UNCONTROLLED COPY

ENGINEERING REPORT - E.R. 1.0

MOVATS INCORPORATED

DIFFERENTIAL PRESSURE THRUST CALCULATION METHODOLOGY

JUN 2 0 1988

Issue Date

Revision: 0

Prepared By:	Lee Kelly	6/1/88 Date
Approved By:	Lee Kelly Engineering Department Manager	6/1/88 Date
Approved By:	RW Ca Manager, Engineering Division	6/16/88 Date
Reviewed By:	Mark A. Milo Quality Assurance Manager	06/17/88 Date

2388

TABLE OF CONTENTS

[illegible]

I. OBJECTIVES

The objectives of the MOVATS Incorporated differential pressure thrust calculation and valve capability assessment are as follows:

1. Establish the actuator output thrust requirements for operation under worst case conditions based on the MOVATS Incorporated differential pressure test data base.

2. Determine actuator capability to provide the thrust requirement without exceeding its limits, including valve and actuator stress ratings and actuator reduced voltage stall thrust.

II. DETERMINING THRUST REQUIREMENTS

The MOVATS Incorporated differential pressure (DP) test data base contains the results of MOVs that have been tested under DP conditions. If sufficient data points for a particular type of valve are included in the data base, they can be used to predict thrust requirements for valves of that particular type, in lieu of performing DP testing to determine the thrust requirements. This approach is included in the Union Electric Company (Callaway) response to IEB 85-03, which has been accepted by the NRC.

The Callaway response specified that if there are 4 or more data points from valves of the same type, manufacturer, orifice diameter, and stem diameter; or if there are 20 or more data points from valves of the same type; then further DP testing is not required for those categories of valves if 1) the data points are used themselves to calculate required thrust statistically or 2) the data points verify that a particular calculation method is conservative.

If a valve is adequately represented in the DP data base, the DP thrust requirement is calculated by MOVATS Incorporated as follows. Linear regression is performed on the DP test data points to find the equation for the "best-fit" line through the data. After a thrust value is predicted for the valve using the "best-fit" equation, a 90% confidence band, or tolerance is calculated and then added to the predicted thrust to obtain the thrust, above running load, required by the valve to be able to operate against differential pressure, (DP Thrust Requirement).

Standard statistical analysis methods are applied for deriving the confidence interval. Attachment 1 explains the methods in more detail.

To obtain the minimum target thrust, which is the value used to set the torque switch during MOVATS® valve diagnostic testing, the "DP Thrust Requirement" is multiplied by a factor that accounts for torque switch repeatability and accuracy of the MOVATS® diagnostic system instruments.

All calculations provided are based on the MOVATS® DP data base as of the date on which the calculations were performed. Because the calculations are performed using actual data from the data base, the calculation results can change as data is added to the data base. All data used in the calculation is available for review at MOVATS Incorporated in Marietta, Georgia.

If a valve is not adequately represented in the DP test data base, then the valve should be tested under pressure to determine the actual thrust required or to verify that a particular calculation method is conservative for the valve type. Testing may be performed at several reduced pressure points and the required thrust calculated by extrapolating the test data to the maximum pressure. The procedure for calculating the confidence band for the extrapolated thrust values is the same procedure used to calculate thrust using data points from the DP data base.

The magnitude of the confidence band is influenced by the number and values of test data points as follows:

1. The greater the difference between the actual test pressures and the maximum expected pressure, the lower the confidence.

2. The greater the number of tests performed at different pressures, the higher the confidence. Testing at a minimum of two different pressures is required in order to calculate a confidence band for the extrapolated thrust values.

3. The greater the scatter of data points, the lower the confidence.

If the valve can only be tested at one pressure point, consider the following:

1. The test results may be compared to the calculated thrust requirement for the reduced pressure. If the calculated value proves to be conservative, the calculational method can be used with relative confidence when computing thrust required at full differential pressure.

2. Theoretically, a thrust value obtained by extrapolating from a single data point is more reliable than a value obtained

for a generic thrust equation alone, because the extrapolated value is based on empirical data from the specific valve in its actual condition, rather than on values judged to be applicable to all similar valves. Note, that a statistically valid confidence band cannot be computed without at least two test points (in addition to the zero point); therefore, engineering judgement must be used when using the one point extrapolation approach.

