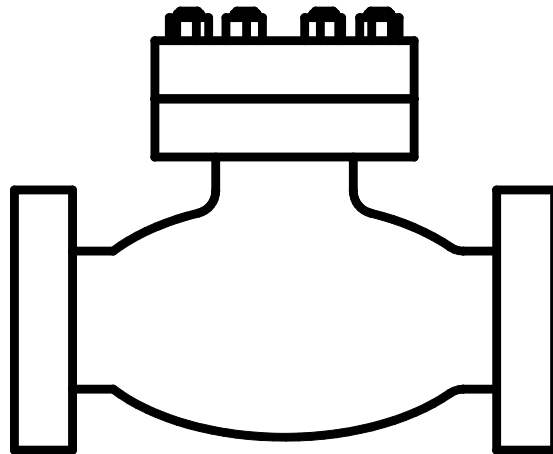


# MAINTENANCE AND OPERATION MANUAL

## TYPE 'QMS' CHECK VALVES



## **DISCLAIMER**

Any recommendations for use, oral or written, shall be considered advisory in content and as such, Quality Oil Tools, Inc. shall not be held liable under any warranty, expressed or implied, should this product not perform under conditions other than its intended use as a one way fluid check valve device.

Quality Oil Tools, Inc. shall in no way be liable for damages incurred while using this product.

## **PRECAUTIONS**

This product is designed for use under high pressure conditions, and as such, extreme caution should always be taken when servicing, operating, or testing this equipment

**Never attempt to disassemble a valve assembly until all pressure has been removed from the system.**

Always be sure that when pressure testing any product that all air has been purged from the system.

Do not approach any equipment for visual inspection until a suitable pressure stabilization period has been allowed.

Always use suitable protective equipment when performing any maintenance or testing.

Always use caution when servicing this equipment as the retained fluid may present a H<sub>2</sub>S gas hazard.

## INTRODUCTION

The 'QMS' Type Check Valve provided has been designed and manufactured in accordance with American Petroleum Institute-API-6A, NACE MR-01-75 for H<sub>2</sub>S Service, and all applicable industry standards at time of manufacture.

As with any pressure containing equipment the Type 'QMS' Check Valve is subject to wear and eventual failure. Periodic disassembly and inspection is required and should be left to a qualified technician.

Every precaution has been taken to ensure the highest quality product has been provided for use. Any question or correspondence should be directed to:

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## SECTION I

### GENERAL INFORMATION

#### 1.0 GENERAL INFORMATION

THE 'QMS' TYPE CHECK VALVE IS A REDUCED OPENING LIFT TYPE VALVE WHICH PERMITS FLUID FLOW IN ONLY ONE DIRECTION. THE 'QMS' TYPE CHECK VALVE WILL PROVIDE A POSITIVE SEAL AT A MAXIMUM WORKING PRESSURE OF UP TO 10,000 PSI DEPENDING ON MODEL, AND A MINIMUM FLOW ORIFICE OF UP TO 3.14 SQUARE INCHES. THE 'QMS' TYPE CHECK VALVE IS AN ALL 'METAL TO METAL' SEAL DESIGN AND CONTAINS NO ELASTOMERIC SEALS.

THE SEAL MECHANISM COMPONENTS ARE CONSTRUCTED OF HIGH STRENGTH, HEAT RESISTANT, CORROSION RESISTANT MATERIALS LAPPED TO A MIRROR LIKE FINISH TO PROVIDE THE 'METAL TO METAL' SEAL.

PERSONNEL, EITHER REPAIRING OR SERVICING 'QMS' TYPE CHECK VALVES SHOULD ALWAYS WEAR EYE PROTECTION.

## SECTION II

### INSTALLATION

#### 2.1 INSTALLING THE 'QMS' CHECK VALVE

THE CHECK VALVE MAY BE PLACED ANY WHERE IN THE SYSTEM THE USER DESIRES. NO SPECIAL PLACEMENT IS REQUIRED. FOR ASSISTANCE IN PLACEMENT OF THE 'QMS' CHECK VALVE IN THE SYSTEM SEE API BULLETIN RP53 ENTITLED "BLOWOUT PREVENTION EQUIPMENT SYSTEMS".

