed to withstand a Category I earthquake.
2. Main steam and feedwater isolation valves are located outside containment in the auxiliary building which is built to withstand a Category I earthquake. I received drawings showing dimensions, lengths and elevations of piping and the locations of feedwater isolation valves. BGE personnel agreed to take photographs and send to me which show potential installation location for an additional feedwater isolation valve in each of the two feedwater lines to the steam generators.
3. I received a cost breakdown (attached) for the cost to install an additional isolation valve in the feedwater line. The cost estimate was based on recent BGE experience in modifying the auxiliary feedwater system.

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PDR FOIA
UDELL82-261 PDR

4. I inquired if the existing feedwater isolation status and control station on the control room panel could be utilized to status and control two isolation valves instead of one, and I was informed that the existing panel hardware and logic would not handle the additional current load.
5. I was shown the existing control room panel where the additional feedwater isolation valve control stations would have to be installed. The panel is already overcrowded and the whole panel would have to be redesigned and reworked to handle two additional feedwater isolation valve stations. A similar problem existed when the auxiliary feedwater systems were recently modified — two control room panels had to be rebuilt at a labor cost of over 4,000 hours.
6. I discussed scheduled outages and durations for both PWRs with BGE personnel. The currently planned outages for refueling, etc. are as follows:

Unit 1	1985 - 1 outage (14 weeks)
	1987 - 1 outage (14 weeks)
Unit 2	1984 - 1 outage (4½ weeks)
	1985 - 1 outage (14 weeks)

The revenue loss per day for an outage of one of the units varies with the season and ranges from \$750,000 to \$1,200,000 per day. BGE personnel stated that they felt that installation of two new feedwater isolation valves would add 3-4 days to a scheduled 14-week fuel reload outage.

7. All valves, pumps, etc. in the auxiliary buildings have extensive maintenance work scheduled as part of each planned outage. There are moderate (?) reactivity levels in the auxiliary building and all work will have to be done in protective clothing and under health physics control. Multiplying the estimated labor for a job by an interference factor of 2.5 is normally used by BGE to take into account work interferences and work performed with protective clothing.
8. Mr. K. Nietmann, BGE, agreed to obtain additional costing details and supply them later via phone. He subsequently did so (see attached telecon).

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Page 3.

During the meetings, I was given two drawings of the feedwater system and a feedwater isolation valve specification. I will retain the drawings and valve specification in my files. The BGE personnel were very helpful and candid during discussions. I consider that the trip was worthwhile.

R. G. Bearden

R. G. Bearden
Sr. Systems Engineer
Project & Systems Engineering Office

jlr

Attachments:
As Stated

Distribution

EG&G Idaho

C. F. Obenchain
B. F. Saffell
C. R. Toole
W. E. Watters

DOE-ID

P. E. Litteneker
J. E. Solecki
R. E. Tiller

cc: R. W. Kiehn, EG&G Idaho

January 25, 1982

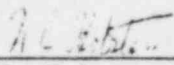
TO: Those listed below

FROM: W. C. Holston

SUBJECT: Installation Costs For a 10-Inch Automatic Isolation Valve


Bob Bierden of EG&G, acting as a consultant for the NRC, will be visiting with us on the 9th, 10th, and 11th of February of 1982. He is interested in studying our Main Feedwater (MFW) System. His charge, from the NRC, is to determine the impact of various possible rulemakings by the NRC in regard to MFW. To facilitate this work, I have prepared in advance, with the help of K. Nietman from PMD, a generic estimate for installing a 10" automatic isolation valve. This could be used on any plant if the manhour cost and distance from the valve to the control room and cable spreading room were known. Although we already have valves of this nature installed, we were able to come up with these numbers rather quickly from our AFW estimate.

Should you have any comments or questions, feel free to contact me at 234-7577.



W. C. Holston
Engineer
Electric Engineering Dept.

WCH/tej

cc - Messrs. R. F. Ash
A. R. Thornton
R. Olson

K. Nietmann

COST TO INSTALL A 10" AUTOMATIC
ISOLATION VALVE

1. Install valve in pipeline:
 - cut and bevel existing line: 100.00 Mhs
 - install 72.80 Mhs
 - two buttwelds 11.40 MhsTotal: 184.20 Mhs

2. Seismic support:
 - install: 70.00 Mhs

3. Fire watch for welding and cutting: 45.00 Mhs

4. Tubing and Fittings: 0.60 Mhs per foot installed

5. Cable: 0.04 Mhs per foot installed

6. Conduit (1"): 0.50 Mhs per foot installed

7. Terminations: 0.71 Mhs per termination
 - assume a two conductor shielded cable for a total of four terminationsTotal: 2.84 Mhs

8. Annunciation would require one or the other of the following two options
 - A. Annunciation from switch position would require running another cable and conduit to the cable spreading room. Use per foot costs from items 5 and 6.
 - B. Annunciation with torque switch on valve would require bigger cable (cost-differential only in material) plus an additional four terminations.

9. Install handswitch: 16.00 Mhs

10. Transport valve 25.00 Mhs

11. Hydro Test 40.00 Mhs

12. Rad Con Coverage: 10% of total manhours from items: 1,2,4,5,6, and 11

13. Quality Control Coverage: 25% of total manhours from items 1,2,4,5,6, 7,8,9, and 11.

14. All manhours in items 1,2,3,4,5,6,10,12, and 13 should be multiplied by a factor of 1.5 to account for this work being performed in the auxiliary building.
15. Materials: It would be accurate enough to only include the cost of the valve. This must include the required environmental qualification, which is quite costly.
16. Overhead: 33.6% of all costs attributable to company labor.
17. Supervision and Engineering: 24% of all costs except item 16 (materials).
18. Reserves (quite often used up totally)
 - 15% of material
 - 20% of labor (excluding overhead and S&E)

Note: Costs for only one valve.

MEMO OF CONVERSATION

FORM EG&G-561

(1-77)

PERSON CALLING: R. B. Bearden DATE February 22, 1982
 REPRESENTING: EG&G Idaho TIME 9:30 a.m.
 PERSON CALLED: Kevin Neitmann PHONE NUMBER (301) 269-4839
 REPRESENTING: Baltimore Gas and Electric (BGE)
 CITY: Baltimore, Maryland
 SUBJECT: Cost Estimating Data on DISTRIBUTION _____
Installation of Feed Water _____
Control Valves _____

During my visit to the BGE Calvert Cliffs PWR on February 11, 1982, Kevin Neitmann, BGE, was asked to provide cost estimating data on the installation of feed water control valves. Since BGE was in the process of installing new 10-inch control valves in the auxiliary feed water system, Kevin stated that he would base the cost estimate on the recently completed installation. I called him today and he provided the following data:

1. Installation of each 10 inch auxiliary feed water system control valve:

Tubing and fittings (200 ft.)	120 man hours
Cabling (800 ft.)	32
Conduit (200 ft.)	100
Miscellaneous (planning, inspection etc.)	383
Total hours	635 man hours

Work Interference Factor	X2.5
	1587 man hours

Cost Based on 7-12 hour shifts

Straight Time (\$25/hr)	\$18.90K
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1½ Time	22.68K
---------	--------

Double	11.34K
--------	--------

	\$52.92K
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Subcontractor Added Cost	X1.5
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Total Cost	\$79.38K
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SIGNATURE _____

(CONTINUE ON REVERSE SIDE)

2. Control Room Panel Modifications:

Total Field Work	4433 man hours
Cost	\$155K
Subcontractor Added Cost	<u>X1.5</u>
Total Cost	\$232.5K

3. Times to Complete Jobs:

- a. Each Valve Installation
(7 day workweek-2 shifts daily) - 44.5 days

NOTE: Neitmann thought that 25% of second valve installation could overlap installation of first valve.

- b. Modification of Control Room Panels - 35 days

ATTACHMENT 3



MEMO OF CONVERSATION

FORM EG&G-561
(Rev. 3-77)

PERSON CALLING Robert G. Bearden *RGB* DATE March 4, 1982
 REPRESENTING EG&G Idaho TIME _____
 PERSON CALLED B. Bergman PHONE NUMBER (215) 667-9090
 REPRESENTING Anchor-Darling Valve Co.
 CITY Williamsport, PA
 SUBJECT Cost Quote on 16-inch DOE Work Order 20-81-165, file
Feed Water Isolation B. Bearden File
Valve and Operator

DISTRIBUTION

I asked Mr. Bergman to supply a budgetary quotation for a 16-inch, 900# carbon steel gate valve for use as a feed water system isolation valve in a nuclear PWR.

He stated that their double disk gate valve which has bi-directional sealing has been used in many PWR feed water systems as isolation valves (see attachments provided from Anchor-Darling Valve Catalog).

For a 900# carbon steel valve with limit torque motor operator (12-inches/minute travel) which meets ASME Section III, Class 2; he quoted as follows:

Each valve and motor operator	\$ 54,000
(with all documentation except seismic)	
One set of seismic documentation	3,000
Total	\$57,000

He stated that Anchor-Darling Valve Co. is currently quoting 40-weeks for delivery of the above valve.

SIGNATURE _____

(CONTINUE ON REVERSE SIDE)

Anchor/Darling EXPERIENCE

PAGE 1

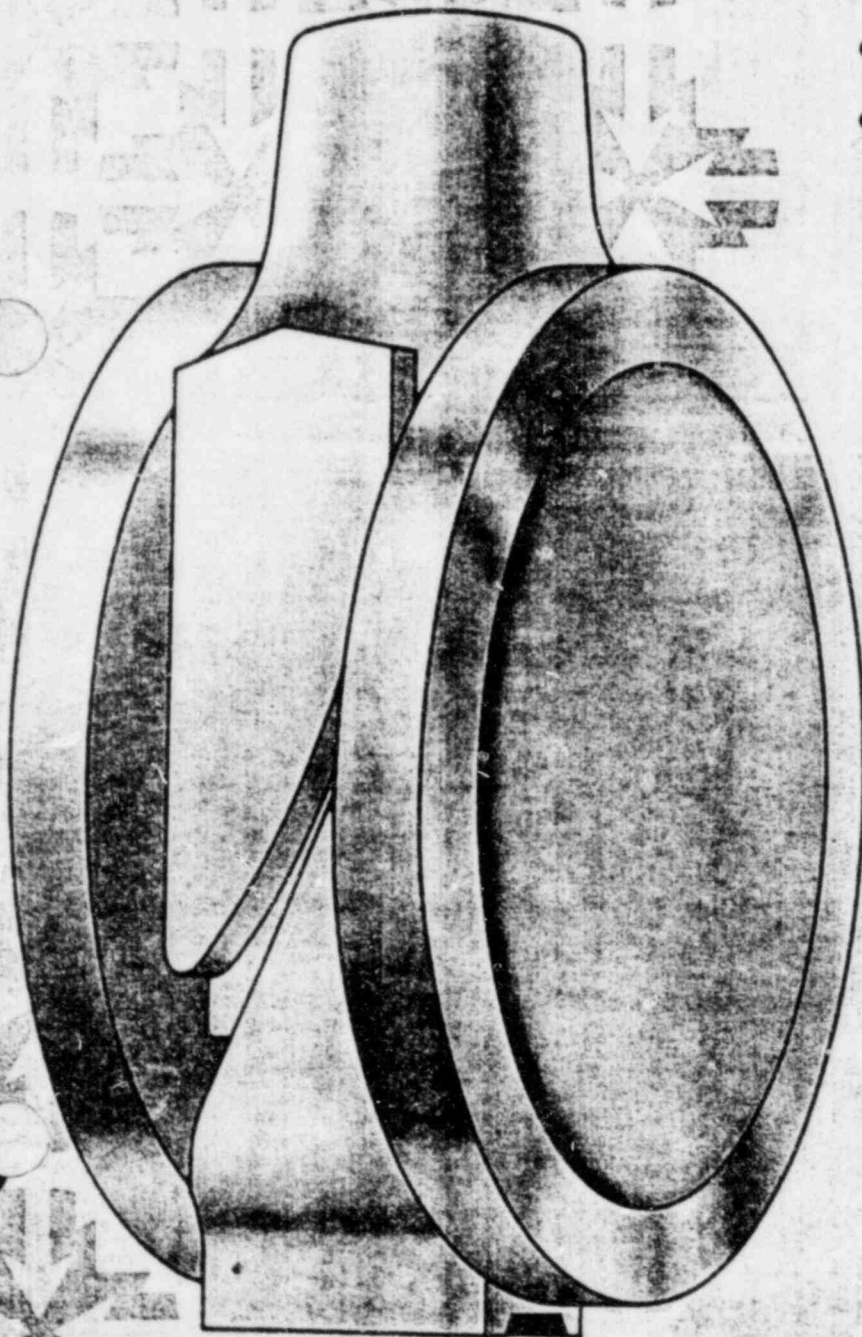
U.S.A. CONTRACTS FOR FEEDWATER ISOLATION VALVES (NUCLEAR)

INSTALLATION	UTILITY	DESCRIPTION	MAT'L.	QTY.
Millstone 3	Northeast Utilities	18x14x18"-900# DD	CS	4
Callaway 1	Union Electric Co.	14x10x14"-900# DD	CS	4
Callaway 2	Union Electric Co.	14x10x14"-900# DD	CS	4
Wolf Creek	Kansas Gas & Electric	14x10x14"-900# DD	CS	4
Sterling 1	Rochester Gas & Electric	14x10x14"-900# DD	CS	4
Tyrone Energy Park 1	Northern States Power	14x10x14"-900# DD	CS	4
WPPSS Nuclear 1	Washington Public Power Supply System	22x20x22"-1130# DD	CS	4
WPPSS Nuclear 4	Washington Public Power Supply System	22x20x22"-1130# DD	CS	4
V. C. Summer	South Carolina Electric & Gas Co.	18x14x18"-900# DD	CS	3
Waterford 3	Louisiana Power & Light	20x18x20"-900# DD	CS	2

Anchor/Darling

DOUBLE DISC GATE VALVES

- Uniform Seat Wear
- Low Pressure Sealing
- Between Seat Sealing
- Reliable Operation
- Critical Surfaces
Stellited for Long Wear
- Rapid Closure
- Ease of Maintenance
- Versatile Actuator
Application



Anchor/Darling has been providing industry with quality fluid control products throughout the world.

