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LOCAL FUEL PLC

SHOREHAM OIL TERMINAL

OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM

TESTING MANUAL

Contents

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CHEVRON UK LTD

BRIGHTON TERMINAL

GASOLINE OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM

FACTORY ACCEPTANCE TEST PROCEDURE

Rev	Date	By	Checked	Approved	Description	Client Ref.
A	10.04.08	D.S.Regan	DRR	DRR	Original Issue	
B	09.07.08	S. Micklewright	DRP	DRR	Panel Test	Document No.
C	22.10.13	D.S.Regan	DBF	DSR	Rebuilt Panel Test	**SI157035_RPT**
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IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

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Revision History

Revision A	Original Issue
Revision B	Revised for FAT
Revision C	Revised following Panel Rebuild Trip Amplifiers changed. Drawings and documentation Revisions Revised

1.0 INTRODUCTION

This procedure details the requirements for the testing and acceptance of a Safety Instrument System control panel.

The panel is designed for ten individual Safety Instrumented Functions.

This FAT is part of the life cycle approach required for Safety Instrument Systems as required in EN IEC 61511-1:2004 Section 13 where the objectives are to ensure the logic solver satisfies the requirements defined in the Safety Instrument System Specification and all elements perform correctly. No software is employed in this SIS; hence the tests involve hardware checks only.

All Test results including documentation verification are recorded in this document. Any failure during the test must be documented and analysed together with details of the appropriate corrective action.

2.0 DOCUMENTATION VERIFICATION

Purpose of Test			
Verify Correct Documentation used for testing.			
Method of Test			
• Confirm documentation and revisions used for testing.			
Permit To Work Number	N/R	**Permit To Work Type**	N/R
Safety Instrument System Documentation Manual SI157001.MNL Revision			
Drawing Number	**Title**		**Revision**
SI157120	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 1		D
SI157121	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 2		C
SI157122	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 3		E
SI157123	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 4		E
SI157124	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 5		E
SI157125	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 6		E
SI157216	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 7		D
SI157227	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 8		B
SI157130	Gasoline Import SIS Monitoring Panel External Layout		D
SI157131	Gasoline Import SIS Monitoring Panel Internal Layout		E
SI157001.SPC	Tank Level Switch (Floating Roof)		B
SI157002.SPC	Tank Level Switch (Fixed Roof)		B
SI157003.SPC	3" Actuated valve		B
SI157004.SPC	8" Actuated valve		B
SI157005.SPC	Annunciator		B
SI157006.SPC	10" Pipeline Import Actuated valve		B
Reports	**Title**		**Revision**
SI157003.RPT	Brighton Terminal Safety Instrument System		B
Actions/Comments			
SPC NOT APPLICABLE TO PANEL PART. CE303001_HOR - HANDOVER CERTIFICATE CE303002_HOR - SNAG LIST.			
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)		**Sign**	**Date**
Tested by			25/10/13

3.0 INSPECTION

Equipment Required	
mA Source, multimeter	
Purpose of Test	
To verify the panel is constructed in accordance with design.	
Method Of Test	**Result**
1. Panel physical construction and paintwork satisfactory.	DRL.
2. Gland plates fitted.	BOTTOM ONLY. PANEL TOP LATER.
3. Doors & locks operational.	DRL.
4. Equipment mountings secure.	DRL
5. External panel layout and identification conforms to SI157030.	DRL FASTNER REQ.
6. Internal panel layout and identification conforms to SI157031.	DRL.
7. Equipment conforms to instrument specifications.	SPC N/A.
8. Terminals type and numbering conforms to SI157020, SI157021, SI1570222, SI157023, SI157024, SI157025, SI157026 and SI157027.	DRL.
9. Panel wire feruling conforms to SI157020, SI157021, SI1570222, SI157023, SI157024, SI157025, SI157026 and SI157027.	DRL.
10. Panel wire gauge and colour conforms to panel specification.	DRL TERMINALS TO UPDATE.
11. Fuse ratings conform to SI157020.	DRL.
12. An equipment voltage rating correct and conforms to specifications.	DRL
13. Termination and crimps tight.	DRL.
14. Panel earthing correct.	DRL.
15. Point to point wiring correct to SI157020, SI157021, SI1570222, SI157023, SI157024, SI157025 , SI157026 and SI157027 and has been completed.	DRL
Actions/Comments	
7. NEED SPC FOR TRIP AMPS.	

Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by	DRL	25/10/13

4.0 FUNCTIONAL TESTING

Equipment Required	
Multimeter	
Purpose of Test	
To verify the correct function of the logic associated with the gasoline import safety instrument system overfill protection monitoring panel.	
Method Of Test	**Result**
1. Remove all 24Vdc fuses.	✓
2. Power up 230Vac to panel. Record dc power supply output voltage.	24 Vdc
3. Insert 24V fuse 1.	✓
4. *ESD Status Tests.*	
5. Simulate ESD healthy by linking terminals TB1/1 and TB1/2. Confirm Relays R088, R124 and R164 energise.	✓
6. *Tank 1 Safety Relay Tests.*	
7. Insert 24V fuse 2, 24V fuse 13.	✓
8. Confirm R245 & R252 remain de-energized, status output signal on TB5/1 and TB5/2 is open circuit, status output signal TB6/1 and TB6/2 is open circuit and status output signal TB7/1 and TB7/2 is open circuit.	✓
9. Simulate a safe level in Tank 1 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS01. Confirm Relay R245 energises. Confirm Relay R252 remains de-energised. Confirm status output signal on TB5/1 and TB5/2 is made, status output signal TB6/1 and TB6/2 is made and status output signal TB7/1 and TB7/2 is open circuit. Confirm open circuit between terminals TB3/1 and TB3/2 and between terminals TB3/7 and TB3/8.	16mA ✓
10. Press the East Bund reset pushbutton. Confirm Relay R252 energises. Confirm circuit made between terminals TB3/1 and TB3/2. Confirm circuit made between terminals TB3/7 and TB3/8. Confirm status output signal TB7/1 and TB7/2 is made.	✓
11. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R245 and Relay R252 de-energise Confirm open circuit between terminals TB3/1 and TB3/2. Confirm open circuit between terminals TB3/7 and TB3/8. Confirm status output signal on TB5/1 and TB5/2 is open circuit, status output signal TB6/1 and TB6/2 is open circuit and status output signal TB7/1 and TB7/2 is open circuit.	↓15mA ✓
12. Simulate a safe level in Tank 1 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS12. Confirm Relay R245 energises. Confirm Relay R252 remains de-energised.	16mA ✓
13. Press the East Bund reset pushbutton. Confirm Relay R252 energises. Confirm circuit made between terminals TB3/1 and TB3/2. Confirm circuit made between terminals TB3/7 and TB3/8. Confirm status output signal on TB5/1 and TB5/2 is made, status output signal TB6/1 and TB6/2 is made and status output signal TB7/1 and TB7/2 is made.	✓

