M&H Valve Company
605 West 23rd Street
Anniston, AL 36201
256-237-3521

Valve & Hydrant Group

M&H Valve Company Large Diameter (14”-36”) Check Valve Operation and Maintenance Manual

I. General Service by Product

A. Style 59, 159, and 259 Check Valves
   1. Bronze to bronze seating is not available in sizes 14” – 36”.
   2. Resilient, rubber to bronze seating for general service cold water, non-shock, at temperatures that shall not exceed 125 Degrees Fahrenheit. May allow some backflow at conditions of low backpressure (less than 5ft H20). Not for steam service.
   3. Lever & Spring/Lever & Weight are occasionally used in conditions where water hammer may occur. They may be fitted with limit switches to detect flow. Check valves with levers can possess clearance and swing hazard issues during the opening and closing of the clapper.

B. General Selection
   1. To prevent chatter and water hammer there must be at least ½ PSI differential across the valve under normal flow conditions.
   2. In typical clear water environments under 100 Degrees Fahrenheit, resilient-seated valves will allow less backflow and minimize water hammer versus bronze-to-bronze seated check valves.
   3. Consult the factory for services other than clean water.
   4. Allow clearance for external levers and understand that external levers allow possible unauthorized operation of the check valve.

II. Installation

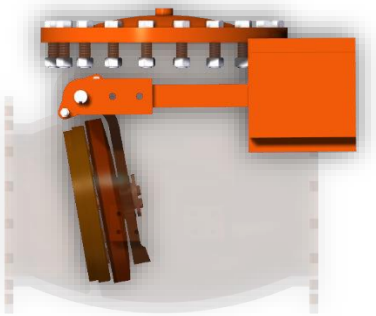
All M&H AWWA Check Valves bolt between ASME/ANSI CLASS 125 Flanges.

A. Orientation
   a. Swing check valves are always installed with the **HINGE PIN** placed horizontally, and above the pipe centerline (as shown in the pictures at the end of this section). Incorrect installation may result in binding, high head loss, and/or sticking in the open position.

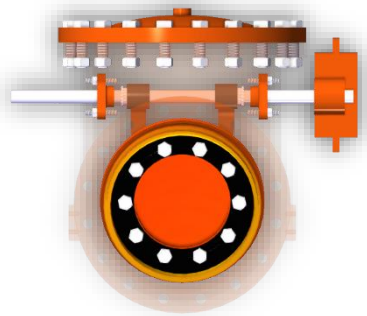
b. Style 59, 159, and 259 check valves must have flow horizontally or vertically, with the **CLAPPER** opening in the upwards vertical direction (as shown in the pictures at the end of this section).
c. Outside lever swing check valves must be installed with the end of the **LEVER**, that is fixed to the **HINGE PIN**, at a higher position than the opposite end of the valve (as shown in the pictures at the end of this section). Failure to do this will cause the valve function to fail.

HORIZONTAL CHECK VALVE IN THE CLOSED POSITION

Right View

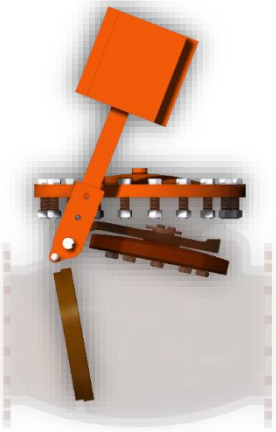


Inlet view

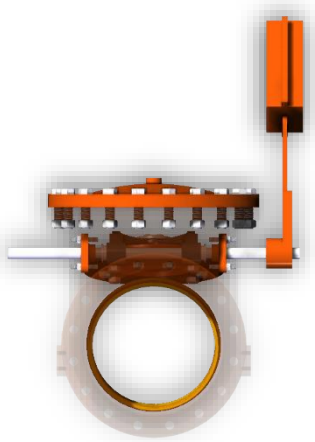


HORIZONTAL CHECK VALVE IN THE OPEN POSITION

Right View

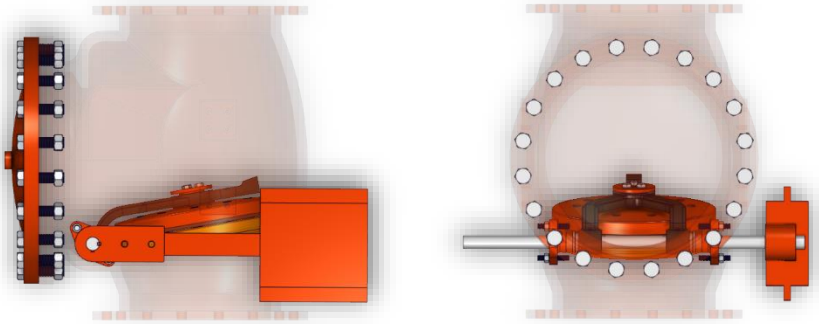


Inlet view



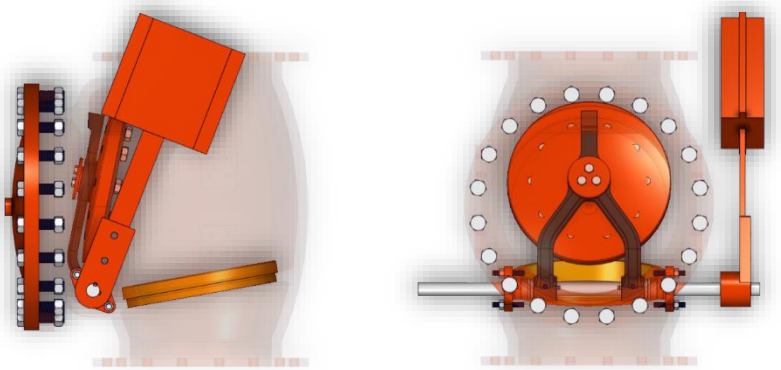
VERTICAL CHECK VALVE IN THE CLOSED POSITION

Right View Front View



VERTICAL CHECK VALVE IN THE OPEN POSITION

Right View Front View



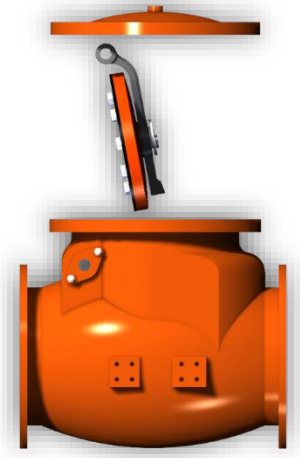
Notice that the hinge pins in the above pictures are all horizontal, and that the clapper always swings upwards, in both horizontal and vertical flow positions.