Anchor/Darling's double disc gate valve has been designed to provide reliable operation under the most severe service conditions. This unique design will provide reliable operation when subjected to large pipe nozzle loadings, rapid closure and repeated cycling. Extreme temperatures, gross thermal transients, high and low differential pressures, dirty and dual phase fluids have been considered in the development of the double disc gate valve design.

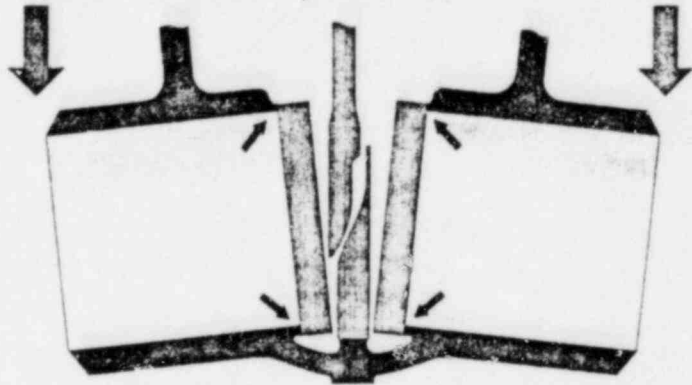
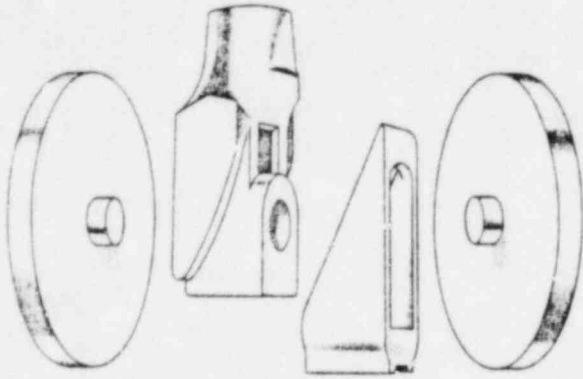
Anchor/Darling regularly supplies valves from 2½" to 54" in diameter and 150 to 4500 psi pressure ratings in carbon steel and a wide range of special alloys. Seating surfaces are normally stellited but other materials can be supplied depending on the application.

Double Disc Gate Valves

DOUBLE DISC WEDGE ASSEMBLY

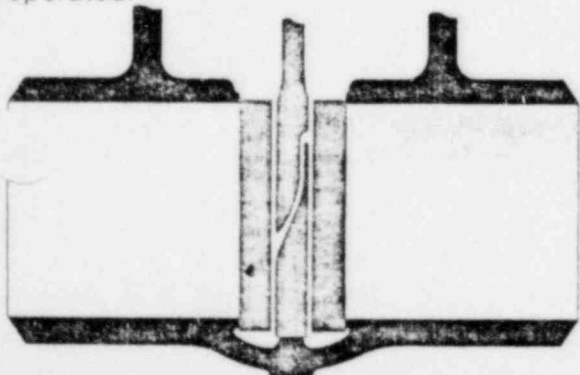
The four piece double disc wedge assembly can neither be incorrectly assembled nor become disengaged while in service.

Exclusive wedge design assures uniform distribution of sealing pressure, even when valve seats have become out of parallel due to body distortion.



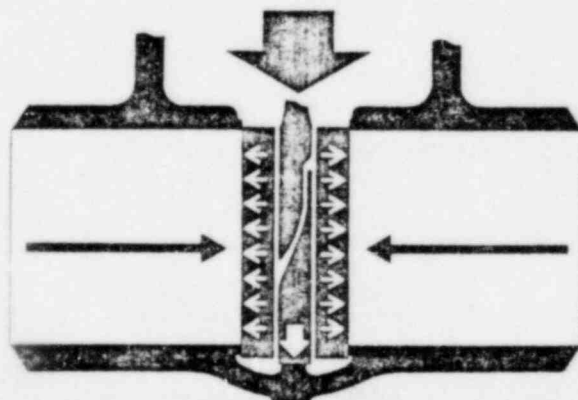
UNIFORM SEAT WEAR

The double disc assembly incorporates a unique revolving disc feature which assures maximum seat life under the most exacting service conditions. The two independent discs, during each closing stroke and immediately prior to the disc seating, rotate a few degrees in the plane of the seats. This rotating feature forces the disc to seat in a different position on each closing stroke, equalizing wear on the seats and the discs. Each time the valve is closed, the seats and discs are wiped clean. The rotating action removes particles from the sealing surfaces before they can become wedged between the seats and the disc and cause damage. In addition, this movement of the disc creates a lapping effect whenever the valve is operated.



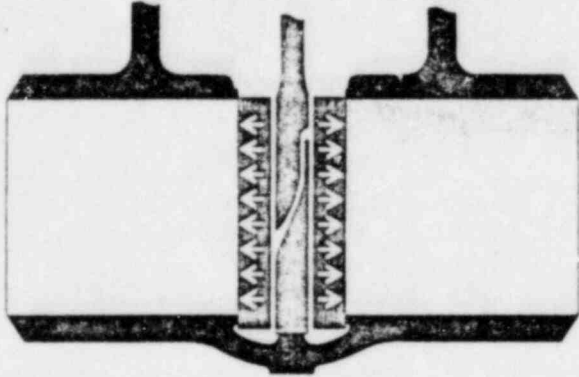
LOW PRESSURE SEALING

The unique Anchor/Darling wedge assembly is designed to impart sufficient thrust to each disc to maintain low pressure sealing. As the differential pressure across the disc increases, the seating load also increases, thus providing a tight seal throughout the entire range of operating differential pressures. Since the discs are completely independent of each other and the design is essentially symmetrical, positive sealing can be maintained in either direction.



BETWEEN SEAT SEALING

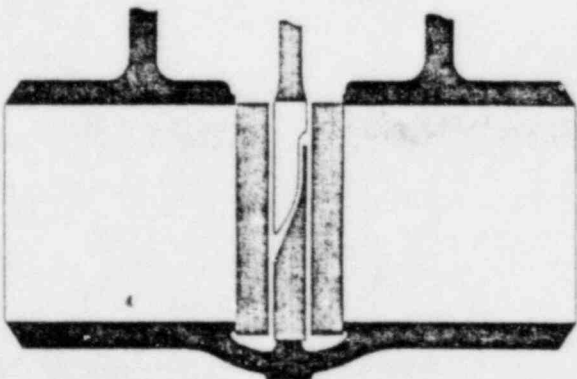
The two discs seat independently of each other. Pressure applied between the discs provides complete isolation of the upstream fluid from the downstream fluid. In addition, the parallel seat design allows for inline seat leak testing without the aid of additional valving.



RELIABLE OPERATION

Another unique feature of the double disc wedging mechanism is the configuration of the upper wedge incline face.

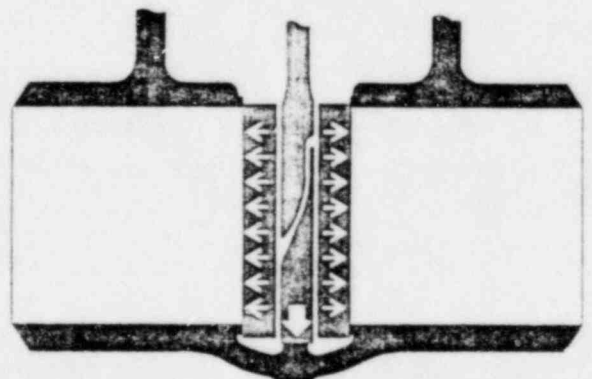
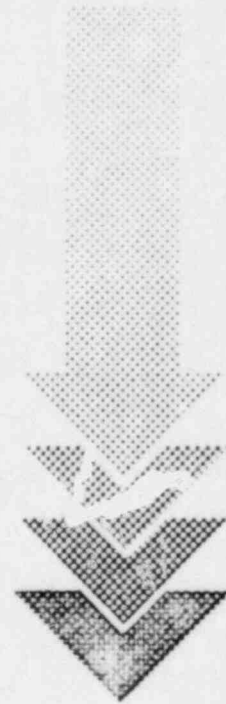
Years of research and experience led to this present rocker face design. This eliminates any possibility of locking the disc in the closed position even when closed quickly and subjected to severe thermal transients. The rocker faces are stellited for longer life.



Anchor/Darling

RAPID CLOSURE

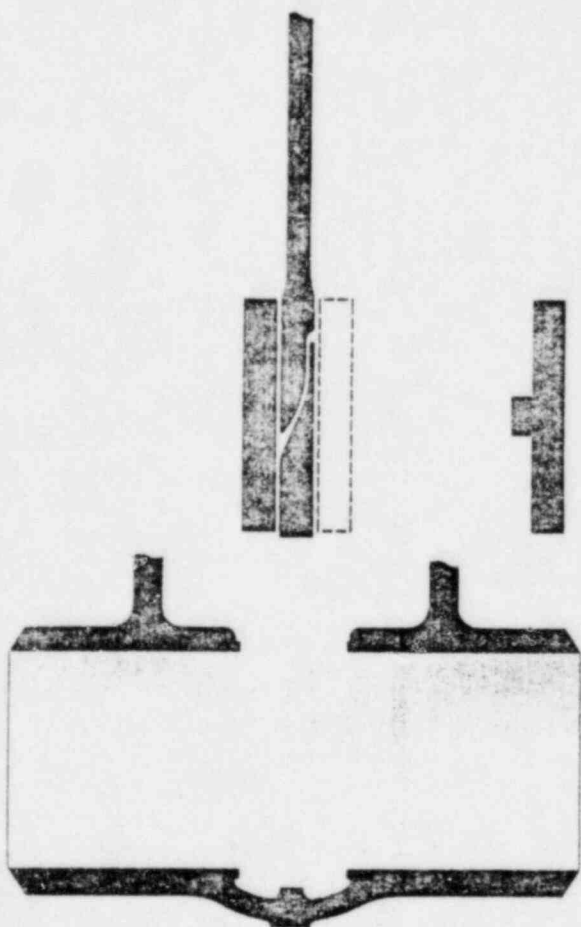
Anchor/Darling's unique wedging design permits rapid closure without seat distortion. Internal moving parts decelerate independently of each other with the result that inertial forces are dissipated in a series of impacts over a period of time. The largest of these is transmitted directly to the bottom of the valve body on a non-sealing surface. Forces transmitted directly to the seats are a small percentage of the total inertial forces. This is a distinct advantage over valve designs in which the total inertial force is absorbed directly by the seating surface.