3. The one data point will add a value to the industry data base, and combined with the rest of the data, may allow for validation of a generic calculational method for that particular type.

In conclusion, if a valve cannot be tested under its maximum differential pressure conditions, the next best option is to test the valve at a minimum of two different pressures. If data can only be obtained at one pressure value, this data point may be used to verify the manufacturer's thrust calculation method or added to the industry data base for future reference.

III. <u>ASSESSING VALVE/ACTUATOR CAPABILITY TO MEET REQUIREMENTS</u>

The general criteria that the valve must meet in order to be considered operable under worst case conditions are as follows, 1) the minimum available thrust must be greater than the DP thrust requirement; and 2) the maximum available thrust plus stem running load must be less than both the reduced stall thrust capability and the component stress limits.

A. Definitions

The capability of the actuator to operate against worst case conditions is characterized by the interrelationships of the following factors:

1. DP Thrust Requirement - Thrust, above running load, required to operate against maximum differential pressure

2. Target Thrust - DP Thrust Requirement multiplied by factor to account for torque switch repeatability and measurement equipment error

3. Reduced Stall Thrust Capability - Calculated in accordance with Limitorque Selection Procedure SEL-10

4. Valve and Actuator Component Stress Limits - The lesser

of the valve or actuator thrust ratings

5. Minimum Available Thrust = T @ TST - Max R.L. - Error

   where, T @ TST = Thrust at torque switch trip
   Max R.L.= Maximum running load seen by TMD
   Error = Factor which accounts for torque switch repeatability and measurement equipment error

6. Maximum Available Thrust = T @ TST - Avg R.L. + Error

   where, Avg R.L.= average running load seen by TMD

7. Stem Running Load - Actuator output thrust required to move the valve stem

B. Capability Evaluation Before Testing

A "pre-test evaluation" of the capability of a valve to perform its design function is provided as part of the MOVATS Incorporated thrust calculations. This evaluation consists of comparing the maximum allowable running thrust (MART) to the estimated stem running load.

For this pre-test evaluation, the stem running load is estimated as follows:

1000# for stem diameter up to 1" inclusive
1500# for stem diameter up to 1.5" inclusive
2500# for stem diameter up to 2.5" inclusive
4000# for stem diameter up to 4" inclusive
5000# for stem diameter above 4"

The maximum allowable running thrust (MART) is calculated as follows:

MART = Thrust Limit - Highest Target Thrust

where,

Thrust Limit = (lesser of valve/actuator commercial rating and reduced voltage stall thrust)

Highest Target Thrust = (greater of opening or closing Target thrust)

If the estimated stem running load is greater than MART, and if the valve is set up to deliver the required thrust, either the component stress limits or the stall thrust limit must be exceeded. If this is the case, the following options should be considered and planned before the test.

1. Component Stress Limitation Exceeded

   If the target thrust plus estimated stem running load is greater than the actuator or valve stress limits, <u>but less than the reduced voltage stall thrust</u>, a stress analysis can be performed to determine the effects of the higher thrust levels on long-term operability of the motor operated valve.

   In general, valves and actuators operating within normal stress limits may be operated many times without excessive wear and damage. When applied thrust levels are increased beyond documented thrust limits, a valve or actuator may still perform without damage, but accelerated wear and fatigue of critical components can occur.

   If the valve is not stroked frequently and/or the required thrust values are not significantly higher than the documented allowable limits of the valve or actuator, a stress analysis is likely to show that the useful life of a MOV is not significantly shortened by the higher thrust conditions. In this case, performing a stress analysis may justify an increased thrust rating, allowing the valve to be set to deliver the required thrust, and thus provide operability documentation.

2. Stall Thrust Limitation Exceeded

   If the target thrust plus estimated stem running load exceeds the actuator's calculated reduced voltage stall thrust value, a stall thrust test can be conducted. Since the standard stall thrust calculation is generally conservative, a stall thrust test is likely to prove that the actual 100% voltage stall thrust (and thus the reduced voltage stall thrust) is higher than the calculated value. Please note that care should be taken prior to performing this test to ensure that actuator or stem limits are not exceeded without having a plan in place for verifying operability afterwards.

