



TELEDYNE TEST SERVICES

Everywhereyoulook™

Valve Diagnostic Testing and Maintenance

Seventh Annual QUIKLOOK Users Group Meeting

August 14 & 15, 2013



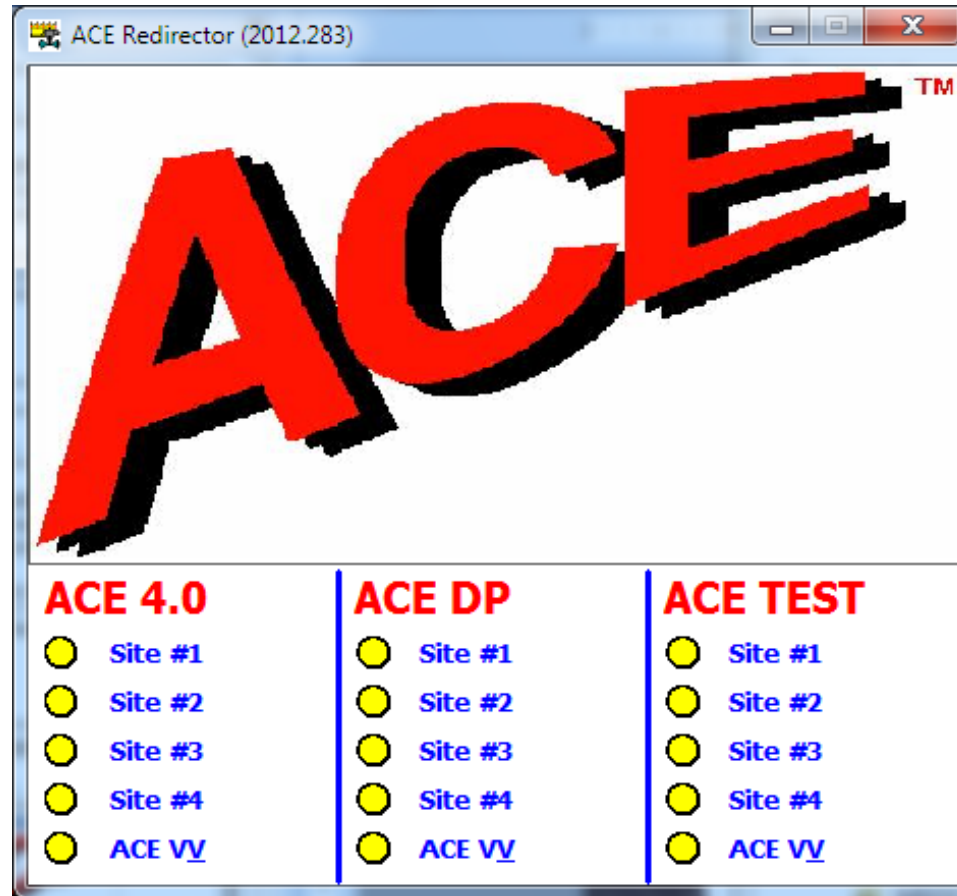
Presented by: **Eric A. Solla**



TELEDYNE TEST SERVICES

Everywhereyoulook™

Valve Diagnostic Testing and Maintenance



Software Engineer

Eric A. Solla

ACE Software

Integrated

Design Calculation Software ACE

Test Analysis Software ACETEST

ACE Calculations

File Edits Tables References Tools Help

ZZ-RSTESTCASE

Globe - Balanced - Flow Over - Down to Close
Diaphragm - Reverse Acting

Packing Accessories Adjustment Factors Output

General Configuration Valve Actuator

Parameter	Dir	Value	Ref
Calculation Number		Unknown	1
Calculation Revision		0	1
System		011	959
Name		Name	970
Fail Position		Close	981
Media		Water	992
Flow Diagram / P&ID		P&ID	993
Max. Fluid Temperature (Deg F)		100	948
Line Pressure Upstream (psig)	(C)	200.00	970
Line Pressure Upstream (psig)	(D)	100.00	970
Line Pressure Downstream (psig)	(C)	20.00	992
Line Pressure Downstream (psig)	(D)	10.00	981
Category		1	993
Air System Name		Air System	948
Stem Material		Stainless Steel	1
Young's Modulus (E)		29,000,000	1
Poisson's Ratio (v)		0.290	1

General Comments
Discussion on the method used to determine the line pressures. - LP Discussion

Eric Solla 10/10/2011 19:09 NOT APPROVED N/A

ACETEST for All Plants - ALL VALVES

File Tables Tools Help

BFN-1-PCV-001-0153

Globe - Balanced - Flow Over - Down to Close
Diaphragm - Reverse Acting

Design Data - Manual Input

FUNCTION	OPEN	Last Edit	SIGNOFF	Last Signoff	PRINT
Pre-Test		11/13/12 13:56		N/A	
Post Test Evaluation		11/13/12 13:58		N/A	

Add New Work Order

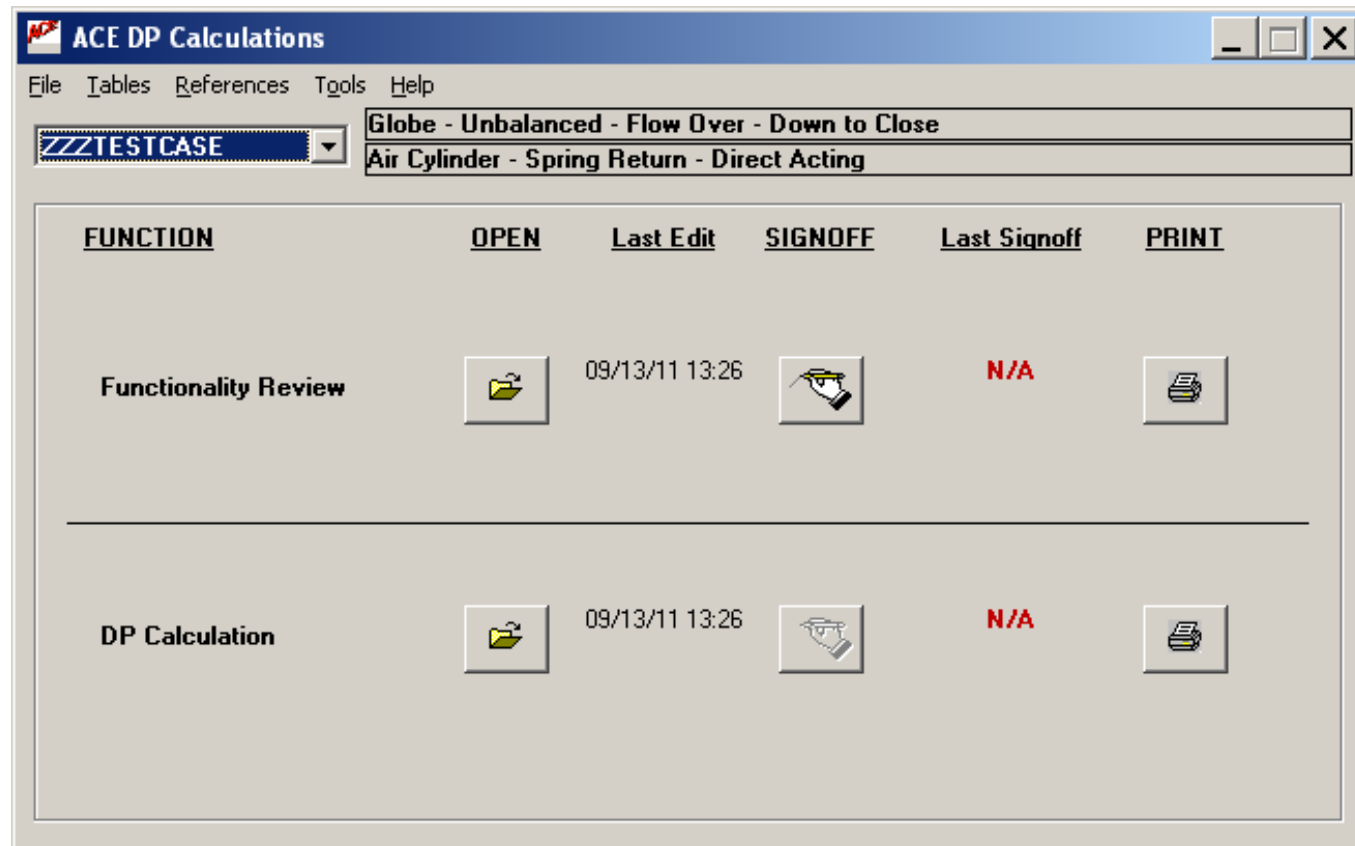
Work Order	AOVDR Rev	Status	Test Date	Test of Record
112585928	0	PreTest	11/10/2012	...
N/A	N/A	Legacy	11/11/2010	...