##### 2.1.1 END CONNECTIONS

BEFORE CONNECTING THE CHECK VALVE, COMPLETELY CLEAN THE FLANGE FACE AND RING GROOVE WITH A SUITABLE SOLVENT. INSPECT THE RING GROOVES AND FLANGE FACES FOR DAMAGE. SHOULD THE RING GROOVE OR FLANGE FACE BE DAMAGED, IT MAY BE NECESSARY FOR THE CHECK VALVE TO BE PLACED IN A SUITABLE, QUALIFIED REPAIR FACILITY.

IF AFTER INSPECTION, NO DAMAGE HAS BEEN NOTED, LIGHTLY OIL OR GREASE THE RING GROOVE AND INSTALL THE CORRECT SIZE RING GASKET, AS STENCILED ON THE OUTSIDE DIAMETER OF THE FLANGE, INTO THE RING GROOVE.

BEFORE INSTALLING THE CHECK VALVE, NOTE THE ARROW ON THE SIDE, SHOWING DIRECTION OF THE FLOW.

ALWAYS INSPECT ALL BOLTING MATERIALS SUCH AS STUDS OR NUTS FOR CRACKS AND/OR DAMAGED THREADS BEFORE INSTALLING. REPLACE DAMAGED PARTS AS NEEDED. THE FLANGE BOLTS SHOULD BE TORQUED TO THE CORRECT TORQUE VALUE FOR THE PARTICULAR STUD. BE SURE THAT EACH NUT HAS FULL ENGAGEMENT ONTO THE STUD. THE STUD SHOULD HAVE 2 TO 4 THREADS SHOWING FOR BEST RESULTS.

WITH FLANGES USING R OR RX TYPE RING GASKETS • THE FLANGE FACES WILL NOT COME FACE TO FACE. THERE WILL BE APPROXIMATELY 3/16" GAP BETWEEN THE FLANGES.

ALWAYS USE A NEW RING GASKET WHEN INSTALLING THE CHECK VALVE AS USED GASKETS DEFORM SLIGHTLY AND MAY NOT HOLD PRESSURE.

RING GASKETS SUITABLE FOR H<sub>2</sub>S SERVICE ARE "MILD " STEEL WITH CADMIUM PLATING" OR STAINLESS STEEL.

## SECTION III

### OPERATION

#### 3.1 OPERATION OF THE 'QMS' CHECK VALVE

THE OPERATION OF THE 'QMS' CHECK VALVE IS VERY SIMPLE. THE CHECK VALVE WILL ALLOW FLOW IN THE SAME DIRECTION AS,THE ARROW ON THE SIDE OF THE CHECK VALVE. IT WILL PROVIDE A POSITIVE METAL TO METAL SEAL UP TO THE FULL WORKING PRESSURE IN THE OPPOSITE DIRECTION.

THE TWO COMPONENTS PROVIDING THE METAL TO METAL SEAL ARE THE "POPPET" AND THE "SEAT". THE SEAL AREAS OF THESE TWO COMPONENTS HAVE BEEN LAPPED TO A MIRROR LIKE FINISH. DAMAGE TO THESE AREAS DURING INSTALLATION OR FROM NORMAL WEAR COULD CAUSE THESE COMPONENTS TO LEAK UNDER PRESSURE..

WHEN THE FLOW MOVES THROUGH THE CHECK VALVE THE POPPET IS FORCED AWAY FROM THE SEAT. AS FLOW INCREASES THE POPPET MOVES FURTHER AWAY FROM THE SEAT UNTIL IT STOPS ON THE BONNET.

AS FLOW DECREASES THE POPPET SPRING RETURNS THE POPPET TO THE SEAT. WHEN THE PRESSURE REACHES ZERO THE POPPET AND SEAT WILL CREATE A METAL TO METAL SEAL. WHEN FLOW REVERSES, THE POPPET SPRING ALONG WITH FLOW FORCES THE POPPET INTO THE SEAT CREATING THE METAL TO METAL SEAL.

S E C T I O N   I V  
MAINTENANCE ANR REPAIRS

4.1 MAINTENANCE AND REPAIRS OF THE 'QMS' CHECK VALVE

THE 'QMS' CHECK VALVE IS A KEY ELEMENT OF THE WELL CONTROL SYSTEM ON THE RIG, AND SHOULD BE KEPT IN GOOD WORKING ORDER AT ALL TIMES.

4.1.1 VISUAL CHECKS (PERFORM DAILY)

CHECK ALL PRESSURE CONTROL EQUIPMENT DAILY TO ENSURE THAT NO DAMAGE, OR VISIBLE LEAKAGE IS PRESENT.