Double Disc Gate Valves

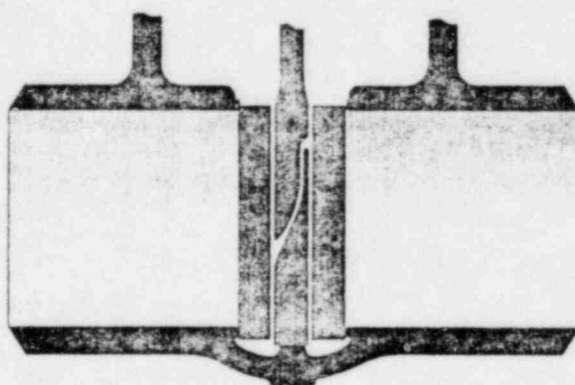
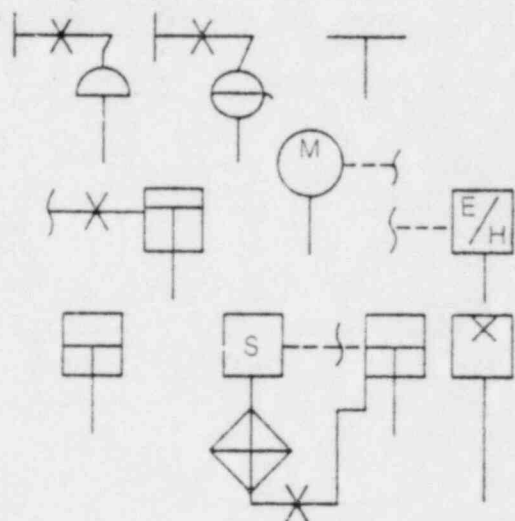
EASE OF MAINTENANCE

The parallel seats and independent discs permit maintenance without special fitting in the field. The repair of minor seat or disc damage is greatly simplified because the seats and discs can be lapped independently of each other. If required, spare parts can be installed directly off the shelf. Disassembly and maintenance can be accomplished without special tools or elaborate rigging.



VERSATILE ACTUATOR APPLICATION

Anchor/Darling offers a full line of actuators designed to increase the utility of our double disc gate valve. An experienced engineering staff is available to work with the customer in determining the type of actuator that best fulfills his design requirements.



For further information contact:

Anchor/Darling

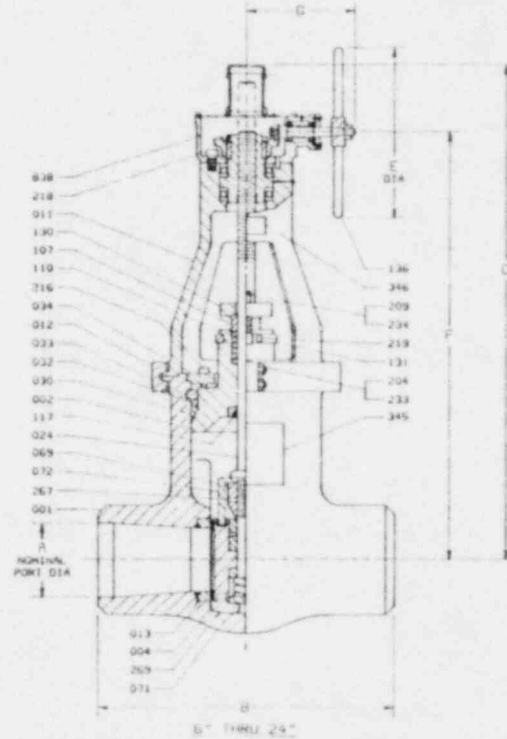
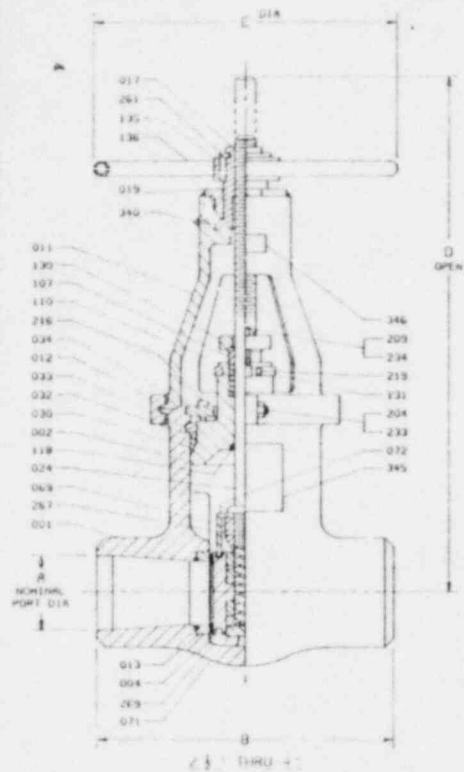
Valve Company

One Belmont Avenue
Bala Cynwyd, PA 19004

Anchor/Darling

International

Jan Van Nassastraat 55
The Hague, Holland



ITEM NO	DESCRIPTION	TYPICAL CARBON STEEL		TYPICAL STAINLESS STEEL	
		MATERIAL	MATERIAL SPEC ASME SA ASTM A	MATERIAL	MATERIAL SPEC ASME SA ASTM A
001	BUDG	CARBON STEEL	SA216 WCB	STAINLESS STEEL	SA321 CF8M
002	BONNET	CARBON STEEL	SA105	STAINLESS STEEL	SA182 F316
004	DISC	CARBON STEEL	SA105 W COOR A	STAINLESS STEEL	SA182 F316 W COOR A
011	YOKI	CARBON STEEL	A216 WCB	CARBON STEEL	A118 WCB
012	YOKI CLAMP	CARBON STEEL	A515 70	CARBON STEEL	A515 70
013	SEAT RING	CARBON STEEL	A136 B W COOR A	STAINLESS STEEL	A240 316 W COOR A
017	YOKI SLEEVE	MANG BRONZE	B184	MANG BRONZE	B184
018	YOKI CAP	STRUCTURAL STEEL	A36	STRUCTURAL STEEL	A36
024	STEM	STAINLESS STEEL	A178 410 CL2	STAINLESS STEEL	A304 304
030	PRESSURE SEAL GASKET	SOFT STEEL		STAINLESS STEEL	A142 304L
030	SPACER RING	CARBON STEEL	A515 70	STAINLESS STEEL	A142 316
032	GASKET RETAINER	CARBON STEEL	SA151 70	STAINLESS STEEL	SA240 316
034	BONNET RETAINER	STRUCTURAL STEEL	A36	STAINLESS STEEL	A240 316
068	UPPER WEDGE	CARBON STEEL	A216 WCB W COOR A	STAINLESS STEEL	A321 CF8 W COOR A
071	LOWER WEDGE	CARBON STEEL	A216 WCB W COOR A	STAINLESS STEEL	A321 CF8 W COOR A
072	DISC RETAINER	CARBON STEEL	A515 70	STAINLESS STEEL	A240 316
107	GLAND	STAINLESS STEEL	A314 410	STAINLESS STEEL	A718 316
110	PACKING	JOHN CRANE 1871		JOHN CRANE 1871	
117	BACKSEAT	CARBON STEEL	A515 70 W COOR A	STAINLESS STEEL	A240 316 W COOR A
118	BACKSEAT INTEGRAL	STELLITE	COOR A	STELLITE	COOR A
130	GLAND FLANGE	CARBON STEEL	A515 70	STAINLESS STEEL	A240 316
131	GLAND RETAINER	CARBON STEEL	A515 70	STAINLESS STEEL	A240 316
135	HANDWHEEL KEYS	CARBON STEEL	A108 1137	CARBON STEEL	A108 1137
136	HANDWHEEL	CARBON STEEL	A53 5B	CARBON STEEL	A53 5B
204	YOKI CLAMP STUDS	ALLOY STEEL	A193 B7	ALLOY STEEL	A193 B7
204	EYEBOLTS	ALLOY STEEL	A193 B7	ALLOY STEEL	A193 B7
216	BONNET CAPSCREWS	ALLOY STEEL	A574	ALLOY STEEL	A574
218	ACTUATOR CAPSCREWS	ALLOY STEEL	A574	ALLOY STEEL	A574
219	GLAND RET CAPSCREWS	ALLOY STEEL	A574	ALLOY STEEL	A574
233	YOKI CLAMP NUTS	CARBON STEEL	A194 2H	CARBON STEEL	A194 2H
234	GLAND STUD NUTS	CARBON STEEL	A194 2H	CARBON STEEL	A194 2H
261	RETAINER RING	CARBON STEEL	A515 70	CARBON STEEL	A515 70
267	WEDGE PIN	CARBON STEEL	A108 1020	STAINLESS STEEL	A878 415
268	WEDGE SPRING	STAINLESS STEEL	A501 302	STAINLESS STEEL	A501 302
340	GREASE FITTING	ALLOY STEEL		ALLOY STEEL	
345	NAMEPLATE	STAINLESS STEEL	A501 304	STAINLESS STEEL	A501 304
346	I/D PLATE	STAINLESS STEEL	A501 304	STAINLESS STEEL	A501 304
838	BEVEL GEAR OPERATOR	ANCHOR/DARLING VALVE CO SET DWG PD-025		ANCHOR/DARLING VALVE CO SEE DWG PD-025	

NOTES:

- 1 - DRAWING HAS TYPICAL INFORMATION ONLY, FOR INSTALLATION PURPOSES USE CERTIFIED DRAWINGS.
- 2 - DIMENSION "B" IS FOR SHORT PATTERN.
- 3 - WEIGHTS INCLUDE ACTUATORS

VALVE SIZE	A	B	D	E	F	G	WT APPROX	Cv
2 1/2	2.25	10	Ø16 10	28	14	—	130	300
3	2.88	12	Ø16 10	28	10	—	175	500
4	3.88	14	Ø16 10	31	14	—	260	850
6	5.75	20	Ø16 10	46	18	35	690	2,175
8	7.50	26	Ø16 10	52	20	38	1,085	3,975
10	9.38	31	Ø16 10	59	20	44	1,375	6,125
12	11.12	36	Ø16 10	63	24	51	2,085	8,850
14	12.25	39	Ø16 10	70	24	56	2,540	10,875
16	14.00	43	Ø16 10	84	24	68	3,335	14,325
18	15.75	48	SP1	90	30	75	4,670	18,300
20	17.50	50	SP1	102	30	82	6,265	22,875
24	21.00	59	SP1	113	30	89	9,800	33,275

REV. NO	REVISIONS	BY	DATE
ANCHOR/DARLING VALVE COMPANY			
3 1/2 THRU 24 - 800 LB DOUBLE DISC GATE VALVE PRESSURE SEAL BONNET BUTT WELD ENDS			
DRAWN BY	DATE 5-1-78	CHECKED BY	NO.
CHECKED BY	DATE	DATE	1
APP. BY	DATE	DATE	1 2 3 4 5 6 7 8

TYPE SMB VALVE OPERATORS

A NEW Design to Meet Indust

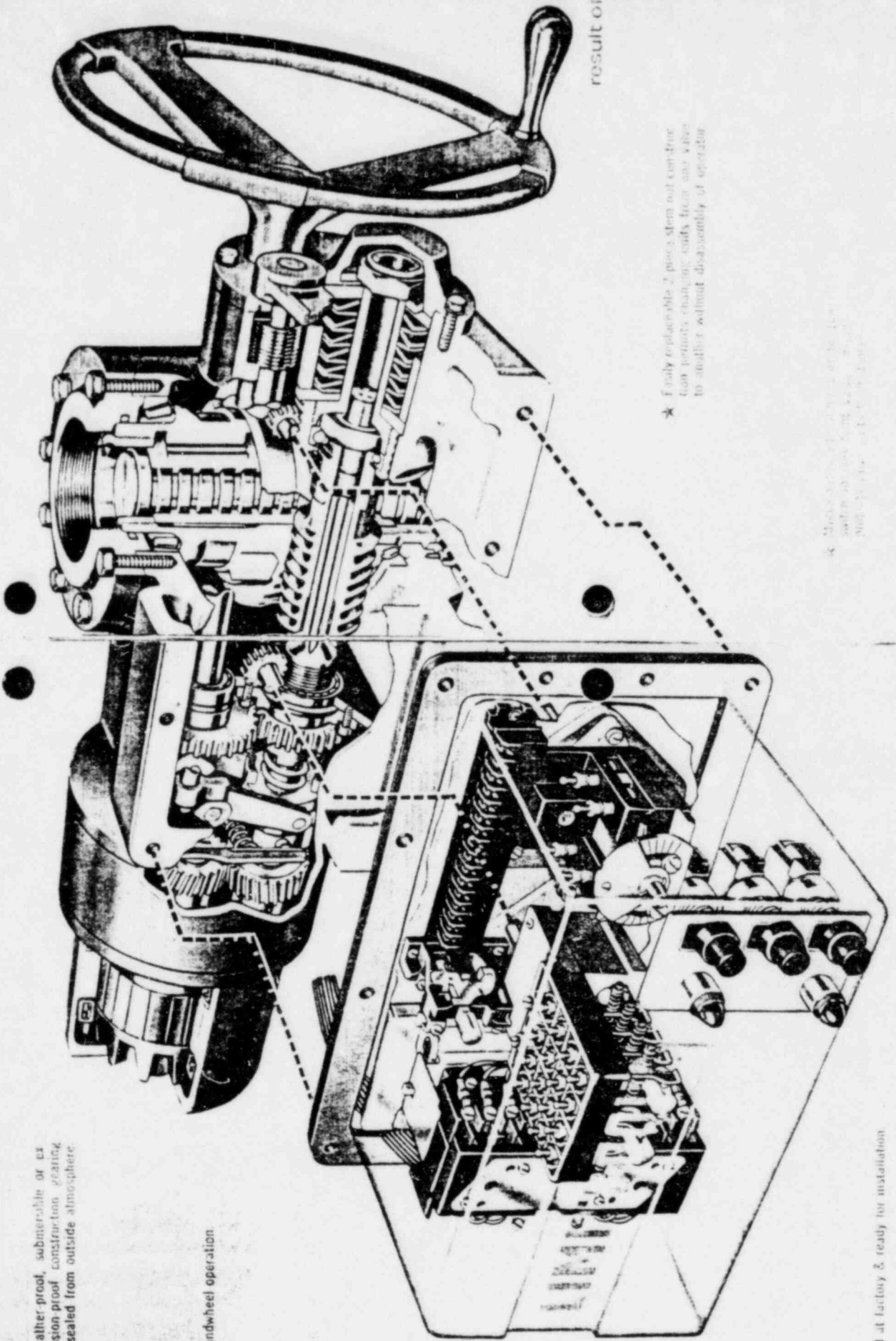
★ Weather proof, submersible or explosion-proof construction, gearing is sealed from outside atmosphere.