ACE Software History

- 2009 – Purchase ACE 3.0 from Areva
- 2011 – ACE 4.0 Beta
 - New User Interface Similar to Midas
 - Calcs and Methodologies Stay Same as ACE 3.0
 - Added many of the Standard Midas Features
- 2012 – ACE 4.0 Release
- 2013 – ACE 4.1 Release

ACE DP

- ACE DP
 - Separate program
 - Same functionality as ACE 3.0 system module



ACE DP

Functionality Review for V&V-TESTCASE

Edits Print Exit

General Information Configuration Licensing Basis / Plant Doc Review Scenarios

Parameter	Dir	Value	Ref	
Calculation Number		TTS-CC-166.1	1	
Calculation Revision		0	1	
System		Test System	46	
Valve Name		System Test Calc	47	
P&ID / Flow Diagram		M-202	36	
Normal Position		Open	35	
Fail Position		Open	34	
Safety Position		IC	41	
Category		1C	33	

Open Functional Description

This valve has an ACTIVE safety function in the CLOSED position to provide reactor coolant pressure boundary integrity.

Close Functional Description

The valve has no safety function in the OPEN position.

Functional Review Comments

No Comments

Rich Enos 12/03/2011 08:12 NOT APPROVED N/A

ACE DP

DP Calculation for V&V-TESTCASE (Readonly)

Edits Print Exit

General Information Scenario Details DP Review

Scenario: 1 Direction: Open Basis: Beyond Design Basis Previous Next

Name: From Close to Open Not Calculated

Media: Two-Phase

Max Flow: 120 units: GPM

Temperature: min: 212 max: 677

Alternate Line Pressures (psig):
Upstream: 0.0 Downstream: 0.0

	Upstream	Downstream
Density: (UD) 12.81 lbs/ft ³	12.81	(DD) 8.62 lbs/ft ³
Pump Head: (UPH) 14 ft.	14	
Pressure: (UPR) 317.60 psig.	317.60	(DPR) 10.12 psig.
Elevation: (UPSE) 650 ft.	650	(DPSE) 610 ft.
9 in.	9	5 in.

Upstream Pressure Source
The water level in the pressurizer is conservatively assumed to be at the top of the pressurizer.

Downstream Pressure Source:
The downstream pressure is containment pressure.

Calculated Line Pressures

Upstream (LPUP) 322.4 psig.
 $LPUP = UPR + (UPSE + UPH - VE) \times \frac{UD}{144}$

Downstream (LPDN) 10.1 psig.
 $LPDN = DPR + (DPSE - VE) \times \frac{DD}{144}$

Differential Pressure (DP)
 312.3 psig.
 (LPUP_LPDN)

Reference for:

Dave Thrall 12/13/2011 16:32 NOT APPROVED N/A

ACE Basics

Design Calculation Software

- Inputs (General, Valve, Operator, Accessories & others)
- Calculated Outputs
- Input References
- Tools
- Margins
- Reports
- Documentation

ACE Basics

General

ACE - ZZ-RSTESTCASE

File Edits Tables References Help

ZZ-RSTESTCASE

Globe - Balanced - Flow Over - Down to Close
Diaphragm - Direct Acting

Packing Accessories Adjustment Factors Output
General Configuration Valve Actuator

Parameter	Dir	Value	Ref
Calculation Number		80054-1	1
Calculation Revision		0	1
System		011	2
Name		Name	3
Fail Position		Open	6
Media		Water	7
Flow Diagram / P&ID		P&ID	8
Max. Fluid Temperature (Deg F)		100	9
Line Pressure Upstream	(C)	200.00	10
Line Pressure Upstream	(O)	100.00	11
Line Pressure Downstream	(C)	20.00	12
Line Pressure Downstream	(O)	10.00	13
Category		1	14
Air System Name.		Air System	15
Stem Material		Stainless Steel	16
Young's Modulus (E)		29,000,000	17
Poisson's Ratio (v)		0.290	18

General Comments
Discussion on the method used to determine the line pressures. - LP Discussion

Eric Solla 08/01/2011 13:06 NOT APPROVED N/A

ACE Basics

Configuration

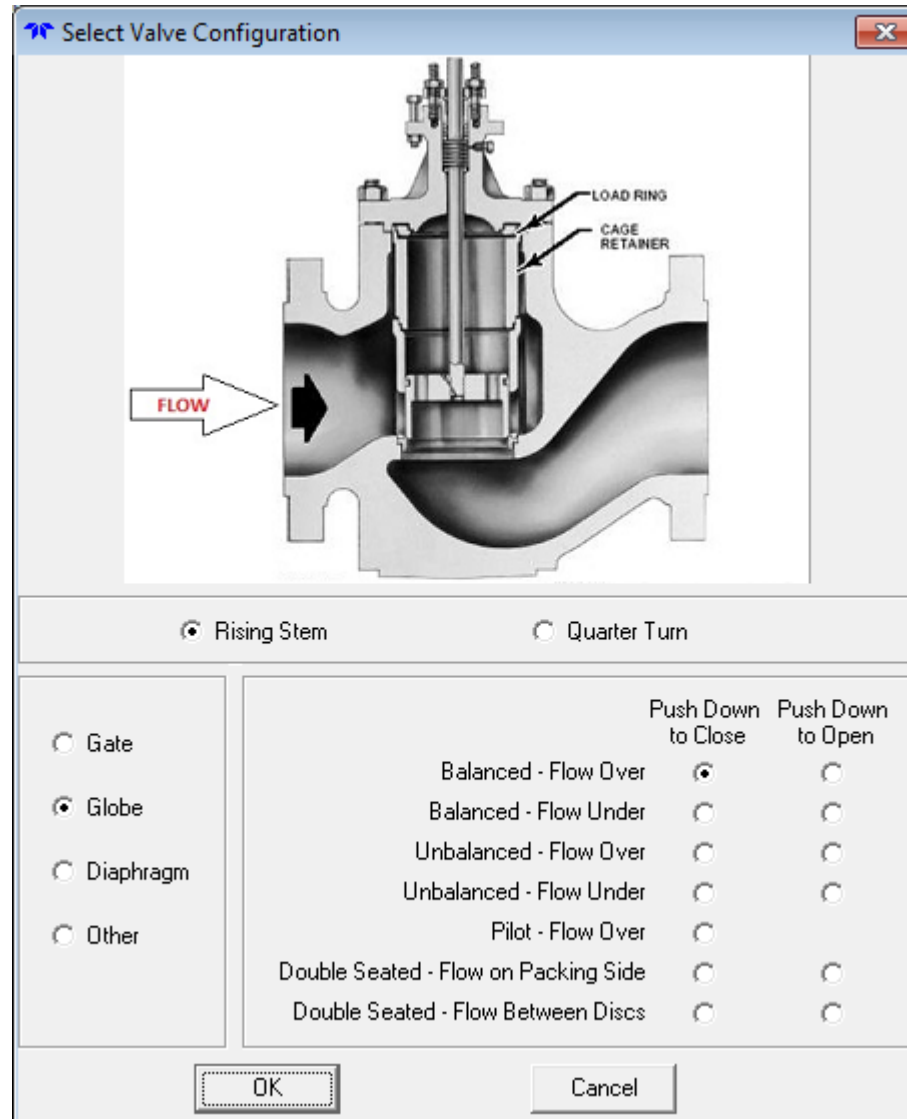
The screenshot shows the 'ACE - ZZ-RSTESTCASE' configuration window. The window title is 'ACE - ZZ-RSTESTCASE'. The menu bar includes 'File', 'Edits', 'Tables', 'References', and 'Help'. The main configuration area is divided into several tabs: 'Packing', 'Accessories', 'Adjustment Factors', 'Output', 'General', 'Configuration', 'Valve', and 'Actuator'. The 'Configuration' tab is currently selected. The configuration is set to 'ZZ-RSTESTCASE' with a dropdown menu. The valve configuration is 'Globe - Balanced - Flow Over - Down to Close' and the actuator configuration is 'Diaphragm - Direct Acting'. The 'Configuration' tab contains a table with the following data:

