

# ATTACHMENT 3

## MTM-ZZ-QV009 WESTINGHOUSE CHECK VALVE DISASSEMBLY/REASSEMBLY

CALLAWAY PLANT  
MAINTENANCE MECHANICAL PROCEDURE  
MTM-ZZ-QV009  
WESTINGHOUSE CHECK VALVE DISASSEMBLY/REASSEMBLY

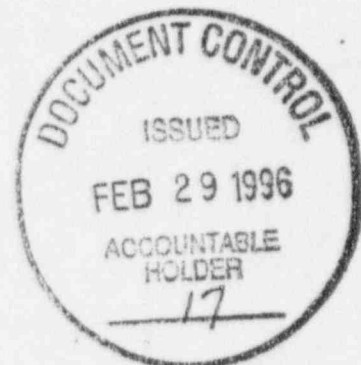
RESPONSIBLE DEPARTMENT MAINTENANCE

WRITTEN BY N/A DATE                     

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This procedure contains the following:

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WESTINGHOUSE CHECK VALVE DISASSEMBLY/REASSEMBLY1. PURPOSE AND SCOPE

- 1.1 Provide instruction for the disassembly and inspection of Westinghouse Swing Check Valves.
- 1.2 Diagrams for the Westinghouse Style A and B check valves are provided on Attachment 1, Style A and B Swing Check Valve Diagrams. Attachment 9, Westinghouse Style A and Style B Swing Check Valve Dimensional Acceptance Criteria, lists which valve style applies for the Westinghouse check valves used at Callaway.

2. PRECAUTIONS AND LIMITATIONS

- 2.1 Use of slugging wrenches or impact drivers is prohibited when tensioning or detensioning fasteners.
- 2.2 Notify Quality Control of any non-conforming conditions discovered during the performance of this procedure.
- 2.3 Mock up training should be part of the job preparation. Planning, Work Supervision, Craft, Quality Control, and Health Physics should have input to assure the work process flows properly and ALARA and contamination parameters have been considered.
- 2.4 Steps identified with an # to the left of the step are those that have information which should be transferred from one of the attachments prior to any field work. Typically the planner transfers the information from the procedure attachment. However, this can also be done by the craft, supervision, etc., if needed.
- 2.5 The acceptance criteria for the measurements taken in this procedure are provided on Attachment 9, Westinghouse Style A and Style B Swing Check Valve Dimensional Acceptance Criteria. These values are the absolute limits acceptable. Worn parts should be replaced upon discovery. Contact the Maintenance Supervisor if worn parts are discovered even if they satisfy the acceptance criteria provided on Attachment 9.

### 3. PREREQUISITES

- 3.1 Work Authorization document \_\_\_\_\_.
- 3.2 A predetermined area for Quality Control inspection of studs should be established, if required.

### 4. PARTS, TOOLS, AND EQUIPMENT

- 4.1 Bonnet Gasket
- 4.2 Approved Solvent
- 4.3 Lifting equipment
- 4.4 Lint free rags
- 4.5 Dial Calipers
- 4.6 N-5000 (stock 6364097)
- 4.7 Westinghouse Check Valve Tool Box(s)
- 4.7.1 Special tool boxes have been assembled for maintenance on Westinghouse style check valves. These tool boxes were assembled primarily for work in the Reactor Building during outages. Attachment 10, Inventory List of Westinghouse Check Valve Tool Boxes, provides a listing of the parts, tools and equipment that should be contained in these boxes. The information on this attachment should also be used to determine which tools may be needed even if the pre-assembled tool boxes are not used.

### 5. WORK PERFORMANCE INSTRUCTIONS

- 5.1 Visually inspect the valve for evidence of gasket leakage or fastener degradation. Document the extent and location of any leakage or apparent degradation in the "Remarks" section.

#### 5.2 BONNET/STUD REMOVAL

<p><u>NOTE:</u> If studs are removed from the work site note where they are located in the Remarks section of this procedure.</p>
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- # 5.2.1 Match the bonnet stud pattern to the pattern shown below. If no markings exist, use an approved marker and number the fasteners per Attachment 2, Main Flange Nut Tightening Sequence.

- ( ) A) 18 Stud Flange 1-5-9-13-17-3-7-11-15-2-6-10-14-18-4-8-12-16  
 ( ) B) 16 Stud Flange 1-5-9-13-3-7-11-15-2-6-10-14-4-8-12-16  
 ( ) C) 14 Stud Flange 1-5-9-13-3-7-11-2-6-10-14-4-8-12  
 ( ) D) 12 Stud Flange 1-5-9-3-7-11-2-6-10-4-8-12  
 ( ) E) 10 Stud Flange 1-5-9-3-7-2-6-10-4-8  
 ( ) F) 8 Stud Flange 1-5-3-7-2-6-4-8

NOTE: Stud nuts are being loosened using a multiple pass sequence.

- 5.2.2 Loosen every other stud nut starting with stud number 1.

NOTE: A torque multiplier may be used, if necessary.

- # 5.2.2.1 Retorque the stud nuts loosened in step 5.2.2 to the Level 1 torque value below. (Obtain from Attachment 3, Check Valve Main Flange Nut and Stud Detensioning Torque).

Level 1 torque value \_\_\_\_\_ ft-lbs.

- 5.2.3 Loosen the stud nuts not loosened in step 5.2.2.

- # 5.2.3.1 Retorque the stud nuts loosened in step 5.2.3 to the Level 2 torque value below. (Obtain from Attachment 3,)

Level 2 torque value \_\_\_\_\_ ft-lbs.

- 5.2.4 Beginning with stud #1, remove every other stud nut.

- 5.2.5 Remove the remaining stud nuts

**CAUTION:** Exercise caution when lifting the valve bonnet to prevent damage to the stud threads.

5.2.6 If the studs are to be removed:

5.2.6.1 Install a properly sized stud remover on the stud.

**NOTE:** If studs are "seized" (i.e., do not break away at the stud removal torque listed below) contact supervision.

# 5.2.6.2 Using a torque wrench, remove the studs from the valve body. Do not exceed a removal torque of \_\_\_\_\_ ft-lbs (refer to Attachment 3).

5.2.7 Clean dirt or foreign material from valve/bonnet joint area.

5.2.8 Screw two lifting eyes into the holes provided in the bonnet; then lift the bonnet clear of the valve. Refer to Attachment 3 for lifting eye hole sizes.

5.2.9 Remove the body to bonnet gasket.

5.2.10 Inspect and record the condition of gasket and gasket seating surfaces.

- |  |   |
|--|---|
| a. Inspect gasket for damage or uneven crush.        | SAT <input type="checkbox"/> UNSAT <input type="checkbox"/> |
| b. Inspect bonnet seating surface.                   | SAT <input type="checkbox"/> UNSAT <input type="checkbox"/> |
| c. Inspect body seating surface.                     | SAT <input type="checkbox"/> UNSAT <input type="checkbox"/> |
| d. Compare new gasket with old gasket for like kind. | SAT <input type="checkbox"/> UNSAT <input type="checkbox"/> |

Report any UNSAT conditions to QC and the Maintenance Supervisor. Record specific details of the damage in the Remarks section of this procedure.

5.2.11 A protective cover should be placed over the valve body and bonnet seating surfaces.

5.2.11.1 Notify QC to inspect the studs for valves equal to or greater than 6 inches on BB, EJ or EP systems.



INSPECTION POINT

OQCM Code W.7.1, W.7.2, W.7.4 or W.8.1

Perform NDE as applicable per OQCM.

5.2.11.2 Perform VT-1 inspection and one of the following NDE techniques (UT, MT or PT) on the studs when required.



5.2.12 Proceed to applicable disassembly section (section 5.3 or 5.4) for the style of valve. Refer to Attachment 3 for a cross reference of component ID versus style.

### 5.3 STYLE A SWING CHECK VALVE INSPECTION INSTRUCTIONS

5.3.1 Check for free movement of the disc arm and disc, making sure they have full-stroke exercise and move freely.

5.3.2 Match mark the bearing blocks to their location in the valve (A-A and B-B).

NOTE: The disc arm assembly may need to be rotated slightly by hand to clear the body.

NOTE: Bearing blocks are sliding fits to the pivot pin and may fall off. The bearing blocks should be removed as soon as they clear the valve body.

5.3.3 Lift the check valve assembly vertically from the check valve, and remove the bearing blocks (11) from the pivot pin (10) as soon as the disc assembly clears the valve body.

5.3.4 Check if the pivot pin (10) is loose inside the disc arm (slides and rotates easily in and out). If it is loose, the pivot pin needs to be resecured with a new lock pin.

5.3.5 Visually inspect the extended portions of the pivot pin (10) for signs of unusual wear, surface pitting, corrosion, etc. Note any findings in the Remarks section of this procedure.

5.3.6 Measure the outside diameter of the pivot pin (10) at two places 90 degrees apart on both ends. Record the measurements below.