B. Lifting.

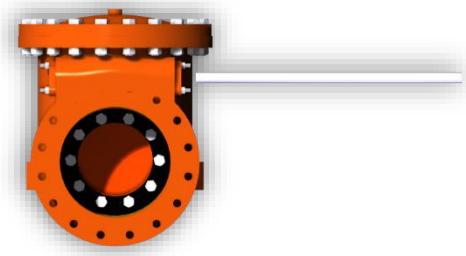
When lifting check valves, always make sure to put the sling around the **BODY**, and avoid putting anything through the inside of the valve.

C. Clearances

a. Allow a minimum of two pipe diameters above the top of the cover for disc removal without having to remove the valve from the line (see picture below).



b. Allow a minimum of one pipe diameter on one side of the valve and 2.5 diameters on the opposite side for the removal of the hinge pin (see picture below).



c. Consult the factory for space limitations with outside lever valves. Note that levers can be clearance and safety hazards (see pictures in section II.A depicting clearance issues caused by the swing of the lever).

D. Start-up

Confirm that all lines have been bled of air.

III. Service Limitations (Pressure & Temperatures)

A. All valves and all service types have a 32° F working temperature minimum, non-shock.

B. Styles 59, 159, and 259 (Resilient Seated Check Valves)

1. Cold water services (125° F maximum, 32° F minimum)
2. Sizes 14" – 36" - 150 PSI maximum

IV. Maintenance, Checking and Testing

A. Swing check valves

With the exception of issues caused by misuse and severe service of the valve, maintenance should be limited to the following:

1. Seating surfaces
2. Bearing surfaces (hinge pins, hinges, and packing glands)

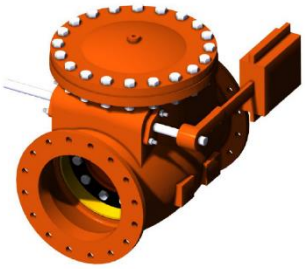
3. Replacement of parts that are subject to corrosion
4. Lubrication and repacking of hinge pin stuffing boxes for outside lever valves.

As stated above, replacement of resilient disc rings, lubrication, and re-packing of stuffing boxes for outside lever valves are the only items subject to regular replacement maintenance or repair.

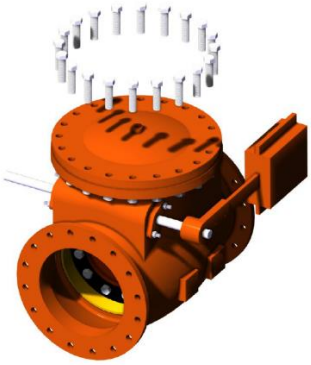
Corrosion of parts is linked to many variables. M&H Sales Staff is qualified to judge a part for repair or replacement.

1. Resilient Discs
    a. When to replace
        1. **RESILIENT DISCS** should be replaced any time there is excessive leakage, or at scheduled intervals.
        2. When replacing any **CLAPPER** component
            a. Confirm year of valve with M&H
            b. Based on year, components required will be determined
            c. No special tools are required for replacement

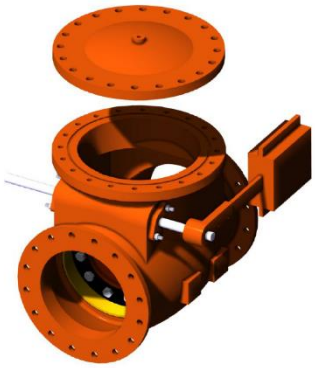
    b. Procedure



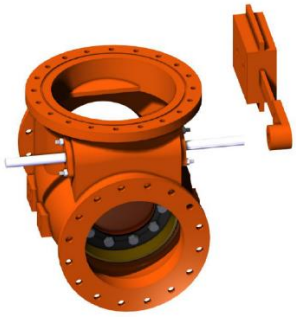
1. Remove **COVER BOLTS**



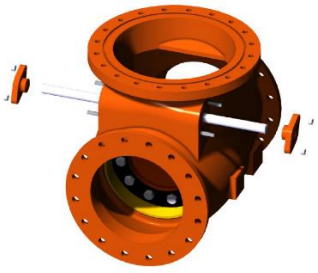
2. Remove **COVER**



3. Remove **LEVER & WEIGHT** or **LEVER & SPRING** (if applicable)



4. Loosen **PACKING GLANDS** (completely removed from valve in the below picture, for clarity).

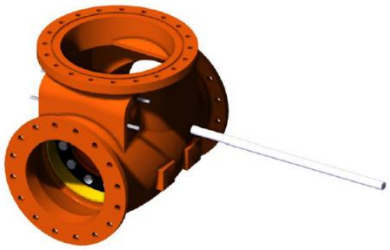


5. Put a load rated soft strap around the **HINGE** of the **CLAPPER ASSEMBLY**

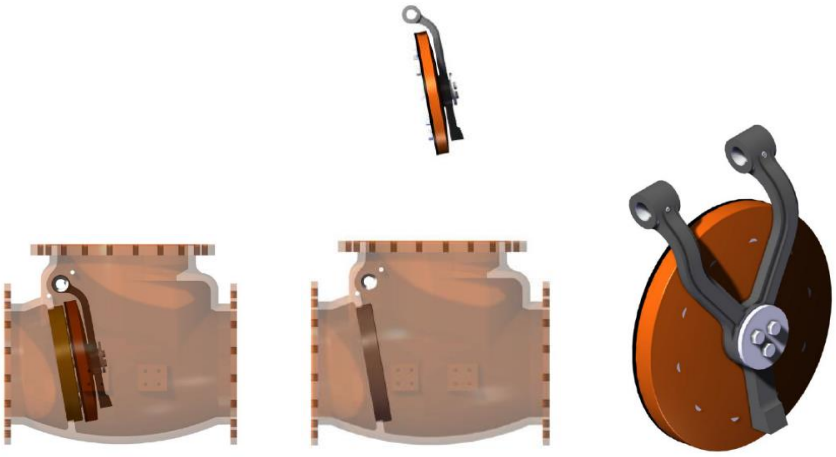
APPROXIMATE CLAPPER ASSEMBLY WEIGHTS

14", 16"	200 LBS.
18", 20", & 24"	350 LBS.
30", & 36"	650 LBS.