or disengaged during handwheel operation

torque switch
[gaj] control

com-
ts are
frains
rater.

sole control by
of computer.



result of

★ Easily replaceable 2 piece stem nut condenser
has permits changing easily from one valve
to another without disassembly of operator

★ Dimensions of unit are 10 1/2" high
width of base 10 1/2" depth 10 1/2"
Weight 10 1/2 lbs.

★ All units lubricated at factory & ready for installation

ATTACHMENT 4



BECHTEL POWER CORPORATION
 ENGINEERS
 GAITHERSBURG, MARYLAND

Specification No. 6750-M-253
 Job No. 6750

SPECIFICATION
 FOR
 LARGE NUCLEAR CARBON STEEL GATE,
 GLOBE AND CHECK VALVES
 CALVERT CLIFFS NUCLEAR POWER PLANT
 UNITS NO. 1 AND 2
 BALTIMORE GAS AND ELECTRIC COMPANY
 CALVERT COUNTY, MARYLAND

Comprising:

- Cover Sheet
- Certification of Specification by Professional Engineer
- Individual Page Revision Index Sheet
- Specific Conditions
- Weld End Preparation (6750-SK-M-520)
- Weld End Transition (6750-SK-M-522)
- Drawings and Data Requirements (Form G-321-C)
- Documentation Distribution Requirements (Form WO-G-61369)
- Quality Control Requirements for Equipment Manufacturers
and Site Constructors (Form BQC-200)
- Valve Data Sheet (Form G-231-E) and (From J-G50)

Rev. 14 AGA 6-23-75
 (Proj. Engr.) (Date)
 Issued for C.O. No. 3: Rev. 4 AK 4-3-72 Date: 12/4/69
 (Proj Engr) (Date)
 Issued for C.O. No. 4: Rev. 5 AK 5-3-72 By: J. B. Z...
 (Proj Engr) (Date)
 Group Supervisor: J. H. B...
 Issued For C.O. No. 5: Rev. 6 AK 7-24-72
 (Proj Engr) (Date)
 Issued for Comments/Approval: Rev. A Law 2-16-70
 (Proj Engr) (Date)
 Issued for Bids: Rev. 0 Law 5-14-70
 (Proj Engr) (Date)
 Issued For C.O. No. 6: Rev. 7 Law 8-21-72
 (Proj Engr) (Date)
 Issued for Purchase: Rev. 1 Law 10-5-70
 (Proj Engr) (Date)
 Issued for C.O. No. 7: Rev. 8 Law 9-11-72
 (Proj Engr) (Date)
 Issued for C.O. No. 1: Rev. 2 Law 6-7-71
 (Proj Engr) (Date)
 Issued for C.O. No. 8: Rev. 9 Law 4-10-73
 (Proj Engr) (Date)
 Issued for C.O. No. 2: Rev. 3 Law 1-25-72
 (Proj Engr) (Date)
 Issued for C.O. No. 9: Rev. 10 Law 7-17-73
 (Proj Engr) (Date)
 Issued for C.O. No. 10: Rev. 11 AGA 1-3-74
 (Proj Engr) (Date)
 Rev. 13 AGA 10-10-74
 (Proj Engr) (Date)
 Rev. 12 AK 5-13-74



CERTIFICATION OF SPECIFICATION
BY PROFESSIONAL ENGINEER

Revision No. 14

I, William E. Knight, Jr., do certify that this design specification provides a complete basis for design, construction and inspection in accordance with the rules of the ASME Code for pumps and valves for Nuclear Power for the stated application.

Rev. No. 12

5/8/74
(Date)

Rev. No. 13

10/8/74
(Date)

Rev. No. 14

6/23/75
(Date)



W. Knight
William Edmund Knight, Jr.

W. Knight
William Edmund Knight, Jr.

W. Knight
William Edmund Knight, Jr.



CERTIFICATION OF SPECIFICATION
BY PROFESSIONAL ENGINEER

Revision No. 11

I, ROBERT C. WILLIAMS, do certify that this design specification provides a complete basis for design, construction and inspection in accordance with the rules of the ASME Code for pumps and valves for Nuclear Power for the stated application.

Revision No. 11

1.3.74
(Date)

RCWilliams
Robert C. Williams

Revision No. 10

7.17.73
(Date)

RCWilliams
Robert C. Williams

Revision No. 9

4.10.73
(Date)

RCWilliams
Robert C. Williams

Revision No. 8

9.11.72
(Date)

RCWilliams
Robert C. Williams

1.25.72
(Date)



RCWilliams
Robert C. Williams

Revision No. 4

4.3.72
(Date)

RCWilliams
Robert C. Williams

Revision No. 5

5.3.72
(Date)

RCWilliams
Robert C. Williams

Revision No. 6

7.31.72
(Date)

RCWilliams
Robert C. Williams

Revision No. 7

8.21.72

RCWilliams



SPECIFICATION REV. 14
INDIVIDUAL PAGE REVISION INDEX SHEET

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SPECIFIC CONDITIONS

1.0 GENERAL

1.1 The work hereunder is subject to this Specification as well as the Specific Conditions contained herein and the Vendor shall consider them in detail for instructions pertaining to his work and shall be responsible for, and be governed by, all of the requirements hereunder.

1.2 The valves specified hereunder will be installed at the Calvert Cliffs Nuclear Power Plant, Units No. 1 and No. 2 of the Baltimore Gas and Electric Company. The jobsite is located at Calvert Cliffs, Calvert County, Lusby, Maryland. There will be no rail facilities for delivery directly to the jobsite.

1.3 Bechtel Power Corporation will be responsible for the detail engineering, expediting and inspection associated with this equipment in collaboration with Baltimore Gas and Electric Company's engineers. Drawings, design information, schedules, etc., will be submitted promptly after receipt of order as outlined in the Specification or as requested by either Bechtel Power Corporation or Baltimore Gas and Electric Company.

2.0 SCOPE OF WORK

2.1 This Specification defines the conditions and requirements for manufacturing and delivery of carbon steel gate, globe and check valves for nuclear service, manual and motor operated, in accordance with these specifications and attachments for the Calvert Cliffs Nuclear Power Plant.

2.2 Any omissions which are noted by the Vendor shall be promptly reported to the Purchaser, for it is the further intent of these specifications to require the manufacturing and delivery of these carbon steel valves and operators to be complete in every detail. Failure of the Vendor to familiarize himself with all the details of the work shall not relieve him of his responsibility to complete the work specified, or which may be reasonably inferred from these specifications.

2.3 The Vendor shall test and deliver all necessary motors, instrumentation and controls for the complete operation of the valves as per the attached Valve Data Sheets.

2.4 The Vendor shall furnish one (1) lot of drawings, data, records and test results as requested on the attached Drawing and Data Requirements (Form G-321-C). The size of lettering, spacing, and density of lines used on the drawings must be suitable to produce legible 35mm microfilms when using the following reduction ratios:



- 16X for drawings no larger than 18 inches by 24 inches.
- 24X for drawings no larger than 24 inches by 36 inches.
- 30X for drawings larger than 24 inches by 36 inches.

2.5 One (1) full set of all special tools or fixtures required for operating and maintaining the valves (if necessary) shall be provided. Tools, if any, shall be new and unused, and of first class quality. The tools shall be shipped to the job-site in a suitable separate container, clearly marked to indicate the use for which they are intended.

3.0 WORK NOT INCLUDED

3.1 The following will be furnished by others:

- a. Labor for installation of the valves specified herein.
- b. All other valves.

4.0 DESIGN REQUIREMENTS

4.1 All valves shall comply with the design, material, fabrication, testing, marking, stamping, and documentation requirements of the ASME Code for Pumps and Valves for Nuclear Power, the ASME Boiler and Pressure Vessel Code Case 1427, the March, 1970 Addenda, and meet the requirements of ANSI B16.5.

4.2 The latest edition of all codes, specifications and standards shall be used. Latest issue of such specifications, standards and codes means the issue (including latest published case rulings and addenda) in force at the date of award of order. Adoption of any subsequent issue or case rulings shall be subject to the Purchaser's approval. For this purpose, the Vendor shall notify the Purchaser of such official publication which would affect the material or fabrication procedures.

4.3 All materials shall be designed to operate at the following conditions:

- a. The fluid will be water or saturated steam associated with a pressurized water reactor for a nuclear power plant.
- b. Ambient air conditions for design purpose shall be 150 F maximum and 50% relative humidity or as otherwise stated on data sheets.



4.4 Valves shall be designed to meet the seat leakage test requirements as specified in Manufacturers Standardization Society (MSS-SP-61).

4.5 The valves shall be complete in every detail and in accordance with the highest standards of workmanship. Any items of this Specification on which the Vendor is in doubt shall be referred to the Purchaser for clarification before proceeding with manufacture.

4.6 The valves shall be designed to enable repacking while under pressure.

4.7 Valves shall have standard ANSI B16.10 face-to-face dimensions.

5.0 FABRICATION AND CONSTRUCTION

5.1 Bonnet - Valves shall be as follows:

a. 150# and 300# - bolted bonnet.

b. 600# and 900# - pressure seal.

5.2 Backseat - Valves shall be furnished with a backseat. Backseat on motor operated valves shall be mechanically and functionally suitable for the torque applied as a result of the torque switch setting used to assure backseating and subsequent motor shut-off.

5.3 Trim - Trim shall be suitable for the service conditions specified or as required on the attached Valve Data Sheets.

5.4 Valve and Pipe Ends - Valves shall have end transitions and weld end preparation in accordance with the attached drawings to this Specification.

6.0 MATERIALS

6.1 Carbon steel valve body forgings shall comply with the material specified on attached Valve Data Sheets. All major repairs shall be approved by the Purchaser prior to making the repairs.

6.2 Trim and seating surfaces shall be as specified on the attached Valve Data Sheets.

6.3 Each valve and valve component shall be examined, documented, stamped, and nondestructive tested in accordance with the ASME Code for Pumps and Valves for Nuclear Power, Class II or III as specified on the attached data sheets, and ASME Code Case 1427, unless otherwise noted.



7.0 FINISH

7.1 The surface finish shall meet the Quality Standard for Steel Castings MSS SP-55, unless better finishes are otherwise required for radiography and liquid penetrant testing.

7.2 Machined surfaces shall have a 250 micro-inch (RMS) finish or better, except as otherwise required on flange faces and stems.

8.0 WELDING

8.1 Welding, for casting repair and fabrication, shall be in accordance with paragraph 2512 of the ASME Code for Pumps and Valves.

8.2 Any welding performed after final heat treatment shall be liquid penetrant inspected.

9.0 INSPECTION AND TESTING

9.1 The prime responsibility for inspection of all materials and work furnished by the Vendor pursuant to the purchase order shall rest with the Vendor. The inspection, or waiving of inspection, by the Purchaser shall not relieve the Vendor of any obligations or responsibilities to perform in accordance with the Purchase Order. Purchaser's "Release" of any materials being furnished by Vendor's suppliers shall not be construed to imply acceptance of same in the end product and will not in any way relieve Vendor's responsibility of inspection.