Parameter	Dir	Value	Ref
Valve Configuration		Rising Stem	4
Valve Type		Globe	4
Bal / Unbal / Dbl Seated / Pilot		Balanced	4
Flow Direction		Flow Over	4
Valve Action		Push Down to Close	4
Actuator Type		Diaphragm	5
Actuator Action		Direct	5

Below the table is a large text area containing 'N/A'. At the bottom of the window, there is a status bar with the following information: 'Eric Solla', '08/01/2011 13:06', 'NOT APPROVED', and 'N/A'.

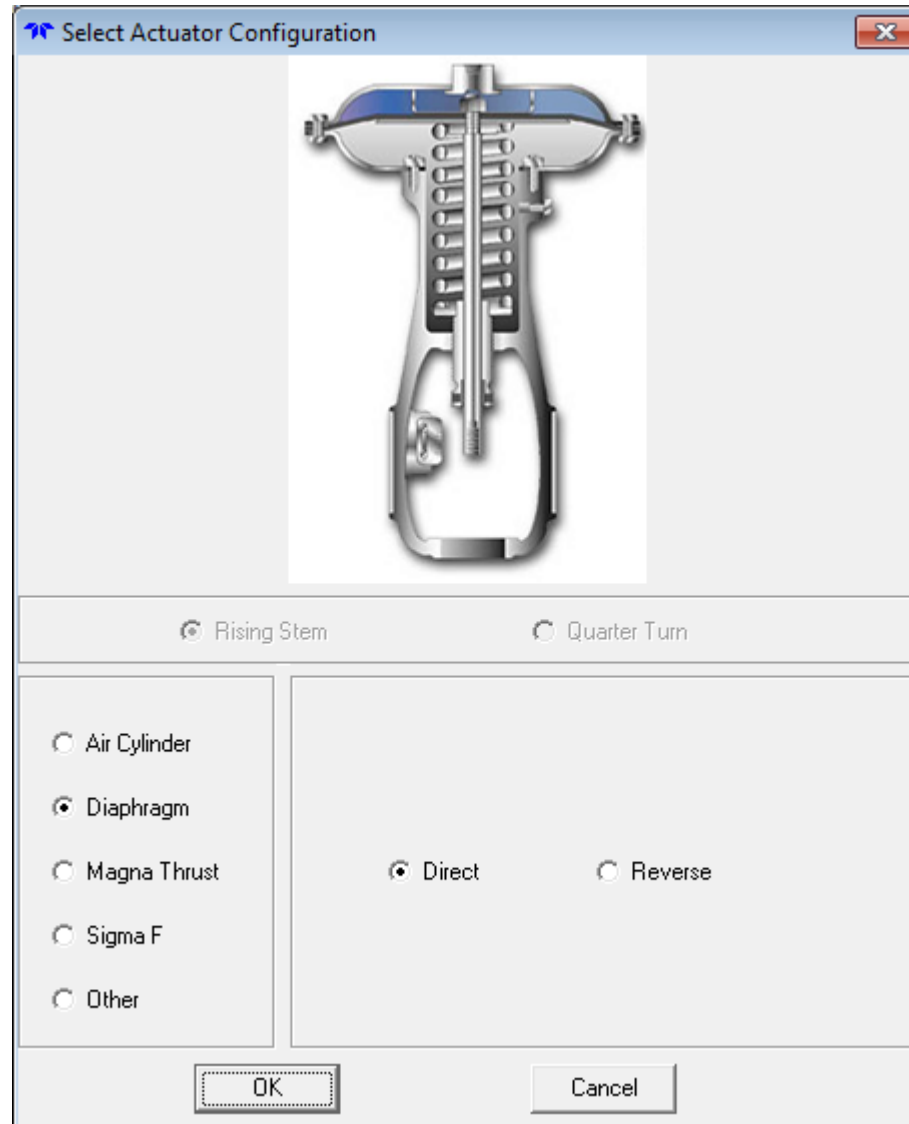
ACE Basics

Valve Configuration



ACE Basics

Actuator Configuration



ACE Basics

Configuration

The screenshot shows the ACE - ZZ-RSTESTCASE configuration window. The window title is "ACE - ZZ-RSTESTCASE". The menu bar includes File, Edits, Tables, References, and Help. The main configuration area is divided into several tabs: Packing, Accessories, Adjustment Factors, Output, General, Configuration, Valve, and Actuator. The Configuration tab is currently selected. The configuration is for a "Globe - Balanced - Flow Over - Down to Close" valve with a "Diaphragm - Direct Acting" actuator. The configuration table is as follows:

Parameter	Dir	Value	Ref
Valve Configuration		Rising Stem	4
Valve Type		Globe	4
Bal / Unbal / Dbl Seated / Pilot		Balanced	4
Flow Diection		Flow Over	4
Valve Action		Push Down to Close	4
Actuator Type		Diaphragm	5
Actuator Action		Direct	5

Below the table, there is a text area containing "N/A". At the bottom of the window, there is a status bar with the following information: Eric Solla, 08/01/2011 13:06, NOT APPROVED, N/A.

ACE Basics

Valve

ACE - ZZ-RSTESTCASE

File Edits Tables References Help

ZZ-RSTESTCASE

Globe - Balanced - Flow Over - Down to Close
Diaphragm - Direct Acting

Packing Accessories Adjustment Factors Output
General Configuration **Valve** Actuator

Parameter	Dir	Value	Ref
Manufacturer		Valve Manufacturer	2
Model		Model	3
Shop Order Number		SO Number	5
Serial Number		Serial	6
Valve Type		N/A	1
Size		4.00	4
DP Load used in MRSTC Calc	(C)	Alternate	1
Alternate value to use for the DP Load	(C)	200.0	10
DP Load used in MRSTO Calc	(O)	Calculated	1
Alternate value to use for the DP Load	(O)	100.0	9
Seal Friction Option		Alternate	1
Seal Ring Coefficient		0.000	1
Number of Seal Rings.		0	1
Seal Ring Width.		0.000	1
Static Seal Force.		0.0	1
Alternate Dynamic Seal Friction		0.0	1
Maximum Allowable Thrust (Weak Link)	(C)	12,000	14
Maximum Allowable Thrust Component	(C)	Close Component	16
Maximum Allowable Thrust (Weak Link)	(O)	11,000	15

Basis for the additional load input. - ALC Basis
Basis for the additional load input. - ALO Basis
Basis for the selection of the Cracking Option - Cracking Basis
Basis for the selection of the DP Load Close Option - DBLCBasis
Basis for the selection of the DP Load Open Option - DPLOBasis