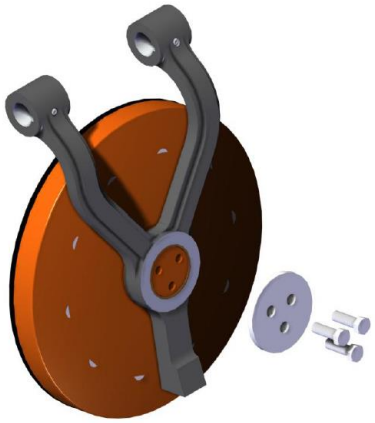
6. Drive the **HINGE PIN** out using a wooden dowel.



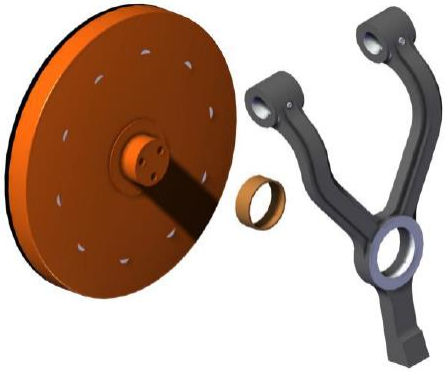
7. Using the soft strap, lift the **CLAPPER ASSEMBLY** from the valve (if applicable, "V" notches on the side of the valve are to provide clearance for the disc assembly).



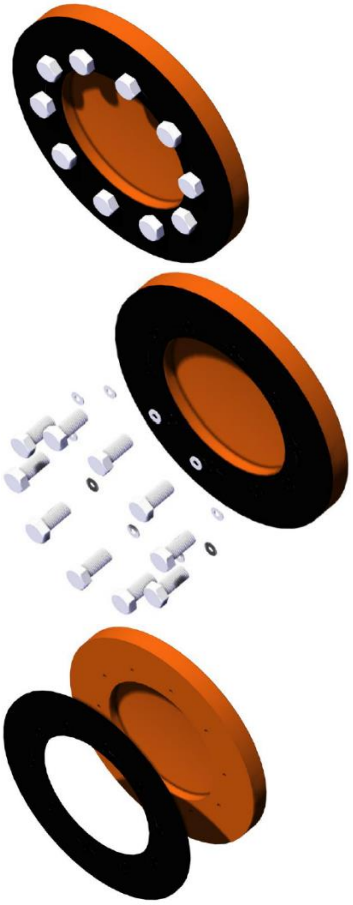
8. Remove **CLAMP PLATE BOLTS**, and **CLAMP PLATE** from the **CLAPPER ASSEMBLY**.



9. Remove the **HINGE** and **BRASS BUSHING** from the **CLAPPER DISC** (using a soft mallet, if necessary). M&H recommends replacing the **BRASS BUSHING**.



10. Remove the **BOLTS** and **WASHERS** holding the **ENCAPSULATED RESILIENT SEAT RING** on to the **CLAPPER DISC**, and then remove the **ENCAPSULATED RESILIENT SEAT RING**.



11. Clean any parts that need to be cleaned, particularly focusing on the flat, seating surfaces, and the **CLAPPER ASSEMBLY**.

12. Replace the **ENCAPSULATED RESILIENT SEAT RING** with a new one, and make sure to seat it flat in the on the **DISC**. Do **NOT** use gasket sealant.
13. Polish the **SEAT RING** in the valve body with 600 grit crocus cloth or wet/dry sandpaper, if necessary.
14. Replace the reassembled **CLAPPER** on the **HINGE**.
15. Reinsert the **CLAPPER ASSEMBLY** into the **CHECK VALVE**, and reinsert the **HINGE** in the same fashion as it was removed, while making sure to keep key-ways lined up.
16. Replace **SIDE PLUGS** or **PACKING GLANDS** (where applicable; **SIDE PLUGS** should be tightened to 300 in-lbs. of torque).
17. Inspect **COVER** sealing surfaces, and clean if needed. Inspect the cover **O-RING** / **GASKET**, and replace if needed (order from M&H).
18. Tighten the **COVER PLATE BOLTS** in a star pattern.
19. Pressurize and bleed the valve, tightening any leaks. It may be necessary to loosen and re-tighten any bolts.

V. Spare Parts for Large Resilient Seated Check Valves

A. Basic
   1. Cover plate gasket / O-ring.
   2. Encapsulated resilient seat ring.
   3. Packing for Lever & Spring / Weight valves

B. Useful
   1. Hinge pin and clapper assembly (clamp plate and associated bolts, hinge, disc bushing, clapper / disc, encapsulated rubber clamp ring and associated bolts and washers).
   2. Bolts and nuts (contact M&H for sizing)
   3. O-rings and gaskets

VI. Sizing of Swing Check Valves

To assure reliable, chatter-free operation, it is recommended that swing check valves be sized to assure the disc will open full during normal flow conditions. The head loss during normal flow conditions should exceed (1/2) one-half PSI. The data below provides an estimate of what should be the minimum design flow rates:

M&H Model 59, 159 & 259 Check Valve

Flow Coefficient (Cv) for Valves Fully Open

Valve Size	Cv
14	6,000
16	8,000
18	10,000
20	12,000
24	17,000
30	27,000

$\Delta P = (Q/Cv)''$

$\Delta P \equiv$ head loss in psi

$Q \equiv$ gallons per minute of flow

$Cv \equiv$ flow coefficient with valve full open

1. AIR CUSHIONED CHECK VALVES CAN ONLY BE INSTALLED IN A HORIZONTAL APPLICATION.
2. THE FLOW CONTROL VALVE WILL HAVE TO BE MORE CLOSED FOR A SLOWER CLAPPER DESCENT; IT WILL HAVE TO BE MORE OPEN FOR A QUICKER CLAPPER DESCENT. THE DESIRED CLAPPER CLOSING SPEED IS TO BE DETERMINED BY THE END USER.
3. CYCLE THE CHECK VALVE SEVERAL TIMES TO ENSURE THE FLOW CONTROL VALVE IS AT THE DESIRED FLOW RATE.
4. SEE CHART BELOW FOR MAXIMUM RECOMMENDED BACK PRESSURES. BACKPRESSURES EXCEEDING THESE LIMITS MAY DAMAGE THE AIR CYLINDERS.