The Purchaser's representatives shall be given free access to the Vendor's manufacturing facilities to inspect the work in all phases of progress. Prior to start of manufacture, Purchaser should be given a list, with scheduled dates, of all proposed tests and inspections. The Purchaser is to be notified at least five days in advance of the tests and inspections that he wishes to observe.

After installation, the Purchaser reserves the right to make tests at his expense to demonstrate the ability of the equipment furnished by the Vendor to operate under the conditions specified and to meet the guaranteed performance. These tests will be conducted in accordance with the latest applicable Test Code in effect at the date of purchase with such modifications as may be mutually agreed upon between the Purchaser and the Vendor. If the results of the tests conducted indicate that the equipment does not meet its guaranteed performance, the Vendor shall, at his expense, make all necessary adjustments or changes to improve the performance. All subsequent tests until acceptance by Purchaser shall be made at Vendor's expense.

The Vendor shall furnish a list of any field tests of equipment which must be made during installation and initial start-up.

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9.2 Non-destructive testing shall be performed in accordance with the requirements of the ASME Code for Pumps and Valves for Nuclear Power.

9.3 Hydrostatic Tests - All valves shall be hydrostatically tested in accordance with the ASME Code for Pumps and Valves Nuclear Power Article 7.

9.4 Seat Leakage Tests - All valves shall be shell and seat tested in accordance with MSS SP-61.

9.5 Operational Tests - All motor operated valves shall be given an operational test at full design differential pressure.

9.6 Impact Tests - Impact test is not required for valves six inch nominal pipe size and under. All other valve bodies, bonnets and discs shall meet the necessary Charpy V-notch impact values at a temperature of 0° F or below. Carbon Steel materials (Group P-1 of Table Q-11 of Section IX of the ASME Code) shall meet the requirements for impact properties specified in Article 12 of Section III of the ASME Code.

10.0 MOTOR OPERATOR

10.1 The Vendor shall supply motor operators where indicated on the attached Valve Data Sheets. The following is a list of acceptable suppliers of motor operators:

- a. Limitorque.
- b. Electrodyne.
- c. E. I. M.

10.2 Motor operator shall be suitable for 460 volts, 60 hertz, 3 phase, AC power having a totally enclosed motor. No starting equipment shall be supplied. The limit switch and torque switches shall be provided in accordance with the data sheets. An external handwheel with power preference shall be included. Stem covers or protectors shall be included ormmounted with the operator.

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11.0 SEISMIC REQUIREMENTS

11.1 All valves and components including operator shall be designed to operate both during and after the design basis earthquake. The Vendor shall guarantee valves and operators will be able to withstand an earthquake acceleration of 3 g's in any direction and the natural frequency of valves and operators shall be greater than 20 cps.

12.0 QUALITY ASSURANCE PROVISIONS

12.1 The valves, operators, and/or materials listed in this Specification shall conform to the Quality Assurance Provisions specified herein and Category 1 of Form BQC-200 attached. The purpose of the Quality Assurance Provisions is to assure that all components, systems and materials involved will perform in accordance with the design objective.

The Vendor is required to supply equipment and/or materials and perform work fully in accordance with this Specification, utilizing recognized industry standards and practices with approvals as required by the Purchaser. The Vendor will have the responsibility of providing all necessary documents to certify that all work within his responsibility is done in accordance with the provisions of this Specification.

12.2 The Quality Assurance Provisions for design, material selection, fabrication, testing and cleaning of equipment shall be in accordance with the following:

- a. ASME Code for Pumps and Valves for Nuclear Power, and the March, 1970 Addenda.
- b. American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section IX (Welding Qualifications).
- c. American National Standard Institute Standard for Steel Pipe Flanges and Flanged Fittings ANSI B16.5.
- d. Manufacturer's Standardization Society Standard, MSS-SP-61.

12.3 All material selections and applications shall be in accordance with the ASTM Specification as listed on the attached Valve Data Sheets.

13.0 CLEANING AND PREPARATION FOR SHIPMENT

13.1 All valve internals shall be thoroughly cleaned and degreased prior to shipment. Immediately after cleaning, the internals of carbon steel valves shall be protected with a water soluble protective coating. Parkerizing is an acceptable method of meeting this requirement.



13.2 During manufacture all reasonable care shall be taken to keep components and manufacturing area free of contamination and dirt.

13.3 After cleaning and drying, all open valve ends shall be closed with suitable metal or wooden covers, fastened by means other than welding or drilling, and tightly sealed against the atmosphere with pressure sensitive tape. Special care shall be given to protect the weld end preparation during the shipment and storage.

13.4 Each valve (and loose accessory packages) shall be clearly identified with a securely fastened metal tag, showing purchase order numbers and valve mark numbers.

14.0 DELIVERY

14.1 Insofar as practicable the Vendor shall manufacture the valves in a sequence to be established by the Purchaser in order to meet the erection schedule. The Vendor shall send to the Purchaser monthly progress reports showing the progress of manufacture.

14.2 Delivery of the valves to the jobsite shall be complete February, 1971.

15.0 DRAWINGS AND DATA

15.1 The Vendor shall send to the Purchaser for approval before fabrication those drawings and data required by Form G-321-C enclosed. Valve outline and cross section drawings shall include list of materials, weights, size and rating.

15.2 Details of the following fabrication procedures and shop practices shall be submitted to the Purchaser for review and shall be approved prior to proceeding with work. The Purchaser shall be allowed 21 days for review. Copies of those documents bearing the Purchaser's approval will be returned to the Vendor and kept on file for use of the Purchaser's inspector at the Vendor's Plant.

- a. Copies of all welding procedure Specification and records of procedure qualifications of all material groups and thickness to be welded under the Specification.
- b. Major weld repairs made under the above procedure.
- c. Cleaning valves and component parts.
- d. Vendor's Quality Control and/or Quality Assurance Manual.
- e. Liquid Penetrant Inspection.

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- f. Magnetic Particle Inspection.
- g. Radiographic Inspection.
- h. Ultrasonic Inspection.

16.0 DOCUMENTATION

16.1 The following documentation shall accompany each valve shipment:



- a. Mill test reports for all pressure parts except bolting.
- b. All non-destructive test reports.
- c. Hydrostatic test certificates.
- d. All performance or leakage test reports.
- e. Records of all major repairs performed.

17.0 GUARANTEE

17.1 The equipment furnished shall be new and shall be guaranteed to perform in accordance with this Specification and the pertinent attachments thereto, except where modified by specific exceptions clearly noted in the vendor's proposal.

17.2 The Vendor shall guarantee that the equipment furnished is free from fault in design, workmanship and of proper materials to fulfill satisfactorily the operating conditions.

17.3 Should any defect in the design, workmanship, or operating characteristics develop in the assembled equipment or in part thereof during the first year of operation, the Vendor agrees to make all necessary or desirable alterations, repair or replacements free of charge within a time satisfactory to the Purchaser. Equipment repaired or replaced under this guarantee due to faults in design or workmanship shall in each case be guaranteed, in turn, for one year from the date of repair or replacement.

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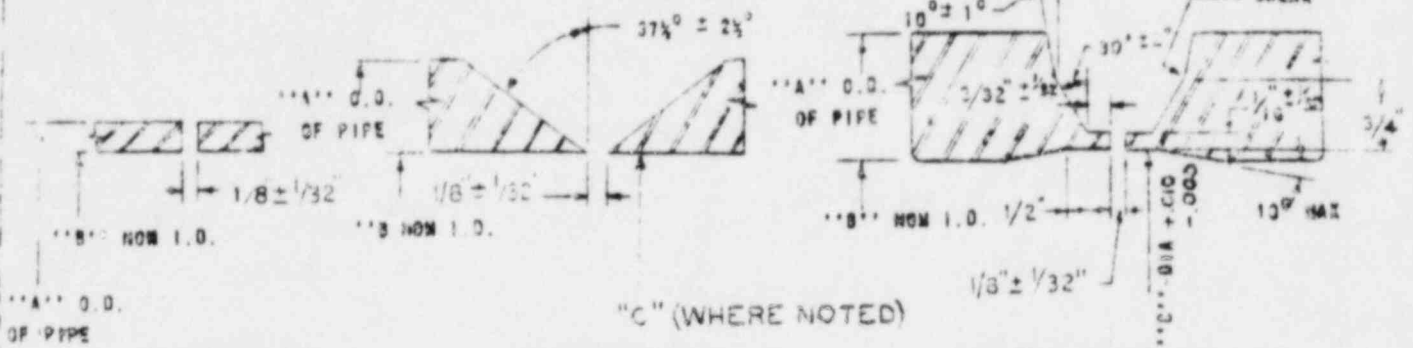
Page 8 of 8

Rev. 11 - 1/4/74

FIG. A

FIG. B

FIG. C



FOR NOMINAL WALL THICKNESS 1/3" AND UNDER

FOR NOMINAL WALL THICKNESS GREATER THAN 1/8" UP TO 3/8"

FOR WALL THICKNESS GREATER THAN 3/8"

* For stainless steel only. Carbon steel weld prep. to have 1/16" ± 1/32" land.

PIPE CLASS	"A" NOMINAL O. D.	SCHEDULE OR MINIMUM WALL THICKNESS	"T" NOMINAL WALL THICKNESS	"B" NOMINAL I. D. TYPE 1&2	"C" MACHINED I. D. TYPE 3	REMARKS
EB	36.000	2.00		-	32.059	
	34.000	.9500		-	32.059	
	30.00	.838		-	28.283	
CC	12.750	Sch. 160	1.312	-	10.413	
	4.500	Sch. 160	0.531	-	3.530	
	3.500	Sch. 160	0.438	-	2.693	
	2.875	Sch. 160	0.375	-	2.178	
	2.375	Sch. 160	0.343	-	1.731	
CC	16.000	Sch. 140	1.437	-	13.444	
	14.000	Sch. 140	1.250	-	11.771	
	12.750	Sch. 140	1.125	-	10.740	
	10.750	Sch. 140	1.000	-	8.959	
	8.625	Sch. 140	0.812	-	7.163	
CC	6.625	Sch. 120	0.562	-	5.600	
	4.500	Sch. 120	0.438	-	3.692	

FOR USE WITH SEAMLESS PIPE TO ASTM A-108, A-375, A-312 & WELDED PIPE TO ASTM A-199, A-312 & A-350

SECHTEL CORPORATION



POWER AND INDUSTRIAL DIVISION

WELD END PREPARATION
TUNGSTEN-INERT-GAS SHIELDED ARC
WITH OR WITHOUT COMPRESSION INSERT RINGS

Calvert Cliffs Nuclear Power Plant,
Units Nos. 1 & 2
Baltimore Gas and Electric Company

ACIP No. 8759

Dwg. No. 6750-SK-M-520

Sheet 1 of 5

REV.

1

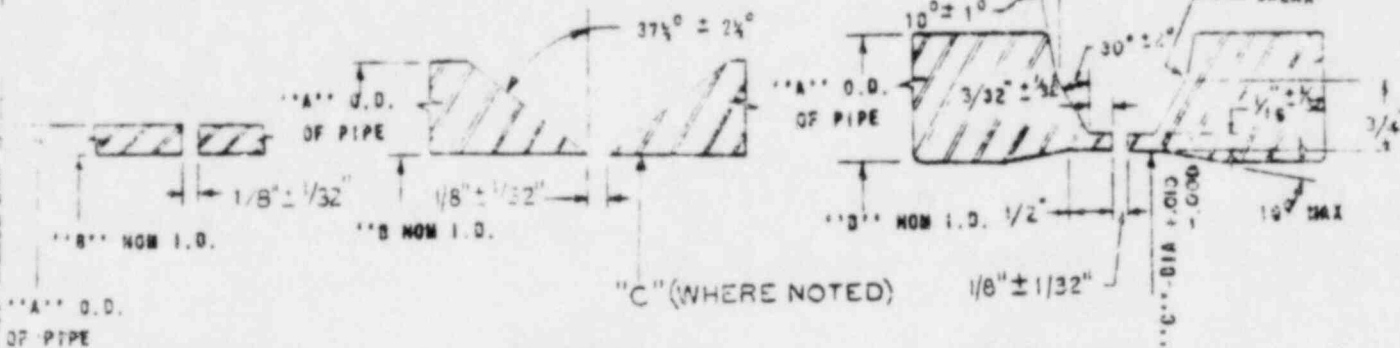
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 REVISED FIG. 1
 DESCRIPTION

DATE
 APPROVAL
 MATL
 SUPV
 CHK
 LR
 ENG

FIG. A

FIG. B

FIG. C



FOR NOMINAL WALL THICKNESS 1/8" AND UNDER

FOR NOMINAL WALL THICKNESS GREATER THAN 1/8" UP TO 3/8"
 For stainless steel only.
 Carbon steel weld prep. to have 1/16" ± 1/32" land.