Eric Solla 08/01/2011 13:06 NOT APPROVED N/A

ACE Basics

Actuator

ACE - ZZ-RSTESTCASE

File Edits Tables References Help

ZZ-RSTESTCASE

Globe - Balanced - Flow Over - Down to Close
Diaphragm - Direct Acting

Packing Accessories Adjustment Factors Output
General Configuration Valve **Actuator**

Parameter	Dir	Value	Ref
Manufacturer		Actuator Manufacturer	2
Model		Act Model	3
Size		Act Size	4
Shop Order Number		Act SO Number	5
Serial Number		Act Serial Number	6
Actuator Stem Diameter		0.750	1
Actuator Rated Travel		6.000	7
Diaphragm Effective Area - Extended		0.00	1
Diaphragm Effective Area - Extended - Tol (%Dec)		0.000	1
Diaphragm Effective Area - Retracted		0.00	1
Diaphragm Effective Area - Retracted - Tol (%Dec)		0.000	1
Actuator Spring Part Number		N/A	1
Fully Compressed (Solid) Spring Length		0.00	1
Spring free length (Uncompressed)		0.00	1
Maximum Safe Spring Force		0.0	1
Min and Max Spring Rate Calc Option		Vendor Supplied (lbf/in)	1
Measured Nominal Spring Rate		0.0	1
Uncertainty Associated with Measured Spring		0.00	1
Vendor Supplied Nominal Spring Rate		600.0	1

Notes on the Actuator Inputs - Actuator Comments
Basis for selecting the Option for Piston Breakaway Force - FB Basis
Basis for selection the Air Pressure Option - Air Pressure Discussion

Eric Solla 08/01/2011 13:06 NOT APPROVED N/A

ACE Basics

Accessories

The screenshot shows the ACE software interface for configuring accessories. The window title is "ACE - ZZ-RSTESTCASE". The menu bar includes "File", "Edits", "Tables", "References", and "Help". The current configuration is for "ZZ-RSTESTCASE" with a valve type of "Globe - Balanced - Flow Over - Down to Close" and a diaphragm type of "Diaphragm - Direct Acting".

The "Accessories" tab is selected, showing a tree view of accessory categories: Limit Switch, Positioner, SOV, Accumulator, Air Regulator, and Booster. The "Accumulator" sub-tab is active, displaying "Add Accumulator" and "Delete Accumulator" buttons.

Parameter	Dir	Value	Ref
Equipment ID		Accumulator 1	1
Manufacturer		Accumulator Manuf	2
Model Number		Accum Model	3
Shop Order Number		Accum SO Number	4
Serial Number		Accum SN	5
Accumulator Length		36.00	6
Accumulator Capacity		7.1	7
Maximum Rated Pressure		250.0	8

Below the table is a text area containing "N/A".

The status bar at the bottom shows: Eric Solla | 08/01/2011 13:06 | NOT APPROVED | N/A

ACE Basics

Adjustment Factors

The screenshot displays the 'ACE - ZZ-RSTESTCASE' software window. The title bar includes standard window controls. The menu bar contains 'File', 'Edits', 'Tables', 'References', and 'Help'. Below the menu bar, there are two dropdown menus: the first is set to 'ZZ-RSTESTCASE' and the second is set to 'Globe - Balanced - Flow Over - Down to Close'. Below these are two more dropdown menus: 'Diaphragm - Direct Acting' and 'Adjustment Factors:'. The 'Adjustment Factors' tab is active, showing a table with the following data:

Parameter	Dir	Value	Ref
Air Regulator Setpoint Drift (FS, %Decimal)		0.020	19
Air Regulator Setpoint Drift (OP, %Decimal)		0.010	20
Spring Rate Degradation (FS, %Decimal)		0.040	21
Spring Rate Degradation (OP, %Decimal)		0.030	22
Valve Factor Degradation (FS, %Decimal)		0.060	23
Valve Factor Degradation (OP, %Decimal)		0.050	24
Additional Margin (FS, %Decimal)		0.080	25
Additional Margin (OP, %Decimal)		0.070	26

Below the table is a text area labeled 'Adjustment Factor Comments'. At the bottom of the window, there is a status bar with the following information: 'Eric Solla', '08/01/2011 13:06', 'NOT APPROVED', and 'N/A'.

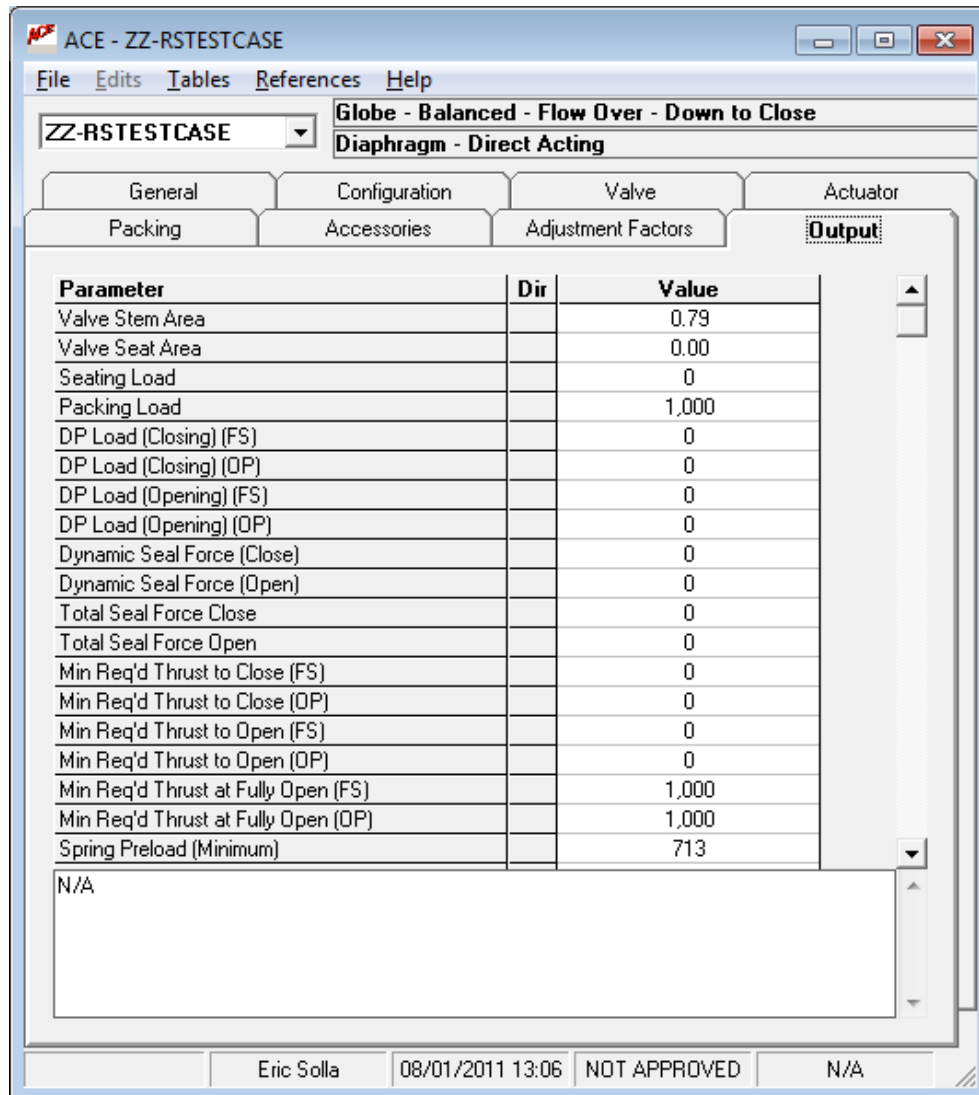
ACE Basics

- Other Inputs (Depending on Valve & Actuator Configuration)
 - Packing
 - Dynamic
 - Alt Dynamic
 - Alt Actuator
 - Coefficients