1.0 Functional Testing (Cont.)

Method Of Test	Result
14. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R245 and Relay R252 de-energise. Confirm open circuit between terminals TB3/1 and TB3/2. Confirm open circuit between terminals TB3/7 Confirm status output signal on TB5/1 and TB5/2 is open circuit, status output signal TB6/1 and TB6/2 is open circuit and status output signal TB7/1 and TB7/2 is open circuit.	
15. Reinstate a safe level in Tank 1 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS01. Confirm Relay R245 energises. Confirm Relay R252 remains de-energised.	
16. Press the East Bund reset pushbutton. Confirm system resets	
17. Confirm circuit made between terminals TB3/3 and TB3/4. Confirm circuit made between terminals TB3/5 and TB3/6. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB3/3 and TB3/4. Confirm open circuit between terminals TB3/5 and TB3/6.	
18. Replace link between TB1/1 and TB1/2.	
19. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB3/3 and TB3/4. Confirm circuit made between terminals TB3/5 and TB3/6.	
20. Tank 2 Safety Relay Tests.	
21. Insert 24V fuse 3.	
22. Confirm R245 & R252 remain de-energized, status output signal on TB5/3 and TB5/4 is open circuit, status output signal TB6/3 and TB6/4 is open circuit and status output signal TB7/3 and TB7/4 is open circuit.	
23. Simulate a safe level in Tank 2 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS02. Confirm Relay R285 energises. Confirm Relay R292 remains de-energised. Confirm status output signal on TB5/3 and TB5/4 is made, status output signal TB6/3 and TB6/4 is made and status output signal TB7/3 and TB7/4 is open circuit. Confirm open circuit between terminals TB3/9 and TB3/10 and between terminals TB3/15 and TB3/16.	
24. Press the East Bund reset pushbutton. Confirm Relay R292 energises. Confirm circuit made between terminals TB3/9 and TB3/10 and between terminals TB3/15 and TB3/16. Confirm status output signal TB7/3 and TB7/4 is made.	
25. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R285 and Relay R292 de-energise. Confirm status output signal on TB5/3 and TB5/4 is open circuit, status output signal TB6/3 and TB6/4 is open circuit and status output signal TB7/3 and TB7/4 is open circuit. Confirm open circuit between terminals TB3/9 and TB3/10 and between terminals TB3/15 and TB3/16.	
26. Simulate a safe level in Tank 2 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS14. Confirm Relay R285 energises. Confirm Relay R292 remains de-energised.	
27. Press the East Bund reset pushbutton. Confirm Relay R292 energises. Confirm circuit made between terminals TB3/9 and TB3/10, and between terminals TB3/15 and TB3/16. Confirm status output signal TB5/3 and TB5/4 is made. Confirm status output signal TB6/3 and TB6/4 is made. Confirm status output signal TB7/3 and TB7/4 is made.	

4.0 Functional Testing (Cont.)

Method Of Test	Result
28. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R285 and Relay R292 de-energise. Confirm status output signal on TB5/3 and TB5/4 is open circuit, status output signal TB6/3 and TB6/4 is open circuit and status output signal TB7/3 and TB7/4 is open circuit. Confirm open circuit between terminals TB3/9 and TB3/10 and between terminals TB3/15 and TB3/16 terminals.	17mA.
29. Reinstate a safe level in Tank 2 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS02. Confirm Relay R285 energises. Confirm Relay R292 remains de-energised.	16mA
30. Press the East Bund reset pushbutton. Confirm system resets	
31. Confirm circuit made between terminals TB3/11 and TB3/12. Confirm circuit made between terminals TB3/13 and TB3/14. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB3/11 and TB3/12. Confirm open circuit between terminals TB3/13 and TB3/14.	+ R292 ACTIONS
32. Replace link between TB1/1 and TB1/2.	
33. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB3/11 and TB3/12. Confirm circuit made between terminals TB3/13 and TB3/14.	+ R292 ACTIONS
34. Tank 3 Safety Relay Tests.	
35. Insert 24V fuse 4.	
36. Confirm R325 & R332 remain de-energized, status output signal on TB5/5 and TB5/6 is open circuit, status output signal TB6/5 and TB6/6 is open circuit and status output signal TB7/5 and TB7/6 is open circuit. Confirm open circuit between terminals TB3/20 and TB3/21 and between terminals TB3/24 and TB3/25.	
37. Simulate a safe level in Tank 3 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS03. Confirm Relay R325 energises. Confirm Relay R332 remains de-energised. Confirm status output signal on TB5/5 and TB5/6 is made, status output signal TB6/5 and TB6/6 is made and status output signal TB7/5 and TB7/6 is open circuit. Confirm open circuit between terminals TB3/20 and TB3/21and between terminals TB3/24 and TB3/25.	16mA.
38. Press the East Bund reset pushbutton. Confirm Relay R332 energises. Confirm circuit made between terminals TB3/20 and TB3/21 and between terminals TB3/24 and TB3/25. Confirm status output signal TB7/5 and TB7/6 is made.	
39. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R325 and Relay R332 de-energise. Confirm status output signal on TB5/5 and TB5/6 is open circuit, status output signal TB6/5 and TB6/6 is open circuit and status output signal TB7/5 and TB7/6 is open circuit. Confirm open circuit between terminals TB3/20 and TB3/21 and between terminals TB3/24 and TB3/25.	to 15mA
40. Simulate a safe level in Tank 3 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS14. Confirm Relay R325 energises. Confirm Relay R332 remains de-energised.	16mA.
41. Press the East Bund reset pushbutton. Confirm Relay R332 energises. Confirm circuit made between terminals TB3/20 and TB3/21. Confirm status output signal TB5/5 and TB5/6 is made. Confirm status output signal TB6/5 and TB6/6 is made. Confirm status output signal TB7/5 and TB7/6 is made.	