CV SIZE	BACK PRESSURE	CYLINDER QTY
14''	9 PSI	1
16''	6 PSI	1
18''	4 PSI	1
20''	5 PSI	1
24''	2 PSI	1
30''	CONSULT FACTORY	CONSULT FACTORY
36''	CONSULT FACTORY	CONSULT FACTORY

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DATE: 3/13/2023
DWG. NO. MHACCVG

AIR CUSHION CHECK VALVE GUIDLINES

1. OIL CUSHIONED CHECK VALVES CAN ONLY BE INSTALLED IN A HORIZONTAL APPLICATION.
2. ISO AW 32, 46 OR 68 HYDRAULIC OILS ARE RECOMMENDED FOR USE IN THE OIL CUSHION CYLINDER.
3. FLOW CONTROL VALVE SETTING WILL VARY DEPENDING ON HYDRAULIC OIL VISCOSITY (WEIGHT). LIGHTER WEIGHTS WILL REQUIRE THE FLOW CONTROL VALVE TO BE MORE CLOSED; HEAVIER WEIGHTS WILL REQUIRE THE VALVE TO BE MORE OPEN. THE DESIRED CLOSING SPEED IS TO BE DETERMINED BY THE END USER.
4. FOR CHECK VALVES UTILIZING ONE CYLINDER CUSHION, FILL THE HYDRAULIC OIL RESERVOIR TO THE HALFWAY MARK, PER THE FILL GAUGE ON THE SIDE (APPROXIMATELY 1.5 GALLONS); FOR CHECK VALVES UTILIZING TWO CYLINDER CUSHIONS, FILL THE HYDRAULIC OIL RESERVOIR TO THE FULL MARK, PER THE FILL GAUGE ON THE SIDE (APPROXIMATELY 3.0 GALLONS).
5. AFTER FILLING THE HYDRAULIC OIL RESERVOIR TO THE APPROPRIATE LEVEL, CYCLE THE CHECK VALVE SEVERAL TIMES TO PURGE AIR FROM THE HYDRAULIC SYSTEM. RECHECK OIL LEVEL AND ADD ADDITIONAL, IF NEEDED.
6. SEE CHART BELOW FOR MAXIMUM RECOMMENDED BACK PRESSURES. BACKPRESSURES EXCEEDING THESE LIMITS MAY DAMAGE THE OIL CYLINDERS.

CV SIZE	BACK PRESSURE	CYLINDER QTY
14''	55 PSI	1
16''	35 PSI	1
18''	28 PSI	1
20''	22 PSI	1
24''	12 PSI	1
30''	14 PSI	2
36''	CONSULT FACTORY	CONSULT FACTORY

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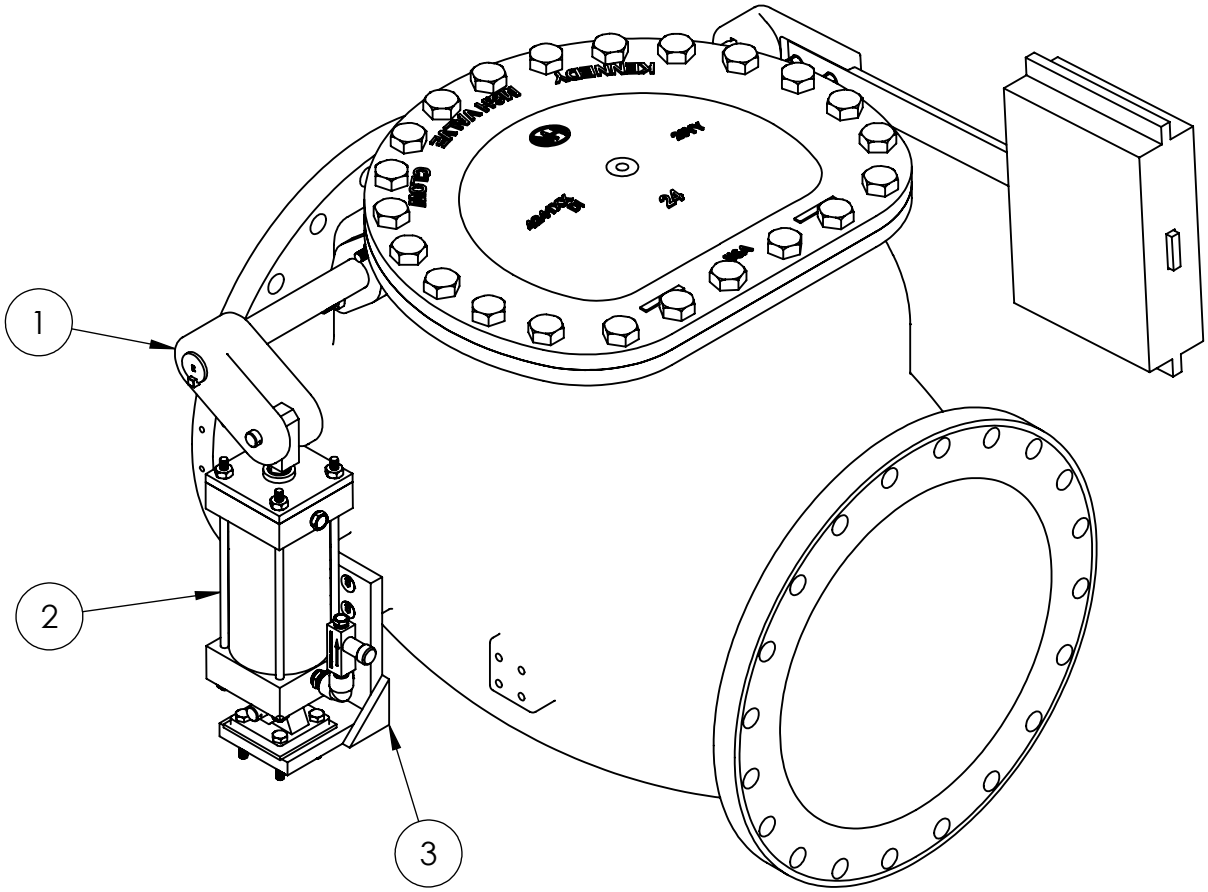
OIL CUSHION CHECK VALVE GUIDLINES