4.1.2 REMOVING THE 'QMS' CHECK VALVE FROM THE SYSTEM FOR INTERNAL PARTS REPLACEMENT

IT IS NOT NECESSARY TO REMOVE THE CHECK VALVE FROM THE SYSTEM UNLESS MACHINE REPAIRS ARE REQUIRED).

CAUTION

BEFORE ATTEMPTING TO WORK ON ANY PRESSURE CONTROL EQUIPMENT, EXTREME CAUTION-SHOULD BE TAKEN TO ENSURE THAT ALL PRESSURE HAS BLED FROM THE CHECK VALVE. ALWAYS USE PROPER SAFETY PRECAUTIONS WHERE H<sub>2</sub>S GAS MAY BE PRESENT. ONLY PERSONEL WHO HAVE RECEIVED INSTRUCTION ON THE HAZARDS OF H<sub>2</sub>S SHOULD BE PERMITTED TO WORK ON THE 'QMS' CHECK VALVE. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PERSONAL INJURY OR DEATH.

CAREFULLY LOOSEN THE FLANGE NUTS ON THE CHECK VALVE BODY ONE TURN EACH UNTIL THE RING GASKET SEAL IS BROKEN. DO NOT REMOVE THE NUTS ON THE FLANGE, REPEAT THE PROCEDURE ON THE OPPOSITE FLANGE. STAND AWAY FROM THE FLANGE GAP WHEN BREAKING THE SEAL, TO AVOID PERSONAL INJURY.



CAUTION

IF THE CHECK VALVE IS NOT SUPPORTED BY  
SUITABLE EQUIPMENT., DO SO BEFORE  
PROCEEDING.

REMOVE THE NUTS FROM THE STUDS AND REMOVE THE  
STUDS. DO ONE FLANGE AT A TIME.

AVOID USING A PRY BAR TO SEPERATE THE FLANGES, AS  
IT COULD DAMAGE THE RING GROOVE.

4.2 REFER TO SECTION II FOR INSTALLATION.

4.3 DISASSEMBLY OF THE "QMS" CHECK VALVE

THE DISASSEMBLY PROCEDURE IS THE SAME WITH THE  
CHECK VALVE INSTALLED OR REMOVED FROM THE SYSTEM.

4.3.1 REMOVE THE BONNET BY REMOVING THE 8 (EIGHT)  
BONNET NUTS. CAREFULLY LIFT OFF THE BONNET SO AS  
NOT TO DAMAGE THE BONNET GASKET GROOVE.

CAUTION

THE BONNET HAS A COIL SPRING AND A  
BELLEVILLE SPRING UNDERNEATH IT, DO NOT  
PLACE YOUR BODY IN ITS PATH.

4.3.2 REMOVE THE BONNET GASKET FROM THE BODY.  
IT MAY HELP TO PUSH DOWN ON ONE SIDE OF THE GASKET  
UNTIL THE OTHER SIDE LIFTS UP AWAY FROM THE BODY. (DO  
NOT USE A HAMMER AS IT COULD DAMAGE THE BONNET GASKET  
GROOVE).

4.3.3 REMOVE THE BELLEVILLE SPRING AND COIL SPRING.

4.3.4 REMOVE THE SEAT RETAINER (NOTE: THERE IS A TAB ON  
THE TOP OF THE SEAT RETAINER WHICH FITS INTO A SLOT  
IN THE BODY NEXT TO THE BONNET SEAL GROOVE.) SHOULD THE  
SEAT RETAINER REQUIRE REPLACEMENT, THE TAB WILL HAVE TO  
BE CAREFULLY BENT INTO THE SLOT TO PREVENT ROTATION OF  
THE SEAT RETAINER DURING USE. IF THIS IS NOT PERFORMED  
THE CHECK VALVE WILL NOT FLOW PROPERLY.

4.3.5 REMOVE THE POPPET. PLEASE NOTE THE POPPET IS A SEALING COMPONENT AND SHOULD BE HANDLED WITH CARE.

4.3.6 REMOVE THE SEAT BY GRIPPING THE INSIDE LIP AND PULLING STRAIGHT UPWARD. 'DO NOT COCK THE SEAT AS IT COULD WEDGE INTO THE BODY AND DAMAGE THE SEAT SEAL AREA.