4.0 Functional Testing (Cont.)

Method Of Test	Result
42. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R325 and Relay R332 de-energise. Confirm status output signal on TB5/5 and TB5/6 is open circuit, status output signal TB6/5 and TB6/6 is open circuit and status output signal TB7/5 and TB7/6 is open circuit. Confirm open circuit between terminals TB3/20 and TB3/21 and between terminals TB3/24 and TB3/25.	17mA. ↑ 17MA.
43. Reinstate a safe level in Tank 3 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS03. Confirm Relay R325 energises. Confirm Relay R332 remains de-energised.	16 mA.
44. Press the East Bund reset pushbutton. Confirm system resets	
45. Confirm circuit made between terminals TB3/22 and TB3/23. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB3/22 and TB3/23. + R332 ACTIONS.	
46. Replace link between TB1/1 and TB1/2.	
47. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB3/22 and TB3/23. + R332 ACTIONS	
48. Tank 4 Safety Relay Tests.	
49. Insert 24V fuse 5.	
50. Confirm R365 & R372 remain de-energized, status output signal on TB5/7 and TB5/8 is open circuit, status output signal TB6/7 and TB6/8 is open circuit and status output signal TB7/7 and TB7/8 is open circuit. Confirm open circuit between terminals TB3/26 and TB3/27 and between terminals TB3/32 and 3/33.	
51. Simulate a safe level in Tank 4 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS04. Confirm Relay R365 energises. Confirm Relay R372 remains de-energised. Confirm status output signal on TB5/7 and TB5/8 is made, status output signal TB6/7 and TB6/8 is made and status output signal TB7/7 and TB7/8 is open circuit. Confirm open circuit between terminals TB3/26 and TB3/27 and between terminals TB3/32 and TB3/33.	16mA.
52. Press the East Bund reset pushbutton. Confirm Relay R372 energises. Confirm circuit made between terminals TB3/26 and TB3/27 and between terminals TB3/32 and TB3/33. Confirm status output signal TB7/7 and TB7/8 is made.	
53. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R365 and Relay R372 de-energise. Confirm status output signal on TB5/7 and TB5/8 is open circuit, status output signal TB6/7 and TB6/8 is open circuit and status output signal TB7/7 and TB7/8 is open circuit. Confirm open circuit between terminals TB3/26 and TB3/27and between terminals TB3/32 and TB3/33.	15mA ↓ 15mA.
54. Simulate a safe level in Tank 4 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS14. Confirm Relay R365 energises. Confirm Relay R372 remains de-energised.	14
55.	?