_____	_____	end A
_____	_____	end B

# 5.3.6.1 Compare these measurements with the minimum allowable pin diameter provided on Attachment 9. If any of the measurements taken are less than this value the pivot pin needs to be replaced.

\_\_\_\_\_ minimum allowable pin diameter from Attachment 9.



- 5.3.7 Measure the diameter of the bearing block holes in two places 90 degrees apart. Record the measurements below.

\_\_\_\_\_ bearing block A  
 \_\_\_\_\_ bearing block B

- # 5.3.7.1 Compare the measurements with the maximum bearing hole diameter provided on Attachment 9. If any of the measurements taken are greater than this value the bearing blocks needs to be replaced. Also the difference between the two measurements taken at each bearing block should be less than 0.01", if not replace that bearing block.

\_\_\_\_\_ maximum bearing hole diameter from Attachment 9.

- 5.3.8 Record the maximum diametral clearance between the pivot pin and bearing block holes below. To determine the maximum diametral clearance subtract the smaller pivot pin diameter from the larger bearing block hole diameter at each end below:

	Larger Bearing Block Diameter	-	Smaller Pivot Pin Diameter	=	Diametral Clearance
END A:	_____	-	_____	=	_____ (inches)
END B:	_____	-	_____	=	_____ (inches)

- # 5.3.9 Compare the diametral clearances from step 5.3.8 with the maximum allowable diametral clearance provided on Attachment 9. The clearance from step 5.3.8 should be less than the value provided on Attachment 9. If not, the bearing block and/or the pivot pin must be replaced.

\_\_\_\_\_ maximum allowable diametral clearance from Attachment 9.

- 5.3.10 Inspect the collar (8) by attempting to rotate the collar relative to the disc. If this occurs, the collar pin (9) needs to be replaced. The collar pin is tack welded at the ends.

- 5.3.11 Check for excessive looseness of the anti-rotation pin (7) by rotating the disc relative to the disc arm. If the disc rotates more than 10 degrees relative to the disc arm, the collar pin (9) is to be drilled out and the anti-rotation pin (7) replaced.

- 5.3.12 Inspect the back side of the disc for evidence of the disc edge impacting the valve body during operation. The impact marks are typically as shown on Attachment 6, Typical Impacts at the Back of the Check Valve Disc.

- 5.3.12.1 Measure the depth of any wear marks and confirm that they are less than half the thickness of the disc at the edge. Record the condition of the back of the disc in the Remarks section.

**QC** INSPECTION POINT OQCM Code **M.4.1**

Valve General Inspection

- 5.3.13 Inspect the disc arm in wear areas. Normal wear is shown on Attachment 7, Typical Disc Arm Wear. Record condition in the Remarks section.
- 5.3.14 Visually inspect the disc arm for signs of cracking or fracture. If there are any indications the disc arm should be replaced.
- 5.3.15 Blue check the disc seating surface using blue check flat supplied in check valve toolbox.

NOTE: Reconditioning of valve seating surfaces as a result of normal wear is not an ASME Section XI repair. If it is necessary to recondition the valve seating surfaces because of abnormal wear, a Section XI repair may be necessary. Contact Engineering or Planning for additional guidance if necessary.

- 5.3.15.1 If necessary, recondition the valve seat and disc seating surfaces.
- 5.3.15.2 If the disc is to be removed to another area for rework, the bonnet should be set back in place or lead blankets placed over the valve opening. This is recommended to lower radiation and minimize contamination.
- 5.3.16 Continue with valve reassembly per Section 5.5.

**5.4** STYLE B SWING CHECK VALVE INSPECTION INSTRUCTIONS

- 5.4.1 Check for free movement of the disc arm and disc, making sure they have full-stroke exercise and move freely.
- 5.4.2 Matchmark the bearing blocks to their location in the valve (A-A and B-B).

NOTE: The disc arm assembly may need to be rotated slightly by hand to clear the body.

NOTE: Bearing blocks are sliding fits to the pivot pin and may fall off. The bearing blocks should be removed as soon as they clear the valve body.

5.4.3 Lift the check valve assembly vertically from the check valve and remove the bearing blocks (11) from the pivot pin (10) as soon as the disc assembly clears the valve body.

5.4.4 Visually inspect the lock block (7) holes to determine if they are out of round due to the wobbling of the disc arm. If they are out of round but the disc pivot pin is tight, note this in the Remarks section. Refer to Attachment 8, Lock Block Inspection.

5.4.5 Measure the outside diameter of the pivot pin (10) at two places 90 degrees apart on both ends. Record the measurements below.

_____	_____	end A
_____	_____	end B

# 5.4.5.1 Compare these measurements with the minimum allowable pin diameter provided on Attachment 9. If any of the measurements taken are less than this value, the pivot pin needs to be replaced.

\_\_\_\_\_ minimum allowable pin diameter from Attachment 9.

5.4.6 Measure the inside diameter of the bearing block (11) holes in two places 90 degrees apart and record the measurements below.

_____	_____	bearing block A
_____	_____	bearing block B

# 5.4.6.1 Compare these measurements from Step 5.4.6 with the maximum bearing hole diameter provided on Attachment 9. If any of the measurements taken are greater than this value the bearing blocks should be replaced. Also the difference between the two measurements taken at each bearing block should be less than 0.01", if not replace the bearing block.

\_\_\_\_\_ maximum bearing hole diameter from Attachment 9.

- 5.4.7 Determine the maximum diametral clearance between the pivot pin and bearing block holes and record below. To determine the maximum diametral clearance subtract the small pivot pin hole diameter from the larger bearing block hole diameter at each end below:

	Larger Bearing Block Diameter	-	Smaller Pivot Pin Diameter	=	Diametral Clearance	
END A:	_____	-	_____	=	_____	(inches)
END B:	_____	-	_____	=	_____	(inches)

- # 5.4.7.1 Compare the diametral clearances from step 5.4.7 with the maximum allowable diametral clearance provided on Attachment 9. Verify the clearance from step 5.4.7 is less than the value provided on Attachment 9. If not, the bearing block and/or the pivot pin should be replaced.

\_\_\_\_\_ maximum allowable diametral clearance from Attachment 9.

- 5.4.8 Check for side to side movement of the pivot pin (10) in the lock block (7). If there is side to side motion either replace the pivot pin or the entire disc assembly.

- 5.4.9 Check for rotational movement of the pivot pin in the lock block. If there is rotational movement, replace the pin.

- 5.4.10 Check for sliding of the disc arm (6) inside the lock block (7). If there is sliding between these parts, replace the pivot pin (10). Also inspect the disc arm and replace if necessary.

<u>NOTE:</u>	Replacement of the disc or disc assembly requires a Section XI replacement plan. Contact planning if necessary.
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- 5.4.11 Check for a worn or loosely held disc arm. If necessary, replace the disc assembly.

- 5.4.12 Check for wear between disc arm and the disc. Replace if necessary.

\_\_\_\_/\_\_\_\_  
**QC** INSPECTION POINT

OQCM Code .4.1

Valve General Inspection.

- 5.4.13 Blue check the disc seating surfaces using blue check flat supplied in check valve tool box.

NOTE: Reconditioning of valve seating surfaces as a result of normal wear is not an ASME Section XI repair. If it is necessary to recondition the valve seating surfaces because of abnormal wear, a Section XI repair may be necessary. Contact Engineering or Planning for additional guidance if necessary.

- 5.4.14 If necessary rework the valve seat and disc in accordance with an approved work document.

Work Document No. \_\_\_\_\_

- 5.4.15 If the disc is to be removed to another area for rework, the bonnet should be set back in place or lead blankets placed over the valve opening. This is recommended to lower radiation and minimize contamination.

- 5.4.16 Continue with valve reassembly per section 5.5.

5.5 VALVE REASSEMBLY

\_\_\_\_/\_\_\_\_  
**QC** INSPECTION POINT

OQCM Code M.4.1

Valve General Inspection.

\_\_\_\_/\_\_\_\_  
**QC** INSPECTION POINT

OQCM Code M.4.2

Verify internal cleanliness per OQCM.

NOTE: If re-using the bearing blocks, install them in their original location using the match marks as a guide. If new bearing blocks are being used, disregard match markings.

- 5.5.1 Slide the bearing blocks on the pivot pin and hold in place while installing the disc assembly in the valve body.

\_\_\_\_/\_\_\_\_ 5.5.2 Stroke the valve and verify that the disc moves freely.

\_\_\_\_/\_\_\_\_ **QC** INSPECTION POINT OQCM Code **M.1.1 or M.1.2**

Verify replacement parts per criteria of OQCM.

\_\_\_\_/\_\_\_\_ 5.5.3 Install a new body to bonnet gasket and lower the bonnet in place.

# 5.5.4 Lubricate the stud threads with Fel-Pro N-5000 and install by hand a minimum of \_\_\_\_ threads. (indicate number of threads from Attachment 4, "Stud Minimum Thread Engagement".)

5.5.4.1 If the studs do not go in freely, the holes may be chased with the appropriate sized tap. If the holes are chased, clean the holes.

