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J. L. Rainsberry
Manager, Plant Licensing

July 21, 1999

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Docket Nos. 50-361 and 50-362
Response to Request for Additional Information Regarding Generic Letter 95-07, Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves
San Onofre Nuclear Generating Station Units 2 and 3 (TAC Nos. M93515 and M93516)

Reference: Letter dated June 15, 1999 from L. Raghaven (NRC) to Harold B. Ray (SCE), Subject: San Onofre Nuclear Generating Station (SONGS), Units 2 and 3 - Request for Additional Information - Generic Letter 95-07, Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves (TAC Nos. M93515 and M93516)

Gentlemen:

This letter provides the response to the referenced NRC request for additional information regarding Generic Letter 95-07, Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves, for Southern California Edison's (SCE's) San Onofre Nuclear Generating Station, Units 2 and 3. The NRC questions and detailed SCE responses are enclosed.

If you have any additional questions on this subject, please call me at (949) 368-7420.

Sincerely,

JLRainsberry

Enclosure

cc: E. W. Merschoff, Regional Administrator, NRC Region IV
J. A. Sloan, NRC Senior Resident Inspector, San Onofre Units 2 & 3
L. Raghavan, NRC Project Manager, San Onofre Units 2 and 3

A056

San Onofre Nuclear Generating Station
P. O. Box 128
San Clemente, CA 92674-0128
949-368-7420

Subscribed on this 21 day of July, 1999.

Respectfully submitted,
SOUTHERN CALIFORNIA EDISON COMPANY

By: J L Rainsberry

J. L. Rainsberry
Manager, Plant Licensing

State of California
County of San Diego
On 7/21/99 before me, Frances M. Thurber,
personally appeared J. L. Rainsberry, personally known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

FRANCES M. THURBER
Commission # [illegible]
Notary Public — California
San Diego County
My Comm. Expires [illegible]

Signature Frances M Thurber

ENCLOSURE

RESPONSE TO NRC GENERIC LETTER 95-07
NRC REQUEST FOR ADDITIONAL INFORMATION

NRC Question Number 1:

In a telephone discussion with the NRC on May 29, 1999, your staff stated that the design of WKM valves is such that the friction coefficient between the gate and segment is not applicable when a valve opens during pressure-locking conditions; therefore, your pressure-locking thrust prediction methodology is not required to account for the friction between the gate and segment. Please describe and discuss:

a. the testing that validates your pressure-locking thrust prediction methodology, and

b. the recommended margin between actuator capability and the calculated thrust value when using your pressure-locking prediction methodology, any limitations associated with the use of your methodology, and any diagnostic test equipment accuracy requirements.

Response to NRC Question Number 1:

In a telephone conversation with the NRC technical reviewer on June 29, 1999, Southern California Edison (SCE) staff discussed the proposed test plan that will validate SCE's pressure-locking thrust prediction methodology. Testing will be performed at the San Onofre Nuclear Generating Station (SONGS) test loop facility on an 8" WKM Model D2 double disc gate valve. This valve is identical in construction to the WKM valves considered potentially susceptible to pressure locking.

The test on the WKM valve will consist of the following: Sequence 1 will perform dynamic testing to obtain valve factors as the valve unseats. This data will be correlated to Generic Letter (GL) 89-10 dynamic testing for like valves to support the pressure locking methodology. Sequence 2 will measure stem thrust with the valve bonnet pressurized at various bonnet and upstream valve pressures. Testing of the valve at differential pressures greater than the 300 psid design may be performed based on the results of the data obtained at the design differential pressure. The internal relief port will be plugged and bonnet pressures adjusted accordingly to achieve differential pressures greater than the design differential pressure of 300 psi. This testing will be used to validate the pressure locking methodology calculation. Both sequences will be performed at two different torque switch settings to verify repeatability at different thrust settings. Testing and data analysis is scheduled to be complete by November 15, 1999. Therefore, Southern California Edison (SCE) will provide the results to the NRC along with any recommended actuator margin requirements, any limitations associated on the use of the methodology, and any diagnostic test equipment accuracy considerations by December 15, 1999.

No testing to validate the pressure locking analytical model will be performed on the Target Rock valve design for the following reasons:

1. The Target Rock valves are position seated parallel disc gate valves which do not have a wedging action (disc contact force is provided by an internal spring between the discs). Therefore, no unwedging load other than normal disc to seat contact force is required to open the valve. The lack of unwedging force and in-situ valve factors were confirmed during GL 89-10 design basis testing. The current analytic methodology assumes double disc drag throughout the opening stroke and also includes consideration for stem/disc weight. During the opening stroke, no other forces can exist which would result in an increase in required thrust beyond the current prediction methodology.

2. The available open thrust margin calculated for the Target Rock valves under worst case pressure locking conditions ranges from a minimum of approximately 40% to greater than 100%.

3. It is anticipated that,if needed, the validation testing scheduled to be performed on the WKM valve can be extrapolated to confirm that the existing Target Rock methodology is conservative.

NRC Question Number 2:

Your submittal dated February 13, 1996, states that you credit the internal relief valve installed in the disk of WKM valves to prevent bonnet pressure from exceeding the upstream pressure by 300 psi. The NRC staff considers that failure of the internal relief valve to relieve pressure in the bonnet could prevent a valve from opening during pressure locking conditions. Please:

a. discuss if you periodically test the internal relief valve, and if not tested, explain why testing is not required;

b. explain why the internal relief valve feature is not required to be included in your inservice testing program; and

c. explain why WKM valves are equipped with an internal relief valve. Normally, valves are not equipped with an internal relief valve.

Response to NRC Question Number 2

1. Background

Several gate valves manufactured by WKM were identified in Southern California Edison's (SCE) submittal of February 13, 1996 (Reference 1) as valves with potential functional impact due to pressure locking. Since submittal of the SCE response, the screening criteria calculation (A-95-NM-MOV-PL/TB-002, Rev. 2) has been revised to remove the Emergency Core Cooling system (ECCS) Miniflow Valves 2(3)HV9306, 9307, 9347, and 9348 from the pressure locking/ thermal binding (PL/TB) scope since further review of the system functional requirements indicated that these valves have a closing safety function only and are therefore exempt from the scope of GL 95-07. The remaining WKM valves which are currently considered as susceptible to pressure locking are the shutdown cooling (SDC) valves identified in Table 1. Figure 1 is a Piping and Instrumentation Diagram (P&ID) representing part of the SDC system. The figure shows schematically the location of the SDC valves inside and outside containment.