One actuator manufacturer states that their actuators may be operated one time at up to 2.5 times the rating without any effect on the life of the actuator.

C. Capability Verification During/After Testing

The pre-test evaluation determines if the valve is capable of operating against maximum conditions _if_ the valve is set up properly. During or after the testing, the actual operating characteristics of the valve should be evaluated in three steps to determine if the valve actually _is_ set up properly to deliver its design requirements.

1. Compare Actual Running Load to MART

MART can be used as a quick and conservative indicator of whether the valve can operate under worst case DP conditions. If both the open and close motor load running loads are less than MART, the valve _is_ capable of operating under design DP conditions without operating outside the limitations of the valve/actuator. The next steps are to check the actual thrust output against requirements and limits (see steps 2 and 3 below).

If the motor load running load is greater than MART, this indicates that sufficient available thrust to meet the calculated DP requirements cannot be obtained without exceeding the capability or stress limits of the actuator. At this point the following options should be considered:

a. Since the motor load running load (which includes internal actuator running load) is a conservative measure of the actual stem running load, a more accurate measurement could reduce the stem running load below MART. This can be achieved by removing the stem nut and obtaining open and close motor load signatures. The differences between the motor load running loads with and without the stem nut installed represent the open and close stem running loads.

b. Since a calculated value is inherently conservative, a DP test to determine the valve's actual DP thrust requirement may reduce the requirement to within the valve limits.

c. Increase MART by performing a stall test to determine actual capability of the actuator if stall thrust is the limiting factor, or

d. Increase MART by performing a stress analysis to increase stress limits of valve/actuator.

2. Compare Thrust Settings to Thrust Requirements

If the motor load running load is less than MART, the next step is to verify that the valve is set-up to deliver the required thrust by comparing the minimum available thrust to the DP thrust requirement. If the minimum available thrust is less than the DP thrust requirement, the torque switch setting should be increased, while ensuring that the valve capability and stress limits are not exceeded, (see Step 3).

3. Compare Thrust Settings to Thrust Limits

If the valve is set-up to deliver the required thrust, the final step is to ensure that the valve limits are not exceeded by verifying the following:

a. Maximum Available Thrust + Stem Running Load (estimated or measured) must be less than:

Reduced Voltage Stall Thrust and
Valve/Actuator Rating

and:

b. Maximum Available Thrust + Inertia + Stem Running Load (estimated or measured) must be less than

1.1 x Actuator Limit

If the limits are exceeded, the torque switch setting should be reduced, while ensuring that the minimum available thrust is sufficient to meet the DP thrust requirement. If this is not possible refer back to the options listed in Step 1.

IV. ASSUMPTIONS

The following assumptions are made when using the thrust calculation methodology described above.

1. Stem friction due to packing drag is assumed to be equal for both pressurized and non-pressurized conditions.

2. It is assumed that the valve is in good working order; however, MOVATS® thrust calculations are based on a differential pressure test data base that includes valves of differing ages and conditions.

3. No foreign internal obstruction to valve travel is assumed.

4. The coefficient of friction that dictates the operator's torque to thrust conversion (stem factor) is assumed to remain constant over time.

5. Unless provided on customer data sheet, the calculated yield values of valve components are assumed to be greater than the operator's commercial rating.

6. Thermal transients are assumed not to affect the thrust required to open valves of all types.

7. In cases where the closing line pressure was not recorded, the closing line pressure was assumed to be equal to the closing differential pressure.