\_\_\_\_/\_\_\_\_ **QC** INSPECTION POINT OQCM Code **M.4.5**

Verify final torque.

# 5.5.5 Torque the studs to the value listed below for those studs removed during this procedure.

\_\_\_\_ ft-lbs.

5.5.6 Lubricate the nut threads and faces with Fel-Pro N-5000.

5.5.7 Run the nuts onto the studs hand tight.

\_\_\_\_/\_\_\_\_ **QC** INSPECTION POINT OQCM Code **M.4.5**

Verify final torque.



- # 5.5.8 Tighten the nuts in numerical order using the following six pass method.

<i>Initial When Complete</i>	<i>Pass No.</i>	<i>Torque</i>	<i>Forward/Reverse</i>
_____	1	_____ ft-lbs.	Forward
_____	2	_____ ft-lbs.	Forward
_____	3	_____ ft-lbs.	Reverse
_____	4	_____ ft-lbs.	Forward
_____	5	_____ ft-lbs.	Forward
_____	6	_____ ± _____ ft-lbs.	Reverse

(insert torque values from Attachment 5, Check Valve Main Flange Torque Values).

- 5.5.9 Remove all excess lubricant from the fasteners.

## 6. RESTORATION AND RETEST

- 6.1 Release the WPA.
- 6.2 Operations perform Operational/Surveillance testing as required.

## 7. REFERENCES

- 7.1 M-724-409, Instruction Manual for Gate and Check Valves  
Westinghouse Electric Corp.
- 7.2 **APA-ZZ-00801**, Foreign Material Exclusion
- 7.3 **APA-ZZ-00420**, Traceability and Accountability of Safety Related  
Material and Equipment After Issue.
- 7.4 **APA-ZZ-00800**, General Plant Housekeeping
- 7.5 Callaway Plant Operational Quality Control Manual (OQCM)
- 7.6 NRC IE Bulletin 82-02, Degradation of Threaded Fasteners in the  
Reactor Coolant Pressure Boundary of PWR Plants.
- 7.7 **QCP-ZZ-05040**, Visual Examination of ASME VT-1
- 7.8 RFR 02182
- 7.9 RFR 8353B
- 7.10 RFR 9970

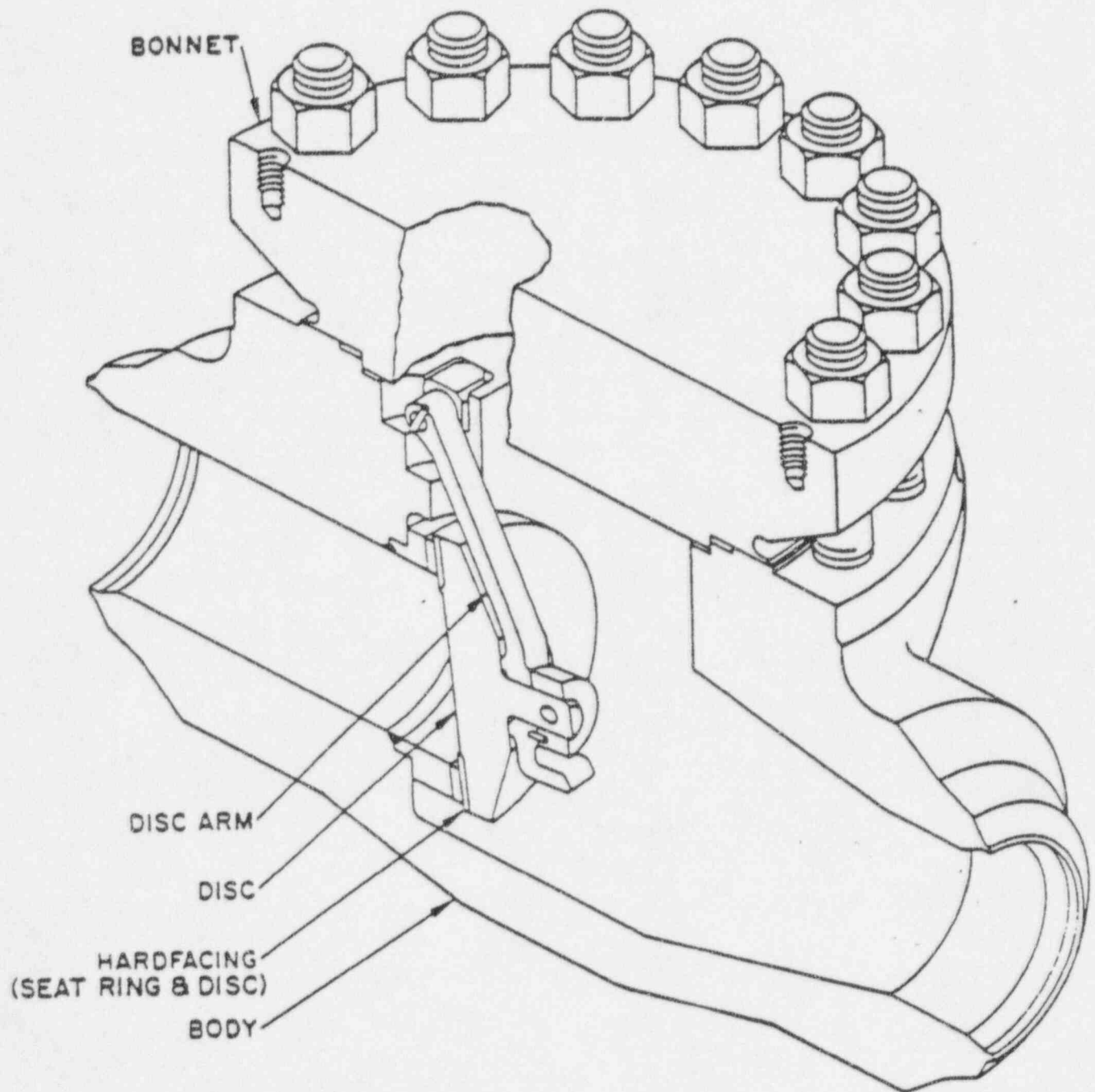


8. RECORDS

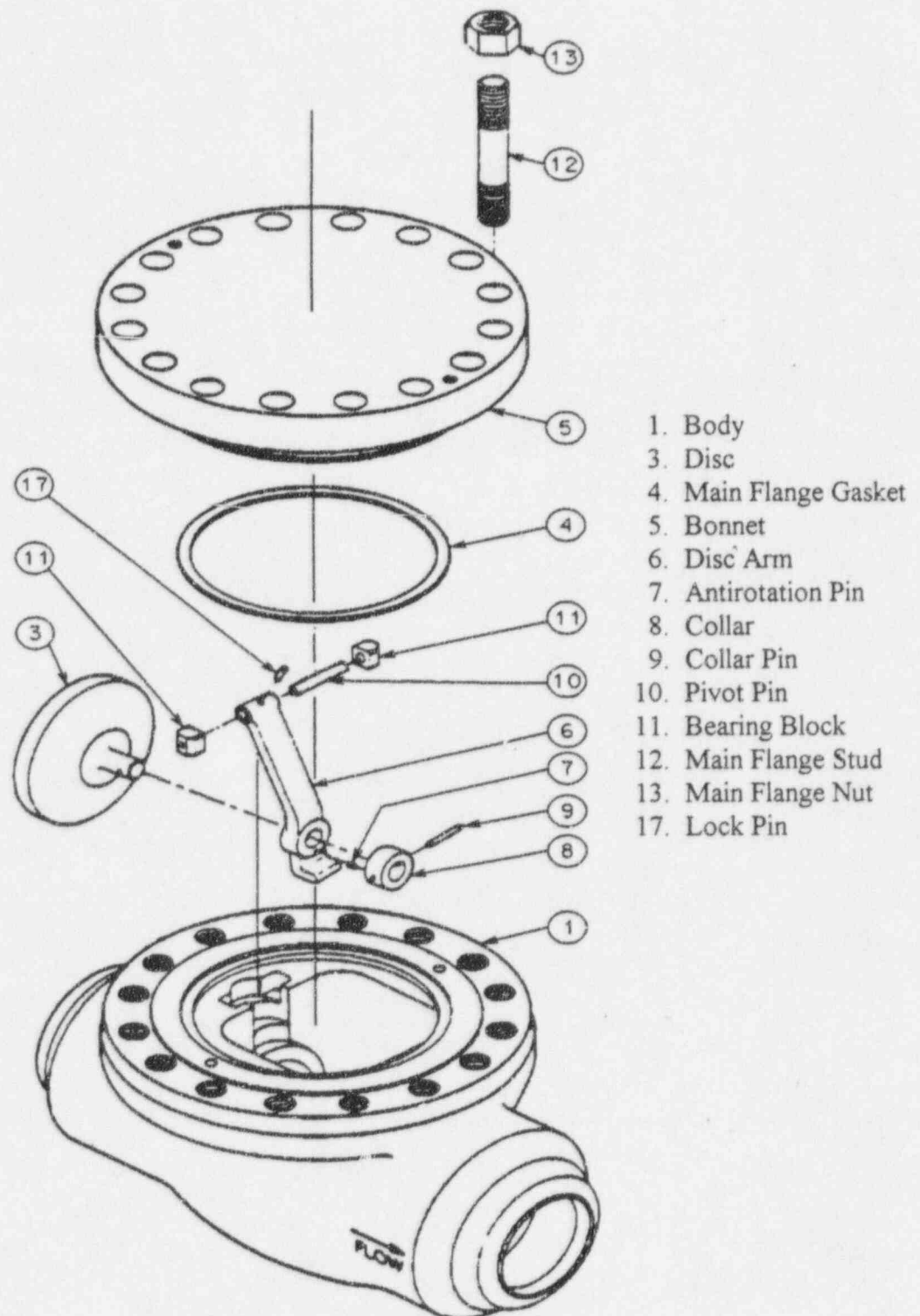
- 8.1 Process completed portions of this procedure as a QA record with the work authorizing document.

