

PP&L

CALCULATION COVER SHEET

CALC. NO. M-VLV-339FILE NO. R2-1M

SUPERSEDED BY _____

SAFETY-RELATED ☒
ASME III OR XI
OTHER QUALITY
NON QUALITYPROJECT SSES MOV ProgramER/CTN NO. 402288

DESIGN ACTIVITY/P&MR NUMBER _____

PAGE 1 OF 41TITLE/DESCRIPTION MOV Data Detail, Limit Switch Settings and Torque Switch SettingsFor: HV-244 F001SYSTEMS AFFECTED 261

STATEMENT OF PROBLEM

NRC Generic Letter 89-10 required establishment of a program to provide for the testing, inspection and maintenance of safety-related motor-operated valves. This calculation provides the data details for the valve identified above which will be used to prepare the Data Detail Drawing which will support the testing, inspection and maintenance activities.

DESIGN BASIS (EPM-QA-208 OR EPM-QA-400)

See Section 2.0 for Methodology.

This calculation serves as the design inputs for drawing M-1341

REFERENCES/FORMULAE

See Section 3.0 for Inputs/References.

SUMMARY/CONCLUSIONS

See Section 6.0 for Results/Conclusions.

Rev 3 adds pages 23A & 23B and ref. 16.

*88.3 % Voltage
used for Limiting
Valve Factor
Calculation.*

ENGINEERING TURNOVER

(ETO) BINDER AFFECTED? ☐ YES-If Yes enter: Binder # _____ Vol: _____
Calc. File _____ Pgs. _____☐ NO

REV. NO. DATE PREPARED BY REVIEWED/CHECKED BY DATE APPROVED BY DATE

9110100057 911004
PDR ADOCK-05000387
PDR310-1-91DH HuntR. M. Chetani10-2-91R. W. Anderson10/3/91

PP&L

CALCULATION COVER SHEET

CALC. NO. M-VLV- 339FILE NO. R2-1MSUPERSEDED BY (N/A)SAFETY-RELATED ☒
ASME III OR XI ☒
OTHER QUALITY ☐
NON QUALITY ☐PROJECT SSES MOV ProgramER/CTN NO. 402288

DESIGN ACTIVITY/PMR NUMBER _____

PAGE 1A OF 41TITLE/DESCRIPTION MOV Data Detail, Limit Switch Settings and Torque Switch Settings
for: HV-244FO01SYSTEMS AFFECTED 2 61

STATEMENT OF PROBLEM

NRC Generic Letter 89-10 required establishment of a program to provide for the testing, inspection and maintenance of safety-related motor-operated valves. This calculation provides the data details for the valve identified above which will be used to prepare the Data Detail Drawing which will support the testing, inspection and maintenance activities.

DESIGN BASIS (EPM-QA-208 OR EPM-QA-400)

See Section 2.0 for Methodology.

This calculation serves as the design inputs for drawing #1341

REFERENCES/FORMULAE

See Section 3.0 for Inputs/References.

SUMMARY/CONCLUSIONS

See Section 6.0 for Results/Conclusions.

Voltage Used = 80%

- Revision 1 replaces rewrite to Revision 0.

ENGINEERING TURNOVER

(ETO) BINDER AFFECTED? ☐ YES-If Yes enter: Binder # _____ Vol. _____
Calc. File _____ Pgs. _____☐ NO

REV. NO.	DATE	PREPARED BY	REVIEWED/CHECKED BY	DATE	APPROVED BY	DATE
2	9-24-91	DH Hunt	JP Marchison	9/24/91	JP Marchison	9/24/91
1	9-20-91	Rw H. H. H.	JP Marchison	9-21-91	JP Marchison	9/21/91
0	4/1/91	C.D. Akula	DH Hunt	4-8-91	JP Marchison	4/9/91

mls/frb0061(12)

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GMP 9/24/91

DESIGN INPUTS CHECKLIST

Title & No. M-VLV- 339 R.1

A. DESIGN INPUTS

	APPLICABLE	
	YES	NO
1. APPLICABLE CODES		
Codes: ASME, ASTM, AISI. Standards: ANSI, IEEE, AWS, ANS Regulatory Requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. PERFORMANCE REQUIREMENTS		
A. Input Requirements - For services such as air, water, electricity, lube oil, etc.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. Output Requirements - Physical output such as: capacity, pressure, temperature, voltage, velocities of fluids, pressure drops separation and isolation both system and unit, and redundancy requirements of structures systems and components.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. Operational requirements under various conditions, such as plant startup, normal plant operation, plant shutdown, plant emergency operation, special or infrequent operation and system abnormal or emergency operation. This includes the overall effect on the plant (i.e., the potential loss of generation).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. Failure effects requirements of structures, systems and components, including a definition of those events and accidents which they must be designed to withstand.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. COMPATIBILITY		
A. Compatibility and suitability of material selection, such as chemical and physical characteristics, radiation and heat resistance protective coatings and corrosion resistance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Operational interface requirements including definition of the functional interface involving structures, systems and components.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. INSTALLATION (ITEMS MAY APPLY TO ANY DISCIPLINE)		
A. Transporting and Storing - Includes environmental conditions anticipated during storage, construction and operation and handling storage and shipping requirements.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Civil - Plant layout and arrangement requirements, escape from enclosures, anchor bolts, penetrations, equipment foundations.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Piping - Thermal expansion or heat restriction requirements, vibration or dynamic loading considerations, stress, shock, reaction forces and pipe supports.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D. Electrical - Voltage, source, grounding conduit/raceway requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. Instrumentation - Instrumentation and control requirements including indicating instruments, control and alarms required for operation, testing and maintenance and calibration.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. Chemistry - Water chemistry considerations, including sampling provisions.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. MAINTAINABILITY		
A. Accessibility - Maintenance, ISI and ALARA accessibility requirements.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. TEST REQUIREMENTS - Including pre-OPS, ISI and LLRT tests.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. SAFETY - Personnel and public safety including special blocking, radiation exposures, ALARA environmental concerns, effluents and noise.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. SECURITY - Physical security plant considerations.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. DESIGN CONSIDERATIONS - Form EPM-QA-208B2 and B3.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10. OTHER - _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>

DESIGN INPUTS CHECKLIST
Title & No. M-VLV-339 2.1

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JMP 2/24/91

B. DESIGN CONSIDERATIONS

SUBJECT	APPLICABLE YES	NO	REFERENCE PROCEDURE	NPE LEAD	ISSUED GUIDANCE
1. Dynamic Qualification	<input type="checkbox"/>	<input checked="" type="checkbox"/>	EPM-QA-222	CIV Vernarr	
2. Environmental Qualification	<input checked="" type="checkbox"/>	<input type="checkbox"/>	EPM-QA-222	CIV Derkacs	GDG-03
2.1 Relay Qualified Life	<input type="checkbox"/>	<input checked="" type="checkbox"/>		ELC Nudge	SEA-EE-170 SEA-EE-171
3. Electrical Separation	<input type="checkbox"/>	<input checked="" type="checkbox"/>		ELC Akus	E-1012
4. II over I, Safety Impact	<input type="checkbox"/>	<input checked="" type="checkbox"/>	EPM-QA-211	CIV Rose	
5. Fire Protection	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NDI-QA-15.3.1 EPM-QA-440	EP Kohn	Fire Protection Manual
6. Appendix R -					
6.1 Safe Shutdown Analysis	<input type="checkbox"/>	<input checked="" type="checkbox"/>		ELC Backenstoe	EDS-01
6.2 Combustible Loading Anal.	<input type="checkbox"/>	<input checked="" type="checkbox"/>		CIV Delgado	CDS-03 & Dwg. C-1929
7. Flooding Protection	<input type="checkbox"/>	<input checked="" type="checkbox"/>		MCH	
8. Jet Impingement	<input type="checkbox"/>	<input checked="" type="checkbox"/>		MCH	
9. Missile Protection	<input type="checkbox"/>	<input checked="" type="checkbox"/>		CIV Reinsmith	
10. Radiation Exposure, ALARA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NDI-6.4.2	CIV Matchick	Memo AM-151 DG-G-100
11. Physical Separation	<input type="checkbox"/>	<input checked="" type="checkbox"/>		CIV Rose	Dwg. C-1804
12. HVAC Requirements	<input type="checkbox"/>	<input checked="" type="checkbox"/>		MCH Agnew	
13. Electrical Load/Voltage Study	<input checked="" type="checkbox"/>	<input type="checkbox"/>		ELC Sleva/Nudge	EDG-02 EDS-02
14. Human Factors Engineering	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NDI-15.3.12	EP Patnaude	Human Factors Specifications & Guidelines Manual
15. Inservice Inspection Requirements	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NDI-QA-15.3.7	EP Lindberg	ISI Manuals
16. Materials Compatibility	<input type="checkbox"/>	<input checked="" type="checkbox"/>		EP Willertz	
17. ASME Code Compliance (See Note 1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		MCH Sattar	
18. Design Assessment	<input type="checkbox"/>	<input checked="" type="checkbox"/>		SE Detamore	PLI-59437 dated 3/31/89
19. Fuel/Core Effects	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NDI-QA-7.2.2	NPE Kulick	

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DESIGN INPUTS CHECKLIST

Title & No. M-VLV-339 R. 1

B. DESIGN CONSIDERATIONS

SUBJECT	APPLICABLE		REFERENCE PROCEDURE	NPE LEAD	ISSUED GUIDANCE
	YES	NO			
20. Heavy Loads	[]	[X]	M-1435	MCH Kostelnick	
21. Radwaste Minimization	[]	[X]		MCH	NDPL85-003
22. Approved Materials	[]	[X]	NDI-QA-15.3.9	EP Morgan	Susq. Approved Matl's PLI-37573 of 1/10/85 PLI-45673 of 5/22/86
23. Secondary Containment, Control Structure, Ventilation Zone Boundary Penetrations	[]	[X]		MCH Agnew	
24. Electrical Load Tracking	[]	[X]		ELC Sleva/Nudge	EDS-02
25. Computer Program Change including Display Formats	[]	[X]	EPM-QA-401	CPU	
26. Environmental Protection	[]	[X]	NDI-QA-6.3.2	(Nuc. Svcs.- J. S. Fields)	
27. Station Blackout	[]	[X]		ELC Sleva	GDS-08

NOTE 1: For modifications to ASME III systems/components (both paperwork only and physical changes) request in the installation instructions that Plant Staff prepare the required documentation package per NDI-QA-5.3.4 and AD-QA-522.

dc/al861(11)

4. ITEM

5. DISCUSSION

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3. NO

1. Applicable Codes: Calculation shall address requirements of NRC Generic Letter 89-10

2.
A, B, C

Performance Requirements:

Electricity input requirements are given by Limit Torque Data Sheets, SEA-ME-237 and the MDS-01 Torque and Thrust calculation.