ACE Basics

Outputs

- Rising Stem



ACE - ZZ-RSTESTCASE

File Edits Tables References Help

ZZ-RSTESTCASE

Globe - Balanced - Flow Over - Down to Close
Diaphragm - Direct Acting

General Configuration Valve Actuator
Packing Accessories Adjustment Factors **Output**

Parameter	Dir	Value
Valve Stem Area		0.79
Valve Seat Area		0.00
Seating Load		0
Packing Load		1,000
DP Load (Closing) (FS)		0
DP Load (Closing) (OP)		0
DP Load (Opening) (FS)		0
DP Load (Opening) (OP)		0
Dynamic Seal Force (Close)		0
Dynamic Seal Force (Open)		0
Total Seal Force Close		0
Total Seal Force Open		0
Min Req'd Thrust to Close (FS)		0
Min Req'd Thrust to Close (OP)		0
Min Req'd Thrust to Open (FS)		0
Min Req'd Thrust to Open (OP)		0
Min Req'd Thrust at Fully Open (FS)		1,000
Min Req'd Thrust at Fully Open (OP)		1,000
Spring Preload (Minimum)		713
N/A		

Eric Solla 08/01/2011 13:06 NOT APPROVED N/A

ACE Basics

Margin Review

Margin Review - Globe - Balanced - Flow Over - Down to Close

Optimize Exit

Capability Margin Pressure Rating Spring Margin Weak Link Setpoints

Operability Margin	Close	Open	Full Open	
Min. Required Thrust (MRST):	0	0	1,000	lbf.
Actuator Output (FA):	0	0	0	lbf.
Margin (Margin):	0.0	0.0	0.0	%

Setup Margin	Close	Open	Full Open	
Min. Required Thrust (MRST):	0	0	1,000	lbf.
Actuator Output (FA):	0	0	0	lbf.
Margin (Margin):	0.0	0.0	0.0	%

ACE Basics

Optimize Setup

Optimized Setup Range ✕

Exit

OPTIMIZED SETUP RANGES FOR 0% MARGINS
FOR INFORMATION ONLY
ZZ-RSTESTCASE

FAIL POSITION: Open ACTION: Push Down to Close

	Minimum	Maximum	
Spring Preload	<input type="text" value="0"/>	<input type="text" value="0"/>	lbf.
Lower Bench Set	<input type="text" value="0"/>	<input type="text" value="0"/>	psig.
Air Set	<input type="text" value="0"/>	<input type="text" value="0"/>	psig.

	Nominal		Tolerance
Spring Preload	<input type="text" value="0"/>	lbf +/-	<input type="text" value="0"/>
Lower Bench Set	<input type="text" value="0"/>	psig +/-	<input type="text" value="0"/>
Air Set	<input type="text" value="0"/>	psig +/-	<input type="text" value="0"/>

Based on the following Assumptions:

Actual Packing Load < lbf

lbf/in < Actual Spring Rate < lbf/in

sq in < Actuator Area Extended < sq in

sq in < Actuator Area Retracted < sq in

CHANGE: TO:

ACE Basics

Minimum Required Thrust

Minimum Required Thrust - Diaphragm - Direct Acting

Print Exit

Parameter	Dir	Value	Units
Valve Stem Area		0.79	sq. in.
Valve Seat Area		0.00	sq. in.
Seating Load		0	lbf.
Packing Load		1,000	lbf.
Dynamic Seal Force (Close)		0	lbf.
Dynamic Seal Force (Open)		0	lbf.
Total Seal Force Close		0	lbf.
Total Seal Force Open		0	lbf.

Parameter	Dir	Operability	Setup	Units
DP Load (Closing)		0	0	psig.
DP Load (Opening)		0	0	psig.
Min Req'd Thrust to Close		0	0	lbf.
Min Req'd Thrust to Open		0	0	lbf.
Min Req'd Thrust at Fully Open		1,000	1,000	lbf.

ACE Basics

Actuator Output

Actuator Output - Diaphragm - Direct Acting

Print Exit

Parameter	Dir	Value	Units
Spring Preload (Minimum)		713	lbf.
Spring Preload (Maximum)		788	lbf.
Min. Spring Rate (Derived)		540	lbf./in.
Max. Spring Rate (Derived)		660	lbf./in.
Upper Bench Set (Maximum)		3,758	lbf.
Minimum Air Pressure		0.00	psig.

Parameter	Dir	Operability	Setup	Units
Upper Bench Set (Minimum)		3,070	3,046	lbf.
Force Output to Retract		3,070	3,046	lbf.
Force Output to Extend		0	0	lbf.
Force Output at Fully Retracted		713	713	lbf.
Force Output at Fully Extended		-3,758	-3,758	lbf.

ACE Basics

Outputs - Quarter Turn

ACE Calculations for All Plants ALL VALVES

File Edits System Tables References Help

ZZ-QTTESTCASE Quarter Turn - Triple Offset - Shaft Upstream
Scotch Yoke - Spring Return - Fail Close

General Configuration Valve Actuator Accessories Adjustment Factors
Dynamic Alt Dynamic Alt Actuator Coefficients **Output**

Parameter	Dir	Value
Packing Torque - TP		6.0
Seating Torque - TS		211.5
Unseating Torque - TUS		211.5
Hydrostatic Torque - THS		0.0
Maximum Minimum Required Thrust to Close - MaxMRSTC_Fs		320.0
Maximum Minimum Required Thrust to Open - MaxMRSTO_Fs		330.0
Spring Preload (Minimum) - SPmin		0
Spring Preload (Maximum) - SPmax		0
Min. Spring Rate (Derived) - SRMin		0
Max. Spring Rate (Derived) - SRMax		0
Minimum Air Pressure - P Amin		0.00
Piston Breakaway Force - FB		0
Maximum Required Spring Preload (FS) - MaxSPReq_Fs		0.0
Maximum Required Spring Preload (DP) - MaxSPReq_Dp		0.0
Maximum Required Actuator Supply Pressure (FS) - MaxPReq_Fs		0.0
Maximum Required Actuator Supply Pressure (DP) - MaxPReq_Dp		0.0
Minimum Required Torque at Seating (FS) - TTS_Fs		320.0
Minimum Required Torque at Seating (DP) - TTS_Dp		320.0
Minimum Required Torque at Unseating (FS) - TTUS_Fs		330.0
Minimum Required Torque at Unseating (DP) - TTUS_Dp		330.0
Maximum Air Pressure - P Amax		150.00
Available Pressure vs. Design Pressure Limit (FS) - MPress_FS		-24.8
Available Pressure vs. Design Pressure Limit (DP) - MPress_OP		-30.3
Max. Spring Preload Allowed (FS) - SPAllowed_FS		0
Max. Spring Preload Allowed (DP) - SPAllowed_OP		0
Spring Preload Allowed vs. Max Spring Preload (FS) - MSpring_FS		0.0
Spring Preload Allowed vs. Max Spring Preload (DP) - MSpring_DP		0.0
Max Torque Output at Seating or Unseating (FS) - T Aseatmax_Fs		370.0
Max Torque Output at Seating or Unseating (DP) - T Aseatmax_Dp		370.0
Max Require Torque at Seating or Unseating (FS) - T Amax_Fs		320.0
Max Require Torque at Seating or Unseating (DP) - T Amax_Dp		320.0
Maximum Required Torque at Seat (FS) - TREQD.seatmax_Fs		330.0
N/A		