#### 4.4 COMPONENT INSPECTION

4.4.1 CAREFULLY CLEAN ALL INTERNAL COMPONENTS, THE BONNET AND THE BODY WITH A SUITABLE SOLVENT.

4.4.2 INSPECT EACH AREA OF THE FOLLOWING COMPONENTS FOR SCRATCHES, DENTS, AND CORROSION ALL OF WHICH COULD CAUSE A LEAK.

BONNET: BONNET GASKET GROOVE

BODY: SEAT SEAL AREA, BONNET GASKET GROOVE, RING GROOVES (BODY REMOVED)

POPPET: LARGE ANGLE

SEAT: LARGE ANGLE, OUTSIDE DIAMETER, AND THE BOTTOM (LARGE FLAT)

SPRINGS: REPLACE IF BROKEN OR CRACKED

IF THE POPPET OR SEAT HAVE ANY DAMAGE REPLACE THEM. DO NOT REUSE DAMAGED COMPONENTS.

BONNET GASKET: (NOT MENTIONED ABOVE) SHOULD BE REPLACED EACH TIME THE BONNET IS REMOVED.

SEAT RETAINER: (NOT MENTIONED ABOVE) DOES NOT USUALLY REQUIRE REPLACEMENT, HOWEVER SHOULD IT BECOME BENT OR DAMAGED REPLACE IT.

IF THERE IS DAMAGE TO THE BODY OR BONNET, FORWARD THE DAMAGED COMPONENT TO A QUALIFIED REPAIR FACILITY FOR REPAIR OR REPLACEMENT.

## 4.5 REASSEMBLY

- 4.5.1 CAREFULLY CLEAN ALL COMPONENTS BEFORE REASSEMBLY.
- 4.5.2 LIGHTLY OIL THE SEAT SEAL AREA IN THE BODY.
- 4.5.3 INSTALL THE SEAT INTO THE BODY. MAKING SURE IT SITS DOWN ALL THE WAY FLAT AGAINST THE BODY BEFORE PROCEEDING.
- 4.5.4 INSTALL THE SEAT RETAINER, MAKE SURE THE TAB FITS INTO THE GROOVE BY THE BONNET SEAL GROOVE.
- 4.5.5 INSTALL THE POPPET. COAT WITH A LIGHT OIL BEFORE INSTALLING.
- 4.5.6 INSTALL THE POPPET SPRING OVER THE POPPET. MAKE SURE IT SITS ON THE POPPET CORRECTLY, IT SHOULD FIT AROUND THE SMALL DIAMETER STEP ON THE POPPET.
- 4.5.7 INSTALL THE SEAT SPRING. IT RESTS ON TOP OF THE SEAT RETAINER JUST BELOW THE BONNET SEAL GROOVE CONCAVED SIDE DOWN.
- 4.5.8 INSTALL THE BONNET GASKET. COAT THE GROOVE AND GASKET WITH LIGHT OIL. THE GASKET SHOULD ROCK SLIGHTLY IN THE GROOVE.
- 4.5.9 INSTALL THE BONNET OVER THE BONNET STUDS. NO SPECIAL ORIENTATION IS REQUIRED.
- 4.5.10 GREASE THE STUDS, NUTS AND LOAD SURFACE ON THE BONNET. TIGHTEN THE NUTS EVENLY UNTIL THE BONNET IS FACE TO FACE WITH THE BODY.
- 4.5.11 IF THE CHECK VALVE HAS BEEN REMOVED FROM THE SYSTEM INSTALL PER SECTION II.
- 4.5.12 TEST PER SECTION V

SECTION V

TEST PROCEDURES

5.1 TEST PROCEDURES

THE TEST PROCEDURES PROVIDED IN THIS SECTION ARE IN TWO SECTIONS. SECTION 5.1.1 DESCRIBES A STANDARD SEAT TEST PROCEDURE FOR USE AS PART OF THE TESTING OF PRESSURE CONTROL EQUIPMENT. SECTION 5.2.1 DESCRIBES A BODY OR SHELL PRESSURE TEST TO BE USED ONLY AFTER WELDING AND/OR RE-MACHINING OF THE BODY OR BONNET, NOT AS A PART OF PERIODIC TESTING. THE TESTS DESCRIBED HERE-IN CONFORM TO THE REQUIREMENTS OF API SPEC 6A (PSL 1).