#	DESCRIPTION	PAGE
1	CUSHION ARM	3
2	AIR CUSHION CYLINDER	5
3	CYLINDER MOUNTING BRACKET	4

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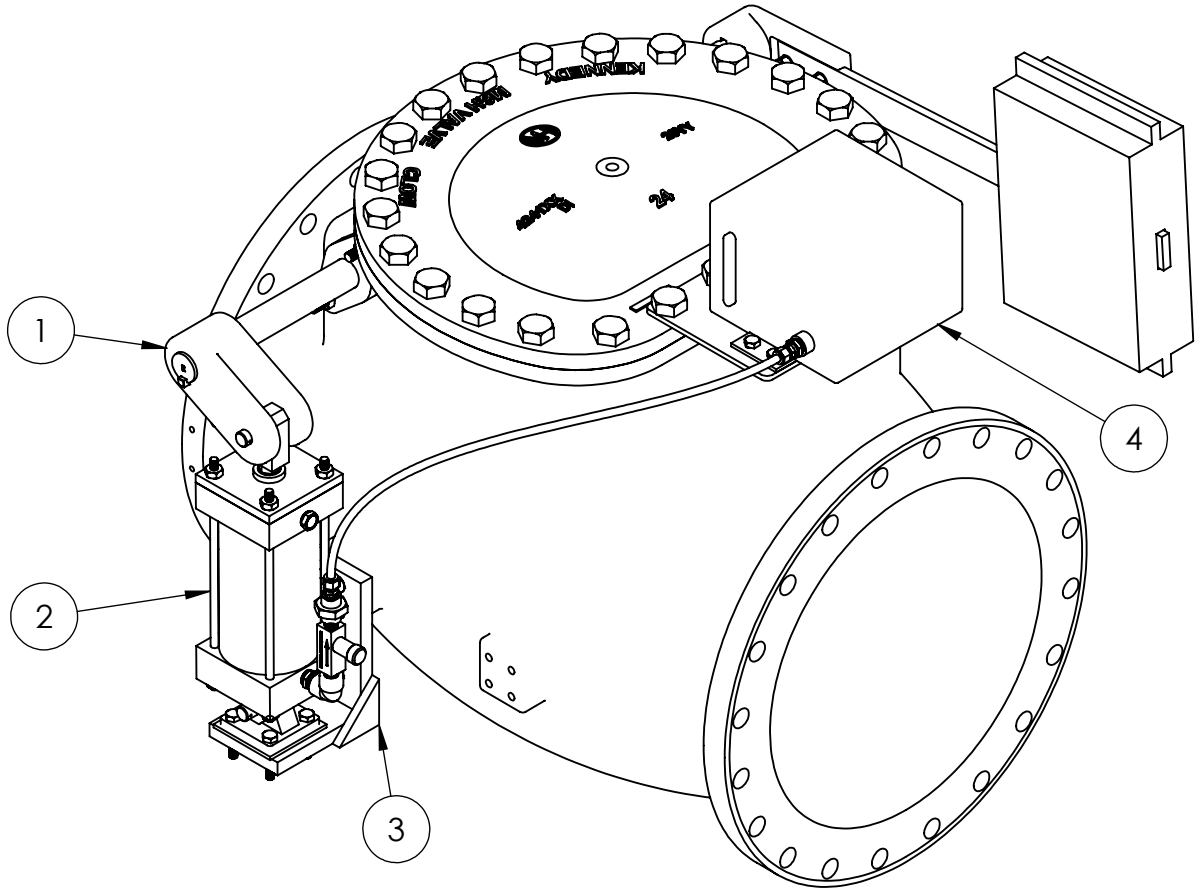
CUSHION CHECK VALVE GENERAL ASSEMBLY

AIR CUSHION



#	DESCRIPTION	PAGE
1	CUSHION ARM	3
2	OIL CUSHION CYLINDER	6
3	CYLINDER MOUNTING BRACKET	4
4	OIL RESERVOIR / HOSE	7

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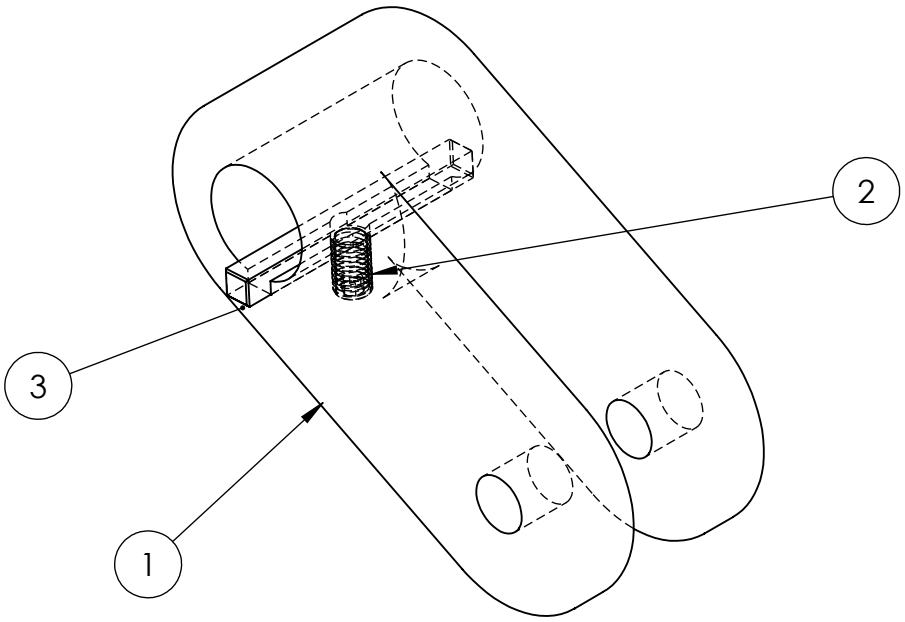
CUSHION CHECK VALVE GENERAL ASSEMBLY