Output requirements for the actuator are given by the MDS-01 calculation.

Operational requirements when the actuator is required to function, including ΔP , are given in SEA-ME-237.

4 D

Installation - Electrical:

Electrical voltage, current and source requirements are given in the calculation data tables. (Table: Electrical/Motor Design Information).

4 E

Instrumentation:

Geared Limit Switch Settings and Spring Pnc/Torque Switch Settings are given in tables in the calculation.

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Calculation Contents

1.0 Purpose/Scope

2.0 Methodology

2.1 Actuator Sizing Calculation

2.2 VOTES Diagnostic Thrust Acceptance Criteria

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2.4 Other Items

3.0 Inputs/References

4.0 Assumptions

5.0 Calculations

5.1 Actuator Sizing Calculation

5.2 VOTES Diagnostic Thrust Acceptance Criteria

5.3 Limit Switch Settings

5.4 Other Items

6.0 Results/Conclusions

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1.0 Purpose/Scope

The purpose of this calculation is to develop all of the information necessary to create a Motor Operated Valve Data Detail Drawing for the subject MOV. In order to meet this end the following specific activities will be performed in this calculation to complete the MOV Detail Drawing for the subject MOV:

- 1.1 Research existing design documents and records for the MOV to determine best available configuration data. This data will be used as input to the MOV Data Detail Drawing as well as to the calculations to be performed herein.
- 1.2 An actuator sizing calculation will be performed to determine the required actuator parameters (e.g. actuator size, motor size, spring pack, torque switch settings, etc.).
- 1.3 Using the results of Item 1.2, diagnostic test acceptance criteria will be established.
- 1.4 Based on the design function of the MOV, geared limit switch settings will be determined. For the purposes of this calculation, the limit switch functions to be considered will be limited to:
 - a.) Torque switch bypass (open and close direction)
 - b.) Full open limit switch
 - c.) Valve position indication
- 1.5 A review of previously approved spring pack Replacement Item Equivalency Evaluations (RIEE's or RIE's) will be performed for the particular MOV being evaluated. Changes to these RIE's will be processed as necessary based on the results of this calculation.

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2.0 Methodology

Existing design documents, modifications and field work authorizing documents will be reviewed to identify required inputs to the MOV Data Detail Drawing. Lists of the required inputs as well as a cross reference to the data source are provided in Section 3.0 of this calculation.

2.1 Actuator Sizing Calculations: These will be performed using the software version of Mechanical Design Standard (MDS) Number 01 (Input a.). The following methods will be used to compliment the techniques used in the software package:

- a.) The active valve stroke length is a required program input which allows the program to calculate a design valve stroke time. The active stroke length will be calculated based on the following expression:

$$\begin{array}{l} \text{ACTIVE} \\ \text{STROKE} \\ \text{LENGTH} \end{array} = Z * \text{FSL}$$

Where:

Z = The setpoint of the full open limit switch in percent open (typically 97%)

FSL = Full Valve Stroke Length from the closed position to the fully open (backseated) position. If FSL is not specifically known it can be calculated using the following expression:

$$\text{FSL} = \frac{\text{HWT} * \text{SL}}{\text{HGR}}$$

Where:

HWT = The number of handwheel turns required for the valve to travel from fully closed to fully

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open.

SL = The valve stem lead.

HGR = The overall handwheel
gear ratio.

- b.) Program overrides will be used to allow the calculation to reflect the current configuration of the MOV.
- c.) Once an expected motor run torque is calculated, a typical motor curve will be consulted to determine an estimated midstroke loaded motor speed (RPM). The calculation will be rerun using this value as an override, the result being a more representative design stroke time.
- d.) For gate valves the calculation will be run using a valve factor of .3.
- e.) The calculation will be run with various acceptable spring packs to allow for flexibility in future replacement. Only spring packs approved on spring pack equivalencies will be included on the MOV Data Detail Drawing.

2.2 VOTES Diagnostic Thrust Acceptance Criteria: Once the actuator sizing has been completed diagnostic test thrust acceptance criteria will be established using the following methodology:

- a.) The Minimum Allowable Thrust will be established as 115% of the design calculated required thrust. This allows for at least 10% error in the diagnostic test results and 5% variation in torque switch repeatability.
- b.) The Maximum Allowable Running Thrust will be established as the Stuffing Box Friction load used in the actuator sizing calculations.
- c.) The Maximum Allowable Thrust will be established as the thrust corresponding to the minimum of the following:

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- 1.) Actuator thrust rating,
 - 2.) 120% of the equivalent thrust at maximum allowable actuator output torque,
 - 3.) Maximum allowed valve thrust (if available).
- d.) The acceptance criteria at each torque switch setting will be specified as the expected thrust +/- 20% .
- e.) In all cases items a.) and c.) shall take precedence over item d.).
- 2.3 Limit Switch Settings: This section of the calculation will determine the appropriate geared limit switch settings for valve control and position indication. The limit switch settings will be established per the requirements of MDS-03 (Input b.). The switch settings will be specified in percentages of physical stem travel from either full open or full closed.

2.4 Other Items

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3.0 Inputs/References

3.1 The principle design inputs for this calculation are:

- a.) MDS-01 "Design Standard for the Sizing of Limitorque Actuators Including Thrust Calculation, Actuator Sizing, Spring Pack Selection and Torque Switch Setting Determination." Revision 1.
- b.) MDS-03 "Design Standard for Determining and Setting Valve Motor Actuator Limit Switches." Revision 0.

3.2 Information required for entry on the MOV Data Detail Drawing and as input to this calculation is provided on pages 12 through 15 of this calculation. Reference Numbers are provided for each of the entries. A listing of all references is provided on Page 16 (Note: Copies of references not readily available are provided as attachment to this calculation).

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General Valve Design

	Data Value	Reference No.
Valve Manufacturer	ANCHOR DARLING	1
Vendor Drawing Number	93 94-13748	1
Valve Serial Number		
Valve Quality Class	Q	9
Valve ASME Section III Edition and Class	1971 THRU W'72 CL. 1	1
Valve Location (Inside/Outside Containment)	INSIDE	9
Valve Type	GATE	1
Valve Pressure Class	600	1
Valve Size (Inches)	6	1
Valve Seat Area (Inches Squared)	25.43	9
Stem Information:		
Stem Diameter (Inches):		
At Stuffing Box Location	1.5	2
At Threaded Portion	1.5	2
Thread Pitch/Lead	0.333 0.333	2
Stem Material	A276 - 410	1
Original Design Stroke Time (Seconds)	28 28	3

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General Valve Design (Cont.)

Rev. 1

Rev. 9-19-91

Reference No.
CPM 9-21-91

Process Parameters:

Flow Medium

WATER

11

Design/Maximum Pressure (PSIG)

1250 / 1375

7

Design/Maximum Temperature (F)

565 / 565

7

Design/Maximum Flow (GPM or LB/HR)

310 / 436

11

Throttled Flow (GPM or LB/HR)

NA

Max. Operating Differential Press. (PSID):

Opening Direction

H/A 0

Closing Direction

1053

11

Additional Physical Parameters:

Valve Max. Thrust Capability (LBS)

NOT AVAILABLE

End Connections/Rating

BW - SCH. 80

1

Body Material

SA 105 II

1

Disc Trim Material

STELLITE

1

Body Seat Trim Material

STELLITE

1

Guide Rib Facing (Gate Valves Only)

SA 105 II

1

Drain/Bypass Required (Y/N)

N

N

1, 3

Actuator Design

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	Data Value	Reference No.
General:		
Actuator Quality Class	Q	9
Safety Function (Open/Close)	C	11
Actuator Manufacturer	LIMITORQUE	1
Main Unit (e.g. SMB):		
Actuator Order Number	381264 X	4
Actuator Serial Number	213458	4
Actuator Size	SMB-00-10	4
Gearing Information:		
Motor Pinion Number of Teeth	21	5
Worm Gear Number of Teeth	44	5
Worm to Worm Gear Ratio	45 : 1	5
Overall Actuator Ratio	94.0 : 1	4, 5
Lost Motion Drive Sleeve (Y/N)		
Auxiliary Worm/Bevel Gear Unit:		
Unit Order Number	NA	
Unit Serial Number	NA	
Unit Type/Size	NA	
Unit Gear Ratio	NA	
Overall Handwheel Ratio	4.38 : 1	6
Handwheel Orientation (Top or Side Mount)	SIDE	1
Handwheel Efficiency	95 %	6

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4-21-91

	Data Value	Reference No.	
Motor Class (1E/Non1E)	1E	12	Rev. 1
Power Supply Type (AC/DC)	Ac	4	Rev. 9.19.9. 9-21-9
Power Source	2B236053	11	
Voltage Supply/Phase/Frequency	460 / 3 / 60	13	
Motor Manufacturer	RELIANCE	13	
Motor Serial Number			
Design Motor Speed (RPM)	3600	13	
Motor Start/Run Torque (ft-lbs)	10 2	4	
Motor Horsepower	1.3	13	
Service Factor	1.0	13	
Motor Type/Frame Size	T / P56	5	
Motor Frame Design/Enclosure Type	/TENV	13	
Winding Type (DC Motors)	NA		
Motor Duty Rating (Min.)			
Insulation Class	R4	13	
Temp. Rise/Ambient Temp. (C)	115 40	13, 5	
Full Load/Locked Rotor Current (Amps) or KVA Code (LRIC) at Supply Voltage (See Note 3)	2.3 11.9	13	
DC Motor Field Current (Amps)	NA		
Limit Switch Comp/Motor Spaceheaters (Y/N)			