Valves HV9378 and HV9339 (shown in Figure 1) provide the first isolation boundary between the reactor coolant system (RCS) and the SDC system. The potential for pressure locking occurs as a result of leakage past the upstream seat which pressurizes the bonnet to the RCS pressure of approximately 2,250 psia. The SDC system is initiated after the upstream RCS pressure is reduced to below 400 psia. It is postulated that the RCS fluid would remain trapped in the bonnets of these valves. Without pressure relieving, the high pressure of the water trapped in the bonnet cavity causes the segment and the gate to press tightly against the seats. The pressure locking scenario for valves HV9377 and HV9337 is similar to that of HV9378 and HV9339 since SONGS assumes (for the purpose of the pressure locking analysis) that the primary isolation valves (HV9378 and HV9339) leak by and subject the secondary isolation valves (HV9377 and HV9337) to RCS pressure as well. Since all four inside containment SDC valves were identified as susceptible to conventional pressure locking, no further analysis was performed to determine if these valves could also be subjected to thermally induced pressure locking.

The SDC valves outside containment (HV9379 and HV9336) were conservatively included in the scope of GL 95-07 based on function only. These valves are normally closed and are required to open to perform their safety function. A detailed system analysis to determine if these valves could actually experience a conventional or thermally induced pressure locking condition was not performed. Upon further review it is considered unlikely that these valves would actually be subjected to a pressure locking transient at the time they are required to open, however, SONGS has chosen to conservatively assume that pressure locking is feasible for these valves.

The valves listed in Table 1 are all manufactured by WKM. These valves are equipped with a pressure relief valve (relief valve) installed in the segment, which together with the gate make up the valve disc (see Figure 2). These relief valves were manufactured by Marotta Scientific Controls, Inc.of Boonton, N.J. The function of the relief valve is to limit the pressure buildup in the bonnet, and between the gate and the segment to a specified value. This is achieved by providing a path between the bonnet and the upstream side of the valve. By limiting the pressure differential between the bonnet and the upstream side, the potential for pressure locking is reduced. The relief valves do not protect the code class boundary. They are neither capacity rated nor set point adjustable. Therefore, they are considered check valves.

Table 1
WKM Valves with Potential for Pressure Locking

valve ID	size (inch)	description
2(3)HV9336	16	SDC suction containment isolation valve
2(3)HV9337	16	SDC suction containment isolation valve
2(3)HV9339	16	SDC suction containment isolation valve
2(3)HV9377	8	SDC suction containment isolation valve
2(3)HV9378	8	SDC suction containment isolation valve
2(3)HV9379	8	SDC suction containment isolation valve

Figure 2 shows a cross sectional view of the 8 inch WKM valve, ID No. 2(3)HV9378. This valve drawing is representative of the other Model D-2 OPG POW-R-Seal WKM valves listed in Table 1 above. The figure shows the valve internal components, including the valve's split disc. This disc consists of the segment (Item 5) and the gate (Item 6). The figure also shows the location of the relief valve in the segment (Item 31).

Figure 3 shows the details of the internal relief valve. The valve is set to lift-off at a pressure of 250±50 psid (differential pressure) between the bonnet and the upstream side (the upstream side pressure plus 300 psi represents an upper bound on the bonnet pressure). The following is a brief description of the valve and its main components:

- The valve is 3/4" long and about 0.362" in diameter. Figure 3 shows how the valve is threaded to the segment at the location shown in Figure 2. The threaded connection eliminates the potential for assembly errors, i.e., installing the valve in backwards.

- The valve internals include a stainless steel poppet, a retaining ring attached to the poppet, an inconel spring, and a stellite seat assembled as shown in Figure 3. The compression spring is about 0.3" in diameter and is less than 0.5" long. It is securely enclosed between a recess in the seat and the retaining ring.

- The materials of the valve internals are highly corrosion resistant. Furthermore, the materials of the poppet and the seat (stainless steel on stellite) were selected such that binding will not occur under operating conditions; thus precluding the poppet from being stuck in a closed position.

- The compression spring has a small height to diameter ratio. This feature ensures stability of the spring under a compressive load without the possibility of buckling.

- The valve has no guides and no stability components. It has only one moving part - the assembly of the poppet and the attached retaining ring.

The above description emphasizes the valve's simplicity in design and construction. It also shows that the materials of construction were selected to provide resistance against corrosion, and to eliminate the potential for binding between the poppet and the seat. The function of the valve is described briefly as follows:

- The spring is precompressed during assembly by the manufacturer between the seat and the retaining ring. The force due to the compression of the spring is transmitted to the poppet via the retaining ring to seat the poppet against the stellite seat to provide the desired sealing. The arrow indicating the flow direction in Figure 3 is on the bonnet side and the seat is on the upstream side.

- If the bonnet pressure is sufficient to overcome the force in the spring, lift-off will take place. Spring stiffness and the amount of precompression applied to the spring during assembly are calculated such that lift-off occurs at the valve set point. The path created between the bonnet and the upstream side by this lift-off allows some of the water trapped in the bonnet to escape to the upstream side, thus relieving the bonnet overpressure.

2. Response to Question 2.a

The WKM internal relief valves at SONGS 2 & 3 are not periodically tested. However, testing of the relief valves was added to SCE Maintenance Procedure SO123-I-6.75 (Reference 2) as a prudent measure in January of 1998. The testing is done if the WKM valve must be disassembled in support of other maintenance activities. The procedure was revised to add lift testing since the calculation of record regarding pressure locking credits the valves opening to relieve bonnet pressure should it exist. Generally, the relief valve was replaced after the inspection, regardless of the inspection results, if the WKM valve was disassembled.