Eric Solla 08/09/2011 16:14 NDT APPROVED N/A

ACE Basics

Margin Review

Margin Review												
Exit												
Act Capability			Pressure		Spring		Structural		Setpoints			
Angle (degrees)	Field Setup						Operability					
	MRT	MRT	TA	TA	Margin	Margin	MRT	MRT	TA	TA	Margin	Margin
	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (%)	Open (%)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (%)	Open (%)
0	320.0	330.0	300.0	370.0	-6.3	12.1	320.0	330.0	300.0	370.0	-6.3	12.1
1	17.0	0.0	257.0	320.0	1,411.8	0.0	17.0	0.0	257.0	320.0	1,411.8	0.0
2	17.0	0.0	225.0	286.0	1,223.5	0.0	17.0	0.0	225.0	286.0	1,223.5	0.0
3	17.0	0.0	202.0	257.0	1,088.2	0.0	17.0	0.0	202.0	257.0	1,088.2	0.0
4	17.0	0.0	185.0	235.0	988.2	0.0	17.0	0.0	185.0	235.0	988.2	0.0
5	17.0	0.0	171.0	219.0	905.9	0.0	17.0	0.0	171.0	219.0	905.9	0.0
10	17.0	0.0	161.0	207.0	847.1	0.0	17.0	0.0	161.0	207.0	847.1	0.0
15	17.0	0.0	154.0	198.0	805.9	0.0	17.0	0.0	154.0	198.0	805.9	0.0
20	17.0	0.0	149.0	187.0	776.5	0.0	17.0	0.0	149.0	187.0	776.5	0.0
25	17.0	0.0	147.0	190.0	764.7	0.0	17.0	0.0	147.0	190.0	764.7	0.0
30	17.0	0.0	145.0	193.0	752.9	0.0	17.0	0.0	145.0	193.0	752.9	0.0
35	17.0	0.0	146.0	195.0	758.8	0.0	17.0	0.0	146.0	195.0	758.8	0.0
40	17.0	0.0	149.0	199.0	776.5	0.0	17.0	0.0	149.0	199.0	776.5	0.0
45	17.0	0.0	153.0	208.0	800.0	0.0	17.0	0.0	153.0	208.0	800.0	0.0
50	17.0	0.0	160.0	210.0	841.2	0.0	17.0	0.0	160.0	210.0	841.2	0.0
55	17.0	0.0	169.0	211.0	894.1	0.0	17.0	0.0	169.0	211.0	894.1	0.0
60	17.0	0.0	183.0	211.0	976.5	0.0	17.0	0.0	183.0	211.0	976.5	0.0
65	17.0	0.0	198.0	212.0	1,064.7	0.0	17.0	0.0	198.0	212.0	1,064.7	0.0
70	17.0	0.0	221.0	238.0	1,200.0	0.0	17.0	0.0	221.0	238.0	1,200.0	0.0
75	17.0	0.0	223.0	261.0	1,211.8	0.0	17.0	0.0	223.0	261.0	1,211.8	0.0
80	17.0	0.0	230.0	291.0	1,252.9	0.0	17.0	0.0	230.0	291.0	1,252.9	0.0
85	17.0	0.0	234.0	295.0	1,276.5	0.0	17.0	0.0	234.0	295.0	1,276.5	0.0
90	17.0	0.0	250.0	300.0	1,370.6	0.0	17.0	0.0	250.0	300.0	1,370.6	0.0

ACE Basics

Minimum Required Torque

Minimum Required Torque												
Exit	Constant Results				Angle Dependant Results				Choking			
Angle (degrees)	Hydrodynamic Torque		Bearing Torque				Eccentricity		Min Required Torque			
	TD	TD	TB FS	TB FS	TB Op	TB Op	TE	TE	MRST FS	MRST FS	MRST Op	MRST Op
	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)
0	0.00	0.00	13.3	13.3	13.3	13.3	23.6	23.6	320.0	330.0	320.0	330.0
1	-1.19	1.19	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
2	-2.38	2.38	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
3	-3.56	3.56	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
4	-4.75	4.75	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
5	-5.94	5.94	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
10	-11.68	11.68	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
15	-18.02	18.02	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
20	-21.38	21.38	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
25	-29.11	29.11	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
30	-41.38	41.38	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
35	-54.05	54.05	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
40	-75.83	75.83	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
45	-106.52	106.52	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
50	-145.33	145.33	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
55	-205.92	205.92	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
60	-279.97	279.97	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
65	-382.14	382.14	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
70	-524.30	524.30	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
75	-684.49	684.49	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
80	-724.68	724.68	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
85	-643.50	643.50	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
90	-425.25	425.25	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0

ACE Basics

Actuator Output

Actuator Output														
Exit														
Constant Results								Angle Dependant Results						
Angle (degrees)	Field Setup							Operability						
	TA Close (ft-lbs)	TA Open (ft-lbs)	TA Max Close (ft-lbs)	TA Max Open (ft-lbs)	PReq Close (psig)	PReq Open (psig)	SPReq (lbf)	TA Close (ft-lbs)	TA Open (ft-lbs)	TA Max Close (ft-lbs)	TA Max Open (ft-lbs)	PReq Close (psig)	PReq Open (psig)	SPReq (lbf)
0	300.0	370.0	300.0	370.0	0.0	0.0	0.0	300.0	370.0	300.0	370.0	0.0	0.0	0.0
1	257.0	320.0	257.0	320.0	0.0	0.0	0.0	257.0	320.0	257.0	320.0	0.0	0.0	0.0
2	225.0	286.0	225.0	286.0	0.0	0.0	0.0	225.0	286.0	225.0	286.0	0.0	0.0	0.0
3	202.0	257.0	202.0	257.0	0.0	0.0	0.0	202.0	257.0	202.0	257.0	0.0	0.0	0.0
4	185.0	235.0	185.0	235.0	0.0	0.0	0.0	185.0	235.0	185.0	235.0	0.0	0.0	0.0
5	171.0	219.0	171.0	219.0	0.0	0.0	0.0	171.0	219.0	171.0	219.0	0.0	0.0	0.0
10	161.0	207.0	161.0	207.0	0.0	0.0	0.0	161.0	207.0	161.0	207.0	0.0	0.0	0.0
15	154.0	198.0	154.0	198.0	0.0	0.0	0.0	154.0	198.0	154.0	198.0	0.0	0.0	0.0
20	149.0	187.0	149.0	187.0	0.0	0.0	0.0	149.0	187.0	149.0	187.0	0.0	0.0	0.0
25	147.0	190.0	147.0	190.0	0.0	0.0	0.0	147.0	190.0	147.0	190.0	0.0	0.0	0.0
30	145.0	193.0	145.0	193.0	0.0	0.0	0.0	145.0	193.0	145.0	193.0	0.0	0.0	0.0
35	146.0	195.0	146.0	195.0	0.0	0.0	0.0	146.0	195.0	146.0	195.0	0.0	0.0	0.0
40	149.0	199.0	149.0	199.0	0.0	0.0	0.0	149.0	199.0	149.0	199.0	0.0	0.0	0.0
45	153.0	208.0	153.0	208.0	0.0	0.0	0.0	153.0	208.0	153.0	208.0	0.0	0.0	0.0
50	160.0	210.0	160.0	210.0	0.0	0.0	0.0	160.0	210.0	160.0	210.0	0.0	0.0	0.0
55	169.0	211.0	169.0	211.0	0.0	0.0	0.0	169.0	211.0	169.0	211.0	0.0	0.0	0.0
60	183.0	211.0	183.0	211.0	0.0	0.0	0.0	183.0	211.0	183.0	211.0	0.0	0.0	0.0
65	198.0	212.0	198.0	212.0	0.0	0.0	0.0	198.0	212.0	198.0	212.0	0.0	0.0	0.0
70	221.0	238.0	221.0	238.0	0.0	0.0	0.0	221.0	238.0	221.0	238.0	0.0	0.0	0.0
75	223.0	261.0	223.0	261.0	0.0	0.0	0.0	223.0	261.0	223.0	261.0	0.0	0.0	0.0
80	230.0	291.0	230.0	291.0	0.0	0.0	0.0	230.0	291.0	230.0	291.0	0.0	0.0	0.0
85	234.0	295.0	234.0	295.0	0.0	0.0	0.0	234.0	295.0	234.0	295.0	0.0	0.0	0.0
90	250.0	300.0	250.0	300.0	0.0	0.0	0.0	250.0	300.0	250.0	300.0	0.0	0.0	0.0

ACE Basics

References

The screenshot shows a software window titled "All References" with a menu bar containing "Find", "Sort", and "Exit". Below the menu bar is a table with the following columns: "Index", "Document #", "Rev #", "Date", and "Title". The table contains several rows of reference data. An "Edit Reference # 15" dialog box is overlaid on the table, allowing the user to modify the details for the reference at index 15. The dialog box has fields for "Document #", "Rev #", "Date", and "Title". The "Document #" field contains "NP-6660-D", the "Rev #" field contains "0", and the "Date" field contains "3/1/1990". The "Title" field contains "EPRI Application Guide for Motor Operated Valves in Nuclear Power Plants". The dialog box also has "OK" and "Cancel" buttons.