9. REMARKS

SWING CHECK VALVE DIAGRAMS

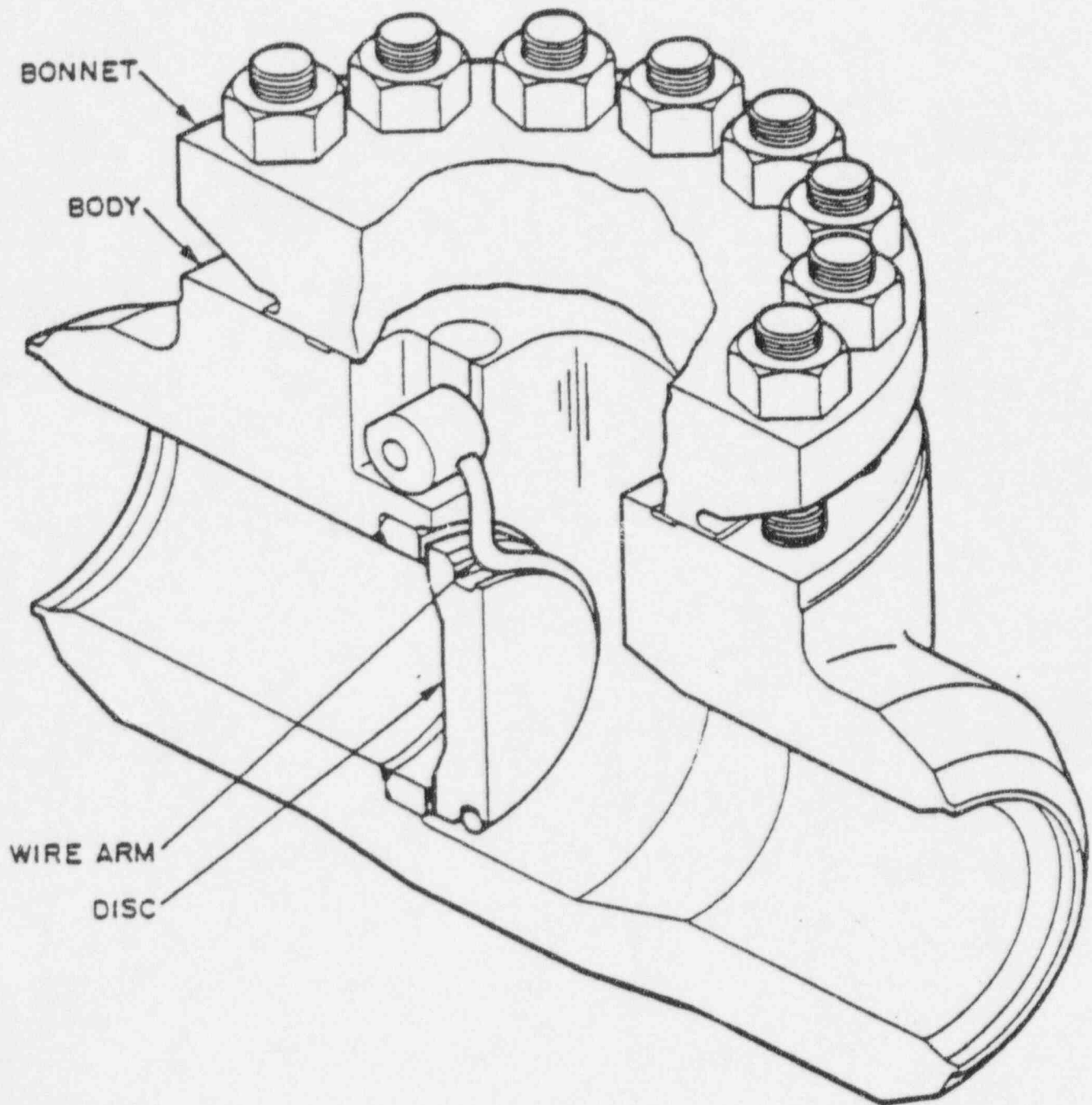


Swing Check Valve Assembly  
Style A



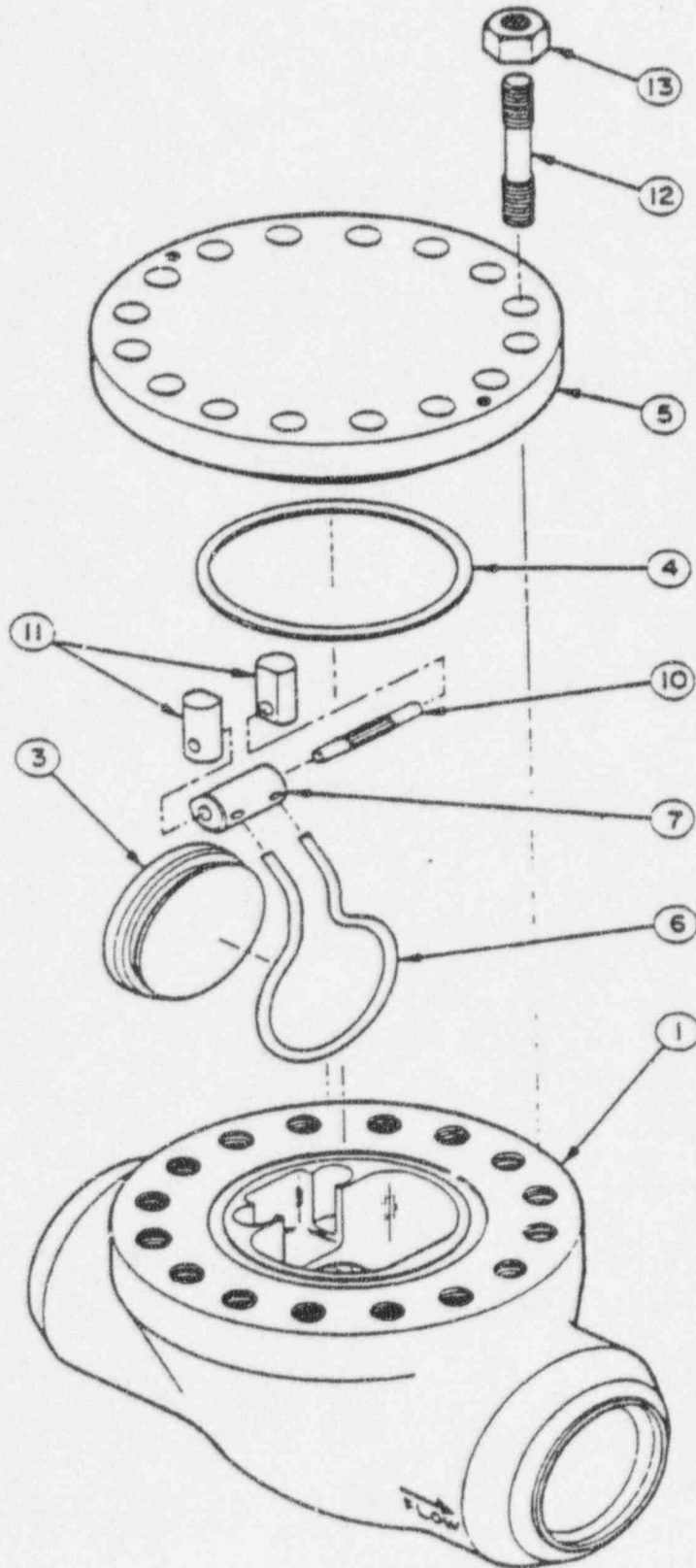
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Swing Check Valve (Exploded View)  
 Style A