A review of maintenance history since startup found only two instances of failures to meet inspection acceptance criteria out of 16 valves inspected or tested. In one instance the poppet was missing, and in another the debris screen was missing or damaged. In both instances, failure to meet the acceptance criteria would not have impacted the viability of the relief path between the bonnet and the upstream side. At least four valves have been pop relief tested with no failures to date. At least three valves which had been installed in the plant were tested and one spare valve was tested 25 times. A more detailed description of the relief valve inspection and testing at SONGS is given in the response to Question 2.b.

Currently, the relief valves are inspected and tested as follows:

a. Inspect the relief valve debris screen.
   Acceptance Criteria: Clean, no broken strands, or foreign material.

b. Remove and test the relief valve as follows:

   - Perform the valve seat leak rate test by pressurizing the valve inlet to [illegible]50 psig.
     Acceptance Criteria: Seat leak rate ≤ 2 cc/hr maximum
   - Perform the valve relief test by pressurizing the valve inlet.
     Acceptance Criteria: Valve relieves at 200 to 300 psig.

c. Install the relief valve.

The above test requirements do not represent periodic testing of the relief valves. Testing is performed only when the valves are disassembled to perform other maintenance work. Periodic testing of the relief valves is not necessary based on the simple design and its inherent reliability, as discussed in more detail in the response to Question 2.b below. The operating history of the WKM valves supports this fact. The WKM valves are routinely stroked open during outages when placing SDC in service. Since the bonnets of the SDC valves are susceptible to pressure buildup as explained in Section 1 (Background), the existence of an adequate relief path is necessary to prevent pressure locking when the RCS pressure is reduced prior to stroking open the SDC isolation valves. This, combined with the fact that there has been no failure to open these valves in the past, provides an assurance that there is a relief path between the bonnet and the upstream side that prevents excessive pressure build up in the bonnet.

3. <u>Response to Question 2.b</u>

The internal relief valve feature is not required to be in the inservice testing program based on the following considerations:

a. The relief valve is manufactured to a very simple design, with only one moving part - the poppet, which is attached to the retaining ring (see Figure 3) as described in Section 1 (Background). The poppet can only move in the axial direction guided by the retaining ring at one end and the hole in the seat at the other end. The short length of the compression spring eliminates the potential for buckling. Also, the seat end of the spring is enclosed in a recess in the seat to prevent lateral motion. All these features ensure that the poppet is allowed to move only in the axial direction should high pressure exist in the bonnet, with no practical possibility of deviation from this simple motion. Accordingly, the poppet being stuck in a cocked position is highly unlikely. Even if the poppet was somehow misaligned, tight seating would not be possible, which provides a relief path. This lack of complexity in the relief valve design ensures a high level of reliability.

This conclusion is supported by inspection results. As mentioned in the response to Question 2.a above, several WKM valves were inspected with no reported relief valve failure, as explained below. Acceptance criteria were not met in two instances only: the poppet was missing in one case, and the screen did not meet the acceptance criteria in the other case. In both cases, however, failure to meet the acceptance criteria would not have resulted in failure to relieve bonnet pressure since the pressure relief path between the bonnet and the upstream side was still available.

Of the total population (37+ safety and non-safety related WKM valves, all of which have internal relief valves) at SONGS, 16 safety related and non-safety related relief valves have been inspected, tested, or replaced during valve disassembly. Of these 16 valves, 13 have been inspected or replaced and three have been tested. In addition to these three, a spare relief valve was also tested as explained below. Results are:

Testing - no failures.

Inspection - acceptance criteria were not met in two instances, one missing poppet and one missing or damaged debris screen. Neither of which would have prevented the valve from performing its pressure relieving function.

Replacements - 6 were replaced as required by the procedure at that time even though there was no sign of degradation.

Spare valve - 25 tests with lift-off occurring at the nominal set point consistently.

b. All internal relief valves were initially tested prior to installation in the WKM valves prior to startup per Reference 3.

c. To further demonstrate the reliability of the relief valve, a spare relief valve was tested at SONGS by pressurizing the inlet and recording the relief pressure. The test was repeated 25 times with the relief pressure consistently between 250 and 260 psi. These results support the conclusion of the repeatability of the relief valve's lift point.

d. Potential relief valve damage and/or failure during operation is expected to be in any of the following forms:

- Poppet and/or seat corrosion - The poppet is made of stainless steel and the seat is made of stellite. Both materials are highly resistant to corrosion, which makes this type of damage unlikely.

- Poppet-seat binding which would result in the relief valves being stuck closed is not credible based on the materials of the poppet and the seat (stainless steel on stellite).

- Loose particles may become lodged between the strands of the screen. This would potentially block the relief path. However, the high differential pressure associated with pressure locking would dislodge any loose particles.

- The spring is made of inconel, which is very resistant to corrosion. Furthermore, any damage to the spring leads to loss of stiffness and decreasing the lift-off differential pressure.

Based on the above considerations, the capability to provide a relief path and limit valve bonnet pressure will not be impacted by any potential damage to the relief valve during operation.

The above is supported by an industry survey of Marotta valves. A search of the Nuclear Plant Reliability Data System (NPRDS) archives, Nuclear Industry Check Valve Group failure data and Equipment Performance Information Exchange (EPIX), shows a total of seven recorded failures of check valves manufactured by Marotta. Although the design details of these valves were not available, the description of the failures clearly indicates that these valves failed to completely seat which resulted in excessive leakage across the valves. Such a failure, if experienced by the subject relief valves, would not compromise the intended function of the valve. To the contrary, onset of leakage across the valve would tend to provide the desired pressure relief.

e. These WKM valves are routinely stroked open during outages to place SDC in service. There has been no failure to open these valves since the startup of both units in 1982 (Unit 2) and 1983 (Unit 3) which could be attributed to failure of the Marotta valve. Furthermore, valves 2(3)HV9378 and 9339, which are the first boundary valves between the RCS and the SDC system, are routinely subjected to entrapped RCS fluid in the valve bonnet. Subsequent depressurization of the RCS to initiate shutdown cooling and opening of these valves provides reasonable assurance that the relief valves are providing a vent path since it has been confirmed that the valve actuators do not have adequate thrust to open if the differential pressure between the bonnet and the upstream side significantly exceed 300 psi because the existing margins are relatively small. At pressures in excess of 300 psi the successful opening of these valves provides additional verification of the inherent reliability of the internal Marotta valve.