Index	Document #	Rev #	Date	Title
11	FP-PE-MOV-01	1		Grouping of MOVs for Selection of Test Frequency Program Position Paper
12	Limited Method			Used in the Valves
13	SEL-4			Kerotest
14	NE-15			Valves
15	NP-6660-D	0	3/1/1990	EPRI Application Guide for Motor Operated Valves in Nuclear Power Plants
16	NX-33			tors
17	1707			
18	SEL-4			
19	Altran 94111-C-02	0	4/20/1994	Valve Thrust Calculation for 10" Crane 300# Gate Valve Cat. No. 63174-U, Valves MV-32084, MV-32085, MV-320187, MV-32188
20	Crane Letter	0	5/12/1994	MV-32084, MV-32085, MV-32187 Yoke (10") Analysis From David B. Dwyer Crane & Seal

Buttons: Edit, Add

ACE Tools

- Export to Excel – provides the capability to export any input or output parameters for a user defined valve selection to an Excel spreadsheet

ACE Software



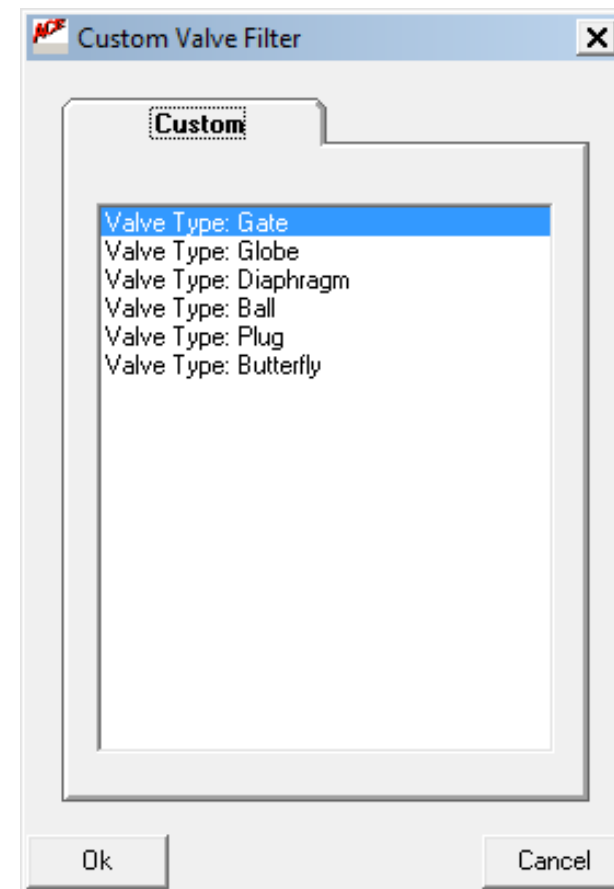
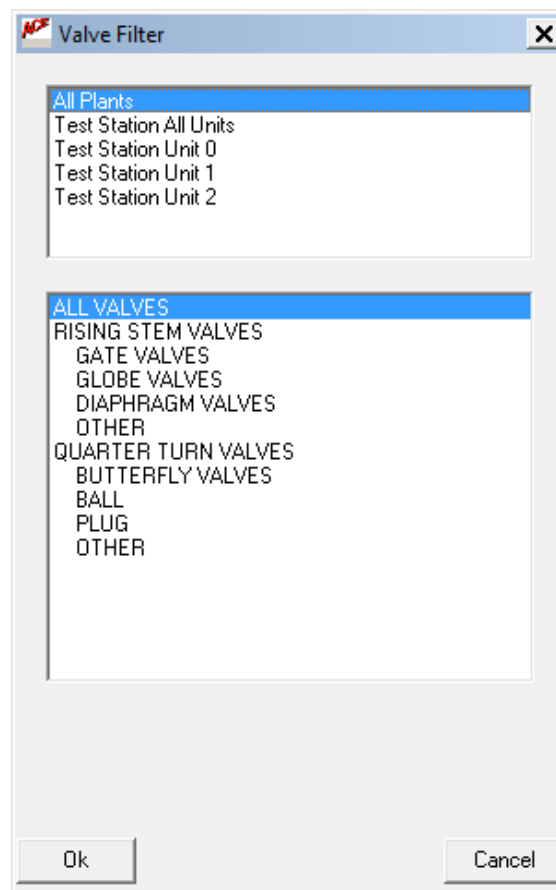
ACE, ACEDP & ACETest Version 4.1

- **SQL Compatible**

ACE Software

ACE, ACEDP & ACETest Version 4.1

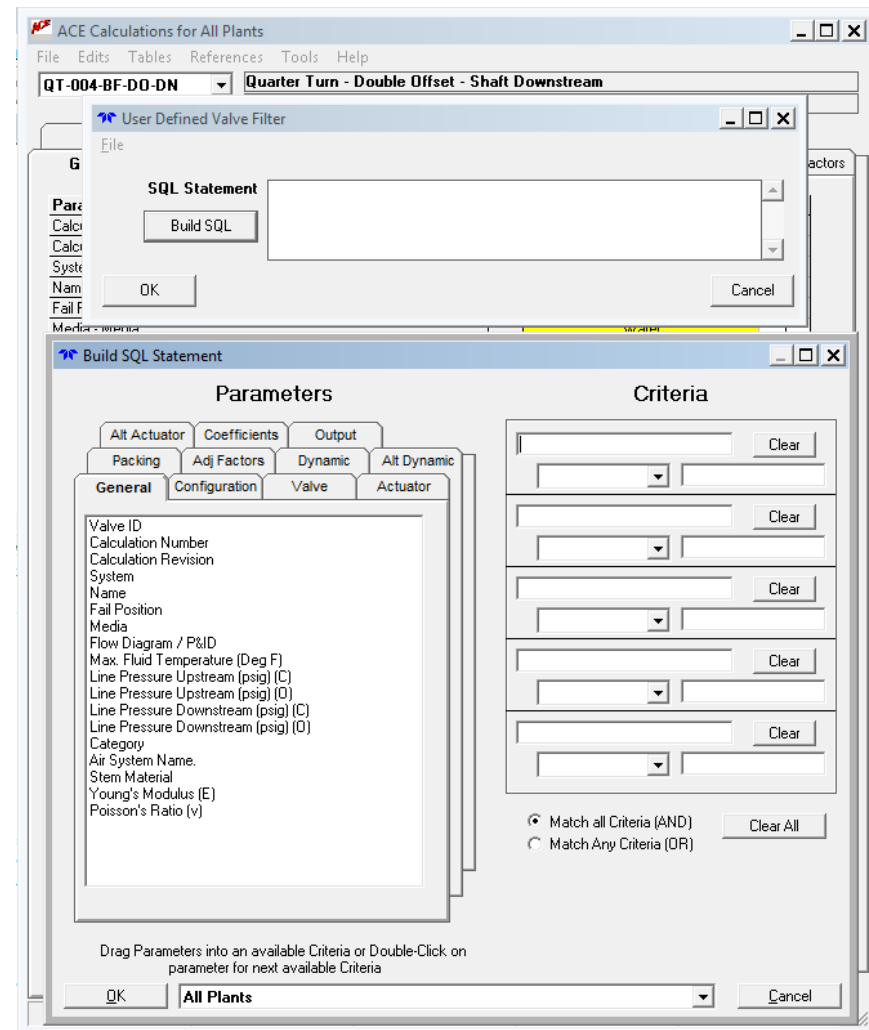
- Custom Filters Added (Similar to Midas)