SWING CHECK VALVE ASSEMBLY

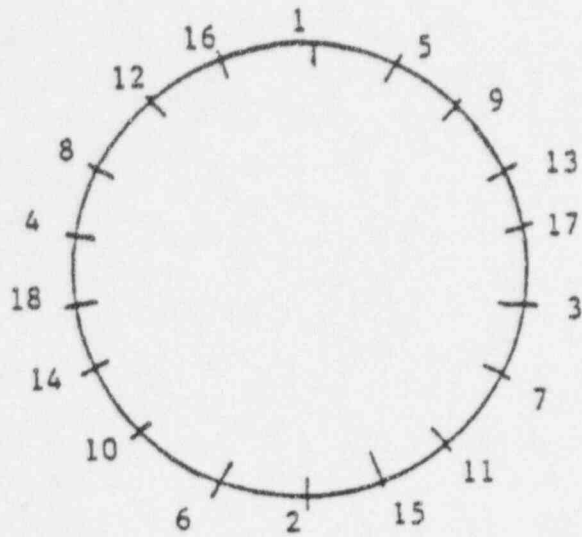
STYLE B



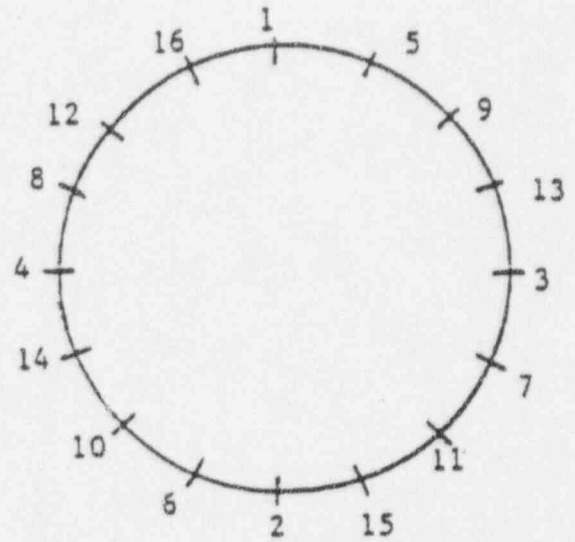
- 1. Body
- 3. Disc
- 4. Main Flange Gasket
- 5. Bonnet
- 6. Disc Arm
- 7. Lock Block
- 10. Pivot Pin
- 11. Bearing Block
- 12. Main Flange Stud
- 13. Main Flange Nut

SWING CHECK VALVE (EXPLODED VIEW)

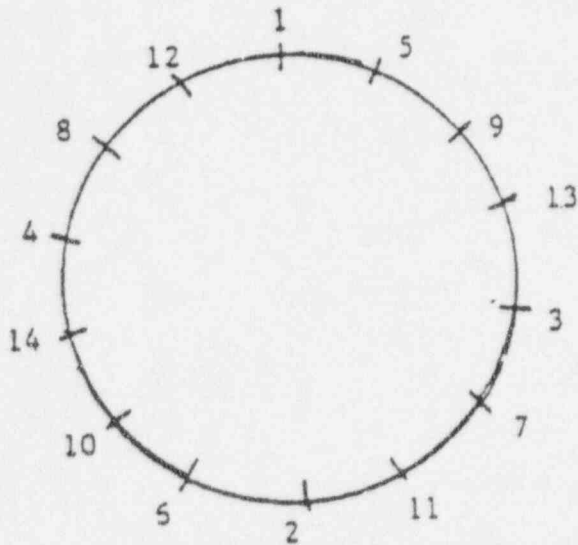
STYLE B



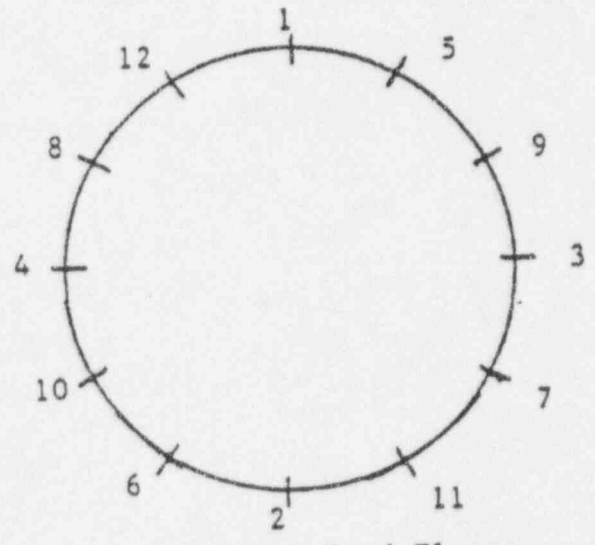
(A) 18 Stud Flange



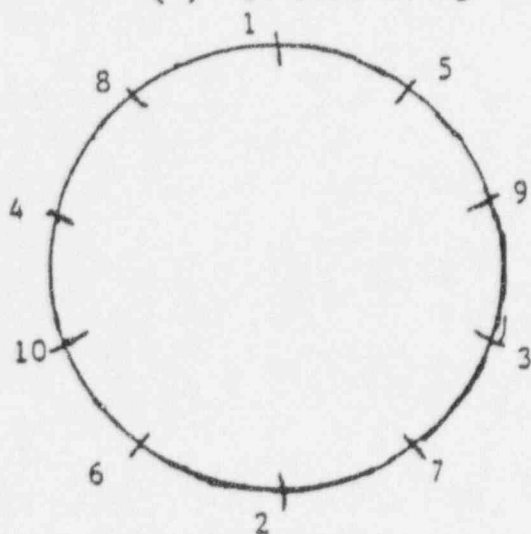
(B) 16 Stud Flange



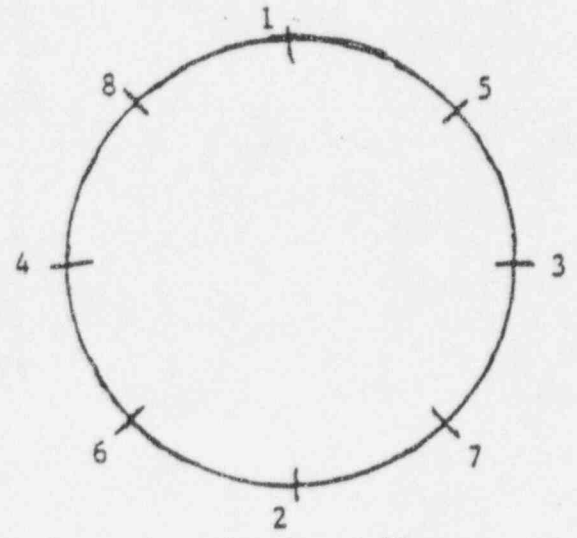
(C) 14 Stud Flange



(D) 12 Stud Flange



(E) 10 Stud Flange



(F) 8 Stud Flange

Main Flange Nut Tightening Sequence

**CHECK VALVE MAIN FLANGE NUT AND STUD DETENSIONING TORQUE**

Valve ID	Valve Style	Model	Stud Size (inches)	Nut Detensioning Torque at Level 1 (ft-lbs)	Nut Detensioning Torque at Level 2 (ft-lbs)	Stud Removal Torque (ft-lbs)	Stud Installation Torque (Ft-Lbs)	Eye Bolt Size (inches)
BB8038A	B	3-C52, 72	0.625	60	25	125	100 +/- 5	.500 - 13
BB8038B	B	3-C52, 72	0.625	60	25	125	100 +/- 5	.500 - 13
BB8378A	B	3-C58, 78, 88	0.625	60	25	125	100 +/- 5	.500 - 13
BB8378B	B	3-C58, 78, 88	0.625	60	25	125	100 +/- 5	.500 - 13
BB8379A	B	3-C58, 78, 88	0.625	60	25	125	100 +/- 5	.500 - 13
BB8379B	B	3-C58, 78, 88	0.625	60	25	125	100 +/- 5	.500 - 13
BB8948A	B	10-C88	1.625	1150	460	250	200 +/- 10	.750 - 10
BB8948B	B	10-C88	1.625	1150	460	250	200 +/- 10	.750 - 10
BB8948C	B	10-C88	1.625	1150	460	250	200 +/- 10	.750 - 10
BB8948D	B	10-C88	1.625	1150	460	250	200 +/- 10	.750 - 10
BB8949A	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
BB8949B	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
BB8949C	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
BB8949D	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
BG7039	B	3-C54, 74	0.625	60	25	125	100 +/- 5	.500 - 13
BG7058	B	3-C54, 74	0.625	60	25	125	100 +/- 5	.500 - 13
BG8381	B	3-C58, 78, 88	0.625	60	25	125	100 +/- 5	.500 - 13
BG8417	B	3-C54, 74	0.625	60	25	125	100 +/- 5	.500 - 13
BG8420	B	3-C52, 72	0.625	60	25	125	100 +/- 5	.500 - 13
BG8440	B	4-C52, 72	0.75	60	25	125	100 +/- 5	.500 - 13
BG8454	B	3-C54, 74	0.625	60	25	125	100 +/- 5	.500 - 13
BG8470	B	3-C52, 72	0.625	60	25	125	100 +/- 5	.500 - 13
BG8481A	B	4-C78	0.75	105	50	125	100 +/- 5	.500 - 13
BG8481B	B	4-C78	0.75	105	50	125	100 +/- 5	.500 - 13
BG8486	B	3-C52, 72	0.625	60	25	125	100 +/- 5	.500 - 13
BG8496	B	3-C54, 74	0.625	60	25	125	100 +/- 5	.500 - 13
BG8497	B	3-C58, 78, 88	0.625	60	25	125	100 +/- 5	.500 - 13
BG8546A	A	8-C72	0.625	60	25	125	100 +/- 5	.500 - 13
BG8546B	A	8-C72	0.625	60	25	125	100 +/- 5	.500 - 13
BL8046	B	3-C52, 72	0.625	60	25	125	100 +/- 5	.500 - 13
EJ8730A	A	10-C74	0.875	170	70	125	100 +/- 5	.750 - 10
EJ8730B	A	10-C74	0.875	170	70	125	100 +/- 5	.750 - 10
EJ8841A	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
EJ8841B	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10