OIL CUSHION



#	DESCRIPTION	CV SIZE	PART #	MATERIAL
1	CUSHION ARM	14"	498855	DUCTILE IRON
		16"	498856	
		18"	498857	
		20"	498859	
		24" & 30"	498858	
		36"	CONSULT FACTORY	

#	DESCRIPTION	CV SIZE	THREAD X LENGTH	PART#	MATERIAL
2	CUSHION ARM SET SCREW	ALL	5/8"-11 X 1"	200357	304 SS *

#	DESCRIPTION	CV SIZE	SQUARE X LENGTH	PART#	MATERIAL
3	CUSHION ARM KEY	14" - 20"	3/8" SQ X 5"	333535	STEEL **
		24" & 30"	1/2" SQ X 5"	332321	
		36"	CONSULT FACTORY	-	

NOTES:
1. (*) 316 MATERIAL AVAILABE. CONSULT FACTORY
2. (**) STAINLESS STEEL MATERIALS AVAILABLE. CONSULT FACTORY

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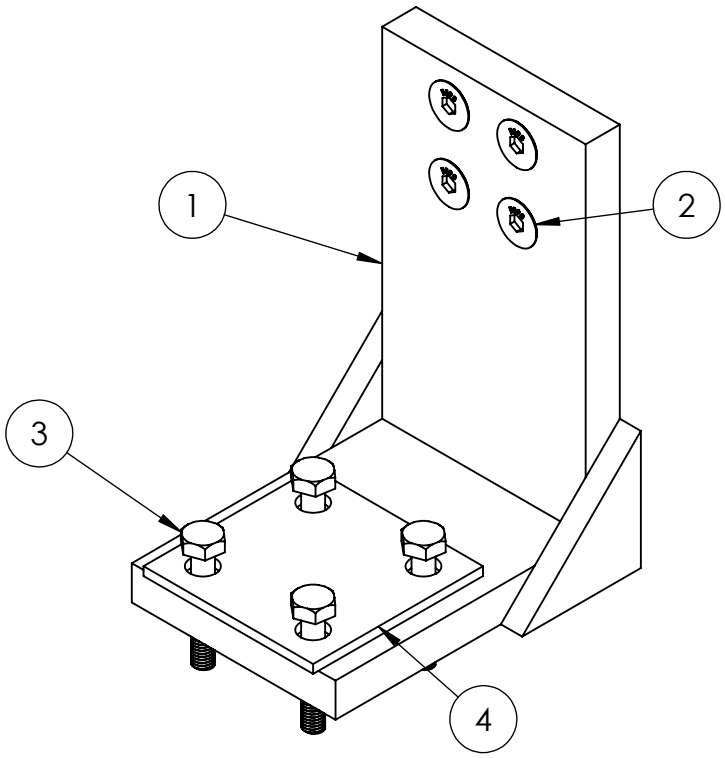
CUSHION CHECK VALVE GENERAL ASSEMBLY

CUSHION ARM COMPONENTS



MOUNTING BRACKET COMPONENTS

#	DESCRIPTION	CV SIZE	PART #	MATERIAL
1	MOUNTING BRACKET	14"	498832	STEEL
		16"	498833	
		18"	498834	
		20"	498842	
		24"	498843	
		30"	498835	
		36"	CONSULT FACTORY	
4	ADJUSTMENT PLATE	14" - 18"	498830	STEEL
		24" - 30"	498840	

FASTENERS

#	DESCRIPTION	CV SIZE	THREAD X LENGTH	PART#	MATERIAL
2	MOUNTING BRACKET TO BODY FLAT HEADS	ALL	5/8"-11 X 1 3/4"	200185	304 SS *
3	CUSHION TO BRACKET HEX HEAD BOLTS	14" - 18"	1/2"-13 X 3"	200946	304 SS *
		24" - 30"	5/8"-11 X 3"	200947	