V. THRUST CALCULATION SUMMARY TABLE

The results of the thrust calculations are presented in table format. The terms and abbreviations used in the table are defined below:

DP	-	Differential Pressure
DDG	-	Double disc gate (wedge shape disc)
FWG	-	Flex Wedge Gate Valve
FLO	-	Flow Over disc for globe valves
FLU	-	Flow Under disc for globe valves
GLB	-	Globe Valve
MART	-	Maximum Allowable Running Thrust
PDG	-	Parallel double disc gate valve
SWG	-	Solid Wedge Gate Valve
WFG	-	Westinghouse flex wedge gate valve with pinned disc

Valve Data

Valve ID	-	Valve identification number
Manuf	-	Valve manufacturer
Type	-	Valve type as categorized by MOVATS Inc. for thrust calculations
Size	-	Nominal size of valve
Orifice Diameter	-	Orifice diameter of valve in inches (inner diameter of seat ring)
Stem Diameter	-	Stem diameter of valve in inches
Stem Pitch	-	Stem pitch in inches
Stem Lead	-	Stem lead in inches
Stem Factor	-	Stem factor

Actuator Data

Type/Size	-	Type and size of actuator
Start Torque	-	Motor Start Torque
Stall Torque	-	Motor Stall Torque
Volts	-	Motor operating voltage
AC/DC	-	Motor type
Motor RPM	-	Motor speed
Unit RPM	-	Actuator output RPM
Unit Ratio	-	Actuator overall gear ratio
Gear Eff	-	Actuator gear efficiency

Maximum Expected Pressures

DP Open	-	Maximum operating DP in close-to-open direction
DP Close	-	Maximum operating DP in open-to-close direction
Line Pressure	-	Maximum operating line pressure

Component Stress Limits

Actuator Rating	-	Thrust rating of actuator
Valve Rating	-	Thrust rating of valve

Stall Thrust Capability

100% Voltage	-	100% voltage stall thrust
Reduced Voltage	-	Reduced voltage stall thrust
Reduced %	-	Required reduced voltage capability

DP Thrust Requirements

Opening	-	Close-to-open DP thrust requirement above running load based on MOVATS® DP data base
Closing	-	Open-to-close DP thrust requirement above running load based on MOVATS® DP data base

Minimum Target Thrust

Opening	-	Opening DP thrust multiplied by factor to account for torque switch repeatability and measurement equipment error
Closing	-	Closing DP thrust multiplied by factor to account for torque switch repeatability and measurement equipment error

MART	-	Maximum Allowable Running Thrust. Refer to section III-B of this document for instructions on how this value is calculated and used.
Estimated Stem Load	-	Stem Running Load Estimated as follows: 1000# for stem diameter up to 1" 1500# for stem diameter up to 1.5" 2500# for stem diameter up to 2.5" 4000# for stem diameter up to 4" 5000# for stem diameter above 4"

Data Points

Opening	-	Number of data points from MOVATS® DP data base used for close-to-open DP thrust calculation
Closing	-	Number of data points from MOVATS® DP data base used for open-to-close DP thrust calculation

Notes

Refer to notes at end of spreadsheet which include results of pre-test operability evaluation

CALCULATING CONFIDENCE BANDS

Reference:

1. Business Statistics, 3rd Edition, 1983, by Wayne Daniel and James C. Terrell, (Chapter 9).

Assumptions:

1. The thrust required to open and close a gate or globe valve is a linear function of differential pressure across the valve.

2. For every differential pressure (x), there is a subpopulation of thrust values (y) for identical valves. The thrust values are normally distributed about some mean value.

3. The standard deviation of thrust values is the same for all subpopulations and is unknown.

4. The mean values lie on some straight line. (i.e., There is a linear relationship between differential pressure and the average thrust values.)

Procedure:

1. Perform a regression (least squares) analysis of the measured DP thrust (thrust above running load) vs differential pressure for at least 4 identical valves. The (0,0) point can be used along with this measured data. The result is an equation of the form:

   $y = a + bx$ where y = thrust required
   x = differential pressure

2. Calculate the estimated thrust (y_1) required for valve operation at some differential pressure, (x_1).

   $$y_1 = a + bx_1$$

3. Calculate the confidence band for the calculated (y_1) value as follows:

   $$\text{confidence band at } x_1 = \pm t\, S_{y/x} \sqrt{1 + 1/n + \frac{(x_1 - \bar{x})^2}{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}}$$

   where: $\bar{x}$ = average of measured differential pressure values (and zero)