FOR WALL THICKNESS GREATER THAN 3/8"

PIPE CLASS	**A** NOMINAL O. D.	SCHEDULE OR MINIMUM WALL THICKNESS	**B** NOMINAL WALL THICKNESS	**B** NOMINAL I. D. TYPE 1&2	**C** MACHINED I. D. TYPE 3	REMARKS
DB	24.000	Sch. 80	1.219	-	21.827	
	20.000	Sch. 80	1.031	-	18.155	
	18.000	Sch. 80	0.938	-	16.319	
	16.000	Sch. 80	0.844	-	14.484	

FOR USE WITH SEAMLESS PIPE TO ASTM A-106, A-376, A-312 & WELDED PIPE TO ASTM A-155, A-312 & A-358

BECHTEL CORPORATION



POWER AND INDUSTRIAL DIVISION

WELD END PREPARATION
 TUNGSTEN-INERT-GAS SHIELDED ARC
 WITHOUT CONSUMABLE INSERT RINGS

C. I. West Cliffs Nuclear Power Plant
 Units Nos. 1 & 2
 Baltimore Gas and Electric Company

JOB No. 8750

Dwg. No.
 6750-SK-M-520

Sheet 2 of 5

REV.

1

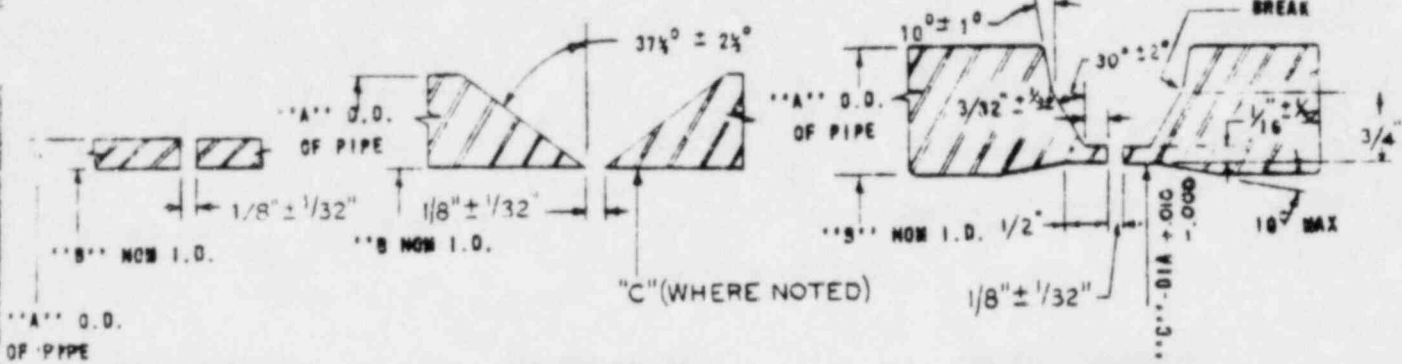
Re-Issued for Comment/Approval
 REVISED FIG. B
 REV. DESCRIPTION

DATE
 APPROVAL
 SUPV
 CHK
 DR
 ENG

FIG. A

FIG. B*

FIG. C



FOR NOMINAL WALL THICKNESS 1/8" AND UNDER

FOR NOMINAL WALL THICKNESS GREATER THAN 1/8" UP TO 3/8"

FOR WALL THICKNESS GREATER THAN 3/8"

*For stainless steel only.
Carbon steel weld prep. to have 1/16" ± 1/32" land.

PIPE CLASS	"A" NOMINAL O. D.	SCHEDULE OR MINIMUM WALL THICKNESS	"T" NOMINAL WALL THICKNESS	"B" NOMINAL I. D. TYPE 1&2	"C" MACHINED I. D. TYPE 3	REMARKS
DB, DC EB	14.000	Sch. 80	0.750	-	12.646	
	12.750	Sch. 80	0.688	-	11.507	
	10.750	Sch. 80	0.594	-	9.671	
	8.625	Sch. 80	0.500	-	7.709	
	6.625	Sch. 80	0.432	-	5.828	
	4.500	Sch. 80	0.337	-	3.869	
	3.500	Sch. 80	0.300	-	2.934	
	2.875	Sch. 80	0.276	-	2.351	
EB	24.000	Sch. 60	0.968	-	22.265	
	20.000	Sch. 60	0.812	-	18.538	
	18.000	Sch. 60	0.750	-	16.646	

FOR USE WITH SEAMLESS PIPE TO ASTM A-106, A-378 4-312 & WELDED PIPE TO ASTM A-155, A-312 & A-358

BSCHTEL CORPORATION



POWER AND INDUSTRIAL PROCESSING

WELD END PREPARATION
TUNGSTEN-INERT-GAS SHIELDED ARC
WITHOUT CONSUMABLE INSERT BLIND

Calvert Cliffs Nuclear Power Plant
Units Nos. 1 & 2
Baltimore Gas and Electric Company

JOB No. 8750

Dwg. No.
6750-SK-M-620

Sheet 3 of 5

REV.

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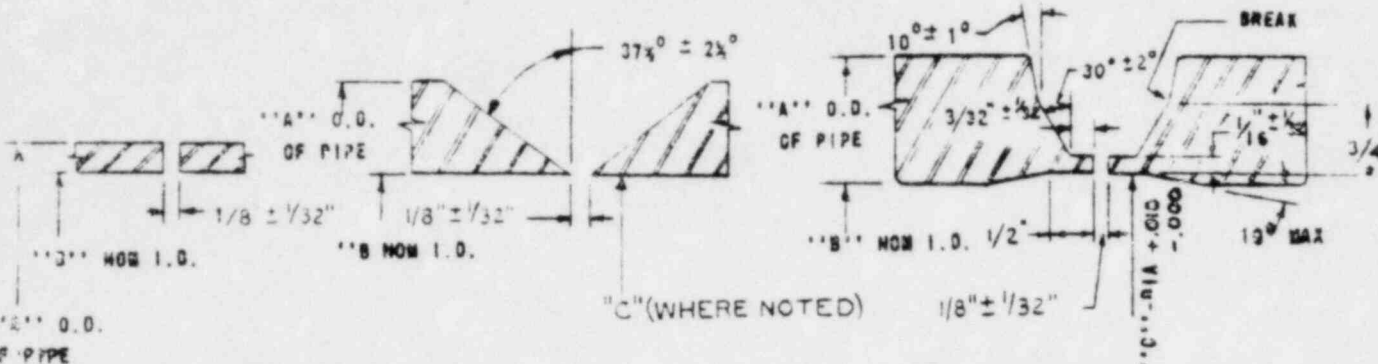
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 APPROVALS:
 SUPV: [Signature]
 CHK: [Signature]
 DR: [Signature]
 REV. DESCRIPTION: REVISED FIG. B
 REVISIONS OF COMMENTS: [None]

DATE 2-11-71
 APPROVAL
 MATL
 SUPV
 CHK
 DR
 ENG
 REVISED FIG B
 REV. DESCRIPTION

FIG. A

FIG. B*

FIG. C



FOR NOMINAL WALL THICKNESS 1/8" AND UNDER

FOR NOMINAL WALL THICKNESS GREATER THAN 1/8" UP TO 3/8"
 *For stainless steel only.
 Carbon steel weld prep. to have 1/16" ± 1/32" land.

FOR WALL THICKNESS GREATER THAN 3/8"

PIPE CLASS	"A" NOMINAL O. D.	SCHEDULE OR MINIMUM WALL THICKNESS	"T" NOMINAL WALL THICKNESS	"B" NOMINAL I. D. TYPE 1&2	"C" MACHINED I. D. TYPE 3	REMARKS
EB & EC	16.000	Sch. 60	0.656	-	14.811	
	14.000	Sch. 60	0.594	-	12.921	
	12.750	Sch. 60	0.562	-	11.725	
	10.750	Sch. 60	0.500	-	9.834	
HC	12.750	Sch. 40S	0.375	-	12.053	
EB, EC & GC	10.750	Sch. 40	0.365	-	10.070	
	8.625	Sch. 40	0.322	-	8.021	
HC	4.500	Sch. 40	0.237	-	4.044	
	3.500	Sch. 40	0.216	3.068	-	
	2.875	Sch. 40	0.203	2.469	-	

FOR USE WITH SEAMLESS PIPE TO ASTM A-106, A-375, A-312 & WELDED PIPE TO ASTM A-165, A-312 & A-358



WELD END PREPARATION
 TUNGSTEN-INERT-GAS SHIELDED ARC
 NITROGEN COMPATIBLE INSERT RINGS
 Calvert Cliffs Nuclear Power Plant
 Units Nos. 1 & 2
 Baltimore Gas and Electric Company

JOB No. 8750

036710
 Dwg. No. 6750-SK-M-520

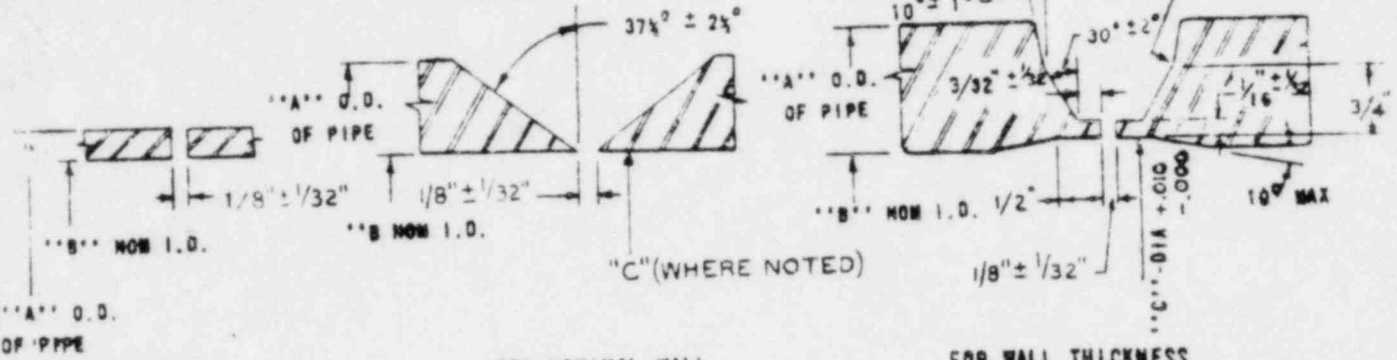
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Sheet 4 of 5

FIG. A

FIG. B*

FIG. C



FOR NOMINAL WALL THICKNESS 1/8" AND UNDER

FOR NOMINAL WALL THICKNESS GREATER THAN 1/8" UP TO 3/8"

FOR WALL THICKNESS GREATER THAN 3/8"

*For stainless steel only. Carbon steel weld prep. to have 1/16" ± 1/32" land.

Re-Issued for Comment/Approval
 REVISED FIG B
 DESCRIPTION
 REV.