NOTES:
1. (*) 316 MATERIAL AVAILABE. CONSULT FACTORY

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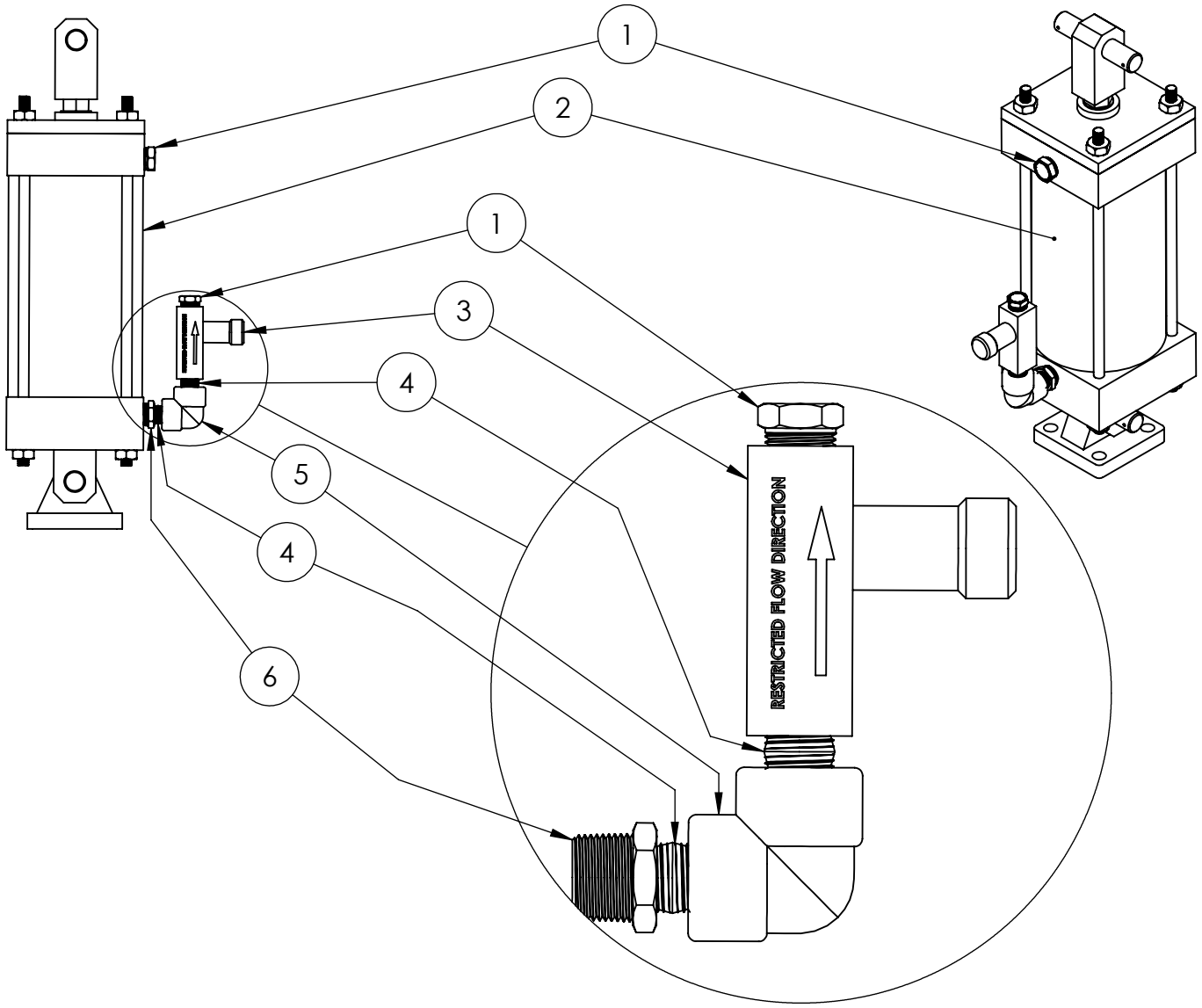
CUSHION CHECK VALVE GENERAL ASSEMBLY

MOUNTING BRACKET COMPONENTS



#	DESCRIPTION	CV SIZE	PART #	MATERIAL
1	NPT BREATHER VENT	ALL	N/A*	BRASS
2	AIR CUSHION CYLINDER	14" - 18"	209305	MISC
		20" - 30"	209301	
3	FLOW CONTROL VALVE	ALL	209307	MISC
4	1/2" NPT PIPE NIPPLE	ALL	209056	BRASS
5	1/2" NPT 90° STREET ELBOW	ALL	209052	CAST IRON
6	3/4" NPT TO 1/2" NPT REDUCER**	20" - 30"	209023	BRASS

NOTES:
1. (*) PROVIDED WITH CYLINDER ASSEMBLY
2. (**) NOT USED WITH CYLINDER 209305

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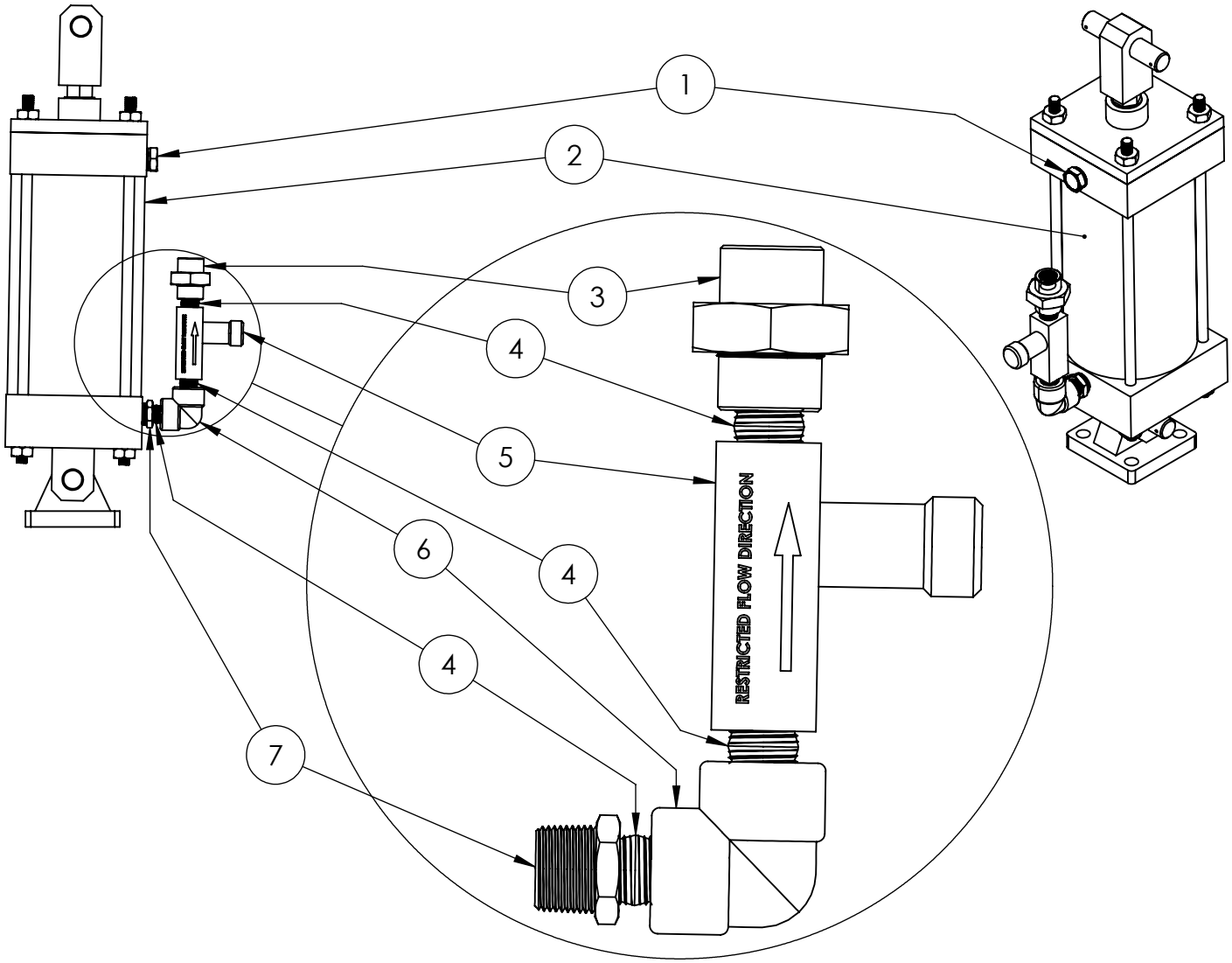
CCV-GA-5