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① DH 9-24-91

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② DH 9-24-91

QWM 10-2-91

References:

1. Anchor Darling Valve Drawing 93-13748
(FF 110100 5001), Rev 7
2. Anchor Darling Letter dated 2/20/90 (copy attached)
3. Valve Specification Data Sheet P10 Sh 9 (copy attached)
4. Work Authorization V 038 dt (copy attached)
5. Motor Operator Information Sheet for 381264X (copy attached)
6. SEL-11, Limitorque Standard Handwheel Ratios (copy attached)
7. SEIS Pipeline Index, Rev 6, dated 8-9-88.
8. Anchor Darling Design Report E5853-23D
(FF 110101 0901), Rev 1 (copy of referenced page attached) 0301
9. P & I D M-2144 RWCU Sht 1 Rev 28
10. Not used
11. SEA-ME-238 Design Basis Development Priority 2
Motor Operated Valves, Rev 0 (copy of data sheet attached) (9/19/91)
12. Electrical Schematic Dwg. E-165 Sh 15 Rev
13. Induction Motor Data Sheet 8856-P10A-131(4)-4
14. Anchor Darling Telecopy dated 3/28/91 (copy attached)
15. Work Authorization V00427 (copy of applicable portion attached)
16. Reliance A-C Motor Performance Curve M1458 (copy attached)
17. PP&L Calculation E/AAA-619, Rev 4

②

③

④

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GMP 9-21-91

4.0 Assumptions

1. For the purposes of this calculation, attempts have been made to verify design information against actual as-installed information as documented in Plant Work Authorizations. Where actual as-installed information is unavailable the original design information will be used. Upon completion of field as-built verification, any discrepancies will be reconciled and this calculation shall be revised as appropriate.
2. Stuffing box friction values will be consistent with the empirical values listed in MDS-01 unless otherwise noted herein.
3. Unless noted otherwise, the stem factor used herein will be based on a coefficient of friction of 0.15 (Reference 14). This is consistent with the original design seismic analysis. The SSES MOV preventative maintenance and trending program will ensure the valve stems/stem nuts are maintained in a manner which supports this assumption.
4. The minimum voltage available will be assumed to be 80% unless noted otherwise. If the electrical voltage drop calculations show this to be unconservative a lower value will be used. If the use of 80% initially produces unacceptable results the electrical voltage drop calcs will be consulted in an attempt to remove some of the conservatism.
5. Gate valve sizing calculations will be run using a valve factor of .3.
6. During the initial preparation of this calculation, the valve maximum thrust capability may not yet be available. In these cases, the maximum thrust/torque shall be based on the following:

Maximum Torque

The maximum allowed torque shall be the lesser of the maximum torque calculated by the MDS01 software or the torque corresponding to the original design maximum torque switch setting.

Maximum Thrust

The maximum allowed thrust shall be the lesser of the actuator thrust rating or 120% of the equivalent thrust at the maximum allowable actuator output torque.

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5.0 Calculations

5.1 Actuator Sizing Calculation

The results of the actuator sizing calculations are provided as follows:

<u>Run #</u>	<u>Conditions</u>	<u>Calc. Pages</u>
1.	SPRING PACK : 0022 VALVE FACTOR : 0.3	pages 14 15
2.	SPRING PACK : 0047 VALVE FACTOR : 0.3	pages ? 22
3.		
4.		

5.2 VOTES Diagnostic Thrust Acceptance Criteria

The calculation of the thrust acceptance criteria was performed per the method outlined in 2.2.

SEE PAGE 20 FOR RESULTS.

5.3 Limit Switch Settings

SEE PAGE 21 FOR RESULTS.

PP&L REVISION 1.90226 DATED 08-14-90 - TODAY IS 09-20-1991 15:29:21

VALVE Info (Input) (TABLE # 1) - FILE: 144F001

Page 1 of 2

Calculated by:

Checked by:

Valve MANUFACTURER:	ANCHOR DARLING
Valve TYPE (GATE or GLOBE):	GATE
Valve SIZE:	6
Valve TAG Number:	HV244F001
Valve VENDOR DRAWING number:	93-13748
Valve PP&L Drawing number:	
Valve LOCATION:	
Valve SYSTEM:	
Valve LINE (ie. PIPE LINE I.D.):	
Valve MAXIMUM Design THRUST:	0

VALVE Data (Input) (TABLE # 2) - FILE: 144F001

ANCHOR DARLING GATE Tag: HV244F001

Valve STEM DIAMETER (Inches):	1.5
Valve STEM PITCH:	.333
Valve STEM LEAD (Inches):	.333
Valve SEAT AREA (Sq-Inches):	25.43
Valve STEM AREA (Default = 0 Sq-Inches):	1.76715
Req'd STEM SPEED (0 or 3-6=Globe or 12-14=Gate):	0
Valve STROKE LENGTH (Inches):	0
Req'd STROKE TIME (Seconds):	0 (0 Min.)
Valve INLET PRESSURE (PSIG):	1053
Valve PRESSURE DROP (PSIG):	1053
Valve Factor (.2 or .3=Globe 1.1=Globe):	.3
Valve STUFFING BOX FRICTION (Default = 0 Lbs):	1500
Valve STEM/NUT Coeff. FRICTION (0 .15 or .2):	.15
Manual ACTUATOR RATIO Selected: 94.29 : 1	
Manual ACTUATOR Selected: 6	

MOTOR Data (Input) (TABLE # 3) - FILE: 144F001

ANCHOR DARLING GATE Tag: HV244F001

Motor TYPE (AC or DC):	AC
Motor RPM (900 1800 or 3600):	3600
Motor REDUCED VOLTAGE Percent (Default=0.8):	.8
High TEMPerature application (Y or N):	N
COMPOund motor GEAR application (Y or N):	N
AIR MoToRs (Y or N):	N
MODULTRONIC MoToRs (Y or N):	N
HILO Applications (Y or N):	N
Non-Rising Stem - OPERator thrust (Y or N):	N
Non-Rising Stem - VALVe thrust (Y or N):	N
Manual MOTOR Selected: 5	

PP&L REVISION 1.90226 DATED 08-14-90 - TODAY IS 09-20-1991 15:29:22

Calculation RESULTS (TABLE # 4) - FILE: 144F001

Page 2 of 2

Calculated by:

Checked by:

ANCHOR DARLING GATE Tag: HV244F001

Valve STEM FACTOR: 0.0132
STUFFING BOX FRICTION: 1500 Lbs
THRUST: 11394.15 Lbs
STEM TORQUE: 150.2606 Ft-Lbs
STEM SPEED: 12.00764 Inches/Min.
UNIT RPM: 36.05897 RPM
Design STROKE TIME: 0 Seconds
OVERALL ACTUATOR RATIO: 94.29

* SMB-00 ACTUATOR selected having a 43.6 - 109 Ratio RANGE (IACT= 6)
* SMB-00 43.6 - 109 UNIT Efficiencies: PULLOUT= 40 RUN= 55 STALL= 60
* * USER Selected ACTUATOR
* * USER Selected ACTUATOR Ratio

used 3600 Rpm 'AC' Motor OPERATING at 3400 Rpm
APPLICATION FACTOR: .9
Calc. MOTOR START TORQUE: 4.426667 Ft-Lbs
MIDSTROKE RUN THRUST: 3360.809 Lbs
Calc. MOTOR RUN TORQUE: .8546311 Ft-Lbs (5 X RUN= 4.273156)

* 10 Ft-Lbs SMB-00 MOTOR with 102 Maximum Ratio Selected (IMTR= 5)
* * USER Selected MOTOR

Revised MOTOR START TORQUE: 6.916667 Ft-Lbs
STALL TORQUE: 622.314 Ft-Lbs
STALL THRUST: 47189.61 Lbs (2.5 X Rated= 35000)
* * USER Selected Motor SIZE

* SPRING PAC Curve: SMB-00 MEDUM Selected (ISPG= 7)
SPRING PAC No: 60-600-0049-1
BILL of Materials No: 0301-112

* Calc. SPRING PAC SETTING: 2.070642
* Set SPRING PAC to: 2.25 Normal TORQUE: 156 Ft-Lbs
Max. SPRING PAC SETTING: 2.75 Max. TORQUE: 175 Ft-Lbs

MOTOR SIZE Checks: 10 Ft-Lbs vs 4.426667 Ft-Lbs Calc. Start TORQUE
10 Ft-Lbs vs 6.916667 Ft-Lbs Revised Start TORQUE
10 Ft-Lbs vs 4.273156 Ft-Lbs 5 X RUN TORQUE

MOTOR STALL Check: 47189.61 Lbs vs 35000 Lbs 2.5 X Actuator THRUST

TORQUE SWITCH Checks: 175 Ft-lbs vs 250 Ft-Lbs Actuator RATING
13270 Lbs vs 14000 Lbs Max. Actuator THRUST
175 Ft-Lbs vs 622 Ft-Lbs Stall TORQUE
2.75 SETTING vs 3 Max. SPRING PAC Setting

* * WARNING - 47189.61 Lbs EXCEEDS 2.5 X Actuator THRUST

PP&L REVISION 1.90226 DATED 08-14-90 - TODAY IS 09-20-1991 15:28:42

VALVE Info (Input) (TABLE # 1) - FILE: 244F001A

Page 1 of 2

Calculated by:

Checked by:

Valve MANUFACTURER:	ANCHOR DARLING
Valve TYPE (GATE or GLOBE):	GATE
Valve SIZE:	6
Valve TAG Number:	HV244F001
Valve VENDOR DRAWING number:	93-13748
Valve PP&L Drawing number:	
Valve LOCATION:	
Valve SYSTEM:	
Valve LINE (ie. PIPE LINE I.D.):	
Valve MAXIMUM Design THRUST:	0