PIPE CLASS	"A" NOMINAL O. D.	SCHEDULE OR MINIMUM WALL THICKNESS	"T" NOMINAL WALL THICKNESS	"B" NOMINAL I. D. TYPE 1&2	"C" MACHINED I. D. TYPE 3	REMARKS
GC & HC	24.000	-	0.500	-	23.084	
	24.000	-	0.375	-	23.303	
	24.000	-	0.250	-	23.522	
	20.000	-	0.375	-	19.303	
	20.000	-	0.250	-	19.522	
	18.000	-	0.250	-	17.522	
	16.000	-	0.250	-	15.522	
	14.000	-	0.250	-	13.522	
	12.750	-	0.250	-	12.272	
	12.750	Sch. 10S	0.180	12.390	-	
	10.750	-	0.250	10.250	-	
	10.750	Sch. 10S	0.165	10.420	-	
	8.625	Sch. 10S	0.148	8.329	-	
	6.625	Sch. 10S	0.134	6.357	-	
	4.500	Sch. 10S	0.120	4.260	-	
	3.500	Sch. 10S	0.120	2.260	-	
	2.875	Sch. 10S	0.120	2.635	-	
2.375	Sch. 10S	0.109	2.157	-		

FOR USE WITH SEAMLESS PIPE TO ASTM A-108, A-378, A-312 & WELDED PIPE TO ASTM A-185, A-312 & A-358



WELD END PREPARATION
 TUNGSTEN-INERT-GAS SHIELDED ARC
 WITHOUT CONCEALABLE INSERT RINGS
 Calvert Cliffs Nuclear Power Plant
 Units Nos. 1 & 2
 Baltimore Gas and Electric Company

JOB No. 8750

Dwg. No. 6750-SK-M-520

036710

Sheet 5 of 5

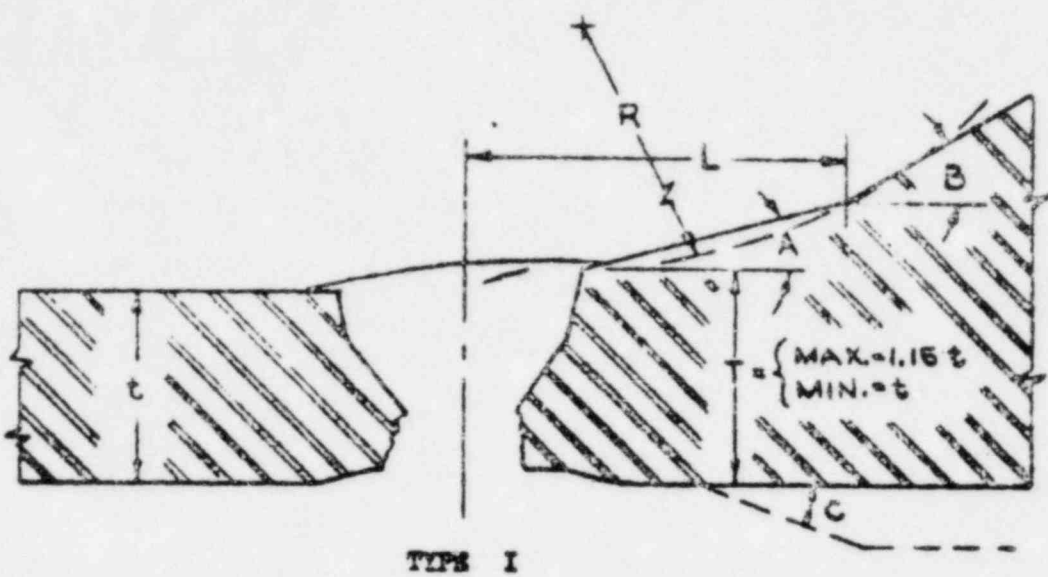
REV.

1

0 Issued for Construction
 B Re-Issued for Comment/Approval
 I Revised to Include Nuclear Services
 REV. DESCRIPTION

DATE: 8-28-63
 9-18-63
 11-63

APPROVALS: [Signature]
 MATE: [Signature]
 CHECK: [Signature]
 DR: [Signature]
 ENG: [Signature]



Type	t=Max. Pipe Wall	L	R	Maximum Angle (Deg.)		
				A	B	C
I	Less than 3/4"	2t	2 1/2"	15°	30°	10°
I	3/4" to 1" Incl.	2t	3"	15°	30°	10°
I	More than 1"	1 1/2 t	3"	15°	30°	10°
II	Machine to ASA B16.5 - Fig. 9 & Table II (See Note d3)					

1. Type I Transition is for critical and nuclear services;
2. Critical services are as indicated on Piping Class Summary Sheets.
3. Type II Transitions are for all other services
4. The internal transition angle "C" shall not exceed 10° for Type I, or 30° for Type II. The sum of "A" plus "C" shall not exceed 30°, and "B" plus "C" shall not exceed 45°.
5. Manufacturer's transition of radius "R" is an acceptable alternate.

405-P
 1-11-63

BECHTEL CORPORATION

POWER AND INDUSTRIAL

WELD END TRANSITIONS FOR VALVES, FITTINGS AND EQUIPMENT

... Nuclear Power Plant
 ... Nos. 1 & 2
 ... Gas and Electric Company

JOS No. 1750

Dwg. No. 6750-SK-M-522

Sheet 1 of 1

REV. 1

This schedule of drawing and data requirements is to be fulfilled before rendering final invoices. See below for drawings required and dates due. Failure of Vendor to comply with drawing and data requirements may result in final payment being withheld. Drawings are to be forwarded to:

BECHTEL POWER CORPORATION P.O. BOX 607, GAITHERSBURG, MARYLAND, 20760 ATTENTION: MR. A. J. ARNOLD
 In addition, forward with shipment, one set of any drawings necessary for field installation. Forward copy of letter of transmittal to Manager of Purchases, PO Box 607, Gaithersburg, Maryland.

1 additional transparency of drawings with two (2) copies of the letter of transmittal shall be sent to: MR. C. H. POINDEXTER

BALTIMORE GAS AND ELECTRIC COMPANY
 GAS AND ELECTRIC BUILDING, BALTIMORE, MARYLAND 21203

11

Issued for Purchase
 Issued to Change P
 Issued for Change Order No. 8
 1
 11
 9
 REV.

DATE
 APPROVAL
 MATL.
 CHEF.
 DIR.
 ENG.
 DESCRIPTION


	TYPE OF DRAWINGS AND OTHER REQUIREMENTS	KIND OF COPIES	BEFORE FAB *	NUMBER REQUIRED	
				INITIAL	FINAL
A	OUTLINE DIMENSIONS AND FOUNDATION REQUIREMENTS	TRANSPARENCY	*	1	1
		PRINTS	*	2	2
B	CROSS SECTION WITH PARTS LISTS, WITH PRICES	TRANSPARENCY	*	1	1
		PRINTS	*	2	2
C	SHOP DETAIL DRAWINGS	TRANSPARENCY	*	1	1
		PRINTS	*	2	2
D	CERTIFIED PERFORMANCE DATA	PRINTS			
E	WIRING DIAGRAMS WHERE APPLIC. TO OPERATORS	TRANSPARENCY	*	1	1
		PRINTS	*	2	2
F	NON-DESTRUC. TEST RESULTS INCLUD. X-RAY WHERE REQUIRED				1
G	CODE CERTIFICATES	ORIGINAL COPIES			
H	INSTRUCTIONS FOR ERECTION OR INSTALLATION. OPERATION AND MAINTENANCE	MANUALS OF EACH TYPE		2	15
J	LIST OF RECOMMENDED SPARE PARTS FOR ONE YEAR'S OPERATION. WITH PRICES	LISTS		1	6
K	COMPLETED BECHTEL CORPORATION DATA SHEETS	TRANSPARENCY			
L	NON-DESTRUC. TESTING & WELDING PROCEDURES PER PAR. 15.2		*	2	

Initial drawings requiring approval must show all information necessary for Purchaser's design of foundations and any connections to other equipment.

Vendor's drawings will be reviewed and approved only as to arrangement and conformance to the Specifications and related drawings, and approval shall not be construed to relieve or mitigate the Vendor's responsibility for accuracy or adequacy and suitability of materials and/or equipment represented thereon.

Final drawings must be certified and must show equipment and purchase order numbers. Transparencies may be process cloth tracings, black line on vellum, Kodagraph, Autopositive vellum, or equal. Initial drawings required within 14 days of receipt of firm order. Final drawings required within 21 days of receipt of approved initial drawings, or within ~~14~~ days of receipt of firm order. ~~Final drawings required within 21 days of receipt of approved initial drawings, or within 14 days of receipt of firm order.~~

* A check in this column indicates that approved drawings are required before fabrication is to start.



G-321-C 1-10-63 (W)	 BECHTEL CORPORATION POWER AND INDUSTRIAL DIVISION	DRAWINGS AND DATA REQUIREMENTS LARGE NUCLEAR CARBON STEEL GATE, GLOBE AND CHECK VALVES		JOB NO. 6750
		CALVERT CLIFFS NUCLEAR POWER PLANT UNITS 1 & 2 BALTIMORE GAS AND ELECTRIC COMPANY		ATTACHMENT TO REQUISITION NUMBER 6750-M-253
				REV. 11

FOR QUALITY ASSURANCE USE

(A) MR. A. J. ARNOLD
PROJECT ENGINEER
BECHTEL POWER CORPORATION
P. O. BOX 607
GAITHERSBURG, MD. 20760

(B) MR. D. M. LAKE
PROJECT SUPERINTENDENT
BECHTEL CORPORATION
P. O. BOX 36
LUSBY, MARYLAND 20657

The required certified copies shall be furnished upon or prior
to the arrival of the material at the jobsite.

NO.	DATE	APPRV	MATERIAL	DESCRIPTION	REFER TO SPECIFICATION PARA.	COPIES WITH BID	KIND OF COPIES	CERTIFIED COPIES	
								COPIES FOR APPRV TO (A)	TO (A) TO (B)
1	1/4/74	AP		Mill Test Reports on Pressure Parts* 	16.1.a		REPRODUCIBLE PRINTS	2	2
2	4-10-73	MR		Any N. D. T. Reports*	16.1.b		REPRODUCIBLE PRINTS	2	2
3				Hydrostatic Test Certificates*	16.1.c		REPRODUCIBLE PRINTS	2	2
4				All Performance or Leakage Test Reports*	16.1.d		REPRODUCIBLE PRINTS	2	2
5				Records of all Major Repairs Performed	16.1.e		REPRODUCIBLE PRINTS	2	2
6									
7				Welding Procedures	15.2.a			2	3
8				Cleaning Procedures	15.2.c			2	3
9				N. D. T. Procedures	15.2.e. f. g. h.			2	3
10				QA/QC Manual	15.2.d			2	3
11				Code Certificates* 	4.1			2	2
12				*To be shipped with material to jobsite					
13									
14									
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16									
17									
18									
19									
20									

Issued to change P. E.
 Issued for CHANGE ORDER 103
 ISSUED FOR CHANGE ORDER


 POWER AND INDUSTRIAL DIVISION

CALVERT CLIFFS NUCLEAR POWER PLANT
UNITS 1 AND 2
BALTIMORE GAS AND ELECTRIC COMPANY
 DOCUMENTATION DISTRIBUTION REQUIREMENTS

Job No. 6750	Rev.
6750-M-253 Large Nuclear Carbon Steel Gate, Globe and Check Valves	11



BECHTEL ASSOCIATES
ENGINEERS
GAITHERSBURG, MARYLAND

Technical File No. 6750-1490
Job No. 6750
Form BQC-200

QUALITY CONTROL REQUIREMENTS
FOR
EQUIPMENT MANUFACTURERS AND SITE CONSTRUCTORS
FORM BQC-200

CALVERT CLIFFS NUCLEAR POWER PLANT
UNITS NO. 1 AND 2
BALTIMORE GAS AND ELECTRIC COMPANY
CALVERT COUNTY, MARYLAND

Comprising:

- Cover Sheet
- Individual Page Revision Index Sheet
- Specific Conditions

Date: 3-11-69

By: Rewilliams

Rev. 4 Rew 12.22.71
(Proj Engr) (Date)

Original Issue: Rev. 0 Rew 3.11.69
(Proj Engr) (Date)

Rev. 1 Rew 5.6.69
(Proj Engr) (Date)

Rev. 2 Rew 6.3.69
(Proj Engr) (Date)

Rev. 3 Rew 6.17.70
(Proj Engr) (Date)



GENERAL REV. 4

INDIVIDUAL PAGE REVISION INDEX SHEET

Page Number	Latest Individual Page Revision No.	Latest Page Revision Date
1	4	12/22/71
2	3	6/17/70
3	2	6/3/69
4	2	6/3/69
5	2	6/3/69



QUALITY CONTROL REQUIREMENTS

FOR

EQUIPMENT MANUFACTURERS AND SITE CONSTRUCTORS

1.0 SCOPE

This document establishes minimum requirements for equipment manufacturer and site constructor quality control programs. These requirements are in addition to those quality controls, inspections, and tests set forth in applicable specifications and other contractual documents.

1.1 This document covers three different levels of quality control requirements. The applicable quality control requirements in each of the levels are:

Category 1: All sections of this specification are applicable, except 2.11.2.

Category 2: Sections 2.3, 2.4, 2.5, 2.8, 2.10, 2.11.1, 2.13, 2.15, 3.0, and 4.0 of this document are applicable.

Category 3: Sections 2.3, 2.4, 2.11.2, 2.13, 3.0 and 4.0 of this document are applicable.

The requirements set forth in the categories above shall apply to all equipment or services when referenced in the equipment, or construction specifications, contract or purchase order.

The term contractor is used in these requirements to denote equipment manufacturers, and site constructors. It is intended to include any person or firm supplying materials, parts, assemblies, subassemblies, services, or doing work for Bechtel Corporation or for the customer.

The term customer is used in these requirements to denote the Baltimore Gas and Electric Company or its authorized representative or agent.