CUSHION CHECK VALVE GENERAL ASSEMBLY

AIR CUSHION CYLINDER COMPONENTS



#	DESCRIPTION	CV SIZE	PART #	MATERIAL
1	NPT BREATHER VENT	ALL	N/A*	BRASS
2	OIL CUSHION CYLINDER	14" - 18"	209306	MISC
		20" - 30"	209302	
3	1/2" NPT PIPE UNION	ALL	201400	CAST IRON
4	1/2" NPT PIPE NIPPLE	ALL	209056	BRASS
5	FLOW CONTROL VALVE	ALL	209310	MISC
6	1/2" NPT 90° STREET ELBOW	ALL	209052	CAST IRON
7	3/4" NPT TO 1/2" NPT REDUCER**	20" - 30"	209023	BRASS

NOTES:
1. (*) PROVIDED WITH CYLINDER ASSEMBLY
2. (**) NOT USED WITH CYLINDER 209306

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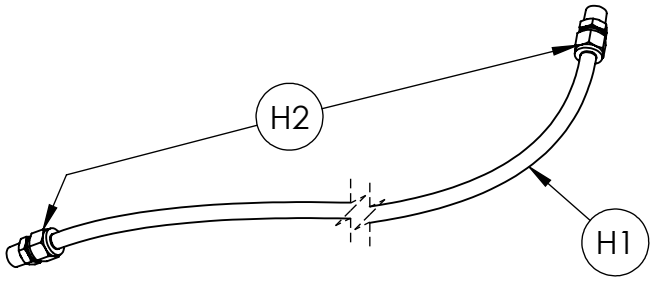
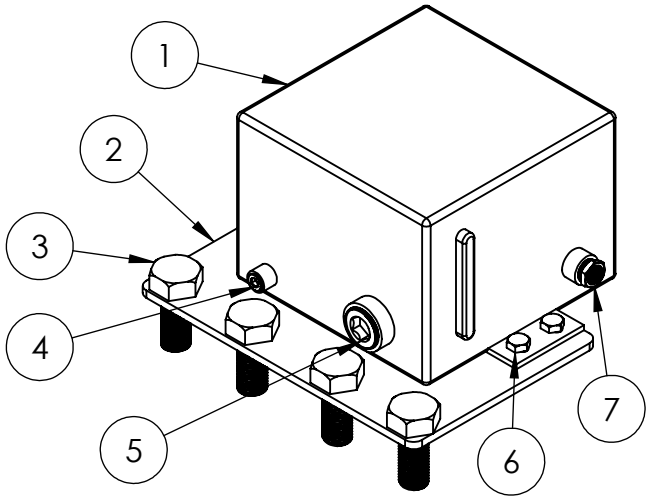
CCV-GA-6

CUSHION CHECK VALVE GENERAL ASSEMBLY

OIL CUSHION CYLINDER COMPONENTS

HOSE SUB-ASSEMBLY ***		
H1	HOSE	HYDRAULIC HOSE
H2	1/2" NPT FITTINGS	STAINLESS STEEL





#	DESCRIPTION	PART #	MATERIAL
1	OIL RESERVOIR	209315	STEEL
4	1/2" NPT PIPE PLUG	200634	STEEL
5	1 1/2" NPT PIPE PLUG	200631	STEEL
7	3/4" NPT TO 1/2" NPT REDUCER	209023	BRASS

# 2	OIL RESERVOIR MOUNTING BRACKET						
CV SIZE:	**14"**	**16"**	**18"**	**20"**	**24"**	**30"**	**36"**
FW PART#:	CF*	209316		CF*	CF*	CF*	N/A
RW PART#:	CF*	209318	CF*	CF*	209319	CF*	CF*

#	DESCRIPTION	THREAD X LENGTH	PART#	MATERIAL
6	OIL RESERVOIR MOUNTING BOLT	1/2"-13 X 1 1/4"	200729	304 SS**
	OIL RESERVOIR MOUNTING NUT	1/2"-13	200954	304 SS**

# 3	OIL RESERVOIR MOUNTING BRACKET BOLTS FOR FW CV						
FW CV SIZE:	**14"**	**16"**	**18"**	**20"**	**24"**	**30"**	**36"**
THREADS	1"-8	1"-8		1 1/4"-7	1 1/4"-7	1 1/4"-7	N/A
LENGTH	3 3/8"	4"		4 1/8"	4 1/2"	5"	N/A
PART#:	CF*	200818		CF*	CF*	CF*	N/A
MATERIAL	304 STAINLESS STEEL**						

# 3	OIL RESERVOIR MOUNTING BRACKET BOLTS FOR RW CV						
RW CV SIZE:	**14"**	**16"**	**18"**	**20"**	**24"**	**30"**	**36"**
THREADS	1"-8			1 1/4"-7	1 1/4"-7	1 1/4"-7	
LENGTH	2 3/4"			2 7/8"	3"	3 1/4"	
PART#:	200744			CF*	CF*	CF*	
MATERIAL	304 STAINLESS STEEL**						

NOTES:
1. (*) CONSULT FACTORY
2. (**) 316 MATERIAL AVAILABLE. CONSULT FACTORY
3. (***) PRE-ASSEMBLED AT FACTORY

M&H VALVE COMPANY
A DIVISION OF McWANE INC.
P.O. BOX 2088
ANNISTON, ALABAMA 36202

DRAWN: CTJ
DATE: 3/13/2023
DWG. NO. CCV-GA-7

CUSHION CHECK VALVE GENERAL ASSEMBLY

OIL RESERVOIR COMPONENTS