VALVE Data (Input) (TABLE # 2) - FILE: 244F001A

ANCHOR DARLING GATE Tag: HV244F001

Valve STEM DIAMETER (Inches):	1.5
Valve STEM PITCH:	.333
Valve STEM LEAD (Inches):	.333
Valve SEAT AREA (Sq-Inches):	25.43
Valve STEM AREA (Default = 0 Sq-Inches):	1.76715
Req'd STEM SPEED (0 or 3-6=Globe or 12-14=Gate):	0
Valve STROKE LENGTH (Inches):	0
Req'd STROKE TIME (Seconds):	0 (0 Min.)
Valve INLET PRESSURE (PSIG):	1053
Valve PRESSURE DROP (PSIG):	1053
Valve Factor (.2 or .3=Gate 1.1=Globe):	.3
Valve STUFFING BOX FRICTION (Default = 0 Lbs):	1500
Valve STEM/NUT Coeff. FRICTION (0 .15 or .2):	.15
Manual ACTUATOR RATIO Selected:	94.29 : 1
Manual ACTUATOR Selected:	6
Manual SPRING PAC CURVE Selected:	23

MOTOR Data (Input) (TABLE # 3) - FILE: 244F001A

ANCHOR DARLING GATE Tag: HV244F001

Motor TYPE (AC or DC):	AC
Motor RPM (900 1800 or 3600):	3600
Motor REDUCED VOLTAGE Percent (Default=0.8):	.8
High TEMPerature application (Y or N):	N
COMPOund motor GEAR application (Y or N):	N
AIR MoToRs (Y or N):	N
MODULTRONIC MoToRs (Y or N):	N
HILO Applications (Y or N):	N
Non-Rising Stem - OPERator thrust (Y or N):	N
Non-Rising Stem - VALVe thrust (Y or N):	N
Manual MOTOR Selected:	5



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PP&L REVISION 1.90226 DATED 08-14-90 - TODAY IS 09-20-1991 15:28:43

Calculation RESULTS (TABLE # 4) - FILE: 244F001A

Page 2 of 2

Calculated by:

Checked by:

ANCHOR DARLING GATE Tag: HV244F001

Valve STEM FACTOR: 0.0132
 STUFFING BOX FRICTION: 1500 Lbs
 THRUST: 11394.15 Lbs
 STEM TORQUE: 150.2606 Ft-Lbs
 STEM SPEED: 12.00764 Inches/Min.
 UNIT RPM: 36.05897 RPM
 Design STROKE TIME: 0 Seconds
 OVERALL ACTUATOR RATIO: 94.29

* SMB-00 ACTUATOR selected having a 43.6 - 109 Ratio RANGE (IACT= 6)
 * SMB-00 43.6 - 109 UNIT Efficiencies: PULLOUT= 40 RUN= 55 STALL= 60
 * * USER Selected ACTUATOR
 * * USER Selected ACTUATOR Ratio

used 3600 Rpm 'AC' Motor OPERATING at 3400 Rpm
 APPLICATION FACTOR: .9
 Calc. MOTOR START TORQUE: 4.426667 Ft-Lbs
 MIDSTROKE RUN THRUST: 3360.809 Lbs
 Calc. MOTOR RUN TORQUE: .8546311 Ft-Lbs (5 X RUN= 4.273155)

* 10 Ft-Lbs SMB-00 MOTOR with 102 Maximum Ratio Selected (IMTR= 5)
 * * USER Selected MOTOR

Revised MOTOR START TORQUE: 6.916667 Ft-Lbs
 STALL TORQUE: 622.314 Ft-Lbs
 STALL THRUST: 47189.61 Lbs (2.5 X Rated= 35000)
 * * USER Selected Motor SIZE

* SPRING PAC Curve: SMB-00 OBSOL Selected (ISPG= 23)
 * * USER Selected SPRING PAC Curve

SPRING PAC No: 60-600-0022-1
 BILL of Materials No: NONE

* Calc. SPRING PAC SETTING: 1.730234
 * Set SPRING PAC to: 1.75
 Max. SPRING PAC SETTING: 2
 Normal TORQUE: 152 Ft-Lbs
 Max. TORQUE: 174 Ft-Lbs

MOTOR SIZE Checks: 10 Ft-Lbs vs 4.426667 Ft-Lbs Calc. Start TORQUE
 10 Ft-Lbs vs 6.916667 Ft-Lbs Revised Start TORQUE
 10 Ft-Lbs vs 4.273155 Ft-Lbs 5 X RUN TORQUE

MOTOR STALL Check: 47189.61 Lbs vs 35000 Lbs 2.5 X Actuator THRUST

TORQUE SWITCH Checks: 174 Ft-lbs vs 250 Ft-Lbs Actuator RATING
 13194 Lbs vs 14000 Lbs Max. Actuator THRUST
 174 Ft-Lbs vs 622 Ft-Lbs Stall TORQUE
 2 SETTING vs 3.315 Max. SPRING PAC Setting

* * WARNING - 47189.61 Lbs EXCEEDS 2.5 X Actuator THRUST

Dept. _____

Date 9.19 1991

Designed by RSM/jmp

Approved by _____

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

PROJECT MOV Data Detail,
Limit Switch Settings, and
Torque Switch Settings for HV-

ER No. Ru. 1

M-VLV-339

Sht. No. 22 of 41

THIS VALVE HAS NO SAFETY FUNCTION
TO OPEN.

PULLOUT TORQUE CALCULATION: (100% Voltage)

Pullout Torque (ft-lbs) = Motor Start Torque x Overall Actuator Ratio x
Pullout Efficiency x Application Factor

Pullout Torque (ft-lbs) = 10 x 94.29 x .4 x .9

Pullout Torque (ft-lbs) = 339 ft lbs.

Equivalent Thrust (lbs) = $339 / .0132 = 25682$ lbs.

TORQUE SWITCH SETTING CHECK (cont'd):

Torque (ft-lbs) at Max
Torque Switch Setting

vs.

Voltage Pullout
Torque (ft-lbs)

MDS#1 - SPRING BACK

torque

@ Max set. (0022)

174

vs.

339

@ Max set. (0049)

175

BECAUSE THE ORIGINAL DESIGN MAX
TORQUE SWITCH SETTING RESULTS
IN EXCEEDING MAX ACTUATOR
RATING, MDS#1 COMPUTER RUN
WILL SET THE NEW LIMITING
CRITERIA. (so will use 175' #)

Dept. _____

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

ER No. _____

Date 10-1 1991

M-VLV-339 Rev 3

Designed by DW/GRM

PROJECT _____

Sht. No. 23 A of 41

Approved by _____

GRM 10-2-91

HV 244F001

Check for Limiting Value Factor in closing direction:

$$LVF = \frac{RVT_{stall} - F - (A_{ss} \times P)}{A_{se} \times \Delta P}$$

[MDS-01 Rev 2]
Eqn. 23

Where: $F = 1500$

$OAR = 94.29$

$A_{ss} = 1.77$

Unit Stall Eff. = .60

$A_{se} = 25.43$

$FS = 0.0132$

$P = 1053$

$\Delta P = 1053$

Reduced Voltage = 88.3% (Ref. 17)

Actual motor start torque = 12.4 ft-lbs (Ref 16)

$$\begin{aligned} \text{Reduced Voltage Stall Torque} &= \text{Reduced Voltage Motor Start Torque} \times OAR \times \text{Unit Stall Eff.} \\ &= 12.4 \times (.883)^2 \times 94.29 \times .6 \times .9 \\ &= 492.3 \end{aligned}$$

$$\text{Reduced Voltage Stall Thrust} = \frac{RV \text{ Stall Torque}}{FS} = \frac{492.3}{.0132} = 37296$$

Thus:

$$\begin{aligned} LVF &= \frac{37296 - 1500 - (1.77 \times 1053)}{25.43 \times 1053} \\ &= 1.27 \end{aligned}$$

Dept. _____

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

ER No. _____

Date 10-1 19 91

M-VLV-339 Rev 3

Designed by DAN/Ron

PROJECT _____

Sht. No. 23B of 41

Approved by _____

Rev 10.2.91

HV 244F001

The foregoing calculation used actual motor start torque from the motor curve. Using nominal motor start torque instead gives:

$$\begin{aligned} \frac{\text{Reduced Voltage}}{\text{Stall Torque}} &= 10 \times (.883)^2 \times 94.39 \times .6 \times .9 \\ &= 397 \end{aligned}$$

$$\frac{\text{Reduced Voltage}}{\text{Stall Throat}} = \frac{397}{.0132} = 30076$$

$$LVF = \frac{30076 - 1500 - (1.77 \times 1053)}{25.43 (1053)}$$

$$= 1.00$$

Geared Limit Switch Settings

CA-4-1-91
DNA 4-1-91

Data Value

Reference
No.

Electrical Schematic & Connection Diagram No.

E 165 - 15

13

Full Stroke Length & Number of Handwheel Turns

Limit Switch
Number

Function

Setpoint
(See Note 4)

Equivalent No. of
Handwheel Turns

ZS-1

ZS-2

ZS-3

close light

3Y. close

Calculated

ZS-4

OPEN L/S

97% 0

"

ZS-5

ZS-6

ZS-7

OPEN LIGHT

3Y. 0

"

ZS-8

CTS BYPASS

97% C

"

ZS-9

ZS-10

ZS-11

ZS-12

ZS-13

ZS-14

ZS-15

ZS-16

Spring Pack/Torque Switch Settings

Rev'd 9-19-91
9-21-91
Reference
No.

Data Value

Minimum Required Torque (ft-lbs)

150

Maximum Allowable Torque (ft-lbs)

175

max torque
switch setting

Original Design

Replacement 1

Replacement 2

Spring Pack Number

60-600-0022-1

60-600-0049-1

Limiter B/M
Number

NONE

0301-112

Lowest Allowed Torque
Switch Setting

1.25

2.25

Corresponding Expected
Actuator Output Torque
(ft-lbs)

152

156

Highest Allowed Torque
Switch Setting

2

2.75

Corresponding Expected
Actuator Output Torque
(ft-lbs)

174

175

RIE Number

91.0154

VOTES Thrust Acceptance Criteria

QWH 9.19.91
JMP 9-21-91
Reference
No.