4.0 Functional Testing (Cont.)

Method Of Test	Result
56. Press the East Bund reset pushbutton. Confirm Relay R372 energises. Confirm circuit made between terminals TB3/26 and TB3/27 and between terminals TB3/32 and TB3/33. Confirm status output signal TB5/7 and TB5/8 is made. Confirm status output signal TB6/7 and TB6/8 is made. Confirm status output signal TB7/7 and TB7/8 is made.	✓
57. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R365 and Relay R372 de-energise. Confirm status output signal on TB5/7 and TB5/8 is open circuit, status output signal TB6/7 and TB6/8 is open circuit and status output signal TB7/7 and TB7/8 is open circuit. Confirm open circuit between terminals TB3/26 and TB3/27 and between terminals TB3/32 and TB3/33.	17mA 17mA. ✓
58. Reinstate a safe level in Tank 4 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS04. Confirm Relay R365 energises. Confirm Relay R372 remains de-energised.	16mA. ✓
59. Press the East Bund reset pushbutton. Confirm system resets	✓
60. Confirm circuit made between terminals TB3/28 and TB3/29. Confirm circuit made between terminals TB3/30 and TB3/31. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB3/28 and TB3/29. Confirm open circuit between terminals TB3/30 and TB3/31. + R372 ACTIONS	✓
61. Replace link between TB1/1 and TB1/2.	✓
62. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB3/28 and TB3/29. Confirm circuit made between terminals TB3/30 and TB3/31. + R372 ACTIONS	✓
63. Tank 5 Safety Relay Tests.	
64. Insert 24V fuse 6.	✓
65. Confirm R485 & R492 remain de-energized, status output signal on TB5/9 and TB5/10 is open circuit, status output signal TB6/9 and TB6/10 is open circuit and status output signal TB7/9 and TB7/10 is open circuit.	✓
66. Simulate a safe level in Tank 5 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS05. Confirm Relay R485 energises. Confirm Relay R492 remains de-energised. Confirm status output signal on TB5/9 and TB5/10 is made, status output signal TB6/9 and TB6/10 is made and status output signal TB7/9 and TB7/10 is open circuit.	16mA. ✓
67. Press the West Bund reset pushbutton. Confirm Relay R492 energises. Confirm circuit made between terminals TB4/1 and TB4/2. Confirm status output signal TB7/9 and TB7/10 is made.	✓
68. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R485 and Relay R492 de-energise. Confirm open circuit between terminals TB4/1 and TB4/2. Confirm status output signal on TB5/9 and TB5/10 is open circuit, status output signal TB6/9 and TB6/10 is open circuit and status output signal TB7/9 and TB7/10 is open circuit.	15mA ↓15mA. ✓
69. Simulate a safe level in Tank 5 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS05. Confirm Relay R485 energises. Confirm Relay R492 remains de-energised.	16mA. ✓
70. Press the West Bund reset pushbutton. Confirm Relay R492 energises. Confirm circuit made between terminals TB4/1 and TB4/2. Confirm status output signal TB5/9and TB5/10 is made. Confirm status output signal TB6/9 and TB6/10 is made. Confirm status output signal TB7/9 and TB7/10 is made.	✓

4.0 *Functional Testing (Cont.)*

Method Of Test	Result
71. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R485 and Relay R492 de-energise. Confirm open circuit between terminals TB4/1 and TB4/2. Confirm status output signal on TB5/9 and TB5/10 is open circuit, status output signal TB6/9 and TB6/10 is open circuit and status output signal TB7/9 and TB7/10 is open circuit.	17mA ↑ 17mA.
72. Reinstate a safe level in Tank 5 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS05. Confirm Relay R485 energises. Confirm Relay R492 remains de-energised.	16mA.
73. Press the West Bund reset pushbutton. Confirm system resets	
74. Confirm circuit made between terminals TB4/3 and TB4/4. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB4/3 and TB4/4 + R492 ACTIONS	
75. Replace link between TB1/1 and TB1/2.	
76. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB4/3 and TB4/4. + R492 ACTIONS	
77. *Tank 6 Safety Relay Tests.*	
78. Insert 24V fuse 7.	
79. Confirm R525 & R532 remain de-energized, status output signal on TB5/11 and TB5/12 is open circuit, status output signal TB6/11 and TB6/12 is open circuit and status output signal TB7/11 and TB7/12 is open circuit.	
80. Simulate a safe level in Tank 6 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS06. Confirm Relay R525 energises. Confirm Relay R532 remains de-energised. Confirm status output signal on TB5/11 and TB5/12 is made, status output signal TB6/11 and TB6/12 is made and status output signal TB7/11 and TB7/12 is open circuit.	16mA.
81. Press the West Bund reset pushbutton. Confirm Relay R532 energises. Confirm circuit made between terminals TB4/5 and TB4/6. Confirm status output signal TB7/11 and TB7/12 is made.	
82. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R525 and Relay R532 de-energise. Confirm open circuit between terminals TB4/5 and TB4/6. Confirm status output signal on TB5/11 and TB5/12 is open circuit, status output signal TB6/11 and TB6/12 is open circuit and status output signal TB7/11 and TB7/12 is open circuit.	15mA ↓ 15mA.
83. Simulate a safe level in Tank 6 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS06. Confirm Relay R525 energises. Confirm Relay R532 remains de-energised.	16mA.
84. Press the West Bund reset pushbutton. Confirm Relay R532 energises. Confirm circuit made between terminals TB4/5 and TB4/6. Confirm status output signal TB5/11and TB5/12 is made. Confirm status output signal TB6/11 and TB6/12 is made. Confirm status output signal TB7/11 and TB7/12 is made.	
85. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R525 and Relay R532 de-energise. Confirm open circuit between terminals TB4/5 and TB4/6. Confirm status output signal on TB5/11 and TB5/12 is open circuit, status output signal TB6/11 and TB6/12 is open circuit and status output signal TB7/11 and TB7/12 is open circuit.	17mA ↑
86. Reinstate a safe level in Tank 6 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS06. Confirm Relay R525 energises. Confirm Relay R532 remains de-energised.	16mA
87. Press the West Bund reset pushbutton. Confirm system resets	