CHECK VALVE MAIN FLANGE NUT AND STUD DETENSIONING TORQUE

Valve ID	Valve Style	Model	Stud Size (inches)	Nut Detensioning Torque at Level 1 (ft-lbs)	Nut Detensioning Torque at Level 2 (ft-lbs)	Stud Removal Torque (ft-lbs)	Stud Installation Torque (Ft-Lbs)	Eye Bolt Size (inches)
EJ8958A	A	14-C74	1	250	100	250	200 +/- 10	.750 - 10
EJ8958B	A	14-C74	1	250	100	250	200 +/- 10	.500 - 13
EJ8969A	A	8-C74	0.625	60	25	125	100 +/- 5	.500 - 13
EJ8969B	A	8-C74	0.625	60	25	125	100 +/- 5	.500 - 13
EM8815	B	3-C58, 78, 88	0.625	60	25	125	100 +/- 5	.500 - 13
EM8922A	B	4-C77	0.75	105	50	125	100 +/- 5	.500 - 13
EM8922B	B	4-C77	0.75	105	50	125	100 +/- 5	.500 - 13
EM8926A	A	8-C72	0.625	60	25	125	100 +/- 5	.500 - 13
EM8926B	A	8-C72	0.625	60	25	125	100 +/- 5	.500 - 13
EP8818A	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
EP8818B	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
EP8818C	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
EP8818D	B	6-C88	1	250	100	125	100 +/- 5	.750 - 10
EP8956A	B	10-C88	1.625	1150	460	250	200 +/- 10	.750 - 10
EP8956B	B	10-C88	1.625	1150	460	250	200 +/- 10	.750 - 10
EP8956C	B	10-C88	1.625	1150	460	250	200 +/- 10	.750 - 10
EP8956D	B	10-C88	1.625	1150	460	250	200 +/- 10	.750 - 10

VALVE SIZE	STUD SIZE	NO. of STUDS	PRESSURE RATING	Minimum No. of threads required to be engaged in valve body.
3"	5/8" - 11	12	2500 psi	4 threads engaged
6"	1" - 8	16	2500 psi	6 threads engaged
10"	1 5/8" - 8	14	2500 psi	10 threads engaged

STUD MINIMUM THREAD ENGAGEMENT \*

- \* For the stud minimum thread engagement for valves with different pressure ratings, contact Engineering.

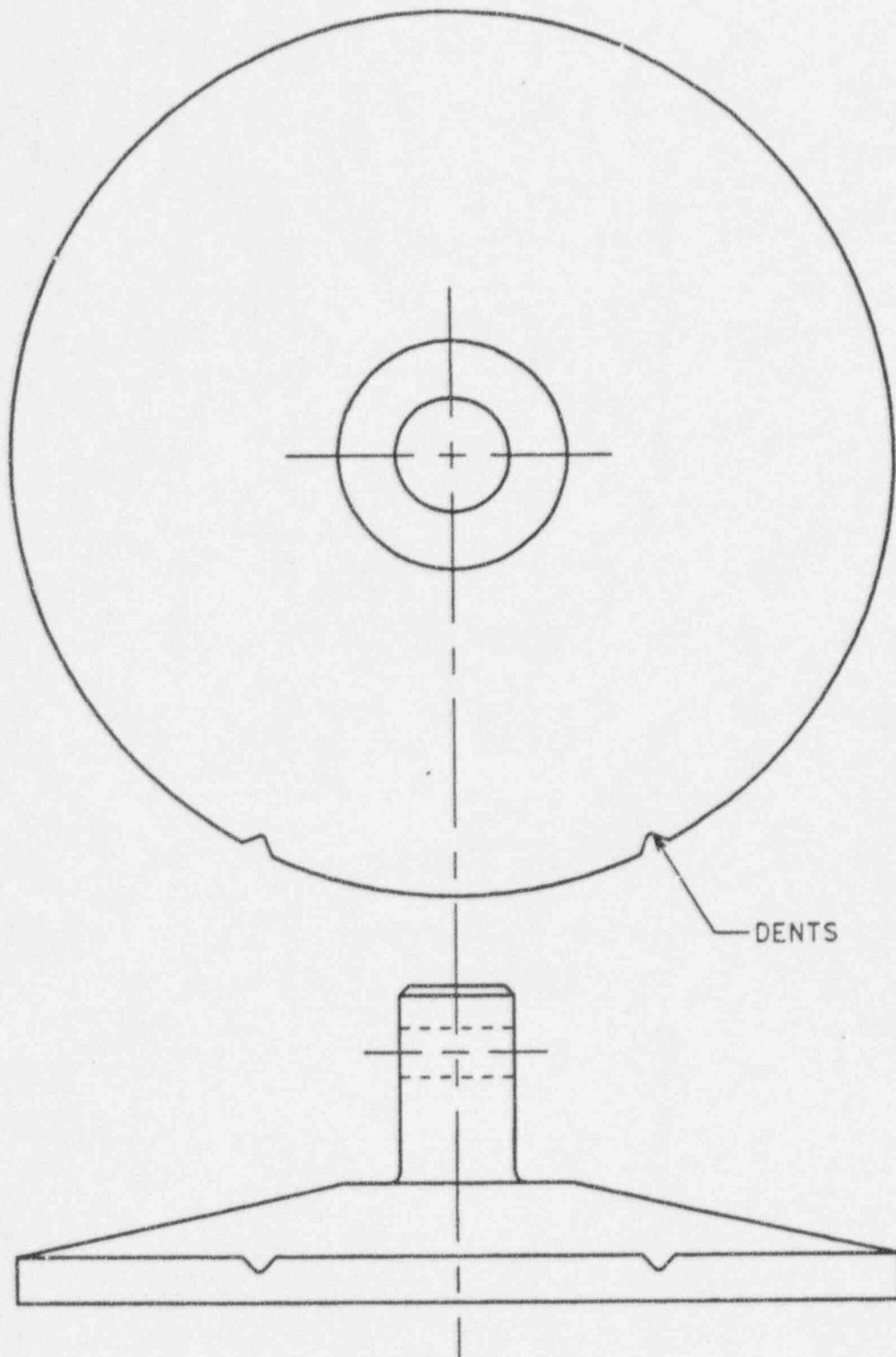
**CHECK VALVE MAIN FLANGE TORQUE VALUES**