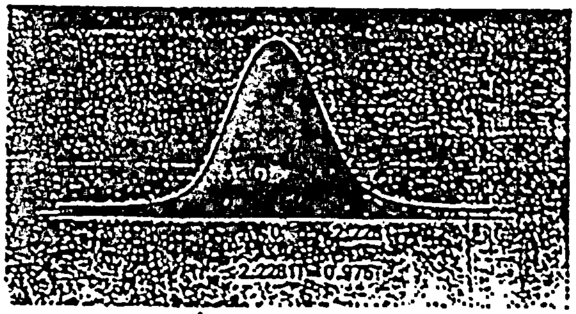
n - number of DP tests plus 1 (for 0,0)

t - value of "Students T" distribution factor (depends on n and confidence, Table E of Reference 1, attached)

$$S_{y/x} = \sqrt{\frac{\sum (y_i - \hat{y})^2}{n - 2}}$$

y_i - measured thrust at each DP value, x_i

$\hat{y}$ - calculated thrust at each DP value



90% confidence

TABLE E
Percentiles of the t distribution
$P(t \leq t_0)$

$df = n-2$	$t_{0.90}$	$t_{0.95}$	$t_{0.975}$	$t_{0.99}$	$t_{0.995}$
1	3.078	6.3138	12.706	31.821	63.657
2	1.886	2.9200	4.3027	6.965	9.9248
3	1.638	2.3534	3.1825	4.541	5.8409
4	1.533	2.1318	2.7764	3.747	4.6041
5	1.476	2.0150	2.5706	3.365	4.0321
6	1.440	1.9432	2.4469	3.143	3.7074
7	1.415	1.8946	2.3646	2.998	3.4995
8	1.397	1.8595	2.3060	2.896	3.3554
9	1.383	1.8331	2.2622	2.821	3.2498
10	1.372	1.8125	2.2281	2.764	3.1693
11	1.363	1.7959	2.2010	2.718	3.1058
12	1.356	1.7823	2.1788	2.681	3.0545
13	1.350	1.7709	2.1604	2.650	3.0123
14	1.345	1.7613	2.1448	2.624	2.9768
15	1.341	1.7530	2.1315	2.602	2.9467
16	1.337	1.7459	2.1199	2.583	2.9208
17	1.333	1.7396	2.1098	2.567	2.8982
18	1.330	1.7341	2.1009	2.552	2.8784
19	1.328	1.7291	2.0930	2.539	2.8609
20	1.325	1.7247	2.0860	2.528	2.8453
21	1.323	1.7207	2.0796	2.518	2.8314
22	1.321	1.7171	2.0739	2.508	2.8188
23	1.319	1.7139	2.0687	2.500	2.8073
24	1.318	1.7109	2.0639	2.492	2.7969
25	1.316	1.7081	2.0595	2.485	2.7874
26	1.315	1.7056	2.0555	2.479	2.7787
27	1.314	1.7033	2.0518	2.473	2.7707
28	1.313	1.7011	2.0484	2.467	2.7633
29	1.311	1.6991	2.0452	2.462	2.7564
30	1.310	1.6973	2.0423	2.457	2.7500
35	1.3062	1.6896	2.0301	2.438	2.7239
40	1.3031	1.6839	2.0211	2.423	2.7045
45	1.3007	1.6794	2.0141	2.412	2.6896
50	1.2987	1.6759	2.0086	2.403	2.6778
60	1.2959	1.6707	2.0003	2.390	2.6603
70	1.2938	1.6669	1.9945	2.381	2.6480
80	1.2922	1.6641	1.9901	2.374	2.6388
90	1.2910	1.6620	1.9867	2.368	2.6316
100	1.2901	1.6602	1.9840	2.364	2.6260
120	1.2887	1.6577	1.9799	2.358	2.6175
140	1.2876	1.6558	1.9771	2.353	2.6114
160	1.2869	1.6545	1.9749	2.350	2.6070
180	1.2863	1.6534	1.9733	2.347	2.6035
200	1.2858	1.6525	1.9719	2.345	2.6006
∞	1.282	1.645	1.96	2.326	2.576

ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION PORV BLOCK VALVE REPLACEMENT PROGRAM

ATTACHMENT C.9

Selected pages from Anchor/Darling Gate Valve Test Data Report for new PORV Block Valves Tag No. 515 and 516

GATE VALVE TEST DATA REPORT

Valve Serial No: EA 636-1-1 Customer P.O. NQ-10974-B-RD
Valve Description 3" 1513 DD Gate Tag No. 515

Demin. Water
345 v.