f. During the Unit 2 Cycle 9 refueling outage, the piping segments between HV9377 and HV9378, and between HV9337 and HV9339 were pressurized on 2/18/97 through the drain valve to about 350 psia to perform a leak test on HV9337 and HV9377. The RCS was then pressurized to 2,250 psia at 0337 on 2/19/97. The Unit returned to shutdown cooling and the valves reopened at 1450 on 2/19/97 indicating that no pressure locking occurred. All four SDC valves inside containment (HV9377, HV9378, HV9337 and HV9339) are required to open per the SDC system's Operating Instruction (Reference 4).

g. Testing of the relief valves is already covered by the requirements of Maintenance Procedure SO123-I-6.75. The valves are tested for screen cleanliness and integrity, leak rate, and lift-off pressure. This testing is performed when the valves are disassembled to perform other maintenance work.

h. There are two options for periodic testing of the relief valves: in situ testing and testing after removal from a disassembled WKM valve. Both options represent significant hardships and risks. Testing the relief valve in situ requires an external source (such as a hydro pump) be used to pressurize the space between the valve gate and segment. The connections for the hydro pump and measurement/test equipment would be made through the valve body plug. The associated hardships and risk utilizing this in situ testing method are:

- Removal of the body plugs on these 6 WKM SDC valves is expected to require the reactor core to be off loaded and draining of the SDC System.

- Failure to detect or confirm the lift pressure of the internal valve is a definite possibility. The relief valve is designed as a pressure relieving device and does not have a rated capacity. Relying on external test instrumentation may not confirm flow through the relief valve or if the valve seats leak. Indeterminate test results will require emergent work to disassemble the gate valve to test the relief valve.

- Removal and reinstallation of the valve body plugs could potentially damage the valve body, resulting in RCS pressure boundary leakage upon return to service. Such leakage will not be noted until the RCS is pressurized as part of returning the unit to service and will be unisolable.

The second option is to test the relief valve after removal from the WKM valve when it is disassembled for other maintenance. Removal of the relief valve requires complete disassembly of the WKM valve. The associated hardships and risks are:

- Complete reactor core offload and draining of the SDC system.

- Disassembly of the WKM valve poses a number of risks. The valve bonnet is a pressure seal design with a metal seal ring. The design is inherently difficult to work on and is prone to causing body seal ring damage. Such damage and difficulties have been experienced a number of times during previous valve maintenance. Damage to the valve body seal ring surface will result in RCS pressure boundary leakage upon return to service. Furthermore, the valve body plugs are removed during a valve overhaul. Removal and reinstallation of the valve body plugs can damage the valve body resulting in RCS pressure boundary leakage upon return to service. The location and service of these valves makes disassembly a difficult, labor intensive task which incurs significant dose to accomplish.

4. Response to Question 2.c

The purpose of the relief valve is to limit the maximum differential pressure between the bonnet and the upstream side to 300 psi to limit the effect of pressure locking. The relief valve provides protection against excessive pressure build up in the bonnet cavity while maintaining the capability to isolate in both directions and help prevent a direct leak path past the upstream valve seat.

Summary

Because of the simple design and inherent reliability of this internal relief valve, the impracticality, hardships, and risks in performing tests of these internal relief valves, and because the results of tests could be interpreted as either WKM gate valve seat leakage or internal relief valve function, these internal relief valves are not tested periodically and are not in the Inservice Testing Program. These internal r `ief valves are tested when the WKM valves are disassembled for necessary maintenance. In addition, to resolve any possible ambiguity, SCE will remove the internal relief valve permanently if and when a WKM valve listed in Table 1 is disassembled for maintenance in the future.

References

1. Letter from Walter C. Marsh of SCE to U. S. Nuclear Regulatory Commission dated February 13, 1996. Subject: Docket Nos. 50-361 and 50-262.

2. Maintenance Procedure SO123-I-6.75, Revision 2,"WKM Model D-2 Gate Valve Disassembly, Cleaning, Inspection and Reassembly."

3. SCE Document No. SO23-507-5-1-207, Rev. 4,"Pressure Test of POW-R-SEAL Gate Valves." This is WKM Engineering Standard, Classification Number 36-0105.

4. SCE Document No. SO23-3-2.6, Revision 11,"Shutdown Cooling System Operation." This was the applicable revision at the time of Unit 2 Cycle 9 refueling outage.