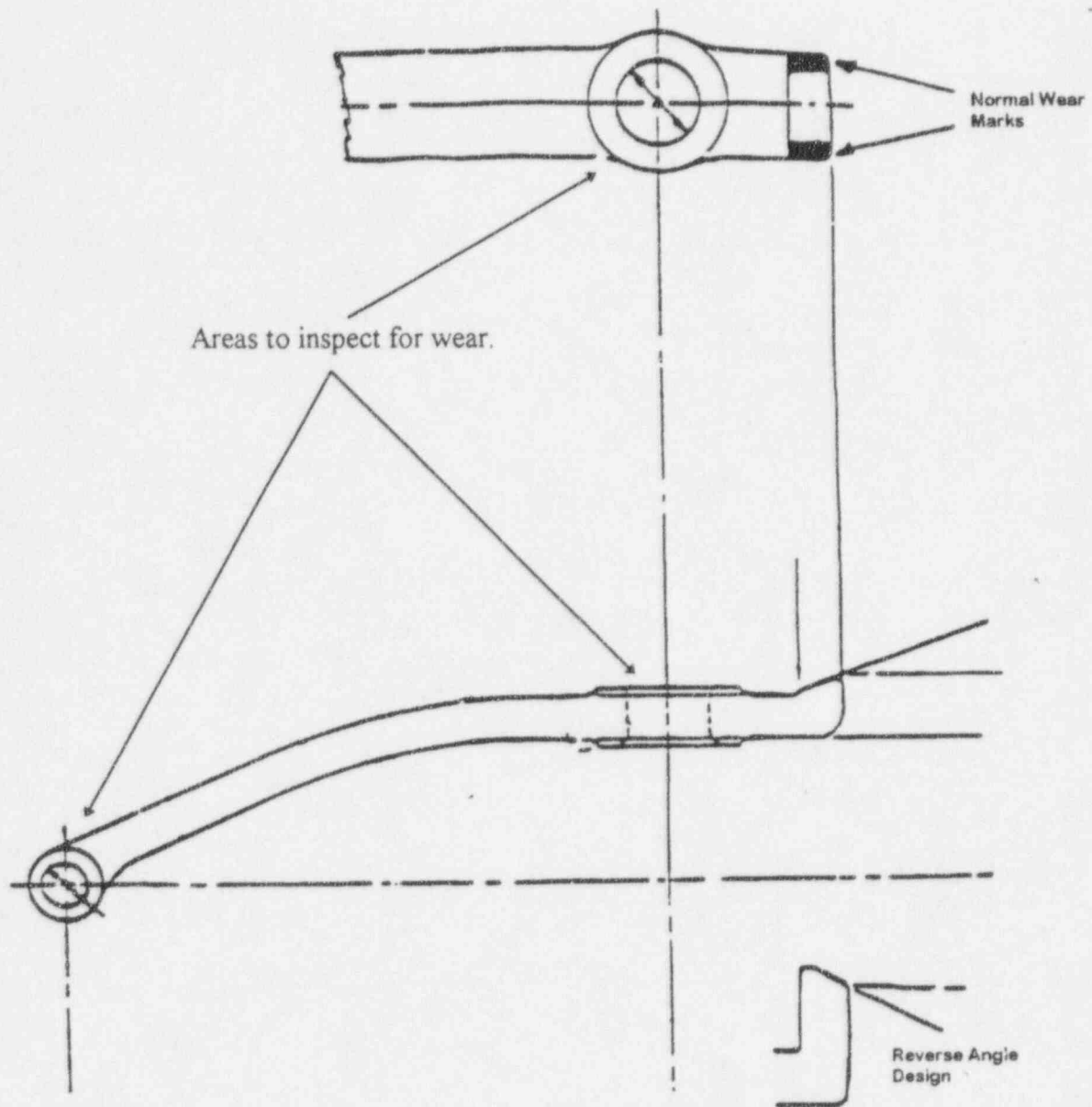
Valve ID	Valve Style	Model	Pass #1	Pass #2	Pass #3	Pass #4	Pass #5	Pass #6 (Design Torque)
BB8038A	B	3-C52, 72	20	40	60	80	100	115 +/- 5
BB8038B	B	3-C52, 72	20	40	60	80	100	115 +/- 5
BB8378A	B	3-C58, 78, 88	20	40	60	80	100	115 +/- 5
BB8378B	B	3-C58, 78, 88	20	40	60	80	100	115 +/- 5
BB8379A	B	3-C58, 78, 88	20	40	60	80	100	115 +/- 5
BB8379B	B	3-C58, 78, 88	20	40	60	80	100	115 +/- 5
BB8948A	B	10-C88	385	770	1150	1535	1920	2300 +/- 50
BB8948B	B	10-C88	385	770	1150	1535	1920	2300 +/- 50
BB8948C	B	10-C88	385	770	1150	1535	1920	2300 +/- 50
BB8948D	B	10-C88	385	770	1150	1535	1920	2300 +/- 50
BB8949A	B	6-C88	85	170	250	335	420	500 +/- 20
BB8949B	B	6-C88	85	170	250	335	420	500 +/- 20
BB8949C	B	6-C88	85	170	250	335	420	500 +/- 20
BB8949D	B	6-C88	85	170	250	335	420	500 +/- 20
BG7039	B	3-C54, 74	20	40	60	80	100	115 +/- 5
BG7058	B	3-C54, 74	20	40	60	80	100	115 +/- 5
BG8381	B	3-C58, 78, 88	20	40	60	80	100	115 +/- 5
BG8417	B	3-C54, 74	20	40	60	80	100	115 +/- 5
BG8420	B	3-C52, 72	20	40	60	80	100	115 +/- 5
BG8440	B	4-C52, 72	20	40	60	80	100	115 +/- 5
BG8454	B	3-C54, 74	20	40	60	80	100	115 +/- 5
BG8470	B	3-C52, 72	20	40	60	80	100	115 +/- 5
BG8481A	B	4-C78	35	70	110	145	180	220 +/- 10
BG8481B	B	4-C78	35	70	110	145	180	220 +/- 10
BG8486	B	3-C52, 72	20	40	60	80	100	115 +/- 5
BG8496	B	3-C54, 74	20	40	60	80	100	115 +/- 5
BG8497	B	3-C58, 78, 88	20	40	60	80	100	115 +/- 5
BG8546A	A	8-C72	20	40	60	80	100	115 +/- 5

**CHECK VALVE MAIN FLANGE TORQUE VALUES**

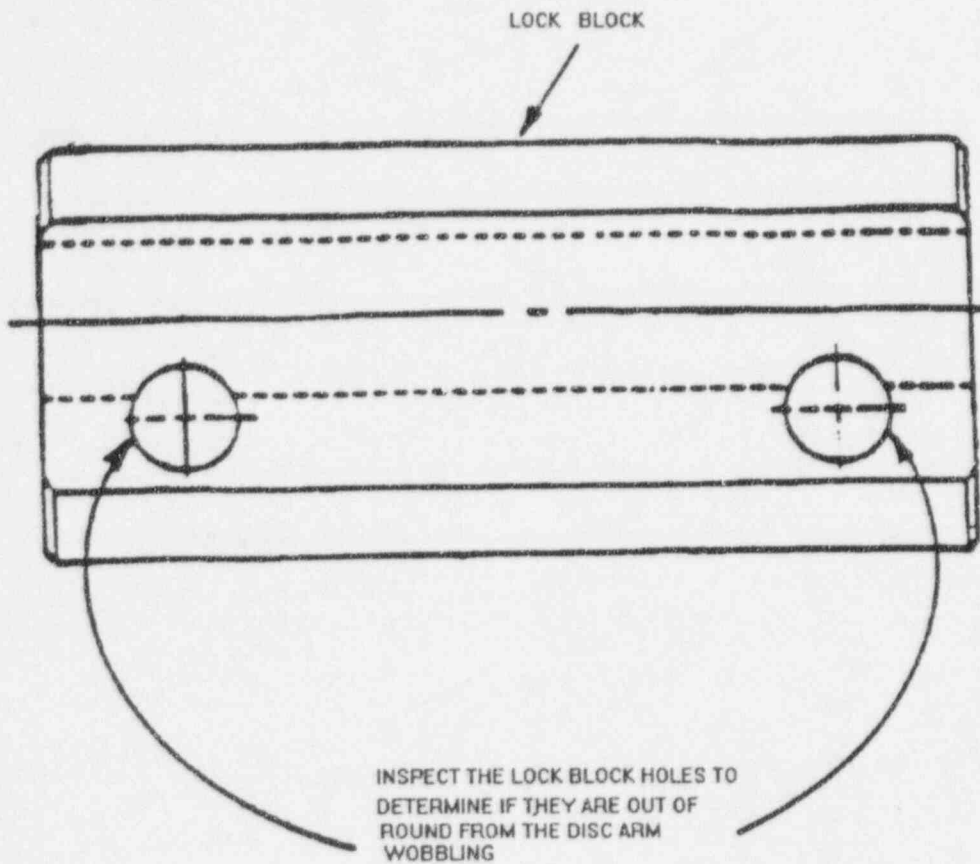
Valve ID	Valve Style	Model	Pass #1	Pass #2	Pass #3	Pass #4	Pass #5	Pass #6 (Design Torque)
BG8546B	A	8-C72	20	40	60	80	100	115 +/- 5
BL8046	B	3-C52, 72	20	40	60	80	100	115 +/- 5
EJ8730A	A	10-C74	55	110	165	220	275	330 +/- 10
EJ8730B	A	10-C74	55	110	165	220	275	330 +/- 10
EJ8841A	B	6-C88	85	170	250	335	420	500 +/- 20
EJ8841B	B	6-C88	85	170	250	335	420	500 +/- 20
EJ8958A	A	14-C74	85	170	250	335	420	500 +/- 20
EJ8958B	A	14-C74	85	170	250	335	420	500 +/- 20
EJ8969A	A	8-C74	20	40	60	80	100	115 +/- 5
EJ8969B	A	8-C74	20	40	60	80	100	115 +/- 5
EM8815	B	3-C58, 78, 88	20	40	60	80	100	115 +/- 5
EM8922A	B	4-C77	35	70	110	145	180	220 +/- 10
EM8922B	B	4-C77	35	70	110	145	180	220 +/- 10
EM8926A	A	8-C72	20	40	60	80	100	115 +/- 5
EM8926B	A	8-C72	20	40	60	80	100	115 +/- 5
EP8818A	B	6-C88	85	170	250	335	420	500 +/- 20
EP8818B	B	6-C88	85	170	250	335	420	500 +/- 20
EP8818C	B	6-C88	85	170	250	335	420	500 +/- 20
EP8818D	B	6-C88	85	170	250	335	420	500 +/- 20
EP8956A	B	10-C88	385	770	1150	1535	1920	2300 +/- 50
EP8956B	B	10-C88	385	770	1150	1535	1920	2300 +/- 50
EP8956C	B	10-C88	385	770	1150	1535	1920	2300 +/- 50
EP8956D	B	10-C88	385	770	1150	1535	1920	2300 +/- 50

All Torque Values Given in Ft-Lbs.