Data Value

Minimum Thrust Required (lbs)

13110

11394.15 x 1.15

Maximum Total Thrust Allowable (lbs)

14000

max. act. rating

Maximum Allowable Running Thrust (lbs)

1500

Torque
Switch
Setting

Acceptable Thrust Range at Torque Switch Trip (lbs)

Original Design
Spring Pack
Installed

Replacement 1
Spring Pack
Installed

Replacement 2
Spring Pack
Installed

1.0

1.25

1.5

1.75 157

2.0 174

2.25

2.50

2.75

3.0

3.25

3.50

3.75

4.0

11515

13110 - 13818

13182

13110 - 14000

11818

13110 - 14000

12576

13110 - 14000

13258

13110 - 14000

BWM 9.19.91

QMP 9-21-91

QMP 9-24-91 QMP 9/24/91

6.0 Results/Conclusions

- 6.1 All available MOV Data Detail Drawing input has been researched and documented herein. Where it was determined that information was unavailable from existing records, the field has been left blank. This information will be determined during the as-built walkdown.
- 6.2 The results of the actuator sizing calculations, VOTES diagnostic acceptance criteria calculations and limit switch setting determination are provided within the body of the calculation.
- 6.3 The following anomalies have been identified through the performance of this calculation:
 - 1.) THIS CALC. ESTABLISHES NEW TORQUE SWITCH SETTINGS WHICH DIFFER FROM THE ORIGINAL DESIGN.
 - 2.) This calculation identified an error on the original Limitorque motor operator information sheet (Ref. 5). Limitorque identified the motor as a 10 ft-lb D.C. motor. Based on actual nameplate data, however, it is known that the motor is a 10 ft-lb A.C. motor (see Ref. ¹⁵4)



Anchor/Darling

Valve Company

701 FIRST STREET
P O BOX 3428
WILLIAMSPORT, PA 17701-0428
717 327-4800
TELEX 759953

Ref # 2
M-VLV-339 Rev 1
Page 28 of 41

February 20, 1990

PENNSYLVANIA POWER & LIGHT COMPANY
Two North Ninth Street
Allentown, PA 18101

Attn: Mr. Ken Anderson, Engineering

SUBJECT: VALVE DATA

Dear Ken,

The valve data you requested at our recent meeting is enclosed.

Please advise if you need further information.

Yours sincerely,

ANCHOR/DARLING VALVE COMPANY


R. W. Dommers
Director - Marketing & Sales

/cjl

cc: J. J. Chappell
R. J. Stout

end.

STEM DATA FOR P.P. & L. (SUSQUEHANNA)


CERT.	A/CN S.O.	VALVE	STEM DIA	STEM DIA	PITCH &	
DWG NO.	ITEM NO	SIZE / TYPE	AT S BOX	AT THDS	LEAD	
21700	1564-2	2-1500-DD	750	750	1/3 - 1/3	
21699	1564-1	2-1500-DD	750	750	1/3 - 1/3	
13661	5853-1	4-900-FW	1.250	1.250	1/3 - 2/3	149F007
13662	5853-2	4-900-FW	1.250	1.250	1/3 - 2/3	149F008
13689	5854-14	20-150-FW	1.875	1.875	1/3 - 1/3	
13692	5854-21	6-150-FW	1.125	1.125	1/3 - 1/3	
13699	5854-9	3-300-FW	.875	.875	1/3 - 1/3	
13709	5853-8	14-900-FW	2.375	2.375	1/3 - 1	151F006
13711	5853-11	10-900-FW	2.000	2.000	1/3 - 1	
13712	5853-15	6-900-FW	1.625	1.625	1/3 - 2/3	
13713	5853-85	4-900-GB	1.500	1.500	1/4 - 1/4	149F022
13715	5854-18	10-150-FW	1.500	1.500	1/3 - 1/3	
13739	5855-2	20-900-FW	3.125	3.125	1/3 - 1	151F008
13740	5855-3	20-900-FW	3.125	3.125	1/3 - 2/3	
13747	5855-10	6-900-GB	2.125	2.125	1/3 - 2/3	
13795	5853-28	10-900-GB	3.125	3.125	1/4 - 1/4	
13797	5853-5	3-900-FW	1.125	1.125	1/3 - 2/3	
13798	5853-6	3-900-FW	1.125	1.125	1/3 - 2/3	
13801	5853-21	10-600-FW	1.875	1.875	1/3 - 2/3	
13802	5853-22	10-600-FW	1.875	1.875	1/3 - 2/3	
13808	5854-27	18-300-GB	3.250	3.250	1/4 - 1/4	
13812	5854-30	6-300-GB	1.500	1.500	1/4 - 1/4	
13814	5853-93	4-600-FW	1.250	1.250	1/3 - 2/3	
13831	5854-28	12-300-GB	2.500	2.500	1/4 - 1/2	
13858	5854-16	16-150-FW	1.750	1.750	1/3 - 1/3	
13956	5796-3	6-900-FW	1.625	1.625	1/3 - 1/3	
13981	5854-89	3-150-FW	.750	.750	1/3 - 2/3	
14071	5853-109	4-900-FW	1.250	1.250	1/3 - 1/3	
15251	5853-87	4-900-GB	1.500	1.500	1/4 - 1/4	
13687	5854-12	24-150-FW	2.000	2.000	1/3 - 1/3	
13710	5853-10	12-900-FW	2.250	2.250	1/3 - 1	
13741	5855-4	12-900-FW	2.250	2.250	1/3 - 1	151F009
15175	9052-1	4-150-FW	1.000	1.000	1/4 - 1/2	
13738	5855-1	24-900-FW	3.750	3.250	1/3 - 1	151F010
13691	5854-19	6-150-FW	1.125	1.125	1/3 - 1/3	
13688		20-150-FW	1.875	1.875	1/3 - 1/3	151F016
13148			1.5	1.5	1/3 - 1/3	
13668			1.5	1.5	1/3 - 1/3	

Calculation - 277 Ref. 3

Rev 3
Chg 4-1-91
Page 2 of 41 Rev. 1
Page 2 of 430

VALVE NO.	10"EBA-6T-MD-FDD3	6"EBA-6T-MD-FDD1	6"EBA-6T-MD-FDD4
SERVICE TYPE	MAIN STEAM	REACTOR RECIRCULATION	REACTOR RECIRCULATION
LINE OR EQUIPMENT REF.	GATE	GATE	GATE
MOTOR TYPE	DBA-102	DBA-101	DBA-101
SIZE	D.C.	A.C.	D.C.
COMMODITY	10"	6"	6"
DESIGN/MAX. PRESS. (PSIG)	STEAM	DEMINEALIZED WATER	DEMINEALIZED WATER
DESIGN/MAX. TEMP. (°F)	1230 / 1350	1250 / 1375	1250 / 1375
FLOW Normal/Max.	565 / 565	565 / 565	565 / 565
VALVE RATING	184.5 x 10 ³ lbs / SAME	352 GPM / 358 GPM	352 GPM / 358 GPM
TYPE ENDS/RATING	600 # ASME	600 # ASME	600 # ASME
BODY MATERIAL	P.W. / SCH. 80	P.W. / SCH. 80	P.W. / SCH. 80
TRIM MATERIAL	SEE APPENDIX 3	SEE APPENDIX 3	SEE APPENDIX 3
SEAT FACINGS	SEE A/DV DWG	SEE APPENDIX 3	SEE APPENDIX 3
PACKING	STEELITE	STEELITE	STEELITE
TYPE BONNET	CRANE 187-I	CRANE 187-I	CRANE 187-I
TYPE OF SEATS	PRESSURE SEAL	PRESSURE SEAL	PRESSURE SEAL
TYPE OF DISC	SEE APPENDIX 3	SEE APPENDIX 3	SEE APPENDIX 3
BYPASS SIZE & TYPE	FLEXIBLE (NET SPLIT)	FLEXIBLE (NET SPLIT)	FLEXIBLE (NET SPLIT)
HANDWHEEL PULL-BREAKAWAY LBS	-	-	-
Act. Op. Diff. Press. (Max.)	100	70	70
PORT DIAMETER (seat)	A 1172 PSID	1000 PSID	1000 PSID
PRESS. DROP (PSI)	8.88	5.38	5.38
VELOCITY (FPS) (seat)	0.047 / 0.040	0.016 / 0.017	0.016 / 0.017
VALVE WEIGHT LBS incl. oper.	43 / 38	6.9 / 7.0	6.9 / 7.0
MOTOR OPER (TYPE/SIZE/SPD)	1530	570	565
OPER. SPEED FT/MIN/MP	SMB 1-40/1900	SMB 00-10/3600	SMB 00-15/1900
TIME TO OPEN	1.1 / 2.9	1 / 1.3	1 / 1.1
TIME TO CLOSE	A 50 SECS.	~28 SEC	~28 SEC
FULL LOAD CURRENT (440V, 3Ø, 60C)	A 50 SECS.	~28 SEC	~28 SEC
STALLED MOTOR CURRENT	11.1	2.3	4
MOTOR OPERATOR WEIGHT	85.4	11.9	25
COST - EACH VALVE	430	210	215
BYPASS			
FURN & INSTALL LIMIT SW.			
TESTS - MAGNAFLUX			
TESTS - X-RAY			
NO. REQUIRED (UNIT) / UNIT 2	1 / 1	1 / 1	1 / 1
TOTAL COST			
MANUFACTURER	Anchor / Darling		
MODEL OR FIG. NO.			
VENDOR	Anchor / Darling		
P/O (8 ITEM) NO. 8856-P-10	4.3 & 4.4	(4.5 & 4.6)	4.7 & 4.8
FOREIGN PRINT NO.	93-13802	93-13748	93-13668
WELD END DWG. REFERENCE 8856-M-149	SWS 306 & 400	SWS 306 & 400	SWS 306 & 400
P & I DIAGRAM REF. 8856-M-	155	144	144
LOCATION DWG. REF.			
Seismic Class 1 (Yes/No)	YES	YES	YES
Active Valve (Yes/No)	YES	YES	YES