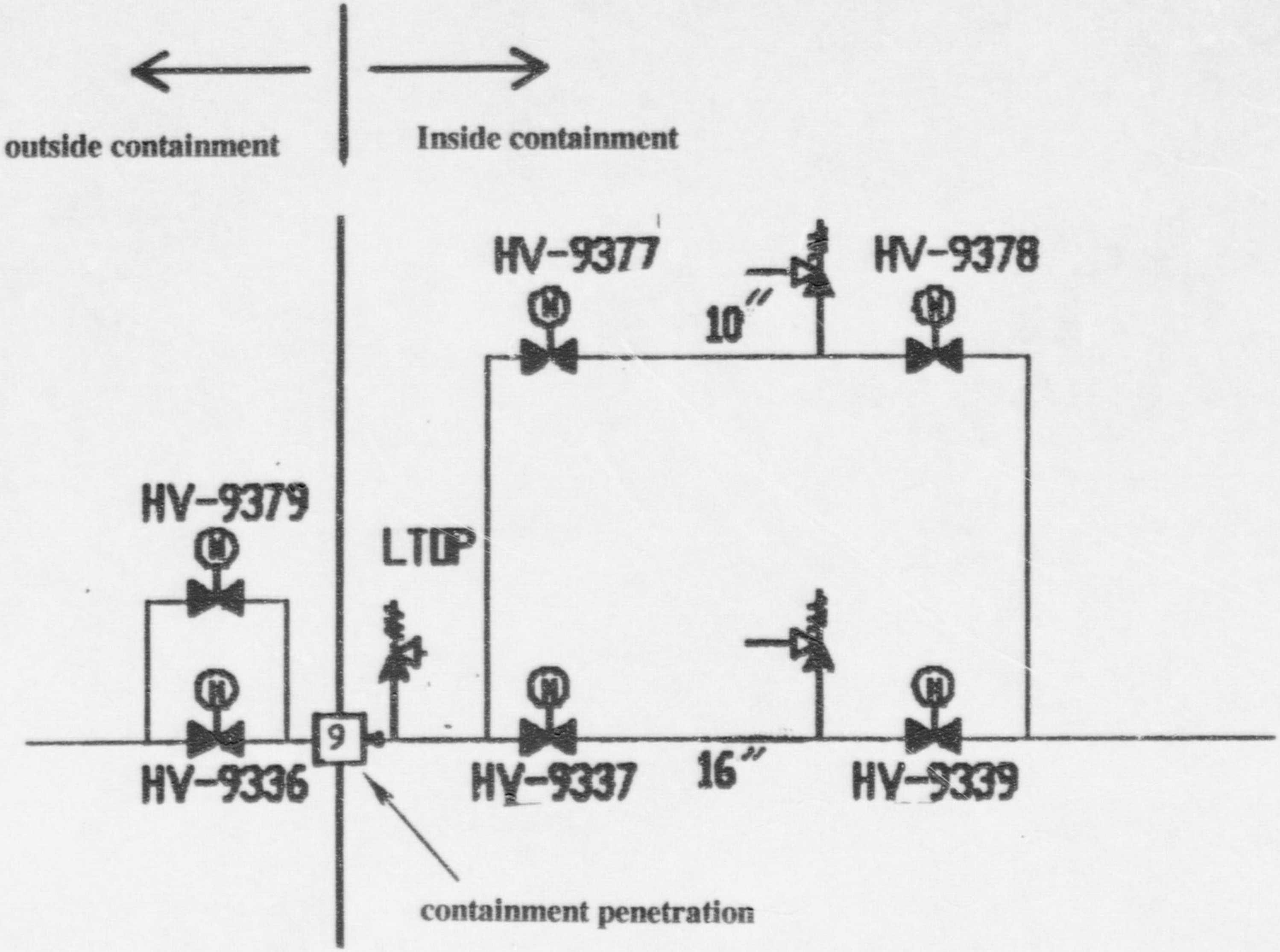

Figure 1 P&ID Showing SDC WKM Valves

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.			NO.	REVISIONS	DATE	DR.	CHK.	E.G.S.	CHF. E.	P.E.
JOB NO.	DATE	APPROVED	A	REVISED TO INCORPORATE 1-VP, 2-VP	7-12-84	JG	[illegible]	[illegible]	—	—
10079										

☒ This revised Vendor Document incorporates changes associated with a Design Change Package (DCP).
DCP Number: 1247J-[illegible]3-1247J
☐ This Vendor Document revision does not reflect any physical plant modification and is not associated with a DCP or FCR.
Explain change ______
Reviewed by JG Date 6-12-84
PP-6183 [10079] 5/83