I. HYDROSTATIC SHELL TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
5673	5673	20	20	0	0
Performed by: R. M. McWilliams			Date 11-23-88		

R. M. McWilliams 12-12-88 OK

II. PACKING TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2485	2485	10	10	0	0
Performed by: R. M. McWilliams			Date 11-23-88		

R. M. McWilliams 12-12-88 OK

III. BACKSEAT TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2485	2485	10	10	0	0
Performed by: R. M. McWilliams			Date 11-23-88		

R. M. McWilliams 12-12-88

IV. HYDROSTATIC DISC TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
4160	4160	A-Port 10	10	0	0
		B-Port –		–	
Performed by: R. M. McWilliams			Date 12-12-88		

V. SEAT TEST (close valve with motor only)

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2485	2485	A-Port 10	10	0	0
		B-Port –		–	
Performed by: R. M. McWilliams			Date 12-12-88		

VI. AIR SEAT TEST N/A

Pressure - psig		Duration - Min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
–	–	A-Port –	–	–	–
		B-Port –	–	–	–
Performed by:			Date		

AN/ W.

Valve Ser.No. EA636-1-1

ATTACHMENT C.9
p. 2 of 6

GATE VALVE TEST DATA REPORT

(345 volts)

VII. OPERATIONAL TEST (Gland Nuts = 16 Ft-Lbs)

Open				Close			
Pressure - psig		Time - min.		Pressure - psig		Time - min.	
Required	Actual	Required	Actual	Required	Actual	Required	Actual
2485 psi	2485	15 sec max.	13	-	2485	15 sec. max.	13
Performed by: [illegible signature]				Date 12-12-88			

VIII. COMPONENT HEAT OR SERIAL NUMBER

Body P2830 u 4066 Stem A17057

Bonnet J7499 1 Motor B7890271 M-XN11

Disc 16116 5-14 Operator L401838

Body/Bonnet Bolting CANOPY RING 35755

Nuts ______ Retaining Ring 35755

IX. MOTOR OPERATOR DATA

Torque Switch Setting: Required: Open 2 1/4 Close 2 1/4

Actual: Open 2 1/4 Close 2 1/4

Test Voltage: Required 345 Actual 345 V.A.C.

Running Current 1.8 amp Starting Current 20 amp

Current at Torque Switch Cutoff 2.2 amp

X. LIMIT SWITCHES SET: Open YES Close YES

Robert Ridley 12-12-88

COMMENTS: ______

GAGES. #43 #45

#50H #50C.

EPS-112-2 Rev. A

Valve Ser.No. EA636-1-1

ATTACHMENT C.9
p. 3 of 6

GATE VALVE TEST DATA REPORT

(460 volts)

VII. OPERATIONAL TEST (Gland Nuts = 16 Ft-lbs)

Open				Close			
Pressure - psig		Time - min.		Pressure - psig		Time - min.	
Required	Actual	Required	Actual	Required	Actual	Required	Actual
2485 psi	2485	15 sec. max.	12.5	-	2485	15 sec. max	12.6
Performed by: [illegible] Williams				Date 12-12-88			

VIII. COMPONENT HEAT OR SERIAL NUMBER

Body ______ Stem ______

Bonnet ______ Motor ______

Disc ______ Operator ______ See Page 2 of 3

Body/Bonnet Bolting ______

Nuts ______ Retaining Ring ______

IX. MOTOR OPERATOR DATA

Torque Switch Setting: Required: Open 2 1/4 Close 2 1/4

Actual: Open 2 1/4 Close 2 1/4

Test Voltage: Required 460 Actual 460

Running Current 2.2 amp Starting Current 3.0 amp

Current at Torque Switch Cutoff 2.5 amp

X. LIMIT SWITCHES SET: Open YES Close YES

Robert Ridley 12-12-88

COMMENTS: ______

ATTACHMENT C.9

P. 4 of 6

GATE VALVE TEST DATA REPORT

Valve Serial No. EA 636-1-2 Customer P.O. NQ-10974-B-RD

Valve Description 3" 1513 DD Gate Tag No. 516

I. HYDROSTATIC SHELL TEST

Demin. Water

345 v.