Typical Disc Arm Wear



### LOCK BLOCK INSPECTION



# WESTINGHOUSE STYLE A & STYLE B SWING CHECK VALVE DIMENSIONAL ACCEPTANCE CRITERIA

Valve ID	Drawing Number	Valve Style	Minimum Pin Diameter (Inches)	Maximum Bearing Hole Diameter (Inches)	Max. Diametral Clearance Between The Pin & The Bearing Block (Inches)
BB8038A	8373D67	B	0.336	0.358	0.020
BB8038B	8373D67	B	0.336	0.358	0.020
BB8378A	8372D76	B	0.336	0.358	0.020
BB8378B	8372D76	B	0.336	0.358	0.020
BB8379A	8372D76	B	0.336	0.358	0.020
BB8379B	8372D76	B	0.336	0.358	0.020
BB8948A	8375D06	B	0.447	0.859	0.278
BB8948B	8375D06	B	0.447	0.859	0.278
BB8948C	8375D06	B	0.447	0.859	0.278
BB8948D	8375D06	B	0.447	0.859	0.278
BB8949A	8375D05	B	0.247	0.584	0.228
BB8949B	8375D05	B	0.247	0.584	0.228
BB8949C	8375D05	B	0.247	0.584	0.228
BB8949D	8375D05	B	0.247	0.584	0.228
BG7039	8373D66	B	0.336	0.358	0.020
BG7058	8373D66	B	0.336	0.358	0.020
BG8381	8372D76	B	0.336	0.358	0.020
BG8417	8373D66	B	0.336	0.358	0.020
BG8420	8373D67	B	0.336	0.358	0.020
BG8440	8373D74	B	0.256	0.398	0.102
BG8454	8373D66	B	0.336	0.358	0.020
BG8470	8373D67	B	0.336	0.358	0.020
BG8481A	8373D73	B	0.256	0.398	0.102
BG8481B	8373D737	B	0.256	0.398	0.102
BG8486	8373D67	B	0.336	0.358	0.020
BG8496	8373D66	B	0.336	0.358	0.020
BG8497	8372D76	B	0.336	0.358	0.020
BG8546A	8374D42	A	*	*	*
BG8546B	8374D42	A	*	*	*
BL8046	8373D67	B	0.336	0.358	0.020
EJ8730A	8374D36	A	0.376	0.937	0.378
EJ8730B	8374D36	A	0.376	0.937	0.378
EJ8841A	8375D05	B	0.247	0.584	0.228
EJ8841B	8375D05	B	0.247	0.584	0.228
EJ8958A	8374D43	A	0.376	1.062	0.628
EJ8958B	8374D43	A	0.376	1.062	0.628
EJ8969A	8374D08	A	*	*	*
EJ8969B	8374D08	A	*	*	*
EM8815	8372D76	B	0.336	0.358	0.020
EM8922A	8375D07	B	*	*	*
EM8922B	8375D07	B	*	*	*
EM8926A	8374D42	A	*	*	*
EM8926B	8374D42	A	*	*	*
EP8818A	8375D05	B	0.247	0.584	0.228
EP8818B	8375D05	B	0.247	0.584	0.228
EP8818C	8375D05	B	0.247	0.584	0.228
EP8818D	8375D05	B	0.247	0.584	0.228
EP8956A	8375D06	B	0.447	0.859	0.278
EP8956B	8375D06	B	0.447	0.859	0.278
EP8956C	8375D06	B	0.447	0.859	0.278
EP8956D	8375D06	B	0.447	0.859	0.278

\* Dimensional Data Yet To Be Determined

## INVENTORY LIST OF WESTINGHOUSE CHECK VALVE TOOL BOXES

### I. BROWN GANG BOX INVENTORY

#### 10 INCH VALVES

VALVE COVERS (3)  
STUD BAGS (6)  
  
TEMPORARY STUDS (7)  
DISC BAGS (2)  
DISC LIFTING HANDLES (3)  
PIPE DAM 8 3/4" DIAMETER WITH NO SEAL (1)

#### 6 INCH VALVES

VALVE COVERS (2)  
RUBBER RINGS FOR 6 INCH  
COVERS (2)  
STUD BAGS (6)  
TEMPORARY STUDS (3 SETS)  
DISC BAGS (1)  
BRIDGE PIECE BAG (1)  
PIPE DAM (1 SET WITH 4 EA  
REPLACEMENT SEALS)

#### OTHER

- STUD BAG FOR 3 INCH VALVES
- ASSORTED EMERY PAPER
- 6 PLUG OUTLET STRIP (1)
- DOUBLE BACK TAPE (1 ROLL)
- AIR LINE PIG TAIL (1)
- 3/8" AIR HOSE, APPROXIMATELY 50 FT, WITH BIG ENDS (1)
- SWING ARM LIGHT (1)
- SHARPENING STONE (1)
- 18 INCH WIRE TIES (APPROXIMATELY 6)
- AIR REGULATOR-OILER (1)
- 3/4" EYE NUTS AND BOLTS (6)
- 1/2" EYE NUTS AND BOLTS (8)
- INSPECTION MIRROR (1)
- BOTTLE BRUSHES (6)

### II. BLUE BOX #2 INVENTORY

#### LAPPING TOOLS

- MAG. DRILL AND CABINET ADAPTER (1)
- ELECTRIC DRILL MOTORS WITH 3/8" CHUCKS (2)
- EFCO DRILL ADAPTER KIT (1)
- BOX WITH 3, 6 AND 10 INCH VALVE BLUE CHECKING FLATS (1 BOX)
  - ⇒ 3 INCH VALVE BLUE CHECK FLAT (2)
  - ⇒ 6 INCH VALVE BLUE CHECK FLAT (1)
  - ⇒ 10 INCH VALVE BLUE CHECK FLAT (1)
- PAPER PAD WITH EDGES (1)

- DIAL CALIPERS (1 PR)
- BLACK MARKERS, BLUING, BRUSH, AND 2 TUBES N-5000 (1 BAG)
- IN PROCESS TAGS (1 BAG)
- SURGICAL GLOVES (1 PARTIAL BOX)
- RUBBER SUCTION CUP (1)

#### HAND TOOLS

- MISC. HAND TOOLS IN BAG
- 12" CRESCENT WRENCH (1)
- 10" CRESCENT WRENCH (2)
- 8" CRESCENT WRENCH (1)
- 6" CRESCENT WRENCH (1)
- 9/16" COMBINATION WRENCHES (2)
- UTILITY KNIVES (2)
- 12 OZ BALL PEEN HAMMERS (2)
- FLASHLIGHTS (2)
- PICK SET POUCH (1)
- ALLEN WRENCH SET (1)
- 12 FT TAPE MEASURE (1)
- FLAT SCREW DRIVERS (5)
- 18" PIPE WRENCH (1)
- 3/8" NUT DRIVER (1)
- FILES (3)
- PACKING PICKS (2)

### III. BLUE BOX #3

- VISE WITH 4 EA MOUNTING BOLTS (1)
- TAP AND DIES (1 BOX) CONSISTS OF:

DIE NUTS	TAPS	TAP HANDLE
1 5/8" (2)	1 5/8" (2)	(1)
1" (1)	1" (1)	
5/8" (2)	5/8" (11)	

- BOX OF SOCKETS (1 BOX) CONSISTS OF:

SOCKETS	ADAPTERS	RATCHETING ADAPTER	BREAKER BAR
1 1/2" (4)	1" TO 3/4" (2)	1/2" TO 1/2"	3/4" (1)
1 13/16" (2)	3/4" TO 1" (2)		
1 5/8" (2)	1/2" TO 3/4" (1)		
2 9/16" (4)			

- STUD REMOVAL BOX CONSISTING OF:

STUD REMOVAL TOOLS	STUD REMOVAL COLLET	GUIDE PINS	HOMEMADE STUD REMOVAL NUTS	DUMMY STUDS
1 1/2" (3)		1 1/2" (4)	1 1/2" (2)	1 1/2" (2)
1 " (2)	1" (1)		1 " (1)	1" (2)
5/8" (4)				

- 3/4" DRIVE RATCHETS (2)
- 1" BREAKER BAR (1)
- 1 5/8" COMBINATION WRENCHES (4)
- 1 1/2" COMBINATION WRENCHES (2)
- 1 13/16" COMBINATION WRENCHES (3)
- 2 1/4" OPEN END WRENCH (1)
- CROW BAR (1)
- N-5000 (2 CANS)
- PAD LOCKS (2) WITH ONE KEY
- 10" EFCO TO VALVE ADAPTER WITH HEX HEAD BOLTS (1)
- 6" EFCO TO VALVE ADAPTER WITH NO SCREWS (1)
- BOTTLES ALCOHOL (2)
- DEMIN WATER BOTTLES (1)
- CHESTERTON 621 (2)
- 2 STAINLESS STEEL MOUNTING PLATES