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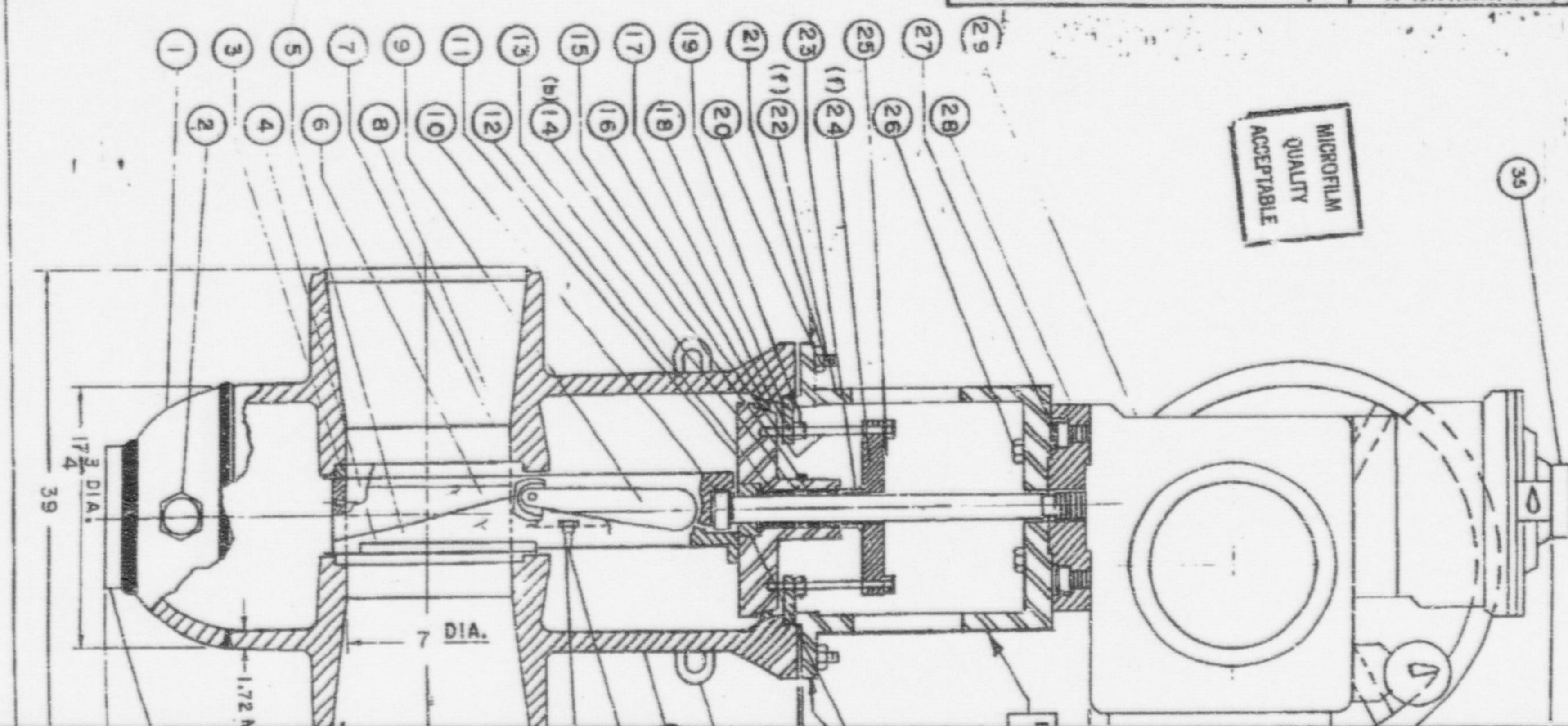
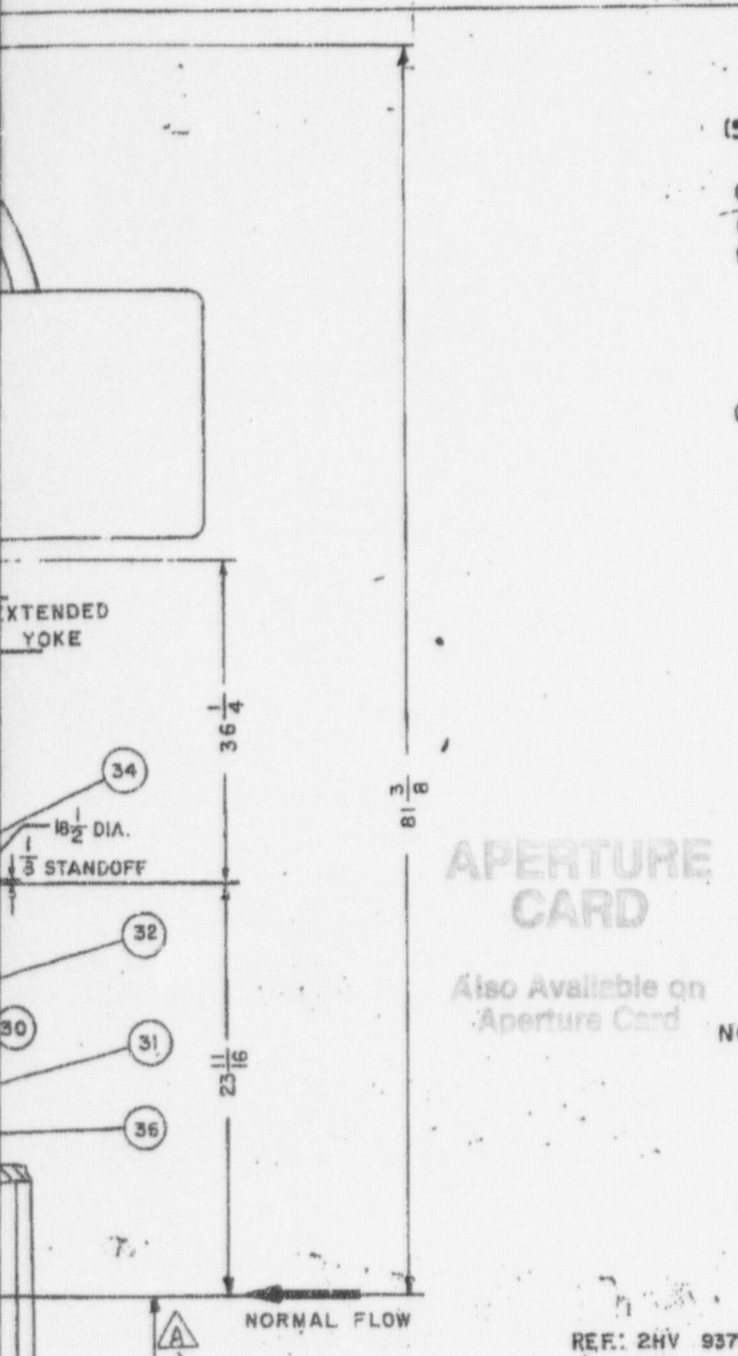


Figure 2 W



	NO.	DESCRIPTION	MATERIAL	QTY.
(h)	1	BODY LOWER SECTION	ASME SA-182 Gr. F316	1
(h)	2	BODY PLUG	ASME SA-479-GR 316	1
(g)(a)(d)	3	SEATS	ASTM A-182-GR F316L W/OL	2
(a)(g)	4	SEAT SKIRTS	ASTM A-693 Gr. 630 W/CHROME PLAT	2
(h)(a)(d)	5	SEGMENT	ASME SA-487-GR CA6NM W/OL	1
(h)(a)(d)	6	GATE	ASME SA 487-GR CA6NM W/OL	1
(g)(d)(a)	7	LEVER LOCK ARM SHOE	ASTM A-693-GR 630 W/OL	2
(g)(a)	8	SHOE PIN	ASTM A-564-GR 630	2
(g)(a)	9	LEVER LOCK ARM ASY	FABRICATED 17-4 PH	1
(g)	10	STEM	ASTM A-564-GR 630	1
(h)	11	BONNET FABRICATED	ASME SA-182 GR. F316 ASME SA-240 GR. 316	1
(j)(a)(c)	12	PACKING SET	GRAFOIL GTN & 1625 GF	1
(j)	13	LANTERN RING	ASTM A-564 GR. 630	1
(j)	14	1/2" NPT PACKING LEAKOFF PLUG	ASTM A-182 GR. F316	1
(j)	15	FOLLOW PLATE STUD	ASTM A-193-GR B7 7/8-9NC	2
(j)(a)	16	SEAL RING	ASTM A-182-GR F316	1
(j)	17	BONNET STUD	ASTM A-193-GR B7 7/8-9NC	6
(j)	18	LIFTING RING	ASTM A-516-GR 70	1
(j)	19	BONNET NUT	ASTM A-194-GR 2H 7/8-9NC	6
(g)	20	YOKE NUT	ASTM A-194 GR. 2H 1-8N	12
(g)	21	YOKE STUD	ASTM A-193-GR B7 1-8N	12
(g)(f)	22	YOKE	FABRICATED CARBON STEEL	1
(j)	23	PACKING GLAND	ASTM A-564 GR. 630	1
(j)(f)	24	FOLLOW PLATE	ASTM A-516-GR 70	1
(j)	25	FOLLOW PLATE NUT	ASTM A-194-GR 2H 7/8-9NC	2
(g)	26	MOUNTING PLATE BOLT	ASTM A-193-GR B7 5/8-11NC	8
(g)	27	MOTOR MOUNTING BOLT	ASTM A-193-GR B7 5/8-11NC	8
(g)	28	MOTOR MOUNTING PLATE	ASTM A-283-GR D	1
~~(g)~~	~~29~~	~~MOTOR ACTUATOR~~	~~SB-1-15-900~~	~~1~~
(h)	30	BODY	ASME SA351 GR CF8M	1