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
5673	5673	20	20	0	0
Performed by: R. McWilliams			Date 11-22-88		

II. PACKING TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2485	2485	10	10	0	0
Performed by: R. McWilliams			Date 11-22-88		

~~R. McWilliams~~ 88 12/1/88

III. BACKSEAT TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2485		10		0	
Performed by: R. McWilliams			Date 11-22-88		

R. McWilliams 11-29-88

IV. HYDROSTATIC DISC TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
4160	4160	A-Port 10	10	0	0
		B-Port –		–	
Performed by: R. McWilliams			Date 11-22-88		

V. SEAT TEST (close valve with motor only)

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2485	2485	A-Port 10	10	0	0
		B-Port –		–	
Performed by: R. McWilliams			Date 11-22-88		

R. McWilliams 11-29-88

VI. AIR SEAT TEST N/A

Pressure - psig		Duration - Min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
–	–	A-Port –	–	–	–
		B-Port –	–	–	–
Performed by:			Date		

Valve Ser.No. EA636-1-2

ATTACHMENT C.9
p. 5 of 6

GATE VALVE TEST DATA REPORT

(345 volts)

VII. OPERATIONAL TEST (Gland Nuts = 16 Ft-Lbs)

Open				Close			
Pressure - psig		Time - min.		Pressure - psig		Time - min.	
Required	Actual	Required	Actual	Required	Actual	Required	Actual
2485 psi	2485	15 sec max.	12.5	2485	2485	15 sec. max.	12
Performed by: [signature]				Date 11-22-88			

VIII. COMPONENT HEAT OR SERIAL NUMBER

Body U4067-P2830 Stem A 17057

Bonnet 2-J 7499 Motor B78G0271M-XN13

Disc 6-15-16176 Operator L401837

Body/Bonnet Bolting

Nuts Retaining Ring 35755

IX. MOTOR OPERATOR DATA

Torque Switch Setting: Required: Open 2 1/4 Close 2 1/4

Actual: Open 2 1/4 Close 2 1/4

Test Voltage: Required 345 Actual 345

Running Current 1.21 Starting Current 1.51

Current at Torque Switch Cutoff 1.89

X. LIMIT SWITCHES SET: Open YES Close YES

Robert Rolley 11-22-88

COMMENTS:

GNGS #43 ~~#Goe~~ #50H

Valve Ser.No. EA636-1-2

ATTACHMENT C.9
p. 6 of 6

GATE VALVE TEST DATA REPORT

(460 volts)

VII. OPERATIONAL TEST (Gland Nuts = 16 Ft-lbs)

Open				Close			
Pressure - psig		Time - min.		Pressure - psig		Time - min.	
Required	Actual	Required	Actual	Required	Actual	Required	Actual
2485 psi	2485	15 sec. max	12	2485	2485	15 sec. max	12
Performed by: R. McWilliams				Date 11-22-88			

VIII. COMPONENT HEAT OR SERIAL NUMBER

~~Body ______ Stem ______~~

~~Bonnet ______ Motor ______~~

~~Disc ______ Operator ______~~ See Page 2. of 3

~~Body/Bonnet Bolting ______~~

~~Nuts ______ Retaining Ring ______~~

IX. MOTOR OPERATOR DATA

Torque Switch Setting: Required: Open 2 1/4 Close 2 1/4

Actual: Open 2 1/4 Close 2 1/4

Test Voltage: Required 460 Actual 460

Running Current 1.97 amp Starting Current 3.20 amp

Current at Torque Switch Cutoff 2.2 amp

X. LIMIT SWITCHES SET: Open YES Close YES

Robert Rolley 11-22-88 Robert Rolley 11-22-88

COMMENTS: RESET LIMIT SWITCHES TO CUSTOMER SPECS.

EPS-112-2 Rev. A

ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION PORV BLOCK VALVE REPLACEMENT PROGRAM

ATTACHMENT C.10

Ginna Station Procedure PT-7, "Hydro Test of Reactor Coolant System", Rev. 36, May 26, 1988