REV. DESCRIPTION

 BECHTEL CORPORATION POWER DIVISION ENGINEERING	VALVE DATA SHEET Δ 9-2-82 RHM MOTOR OPERATED A/DY		JOB No 8856	REV. 4.
	SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 AND 2 PENNSYLVANIA POWER & LIGHT COMPANY		ATTACHMENT NO. 2 8856-P-10	
			SHEET 9 OF 15	

SUSQUEHANNA WORK AUTHORIZATION							PMIS	WA NU
I. PROBLEM/WORK DESCRIPTION		UNIT	SYSTEM	EQUIP. NUMBER	LOCATION	NEED		
Perform votes test		2	61B	HV 244F001	A31 E739			
RESPONSIBLE WORK GROUP		IEG	MECH	ELEC	LABOR	MSER I&C HP CHEM		
Identified (Print)								
Coyla HARROW								
Approved (Signature)								
K. H. H. 7.								
MODIFICATION RELATED								
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO PMR#ECON								
II. WORK CLASSIFICATION		QUALITY	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ASME CODE	<input type="checkbox"/> YES <input type="checkbox"/> NO	ACCT. or ER NO. LOC.		
HV-SE-259-033		EQUIP QUAL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	TECH SPEC	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Work Group Supervisor		
3/12/90 S2-261-001				RELIABILITY RELATED	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	7.		
III. WORK PLANNING		INITIAL INPUT STATUS & AF	PLAN CODE	PRIORITY CODE	WORK CODE	PLANT STA CODE		
A. INVESTIGATION		O/KAH	H2 A	5	1	FU		
B. WORK PLAN						Work Group Foreman		
- SEE ATTACHED -						Operations Authorization		
HEALTH PHYSICS						ERF NO. 805496		
<input type="checkbox"/> NO HP						ERF REQ. YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>		
<input type="checkbox"/> HP CK. 91-155						RWP NO. 91-155		
<input checked="" type="checkbox"/> RWP REQUIRED						EST. Man Hrs 40		
<input type="checkbox"/> REVIEW #						Work Group Foreman/Engineer		
K. H. H. 11-27-90						W. J. S. 11/2		
C. POST MAINTENANCE TESTING REQUIREMENTS						Quality Control Review		
- INCLUDED IN PROCEEDINGS						C. H. H. 11/2		
Stroke valve for proper operation & indication						Operations Authorization		
IV. ACTION TAKEN - EQUIPMENT HISTORY SUMMARY						B07960 3-31		
Performed votes test for HV-244F001						CONTACT G. C. X-1792 SIMPLER PLAN		
FURTHER INVESTIGATION REQUIRED. SEE WA# V10477.						Work Completed		
DATE# 90-3694						W. J. S. 4.		
AZ 4/26/91						ERF SIGNED OFF		
V. PROBLEM CODE						<input type="checkbox"/> N/A <input checked="" type="checkbox"/> YES 4-26		
Copy <input type="checkbox"/> Yes To: Planner <input type="checkbox"/> No						Work Group Review		
PROBLEM AV						IEG Review (MODS)		
CAUSE XX						N/A 4-26		
ACTION GY						Quality Control Review		
PMIS VM						W. J. S. 4-26		
Operations Review						W. J. S. 4-26		

Test: 1
4/18/91
14:51:36

Tag: HV244F001

U-VLV-339 R. 1
REF #4
Page 32 of 41

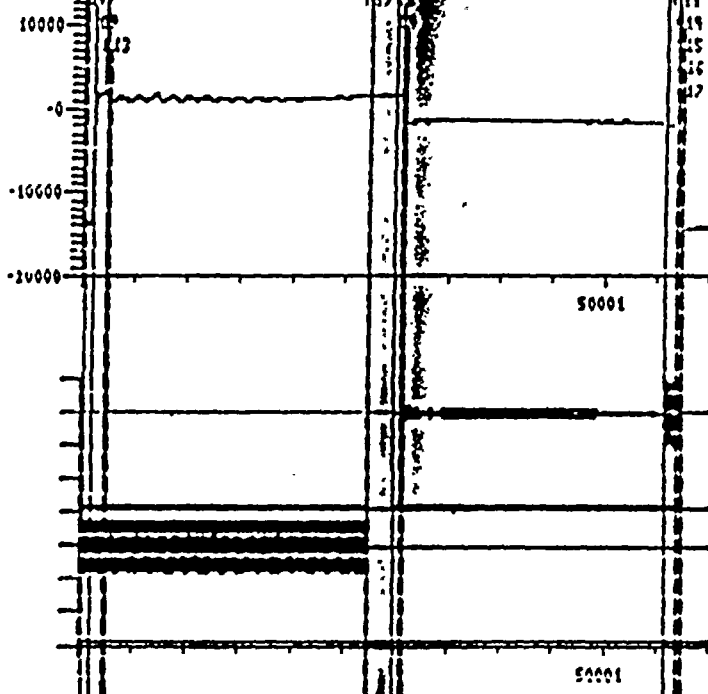
VOTES SENSOR

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Q

OLS

Q



Limit Switch Setting Open/Close.....: 2.000/2.000
Limit Switch Rotor Adjustment (Y/N).....: N
Flow (gpm) Start/Finish.....: 0/ 0
Upstream Pressure (psi) Start/Finish.....: 0/ 0
Downstream Pressure (psi) Start/Finish.....: 0/ 0

General Comments:

LIVE LOAD PACKING BOLTS REMOVE TO CAL

VALVE HAS BEEN OVERHAULED

Valve Information

Plant SSES
Unit 21
Tag Number HV244F001
Type GATE
Size SMB-00
Target Thrust 12995 lbs
Orientation VERT
Location EL-749 AREA-31
Stem Material A2/6410
Stem Diameter 1.500 inches
Threads per in. 3.00
Elasticity (1000) 30.000 psi
Poisson's Ratio 0.280
Lead 1
VOTES Serial # H6309
Valve Calibration 3.0/9E-0000 $\mu\text{V/V/lb}$

Valve Actuator

Actuator Type LIMITORQ
Size SMB-00
Max Thrust Rate 14000 lbs
Serial # 213458
Order # 381264X
Worm Gear Teeth
Gear Ratio 94
Spring Pack # 112

Actuator Motor

Voltage (AC/DC) AC
Volts 460
Amp rating 2.40 amps
Nominal Speed 3400.00 rpm
Start torque 10.00 ft-lb
Run torque 2.00 ft-lb
Horse Power 1.30 h.p.

Signal Conditioner Calibration Due Date 8/25/91

Votes Force Offset: -745 lbs

Actuator: *RELU*

Date: 4/10/91

Tag Number: HV244F881

Test Number: 1

Test Date: 4/18/91

M-VLV-339 R: 1

REF. #4

Page 33 of 41

TEST RESULTS

Close

Stroke Time 27.458 seconds

Bypass Time 25.938 seconds

Max Running Force -2388 lbs

Avg Running Force -1728 lbs

Thrust at CST -12922 lbs

Maximum Thrust -14612 lbs

Disc-To-Seat Thrust at CST -9687 lbs

Spring Pack gap in.

Open

Stroke Time 27.189 seconds

Bypass Time seconds

Max Running Force 1965 lbs

Avg Running Force 1150 lbs

Disc Pullout Force 14889 lbs

Torque Switch Setting (O/C) 2.888/28

Spring pack gap in.

Torque Switch Setting Open/Close..... 2.888/2.888
 Torque Switch Rotor Adjustment (T/M)..... N
 Flow (gpm) Start/Finish..... 0/ 0
 Upstream Pressure (psi) Start/Finish..... 0/ 0
 Downstream Pressure (psi) Start/Finish..... 0/ 0

General Comments:

LIVE LOUD PACKING BULBS REMOVE TO CML

VALVE HAS BEEN OVERHAULED

Valve Information

Plant 88EB
 Unit 21
 Tag Number HV244F881
 Type GAIE
 Size 8NB-88
 Target Thrust 12995 lbs
 Orientation VERI
 Location EL-749 HKEA-31
 Stem Material H2/6410
 Stem Diameter 1.500 inches
 Threads per in. 3.00
 Elasticity (10E6) 30.000 psi
 Poisson's Ratio 0.280.
 Lead 1
 VOTES Serial # H6309
 Valve Calibration 3.079E-0002 10/v/1b

Valve Actuator

Actuator type LIMIFURU
 Size 8NB-88
 Max Thrust Rate 14889 lbs
 Serial # 213458
 Order # 381264X
 N Worm Gear Teeth
 Gear Ratio 94
 Spring Pack # 112

Actuator Motor

Voltage (AC/DC) AC
 Volts 460
 Amp rating 2.40 amps
 Nominal Speed 3400.00 rpm
 Start torque 10.00 ft-lb
 Run torque 2.00 ft-lb
 Horse Power 1.30 h.p.

Signal Conditioner Calibration Due Date 8/25/91

Votes Force Offsets -745 lbs

MOTOR OPERATOR INFORMATION SHEET

M-VLV-339 R. 1
REF #15
Page 34 of 41LIMITORQUE ORDER NO.: 381264 ITEM: XOPERATOR SERIAL NOS.: 213457+458OPERATOR TYPE: SMB OPERATOR SIZE: 00DESIGN UNIT RPM (AS DEFINED IN LIMITORQUE SEL-3): 38.8SPRING PACK NUMBER: 60-600-0022-1NORMAL TORQUE SWITCH SETTING: 1 3/4CORRESPONDING INPUT TORQUE (LB-FT): 8 FT. LBS.
(SEE NOTE 1)CORRESPONDING OPERATOR OUTPUT TORQUE (LB-FT): 149 FT. LBS.CORRESPONDING OPERATOR OUTPUT THRUST (LBS): 10,797 LBS.MAXIMUM TORQUE SWITCH SETTING: 2 3/4CORRESPONDING INPUT TORQUE (LB-FT): 13 FT. LBS.
(SEE NOTE 1)CORRESPONDING OPERATOR OUTPUT TORQUE (LB-FT): 236 FT. LBS.CORRESPONDING OPERATOR OUTPUT THRUST (LBS): 14,000 LBS.
MAX RATING OF UNIT

GEAR RATIO INFORMATION

MOTOR PINION NUMBER OF TEETH: 21 WORM SHAFT GEAR NO. OF TEETH: 44WORM TO WORM GEAR RATIO: 45:1OVERALL ACTUATOR RATIO: 94.0:1

NOTE 1: INPUT TORQUE IS TORQUE FROM WORMSHAFT ON SMB-00 & 000 AND FROM HANDWHEEL ON SMB-0 AND LARGER.