NOTES:
(a) RECOMMEND ONE SPARE SET.
(b) PACKING LEAK-OFF IS TO BE ON DOWN STREAM SIDE OF VALVE AS SHOWN.
(c) PACKING SET CONSISTS OF ONE UPPER AND ONE LOWER ANTI-EXTRUSION PACKING RING OF 1625 GF AND INTERNAL RING OF GRAFOIL GTN.
(d) HARD SURFACING MATERIAL TO BE IN ACCORDANCE WITH AWS A5.13-70, CLASSIFICATION R-COCr-A.
(e) VALVE OPERATOR WILL BE REMOVED & REINSTALLED ON VALVE IN THE FIELD IN ORDER TO PUT VALVE THROUGH AVAILABLE SLEEVE.
(f) YOKE & FOLLOW PLATE SHOWN 90° OUT OF PLANE.
(g) NON-PRESSURE RETAINING PART ESSENTIAL TO FUNCTION.
(h) ASME SEC. III PRESSURE RETAINING PART.
(i) FOR ACTUATOR ORIENTATION SEE NOTE (1), PG. 2 OF 3
(j) NON-PRESSURE RETAINING PART NON-ESSENTIAL TO FUNCTION.

REF.: 2HV 9378
3HV 9378

	NO.	DESCRIPTION	MATERIAL	QTY.
(g)	29	MOTOR ACTUATOR	SB-1-15-900 MOTOR SHAFT TO PINION GEAR KEY SHALL BE TYPE 4140 STEEL.	1
(j)	31	THERMO RELIEF VALVE	ASME SA-479, TYPE 316	1
(j)	32	LIFT EYES	ASME SA-240 TYPE 316	2
(j)	33	SUPPORT RING	ASME SA-240 TYPE 316	1
(j)	34	PACKING BUSHING	ASTM B-150 ALLOY No. 630	1
(j)	35	STEM PROTECTOR	ASTM A-105	1
(j)	36	ADAPTER	ASME SA 479 GR316	1

23
IN. WALL

SO23-507-5-1-139-25

PAGE 1 OF 3

S.O.38301 ITEM NO. 11 SCE # 5028

ACF INDUSTRIES
W-K-M VALVE DIVISION

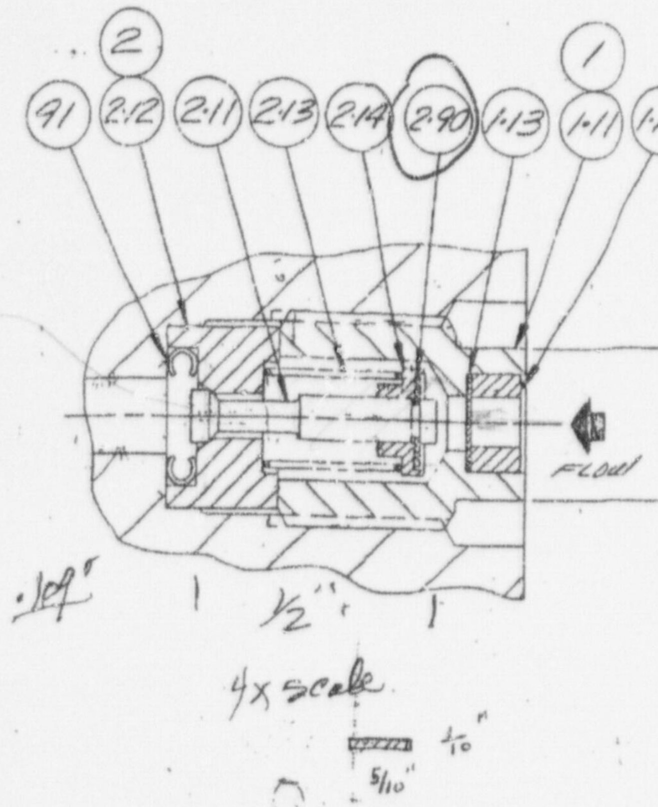
4/27/7 N 322
8/7/7 N 362
7-17-78 N 639
1-24-79 N 769
3-20-81 P 308

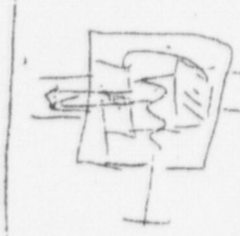
10x8x10 CLASS 1500
MODEL D-2 OPG POW-R-SEAL
EHH. 7/6/76
RS249693