5.1.1 SEAT TEST: INSTALL SUITABLE TEST EQUIPMENT TO THE CHECK VALVE. PRESSURISE AGAINST THE ARROW TO WORKING PRESSURE, HOLD PRESSURE FOR 3 (THREE) MINUTES MINIMUM. BLEED PRESSURE TO ZERO. RE-PRESSURIZE TO WORKING PRESSURE, HOLD FOR 3 (THREE) MINUTES MINIMUM. BLEED PRESSURE TO ZERO. THERE SHOULD BE NO VISIBLE LEAKAGE.

5.2.1 BODY OR SHELL TEST: INSTALL SUITABLE TEST EQUIPMENT TO THE CHECK VALVE. PRESSURIZE IN THE SAME DIRECTION AS THE ARROW TO 1.5 X WORKING PRESSURE EXCEPT 2000 AND 3000 PSI WORKING PRESSURE VALVES. 2000 AND 3000 PSI VALVE SHOULD BE PRESSURIZED TO 2 X WORKING PRESSURE. HOLD PRESSURE FOR 3 (THREE) MINUTES MINIMUM. BLEED PRESSURE TO ZERO. RE-PRESSURIZE TO PRESSURES SHOWN ABOVE. HOLD FOR 3 (THREE) MINUTES MINIMUM. BLEED PRESSURE TO ZERO. THERE SHOULD BE NO VISIBLE LEAKAGE.

CAUTION

DO NOT APPROACH ANY EQUIPMENT UNDER PRESSURE UNLESS A VISUAL INSPECTION IS REQUIRED. USE EXTREME CAUTION WHEN APPROACHING EQUIPMENT, AND APPROACH EQUIPMENT ONLY AFTER A SUITABLE PRESSURE-STABILIZATION PERIOD HAS ELAPSED.

NOTE:

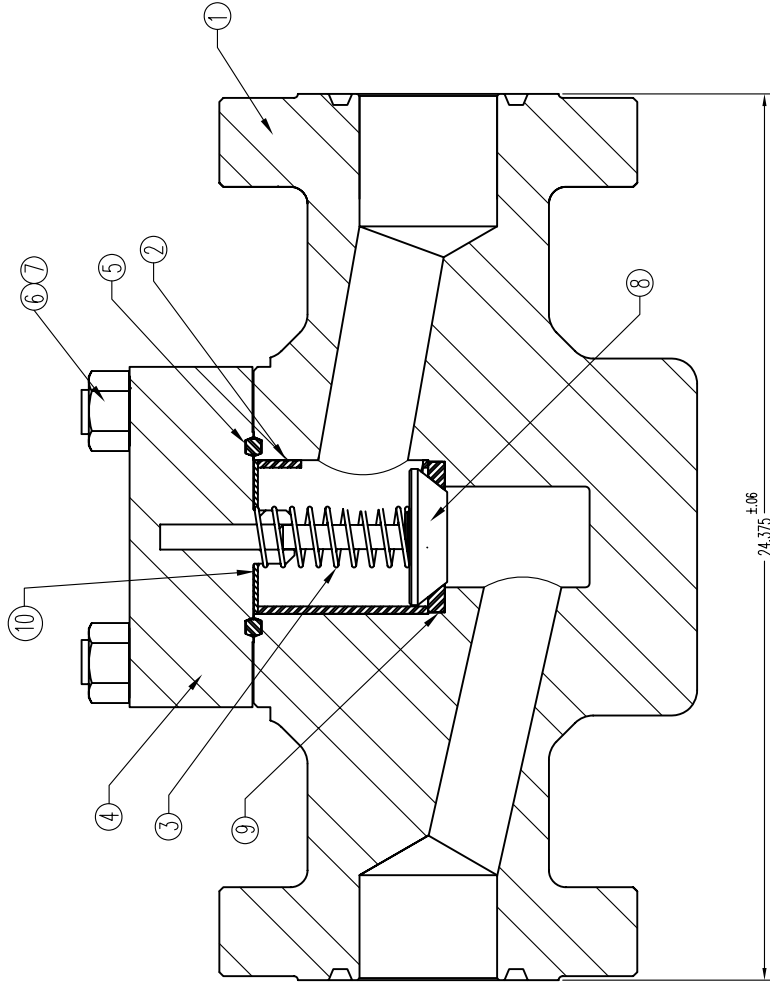
1. WHEN POSSIBLE, A PRESSURE RECORDING DEVICE SHOULD BE USED TO RECORD PRESSURE AND DURATION OF TEST.