LIMITORQUE SIGNATURE: Bradley Stone

ORDER NUMBER: 381264 X SERIAL NUMBER: 213457 + 458

MOTOR NAME PLATE DATA

IDENTIFICATION NUMBER: 715005

START TORQUE (LB-FT): 10 FT. LB. HORSEPOWER: .5

RUN TORQUE (LB-FT): 2 FT. LB. S.F.: 1.0

TYPE: T FRAME: P56 PHASE: DC

MOTOR SPEED (RPM): 1900 HZ: C.P.D

VOLTS: 240 2C CODE: — AMPS: A 2.7/F.0.23

AMB. C: 40° INSULATION CLASS: B DUTY: 5 MIN.

LIMITORQUE SIGNATURE: Bradley Stone

12 CORRECT
Run 9-14-91

12 CORRECT
Run 9-14-91

$$\text{Stroke Length} = \frac{\text{stem lead}}{\text{handwheel turns}} \times \frac{1}{\text{HWR}}$$

STANDARD HANDWHEEL RATIOS FOR SMB & HMB UNITS

UNIT SIZE	HANDWHEEL RATIO	UNIT RATIO	EFF. %	UNIT SIZE	HANDWHEEL RATIO	UNIT RATIO	EFF. %
SMB-000	1:1	All	100	HMB-00	19:1 45:1	9.7-22.0 23.0-109.0	60 30
SMB-00	1:1 *4.38:1	All All	100 95	HMB-0	15.7:1 37:1 58:1 95:1	11.2-26.1 26.4-96.2 102.6-150.8 158.3-247	60 30 25 25
SMB-0 SB-0	8.93:1 21.1:1 33:1 54.1:1	11.2-26.1 26.4-96.2 102.6-150.8 158.3-247	60 30 25 25	HMB-1	14.5:1 34:1 66:1 90:1	11.6-25.6 27.2-88.4 92.4-171.6 191.7-234	60 30 25 25
SMB-1 SB-1	10.75:1 25.3:1 49.0:1 66.7:1	11.6-25.6 27.2-88.4 92.4-171.6 191.7-234	60 30 25 25	HMB-2	13.3:1 33:1 60:1 85:1	10.6-27.2 26.2-82.5 84.8-150.0 153-212.5	60 30 25 25
SMB-2 SB-2	9:1 22.3:1 40.5:1 57.4:1	10.6-25.5 26.2-82.5 84.8-150 153-212.5	60 30 25 25	HMB-3	10.3:1 16:1 41:1 57:1 80:1	11.1-24.1 25.7-37.3 35.9-95.5 98.6-132.8 138.4-186.4	60 60 30 25 25
SMB-3 SB-3	7.15:1 11.07:1 28.37:1 39.4:1 55.36:1	11.1-24.1 25.7-37.3 43.9-95.5 98.6-132.8 138.4-186.4	60 60 30 25 25	HMB-4 HMB-4T	12.7:1 50:1 58:1	10.1-32.3 40.0-124.9 131.8-147.9	60 30 25
SMB-4 SMB-4T SB-4	8.7:1 13.06:1 33.69:1 39.87:1 59.13:1	13.4-32.3 33.6-48.4 51.8-124.9 131.8-147.9 152.1-219.3	60 60 30 25 25	<p>*This ratio supplied when torque required exceeds 65 ft/lbs.</p> <p>△ For SMB-5 and SMB-5T unit, this ratio provided as standard. Alternate ratio shown provided only on request.</p>			
SMB-5 SMB-5T	86:1 163.5:1 142.0:1 269.8:1	61.4-93.4 101.4-230.2	25 25				

ANCHOR/DARLING VALVE CO.

MOTOR OPERATOR DATA SHEET

Customer: Bechtel SF P.O. No. 8856-P-10-A

Prepared by: RHM Approved by: DJK 3-17-75 Sht 27 of 28

Form Line Number	S.O. No.	E 5853
	Vlv. Size, Press. & Type	6" 600 # Gate
	No. Req'd & (Item No.)	23, 24, 64, 65

1	Seat Mean Dia. In. & Area In. ²	= $A = .7854 \times d^2 = .7854 (5.69)^2$	25.43
2	System Design Press. PSI	= Line Pressure = P_1 Use	1600
3	Design Diff. Press. PSI	= ΔP Use	1600
4	Disc Thrust LBS	= $T_d = A \times P$ (Line 1 x Line 3)	40688
5	Stem Thrust Tent. LBS	= $T_t = T_d \times f$ (Line 4 x Coeff Friction)*	12206
6	Stem End Thrust	= $T_e = .7854 \times D_s^2 \times P_1$ (stem area x Line 2)	282
7	Stuff Box Load LBS	= T_s	1500
8	Total Stem Thrust LBS	= $F = T_t + T_e + T_s$ (Sum. of Lines 5, 6 & 7)	16533

$$D_s = 1\frac{1}{2} \text{ Dia}$$

*Coefficient of Friction: Double Disc .2

Flex Wedge .3 ✓

Globe Valve 1.1

PENNSYLVANIA POWER & LIGHT
Susquehanna Steam Electric Station
MOV - Design Basis Review

VALVE TAG NUMBER:HV-244F001

UNIT 2

PRIORITY: 2

VALVE DWG NO.FF110100-5001

MFG. ANCHOR/DARLING

DESIGN DATA		REF NO	MATERIAL/DIMENSIONAL DATA		REF NO
Valve Type	GT	3	Stroke Length (in)	6.000	25
Valve Size	6.00	3	Stroke Time (sec)	28	4
Pressure Class	600	3	Orifice Diameter (in)	5.375	24
Valve Code	SR PC	6	Stem Diameter (in)	1.500	24
Area/Room	31/II400	5,10	Stem Pitch (in)	0.33	24
Elevation	749'-1"	5	Stem Lead (in)	0.33	24
Line No.	DBA-201	1	Stem Material	A276-410	3
Normal Valve Pos	O	1	Stem Mod of Elasticity	29.200	26
Actuator Size	SMB-00-10	3	Stem Mod of Rigidity	11.300	26
Valve Orientation	H	5	Valve Thrust Capability		
Stem Orientation	V	5	Dsk Guide Fac Mat	SA105II	3
Power Supply	2B236053	6	Dsk Seat Surf Mat	STELLITE	3
Rework Window		SEE TS 4.4.4			

DEFINITION OF SAFETY RELATED FUNCTION

HV-244F001 IS THE REACTOR WATER CLEANUP SYSTEM INBOARD CONTAINMENT ISOLATION VALVE. THIS VALVE IS NORMALLY OPEN AND WILL CLOSE ON REACTOR LOW LEVEL OR ON INDICATION OF AN RWCU LINE BREAK. THE VALVE'S SAFETY FUNCTION IS TO CLOSE ON REACTOR LOW LEVEL, UPON INDICATION OF AN RWCU LINE BREAK. THE VALVE MUST BE CAPABLE OF RECOVERY FROM MISPOSITIONING. Recovery from mispositioning is not required since this valve is not classified as position changeable.

VALVE OPERATIONAL DATA

	Large Brk LOCA	Small Brk LOCA	Station Blackout	HELB	LOOP	Fire	Inadvert Oper
Max Diff Press	O 983	O 1115	NA	1053 1162	0	O 1056	NA 1056
Dir Diff Press	D	D	NA	D	NA	D	NA D
Flow Rate	310	310	NA	436	0	310	NA 436
Line Press(psig)	979 983	1112 1115	NA	1053 1162	1053 1056	1053 1056	NA 1056
Fluid	W	W	NA	W	W	W	NA W
Process Temp(F)	542	558	NA	563	551	551	NA 551
Duty Cycle	1	1	NA	1	1	1	NA 1
Time Line (sec)	*	*	NA	0	I	I	NA I
Envr Profile(F)	340	340	NA	150	150	150	NA 150
Initiate Signal	L2	L2	NA	F1	L2	S	NA S
Valve Cycle	C	C	NA	C	C	C	NA C
Normal Cond					O,C		

See CN#2 : Basis for Operational Development
has been updated.