APERTURE CARD
Also Available on Aperture Card

WKM 10x8x10 inch Valve 2(3)HV9378

9907230096-01





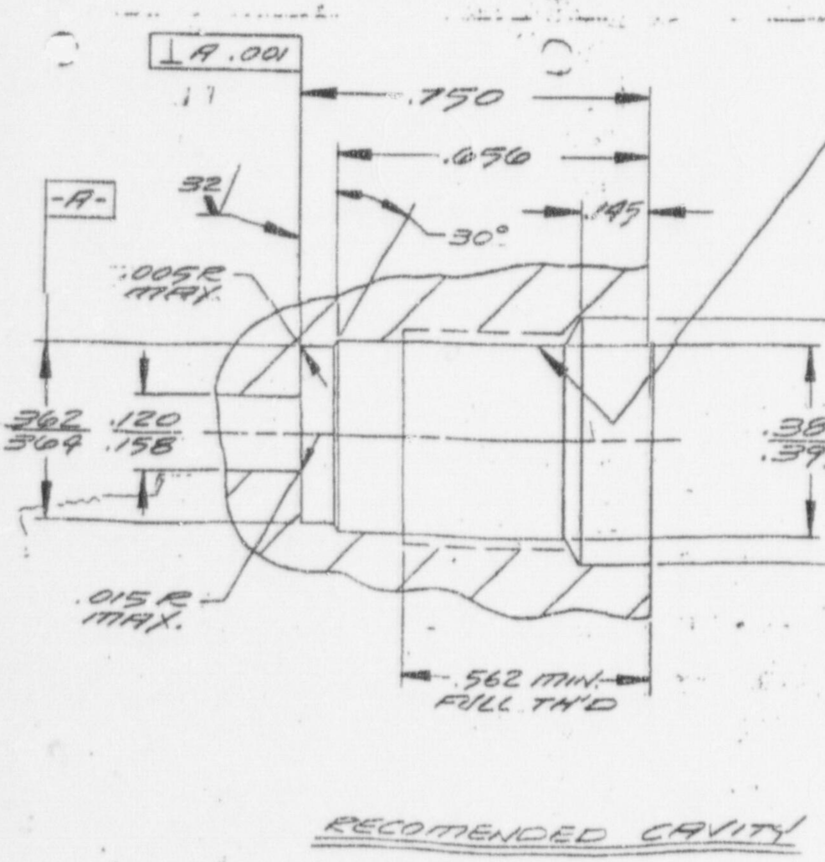
10. VALVE SPECIFICATIONS:

PRESSURES (PSIG) OPERATING PROOF
PORT(S) 0-3360 6750
PORT(S) ______ ______
PORT(S) ______ ______

OPERATING TEMPERATURE (°F) AMBIENT ______
LINE FLUID ______
ACTUATING FLUID ______

SERVICE: LINE FLUID: WATER
MATERIALS IN CONTACT WITH LINE FLUID:
BODY ______ POPPET 316
SEAT(S) STELLITE OTHER INCON
300 SER STN.; 15-7 STN
SEALS ______

CAPACITY:
EQUIV. SHARP EDGE ORIFICE DIA. ______
FLOW FACTOR $C_V = 0.1$
CRACKING PRESS. 250±
LEAKAGE @ 150 PSID



91	1		4.16
2.90			419
2.14	1		121
2.13	1		139
9 2.12	1		187
9 2.11	1		189
2	1		234
1.13	1		10
1.12	1		145
9 1.11	1		189
1	1		23
ITEM NO.	UNIT QTY.	CODE IDENT.	

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES
.XX ± .02 .XXX ± .010
.XXXX ± .0002 ANGLES ± 2°

FILLET AND CORNER RADII (INTERNAL AND EXTERNAL) .002 R. TO .020 R
BREAK EDGES .002 TO .020

ALL MACHINED SURFACES TO BE GEOMETRICALLY TRUE WITHIN .005 T.I.R. GEOMETRIC SYMBOLS ARE TO MIL-STD-8

THREADS PER MIL-STD-9
THREAD CHAMFERS 120° ± 5°

SURFACE FINISH PER MIL-STD-10
RHR OF 125 ✓ ON MACHINED SURFACES

SK 22104	
REF	NEXT ASS'Y

GENERAL NOTES:

1. FOR INSTALLATION DIM & OPR SPEC SEE DWG. ______
2. APPROVED EQUIV. OF COMMERCIAL, AN & MS PARTS MAY BE USED.
3. LOCKWIRE PER MS33540
4. MARK CURE DATE PER SP 167
5. MARK SERIAL NO.
6. FABRICATE PER ______
7. FINAL ASS'Y PER ______
8. ASSEMBLE & TEST PER ______
9. [illegible]

DR
CH
EN
CH
CH
MA

REVISIONS				
NO.	SYM	DESCRIPTION	DATE	APPROVED

140 / 60

8

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SUB-STANDARD ORIGINAL. NOT SUITABLE FOR LEGIBLE REPRODUCTION

JAN 17 1978

ISSUED TO:

DATE

SCE N-5028

S283-5775-1-366-0

reference letter 1/18/78

BURST

13,440

TO

TO 700

TO

STN.

L x 750;

(.6)

PSID

/se max.

IMPORTANT
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Approval of this document does not relieve the supplier from full responsibility for contract or purchase order requirements including, but not limited to, adequacy and suitability of materials and/or equipment represented thereon for the intended function.

DATE RECEIVED 9-14-79

DOC STATUS BY Morgan

DATE 9/21/79

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4 ☐ NOT APPROVED - CORRECT AND RESUBMIT
☒ INFORMATION ONLY ☐ DISTRIBUTION REQUIRED

PART NO.	NOMENCLATURE	MATERIAL	MATERIAL SPEC.	FINISH	UNIT WT.
151-0161	C' SEAL	INCONEL X SILVER PLTD		612951-0532-2	
801-5007	RETAINING RING	STN. STL. PH 15-7 MO		5133-9	
301	GUIDE	300 SER STN	QQ-S-763 ASTM-A-582		
41	SPRING	INCONEL X 750			
40-9001	SEAT	STELLITE	No. 6B		
39-9001	POPPET	F 316 STN	ASME SA-182		
36-9001	POPPET ASSY				
241	SCREEN	300 SER STN	QQ-S-763 ASTM-A-582		
202-328	BUSHING	300 SER STN	QQ-S-763 ASTM-A-582		
38-9001	NUT	F 316 STN	ASME SA-182		
389-9001	NUT ASSY				

PARTS LIST

DRAWN	CORONA	12-16-77
CHECKED		
	SK	1-16-78
DFTSM		
ENGR		

marotta SCIENTIFIC CONTROL, INC. BOONTON, N.J.

TITLE: PRESSURE RELIEF VALVE 250±50 PSID 700°F, PLUG IN

MAROTTA APPROVAL:

CODE IDENT. NO.	SIZE	DWG. NO.
99657	C	281710-9001

SCALE: 4:1 MODEL: PRV 74 SHEET 1 OF 1

281710-9001 PRV 74

9907230096-02

APERTURE CARD

Also Available on Aperture Card

Figure 3

Marotta Pressure Relief Valve 250±50 psid