2.0 QUALITY CONTROL REQUIREMENTS FOR CONTRACTORS

Contractors are required to have a quality control program which shall include the following:

2.1 Organization

A quality control organization which has the authority and responsibility for seeing that the quality control program is established, planned and implemented. The quality control organization shall delineate the responsibilities and duties of the personnel



involved in the quality control program in writing, and shall provide sufficient organizational freedom to permit identification of quality control problems and initiation of appropriate corrective action.

2.2 Planning

The contractor, during the earliest practical phase of contract performance, shall conduct a review of the requirements of the contract and take timely action to ensure that necessary quality control procedures and provisions are established in accordance with the contract, applicable specifications, codes, and standards. In particular, the contractor shall make timely provisions for having the required written procedures of this program approved (and qualified personnel available) and in effect prior to their actual use in manufacturing or construction of the item under contract.

2.3 Control of Special Processes, Testing and Inspections

2.3.1 The contractor shall have written procedures and instructions for control of all special fabrication and construction processes used for items such as welding, heat treatment, cleaning processes, control of tools and fixtures, weld electrode control, concrete production and placement, equipment installation at the construction site, etc.

2.3.2 The contractor shall have written procedures for control of the required inspection programs on the item under contract. These procedures shall cover such items as: all non-destructive testing (radiography, magnetic particle, liquid penetrant, ultrasonic, etc.), soap bubble inspections, etc.

Inspection procedures shall include accept/reject and repair criteria for the inspection being performed.

2.3.3 The contractor shall have written procedures for control of the required testing on items under contract. These procedures shall cover such items as: hydrostatic tests, functional and performance tests, etc. The test procedures shall include accept/reject criteria for test being performed.

2.4 Control and Identification of Material, Parts, and Components

The contractor shall have a system, which is to be described by a written procedure, for assuring the control, identification, and location of materials, welding materials, parts, and components used in the finished item under contract. This shall also include material certification records required by the applicable specification for the item under contract.

3



2.5 Control of Purchased Material, Equipment, and Services

The contractor shall have a written procedure to assure the control of purchased material, equipment and service, including such items as receiving inspection, identification and certification of incoming material and equipment and its final utilization to ensure that it conforms to the requirements of the purchase specification. In addition, the contractor is responsible for assuring that all supplies and services procured from his subcontractors conform to the contract requirements considered applicable. The contractor shall have the right of source inspection and visitation for himself and/or his representatives. The contractor shall further require the submittal of all quality control plans and documents from his supplier, as appropriate.

2.6 In-Process and Final Inspection

The contractor shall operate under a controlled manufacturing system and shall have a written and documented In-Process and Final Inspection Program on the item under contract. As a part of these programs the contractor shall establish an inspection and testing plan, check-off lists, or other suitable systems to assure that required inspection and tests are performed and to provide objective records of their performance. Such plans shall indicate, as appropriate, inspection points to be witnessed and the witnessing organizations. This inspection and testing plan shall be a part of or referenced in the manufacturing operations. In order to assure that the current inspection status of the item under contract is known at all stages in the production process, the contractor shall have a written procedure which requires identification of the current inspection status.

2.7 Control of Inspection Status

The contractor shall have a system for identification or marking of inspection status. This may be accomplished by means of stamps, tags, routing cards, multi-color tape, or other normal control devices and shall be described in the contractor procedures.

2.8 Control of Measurements, Inspection and Testing Equipment

The contractor shall have written procedures governing the control of measurement, inspection and test equipment. These instructions shall include the calibration to nationally recognized standards, accuracy requirements, and recalibration frequency requirements.

2.9 Handling, Storage, Shipping and Preservation

Equipment contractors shall have written procedures to control and govern the handling, storage, shipping and preservation for the items under contract to prevent

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degradation of the quality below that required by the applicable equipment specification. Site installation and construction contractors shall have written procedures to control and govern the handling, storage and preservation for installation and construction of the item under contract.

2.10 Control of Non-Conforming Material, Parts, Equipment or Workmanship

The contractor shall have written procedures governing the identification, control, and disposition of materials, welding materials, parts, equipment, or workmanship for the item under contract that does not meet specification requirements. Repair or rework for non-conforming material, parts, equipment, or workmanship must be in accordance with documented procedures acceptable to Bechtel.

2.11 Control, Storage and Maintenance of Manufacturing, Installation, Construction, Inspection, Test, and Quality Control Records.

2.11.1 The constructor shall have written procedures governing the preparation, control, storage and disposition of manufacturing, installation, construction, inspection, test, and quality control records. This includes a specific list of records which the contractor turns over to Bechtel Associates or Bechtel Corporation (as appropriate) and those which the contractor will maintain for life of the plant (i.e., 40 years). The contractor procedures governing the control of records shall describe what steps he takes to insure that the records he retains are adequately stored and readily retrievable for the life of the plant.

2.11.2 For equipment or structures classified in Category III per Section 1.1 of this document, the Vendor, upon completion of the work shall provide Bechtel Associates or Bechtel Corporation, as appropriate, with copies of the following Quality Control records, if applicable:

- a. Welding procedures used
- b. Cleaning procedures used
- c. Material identification and records
- d. Non-destructive results and records (after the expiration of the retention period for storage of radiographs as required by the applicable codes, the Vendor shall send the radiographs to the Customer).

2.12 Corrective Action

The contractor's quality control program shall provide means to detect and report conditions adversely affecting quality and to initiate corrective action. Records of such conditions and of the corrective action taken are made available for review by Bechtel Associates or Bechtel Corporation (as appropriate) and the Customer and its designated agent.

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2.13 Control of Specifications, Drawings, Procedures, and Instructions

The contractor shall have written procedures governing the control and use of specifications, drawings, and the various work, test, and inspection procedures. This procedure shall describe the process by which the contractor obtains the concurrence of Bechtel Associates, or Bechtel Corporation (as appropriate) for changes to specifications, drawings, and procedures. The procedure shall also describe the means by which the contractor assures that the correct revision of the specification, drawing, etc., is being used by his work force.

2.14 Provisions for Internal Audits

The contractor shall have a system for periodic internal audits of his own quality control program to assure that his program is effective and functioning as required. This system and the approximate frequency of the internal audits are to be covered in the contractor's quality control manual.

2.15 Quality Control Program Documentation

The contractor shall maintain an up-to-date quality control manual or other documents which describe his quality control program and organization, including administrative policies and procedures affecting quality and referencing the various procedures he invokes as required in Sections 2.3 through 2.14 above.

3.0 ACCESS TO AND SUBMITTAL OF DOCUMENTS

The contractor shall make available, upon request, his quality control program description document (Section 2.15 above) and the procedures, records, and qualification governing Sections 2.3 through 2.13 (if these sections are required by the Quality Control Categories of Section 1.1) for review by Bechtel Associates, or Bechtel Corporation, (as appropriate) and the Customer and its agent. Where concurrence of these documents is required by the purchase order, the contractor shall not start work on the specific task governed by these procedures until the procedures have been reviewed and comments resolved.

4.0 QUALITY ASSURANCE SURVEILLANCE

All manufacturing processing, testing, and inspection operations performed by equipment manufacturers, site construction contractors, and their subcontractors are subject to quality surveillance by Bechtel Associates, or Bechtel Corporation, as appropriate. The Customer and its agent shall be accorded similar access. In this regard, any quality surveillance by Bechtel Associates, Bechtel Corporation, or the Customer and its agent does not relieve the contractor of any responsibility of the stated conditions of the contract and is not considered a waiver of warranty or other rights.

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MARK NUMBER	10	14						
TYPE		DATE	DATE					
SIZE (INCHES)	12"	6	4					
END CONNECTIONS	FLANGE	FLANGE	BUTT WELD					
BODY & BOINET MATERIAL	A105 GR1	A105 GR1	A105 GR1					
SEATING SURFACES	STAINLESS	STAINLESS	STAINLESS					
CLASS	DB-3	EB-12	EB-12					
PIPE SCHEDULE OR I.D.	80	40	40					
PRESSURE/TEMPERATURE	1050/400	1000/580	1000/580					
FLOW MEDIUM/GPM	WATER/13,265	STEAM	STEAM					
DESIGN TRANSIENTS								
NUCLEAR CLASS	II	II	II					
LATING	900#	600#	600#					
IMPACT TEST REQD Δ	YES							
OPERATOR:	MOTOR	MANUAL	MANUAL					
Manual-Gear-Motor								
*MANUFACTURER								
*MANUFACTURER'S FIG. NO.								
FOREIGN PRINT NO.								
PURCHASE ORDER NO. ITEM Δ	1	2	3					
TRIM	MFGS STD	MFGS STD	MFGS STD					
ACCESSORIES: TAG NOS.	142-MOV-4516	Now MOTOR						
Position Indicator, Remote	142-MOV-4517	OPERATED						
Position Indicator, Booses,	Moved to	SEE SHEET 4						
Bypass Valve or Limit Sw. Contact	DATA SH. 8 Δ							
	TOTAL QUANTITY PER UNIT							
REV.	DATE	APP'LS	UNIT 1	UNIT 2	UNIT 1	UNIT 2	UNIT 1	UNIT 2
9	4/10/73	GRV FJZ	0	0	0	0	2	2
1	9/24/70	J/J	2	2	2	2	2	2
2	6/4/71	JBZ	2	2	2	2	2	2
3	1/20/72	JBZ	2	2	0	0	2	2
4			2	2	0	0	2	2
5	4/28/72	Conf	2	2	0	0	2	2
6	7/24/72	Conf	2	2	0	0	2	2
7			2	2	0	0	2	2
8	9/11/72	FJZ Conf	2	2	0	0	2	2

*Information to be Supplied by Vendor



VALVE DATA SHEET
 Calvert Cliffs Nuclear Power Plant
 Units Nos. 1 & 2
 Baltimore Gas and Electric Company

JOB No. 6750 REV.
 SPEC. NO. 6750-PM-9203-024 9
 036710
 Sheet 1 of 13

Velan Order P-35327

Project: Baltimore Gas & Electric - On vert Cliffs

ITEM	FIGURE NO.	DESCRIPTION	TAG NO.	DWG. NO.	OPERATION	REMARKS
<u>1</u>	<u>B20-245PS</u>	<u>16" 900# P.S. Gate Valve c/s</u>	1-MOV-4516 1-MOV-4517 2-MOV-4516 2-MOV-4517	<u>P-35327-2 Rev.F</u>	Limitorque SMB-2-60	<u>VEL-MO-2</u>
2A	B14-25PS-2TS	6" 600# P.S. Gate Valve c/s	14	P-35327-12 Rev.D	Limitorque SMB-1-25	VEL-MO-2
3	B12-25PS-2TS	4" 600# P.S. Gate Valve c/s	14	P-35327-1 Rev.D	Manual	VEL-HO-1
4	W8-054B-2TY	2" 150# B.B. Gate Valve c/s	19	P-35327-3 Rev.F	Manual	VEL-HO-1
5	W5-034B-2TY	1" 600" B.B. Piston Check c/s	223	P-35327-4 Rev.D	-	VEL-HO-1
6	B15-0114B-2TS	8" 150" B.B. Swing Check c/s	238	P-35327-5 Rev.D	-	VEL-HO-1
7	B10-0114B-2TS	3" 150# B.B. Swing Check c/s	238	P-35327-5 Rev.D	-	VEL-HO-1
8	W4-274B-2TS	3/4" 600# B.B. Globe Valve c/s	130	P-35327-6 Rev.C	Manual	VEL-HO-1
9	W8-254B-2TS	2" 600# B.B. Gate Valve c/s	1-MOV-2080	P-35327-7 Rev.G	Limitorque SMB-00-5	VEL-MO-2
10	B15-054B-24TS	8" 150# B.B. Gate Valve c/s	129	P-35327-8 Rev.C	Manual	VEL-HO-1
11	W5-234B-2TS	1" 600# B.B. Piston Check c/s	129	P-35327-4 Rev.D	-	VEL-HO-1
12	B10-054B-2TS	3" 150# B.B. Gate Valve c/s	1-MOV-6579 2-MOV-6579	P-35327-10 Rev.O	Limitorque SMB-00-5	VEL-MO-2
13	W5-054B-2TS	1" 600# B.B. Gate Valve c/s	19	P-35327-3 Rev.F	Manual	VEL-HO-1
14	B14-0114B-2TS	6" 150# B.B. Swing Check c/s	238	P-35327-9 Rev.D	Manual	VEL-HO-1
15	W4-054B-2TY	3/4" 600# B.B. Gate Valve c/s	19	P-35327-3 Rev.F	Manual	VEL-HO-1