REF #14

M-VLV-339 Rev 1

Ref. # 14

Page 39 of 41

Anchor/Darling

Valve Company

701 FIRST STREET
P.O. BOX 3428
WILLIAMSPORT, PA 17701-0428
(717) 327-4800
TELEX: 750963

Date 3/28/91

FAX: (717) 327-4805

>>>----->
From ToFax 215-774-7830TO: Joe Parckinson - PPLSUBJ: A/DV EB109Stem Factor used for motor actuator sizingfor SSES was based on $\mu = 0.15$.RMA 3/28/91

Signed:

Bobbie Bergman



Ref. 15

Page 40 of 41

VALVE ID PV2445001
 WA NO. 100247
 SYSTEM 261

Old
New
 Motor

5.13 ACTUATOR TROUBLE SHOOTINGNAMEPLATE REFERENCE DATA

PSID _____
 AREA _____
 ELEV _____

ACTUATOR: ORDER NO. _____
 SERIAL NO. _____
 SIZE _____

MOTOR: ID NO. _____
 MANUFACTURER _____
 HORSE POWER _____
 VOLTAGE _____
 START TORQUE _____
 RUN TORQUE _____
 START CURRENT _____
 RUN CURRENT _____
 INSUL CLASS _____
 FRAME SIZE _____
 OPERATING TEMP _____
 DUTY _____
 RPM _____

713109-L2
4-1/2 RELIANCE
1.3
330/460
13 LB FT
2 LB FT
48/2.4
N/A
RH
M56
40°C AMB
15 MIN-RAD IN
3400

HANDWHEEL TURNS / 1-STROKE _____

SCAFFOLD NEEDED (Y/N) _____

HBC/VGCC: ORDER NO. _____
 SERIAL NO. _____
 SIZE _____

TORQUE SWITCHLIMITORQUE
DESIGN INFOAS FOUNDAS LEFTINITIALS/DATE

OPEN SETTING _____

CLOSE SETTING _____

NORMAL (MIN) _____

MAXIMUM _____

LIMITER PLATE _____

CAL CHART INSTALLED _____

SPRING PACKLIMITORQUE
DESIGN INFOAS FOUNDAS LEFTINITIALS/DATE

PART NO. _____

NO. OF WASHERS _____

AVG. THICKNESS _____

SPRING PACK GAP. _____

SPRING PACK PRELOAD _____

G301-11215-079.395.2254-2-914-2-914-2-914-2-914-2-91

FORM MT-GM-050-7, Rev. 2, Page 1 of 2. (File R7-1)

SUSQUEHANNA SES WORK AUTHORIZATION

WA NUMBER

ACTION TAKEN

CREW

W. BudgounC. REEDJ. Bates

DATE

4/1/91

Removed External limit switch need (4ea) 1/2x20x1" bolts and (4ea) 1/2" nuts for limit switch mounting a
Need new cover gasket for valve.

4-1-91

Joseph L. Bates 4/1/91
Pulled Limit switch assembly, Torque switch, Terminal strip and space heater.

J. Halden 4-1-914-4-91

MEGGERED HV-244FOOL NEW MOTOR AFTER INSTALLATION ON TO THE ACTUATOR. REINSTALLED L/S ASSEMBLY, T.S., TERM. STRIP, & SPACE HTR. INSTALLED LUGS ON THE NEW MOTOR'S LEADS & L2 WIRE FOR THE HEATER. INSTALLED NEW COVER GASKET. INSTALLED NEW CAL CHART (1 3/4 - 2 3/4) ~ C. Reed 4-4-91 ~
NEW MOTOR DATA:

Ident. No.: BT1Q6227m-WJ-1Start: 10 lb.ftHP: 1.3run: 2 lb.ft.S.F.: 1.0type: PFR: M56PH: 3RPM: 3400Hz: 60Volts: 460Code: MNom. Amps: 2.4INS. class: HLR Amps: 16.0INS. type: RHDuty: 15 m.vAmb °C: 60

Radiation Ins.

RCP-242-A-2 TE M

Evaluator: *P. E. White*

Date: 4/10/91

TEST RESULTS

Tag Number : HJ244F001

Test Number : 1

Test Date : 4/18/91

244F001

Close		Open	
Stroke Time	27.458 seconds	Stroke Time	27.189 seconds
Bypass Time	25.938 seconds	Bypass Time	seconds
Max Running Force	-2388 lbs	Max Running Force	1865 lbs
Avg Running Force	-1726 lbs	Avg Running Force	1150 lbs
Thrust at CST	-12822 lbs	Disc Pullout Force	14889 lbs
Maximum Thrust	-14612 lbs		
Disc-To-Seat Thrust at CST	-9687 lbs	Torque Switch Setting (O/C)	2.000/20
Spring Pack gap	in.	Spring pack gap	in.

Torque Switch Setting Open/Close..... : 2.000/2.000
 Limit Switch Kotor Adjustment (I/N)..... : N
 Flow (gpm) Start/Finish..... : 0/ 0
 Upstream Pressure (psi) Start/Finish..... : 0/ 0
 Downstream Pressure (psi) Start/Finish..... : 0/ 0

General Comments:

LIVE LOAD PACKING BOLTS REMOVE TO END

VALVE HAS BEEN OVERRIDEN

Valve Information

Plant : SSES
 Unit : 21
 Tag Number : HJ244F001
 Type : UNITE
 Size : 5000-00
 Target Thrust : 12000 lbs
 Orientation : VERT
 Location : EL-747 HREN-31
 Stem Material : H2/6410
 Stem Diameter : 1.500 inches
 Inreads per in. : 3.00
 Elasticity (1000) : 30.000 psi
 Poisson's Ratio : 0.280
 Lead : 1
 VOIES Serial # : H6007
 Valve Calibration : 3.0/3E-0002 MV/V/LB

Valve Actuator

Actuator Type : LIMITOR
 Size : 5000-00
 Max Thrust Rate : 14000 lbs
 Serial # : 213458
 Order # : 381264A
 H Wor : 3848 teeth
 Gear Ratio : 94
 Spring Pack # : 112

ACTUATOR MOTOR

Voltage (HL/DL) HL
 Volts : 400
 Amp Rating : 2.40 AMPS
 Nominal Speed : 3400.00 RPM
 Start Torque : 10.00 FT-LB
 Run Torque : 2.00 FT-LB
 Horse Power : 1.38 H.P.

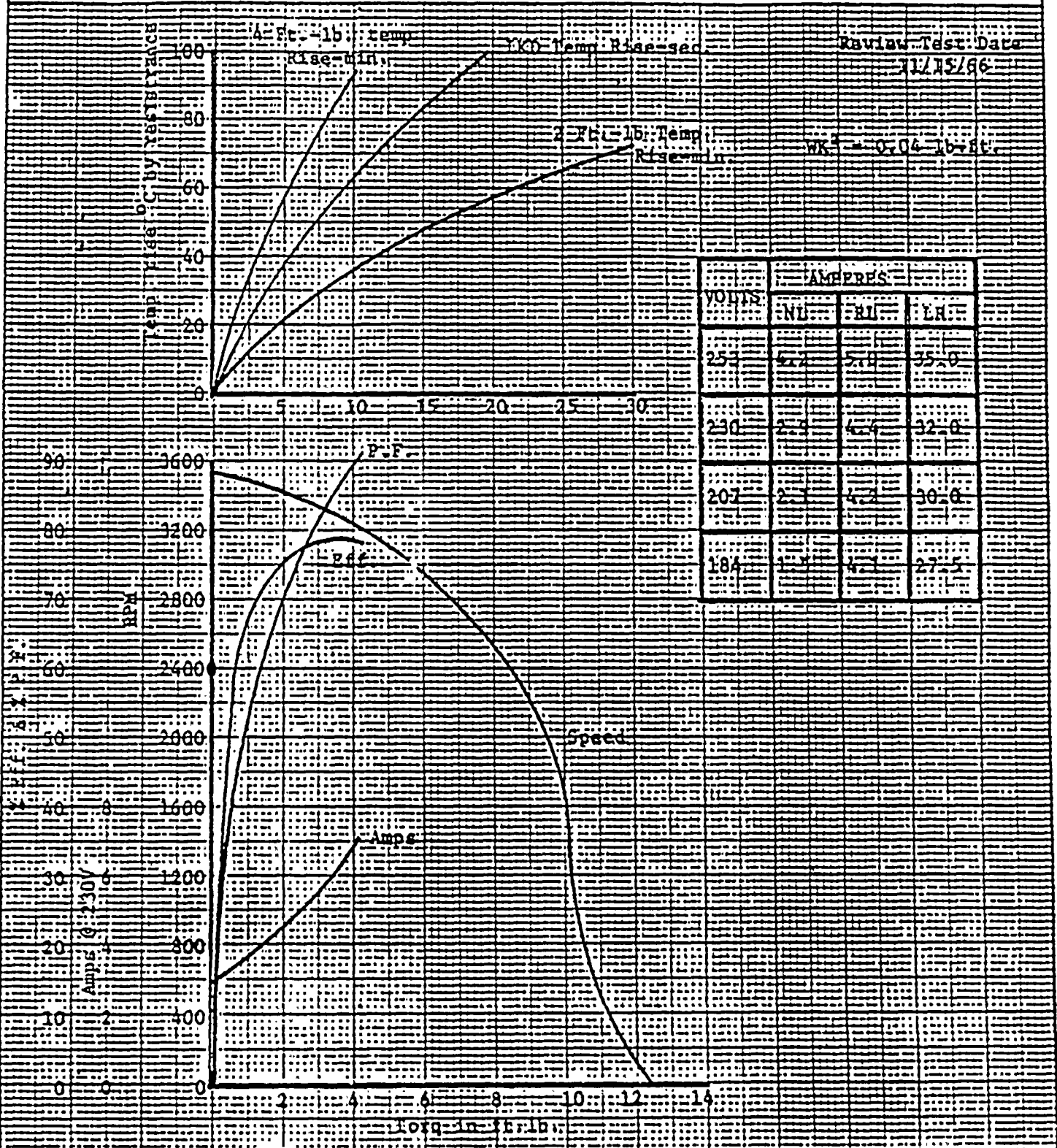
Signal Conditioner Calibration Due Date 8/25/91

VOIES Force Offset: -/45 lbs

REL. S.O.
FRAME 56
HP 1.3
TYPE P
PHASE/HERTZ 3/60

RPM 3400
VOLTS 230/460
AMPS 4.8/2.4
DUTY 15 min.
AMB°C/INSUL 40°C/B
S.F. 1.0
NEMA DESIGN
CODE LETTER L
ENCLOSURE TENV
E/S 500200-50

ROTOR E1891 (164B25)
TEST S.O. E2066
TEST DATE 11-15-66
STATOR RES. @ 25°C @ 230V
2.5 DHMS (BETWEEN LINES)



AMPERES SHOWN FOR 230V CONNECTION. IF OTHER VOLTAGE CONNECTIONS ARE AVAILABLE, THE AMPERES WILL VARY INVERSELY WITH THE RATED VOLTAGE.

RELIANCE
ELECTRIC COMPANY
CLEVELAND, OHIO 44117 U.S.A.

OR. BY DNR
CK. BY DNR
APP. BY J. S. Sauer
DATE 7-21-77

**A-C MOTOR
PERFORMANCE
CURVES**

M1458
(Updated 413018-03-AT)
ISSUE DATE 7/21/77