S E C T I O N V I  
TROUBLESHOOTING

6.1 TROUBLESHOOTING THE 'QMS' CHECK VALVE

BELOW IS A TROUBLESHOOTING CHART TO ASSIST IN THE REPAIRS OF THE 'QMS' CHECK VALVE.

PROBLEM/SYMPTOM	CURE
CHECK VALVE LEAKS AROUND THE BONNET.	1.) REPLACE BONNET GASKET 2.) INSPECT BONNET SEAL GROOVE IN BONNET AND BODY. RE-MACHINE AS NEEDED.
END CONNECTION LEAKS, i.e. FLANGES.	1.) REPLACE RING GASKET 2.) FLANGE BOLTING LOOSE. TIGHTEN BOLTING. 3.) INSPECT RING GROOVE ON CHECK VALVE AND MATING COMPONENTS. RE-MACHINE AS NEEDED.
CHECK VALVE DOES NOT HOLD PRESSURE AGAINST SEAT.	1.) CHECK VALVE NOT PROPERLY INSTALLED. REMOVE AND REINSTALL. 2.) SEAT DAMAGED. REPLACE DAMAGED COMPONENT. 3.) POPPET DAMAGED. REPLACE DAMAGED COMPONENT. 4.) SEAT NOT CORRECTLY INSTALLED. REMOVE AND REPLACE, AFTER INSPECTION OF THE BODY. 5.) SEAT SEAL AREA IN BODY DAMAGED. SEND TO A QUALIFIED REPAIR SHOP 6.) SEAT RETAINER SPRING OR POPPET SPRING DEFECTIVE, MISSING, NOT CORRECTLY INSTALLED. REPLACE OR REINSTALL.



ITEM NO.	QTY	REC'D	PART NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
10	1		611811-01E	SEAT SPRING	INCOEL 750 AWS-558C
9	1		611812-01	SEAT	AISI 17-4
8	1		611809-01	POPPET	AISI 17-4
7	8		127-6005-L7	NUT-HEX HD, 1 1/8-8UN-2B	ASTM GR. 7 ZINC PLT'D
6	8		127-6004-L7	STUD-TAP, 1 1/8-8UN-2A X 5-1/2' LG.	ASTM L-7, ZINC PLT'D
5	1		19141-44	GASKET-RING JOINT	ASTM A479-T316
4	1		127-6003-02	BUNNET COVER	4130 75K
3	1		611808-01	SPRING-HELICAL COMPRESSION	INCOINEL 600
2	1		611810-01	RETAINER-SEAT	AISI 316 SS DR 410 SS
1	1		127-6002-02	BODY-LIFT CHECK, 2 1/16-10M	4130 75K

BILL OF MATERIALS

<b>MATERIAL</b>	<b>DATE</b>	<b>DR. BY</b>	<b>TE</b>	<b>DESCRIPTION</b>
SEE BOM	3-1-08			ASSEMBLY DRAWING, 2-1/16"
ALL DIMENSIONS IN INCHES				10M TYPE 'QMS' CHECK VALVE
<b>UNLESS NOTED:</b> X.X ±.06 X.XX ±.005 X.XXX ±.005 BREAK CORNERS .030 MAX. RAD. .062 FRACTIONAL .31/32	<b>APPR. BY</b>	<b>REF. NO.</b>	<b>PART NO.</b>	
	DJ		127-6001-00	