ACE Software

ACE, ACEDP & ACETest Version 4.1

- **User Defined Filter Added (Similar to Midas)**



ACE Software

ACE, ACEDP & ACETest Version 4.1

- Verify Software

The screenshot displays two overlapping windows from the ACE software. The top window, titled "Verification History for ACE 2012.318 11/13/2012 09:19:50 Version 4.1", shows a table with one entry for Test 1, prepared by Eric Solla on 11/13/12 at 09:20:14 on computer MRNENPC34, with revision 2012.318 and a status of NOT ACCEPTABLE. The bottom window, titled "Verification History Details for Test 1", provides more information: ACE 2012.318 is installed on MRNENPC34, the test was prepared by Eric Solla on 11/13/12 at 09:20:14, and the most recent date of last edit is 10/30/12 at 10:25:33 for QT-004-BF-DO-DN. The overall status is highlighted in red as "OVERALL STATUS IS NOT ACCEPTABLE". Below this, a detailed table lists various valves and their test results.

Test	Prepared By	Date of Test	Computer	Revision	Status
1	Eric Solla	11/13/12 09:20:14	MRNENPC34	2012.318	NOT ACCEPTABLE

Valve	Prepared By	Last Edit Information	Status	Notes
QT-001-BF-Sym	Eric Solla	10/12/12 15:19:39	FAIL	UNEXPECTED
QT-002-BF-SO-DN	Rich Enos	12/23/11 08:55:10	FAIL	UNEXPECTED
QT-003-BF-SO-UP	Rich Enos	12/23/11 12:10:47	FAIL	UNEXPECTED
QT-004-BF-DO-DN	Eric Solla	10/30/12 10:25:33	PASS	N/A
QT-005-BF-DO-UP	Rich Enos	12/23/11 17:03:31	FAIL	UNEXPECTED
QT-006-BF-TO-DN	Rich Enos	12/23/11 14:40:54	FAIL	UNEXPECTED
QT-007-BF-TO-UP	Rich Enos	12/23/11 13:59:36	FAIL	UNEXPECTED
QT-008-BF-Sym	Rich Enos	12/23/11 18:38:57	FAIL	UNEXPECTED
QT-009-BF-Sym	Rich Enos	12/23/11 18:39:39	FAIL	UNEXPECTED
QT-010-BF-SO-DN	Rich Enos	12/23/11 18:39:57	FAIL	UNEXPECTED
QT-011-BF-SO-UP	Rich Enos	12/23/11 18:40:48	FAIL	UNEXPECTED
QT-012-BF-DO-DN	Rich Enos	12/23/11 11:38:41	FAIL	UNEXPECTED
QT-013-BF-DO-UP	Rich Enos	12/23/11 18:38:04	FAIL	UNEXPECTED
QT-014-BF-TO-DN	Rich Enos	12/23/11 18:41:31	FAIL	UNEXPECTED
QT-015-Ball	Rich Enos	12/23/11 18:37:20	PASS	N/A
QT-016-Plug	Rich Enos	12/23/11 18:36:58	PASS	N/A
QT-017-Other	Rich Enos	12/23/11 18:36:03	PASS	N/A
RS-001-GT-FW	Rich Enos	12/22/11 08:39:10	PASS	N/A
RS-002-GT-SW	Rich Enos	12/22/11 08:01:34	PASS	N/A
RS-003-GT-DD	Rich Enos	12/22/11 08:47:16	FAIL	UNEXPECTED
RS-004-GT-Spw	Rich Enos	12/22/11 15:40:11	PASS	N/A
RS-005-GT-PS	Rich Enos	12/22/11 15:41:32	PASS	N/A

ACE Software

ACE Version 4.1

EPRI Butterfly Methodology

- Added Compressible Fluids
- Added Custom Form

The screenshot shows the 'EPRI Butterfly Methodology' software window. It features a 'Return' button and a 'General Information' tab. The interface is divided into 'System' and 'Coefficients' sections. A table lists various parameters with their values and reference numbers. Some values are highlighted in yellow. At the bottom, a summary table shows calculated torque values for different operations.

Parameter	Value	Ref
Shaft Location	Shaft Downstream	1
ShaftType	Double Offset	1
Eccentricity Torque Calc Option	Calculated	1
Eccentricity Option	Assists Opening	1
Eccentricity	1.125	1
Valve Disc Aspect Ratio (thick/dia)	0.00	1
Valve Disk Diameter (in)	5.875	1
Valve Stem Orientation (deg from vertical)	0.00	1
Valve Stem Diameter	1.500	1
Packing Torque (ft-lbs)	6.0	1
Hydrostatic Torque	Assist Opening	1
	Alternate (ft-lbf)	1
Alt (lbf):	10.0	1

Packing Torque (TP)	6.0	ft-lbs.
Seating Torque (TS)	202.8	ft-lbs.
Unseating Torque (TUS)	21.6	ft-lbs.
Hydrostatic Torque (THS)	10.0	ft-lbs.
	Oper.	Setup
Total Seating Torque (TTS)	475.3	475.3 ft-lbs.
Total Unseating Torque (TTUS)	27.8	27.8 ft-lbs.

ACE Software

ACE Version 4.1 Bench Set Configuration

- Added Custom Form

Bench Set Configuration [Return] [X]

Spring Rate

<input type="radio"/> Not Req'd Due to Field Upper Bench Set	Value	Ref		Value	Ref
<input type="radio"/> Measured (lbf/in):	0.0	1	+/-	0.000	1
<input checked="" type="radio"/> Vendor (lbf/in):	330.0	1	+/-	0.030	1

Bench Set / Spring Preload

	Value	Ref		Value	Ref
<input type="radio"/> Field Bench Settings (psig):	Lower: 0.00	1			
	Upper: 0.00	1	+/-	0.000	1
<input type="radio"/> Measured Spring Preload (lbf):	Measured: 0.0	1	+/-	0.000	1
<input checked="" type="radio"/> Vendor Pressure-Nominal (psig):	Nominal: 18.00	1	+/-	0.050	1
<input type="radio"/> Vendor Pressure-Range (psig):	Min: 0.00	1	Max:	0.00	1
<input type="radio"/> Vendor Force-Nominal (lbf):	Nominal: 0.0	1	+/-	0.000	1
<input type="radio"/> Vendor Force-Range (lbf):	Min: 0.0	1	Max:	0.0	1
Vendor Upper Bench Set: (For Info Only)	lbf: 0.0	1	psig:	0.00	1

ACE Software

ACE Version 4.1

Air Pressure Configuration

- Added Custom Form

Air Pressure Configuration

Return

Air Pressure

	<u>Value</u>	<u>Ref</u>		<u>Value</u>	<u>Ref</u>
<input type="radio"/> Air Regulator Setting(psig):	0.0	1	+/-	0.000	1
<input type="radio"/> System Supplied Air Pressure (psig):	0.0	1	Min:	0.0	1
<input checked="" type="radio"/> Vendor Recommended Min. Setting (psig):	30.0	1	Max:	0.0	1
Vendor Actuator Maximum Rating (psig):	100.0	1			



ACE Software

Thank you

USER FEEDBACK?