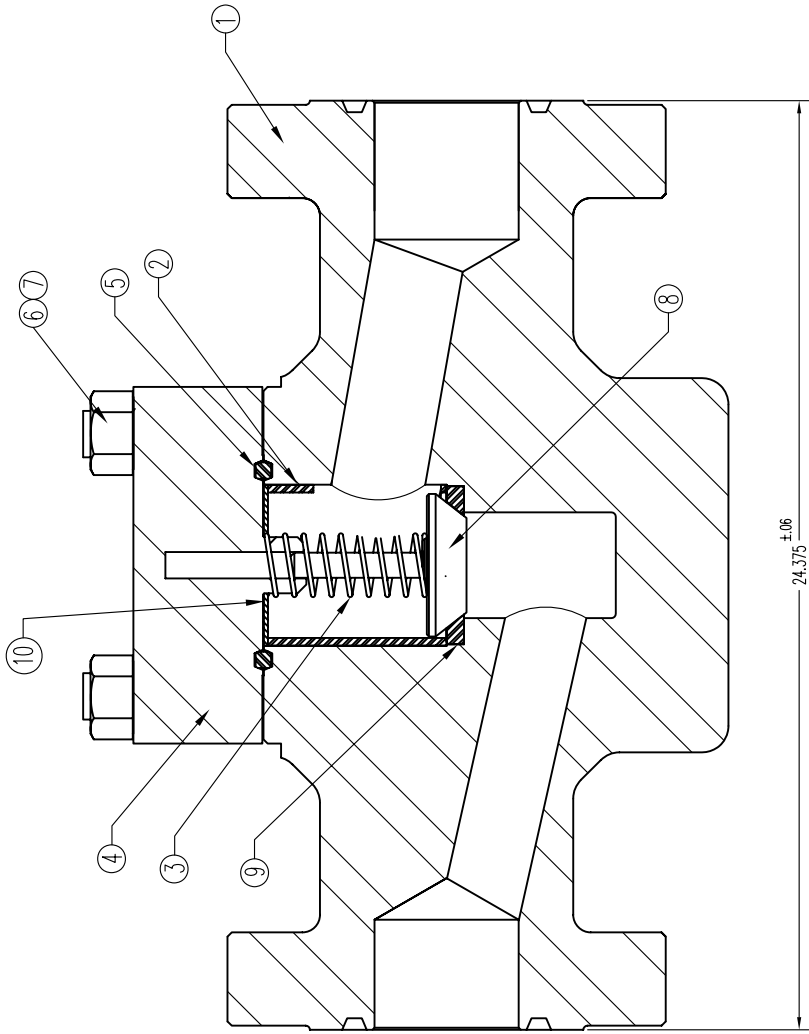
**ENGINEERING AND DESIGN**

DESIGN CODES & STANDARDS:  
 (CURRENT EDITIONS)  
 API 6A 19TH  
 API 16C  
 ASME SECTION VIII, DIV. 2  
 NACE MR-0175

DESIGN SPECIFICATIONS:  
 PRESSURE: 0 TO 10,000 PSI MAWP  
 TEMPERATURE: -20° F TO 250° F

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ITEM NO.	QTY	RECD	PART NUMBER	NOMENCLATURE OR DESCRIPTION	TYPE	MATERIAL SPECIFICATION
10	1		611790-01	SEAT SPRING	CDW L	INCOEL 750 AWS-559C
9	1		611791-01	SEAT	HRS	AISI 17-4
8	1		611788-01	POPPET	HRS	AISI 17-4
7	8		137-6005-L7	NUT-HEX HD, 1 3/8-8UN-2B	CDW L	ASTM GR. 7 ZINC PLT'D
6	8		137-6004-L7	STUD-TAP, 1 3/8-8UN-2A x 6 3/4' LG.	CDW L	ASTM L-7, ZINC PLT'D
5	1		19141-10	GASKET-RING JOINT	HRS	ASTM A479-T316
4	1		137-6003-02	BONNET COVER	HRS	4130 75K
3	1		611787-01	SPRING-HELICAL COMPRESSION	CDW L	INCOEL 600
2	1		611789-01	RETAINER-SEAT	SMLS	ASTM A312-T410
1	1		137-6002-02	BODDY-LIFT CHECK, 3 1/16-IDM	FORGING	4130 75K

BILL OF MATERIALS



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MATERIAL	DATE	DR. BY	APPR. BY	PART NO.
SEE BOM	3-15-08	TE	DJ	137-6001-00
ALL DIMENSIONS IN INCHES				
UNLESS NOTED: X.X ±.06 X.XX ±.005 X.XXX ±.002 BREAK CORNERS .030 MAX. RAD. .062 FRACTIONAL .31/32				

ASSEMBLY DRAWING  
3-1/16" 10M TYPE 'QMS'  
CHECK VALVE

ENGINEERING AND DESIGN

DESIGN CODES & STANDARDS:  
(CURRENT EDITIONS)  
API 6A 19TH  
API 16C  
ASME SECTION VIII, DIV. 2  
NACE MR-0175

DESIGN SPECIFICATIONS:  
PRESSURE: 0 TO 10,000 PSI MAWP  
TEMPERATURE: -20° F TO 250° F

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Q1-0036  
ISO 9001:2008-0308