4.0 *Functional Testing (Cont.)*

Method Of Test	Result
88. Confirm circuit made between terminals TB4/7 and TB4/8. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB4/7 and TB4/8 + R532 ACTIONS	✓
89. Replace link between TB1/1 and TB1/2.	✓
90. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB4/7 and TB4/8. + R532 ACTIONS	✓
91. Tank 7 Safety Relay Tests.	
92. Insert 24V fuse 8.	✓
93. Confirm R565 & R572 remain de-energized, status output signal on TB5/13 and TB5/14 is open circuit, status output signal TB6/13 and TB6/14 is open circuit and status output signal TB7/13 and TB7/14 is open circuit.	✓
94. Simulate a safe level in Tank 7 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS07. Confirm Relay R565 energises. Confirm Relay R572 remains de-energised. Confirm status output signal on TB5/13 and TB5/14 is made, status output signal TB6/13 and TB6/14 is made and status output signal TB7/13 and TB7/14 is open circuit.	16mA. ✓
95. Press the West Bund reset pushbutton. Confirm Relay R572 energises. Confirm circuit made between terminals TB4/9 and TB4/10. Confirm status output signal TB7/13 and TB7/14 is made.	✓
96. Simulate a high tank level by reducing mA signal below 8mA. 15mA Confirm Relay R565 and Relay R572 de-energise. Confirm open circuit between terminals TB4/9 and TB4/10. Confirm status output signal on TB5/13 and TB5/14 is open circuit, status output signal TB6/13 and TB6/14 is open circuit and status output signal TB7/13 and TB7/14 is open circuit.	↓15 mA. ✓
97. Simulate a safe level in Tank 7 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS07. Confirm Relay R565 energises. Confirm Relay R572 remains de-energised.	16 mA. ✓
98. Press the West Bund reset pushbutton. Confirm Relay R572 energises. Confirm circuit made between terminals TB4/9 and TB4/10. Confirm status output signal TB5/13 and TB5/14 is made. Confirm status output signal TB6/13 and TB6/14 is made. Confirm status output signal TB7/13 and TB7/14 is made.	✓
99. Simulate a fault in the level switch by increasing mA signal above 21mA. 17mA Confirm Relay R565 and Relay R572 de-energise. Confirm open circuit between terminals TB4/9 and TB4/10. Confirm status output signal on TB5/13 and TB5/14 is open circuit, status output signal TB6/13 and TB6/14 is open circuit. and status output signal TB7/13 and TB7/14 is open circuit.	↑17mA ✓
100. Reinstate a safe level in Tank 7 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS07. Confirm Relay R565 energises. Confirm Relay R572 remains de-energised.	16 mA. ✓
101. Press the West Bund reset pushbutton. Confirm system resets	✓
102. Confirm circuit made between terminals TB4/11 and TB4/12. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB4/11 and TB4/12 + R572 ACTIONS	✓
103. Replace link between TB1/1 and TB1/2.	✓
104. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB4/11 and TB4/12. + R572 ACTIONS	✓

4.0 *Functional Testing (Cont.)*

Method Of Test	Result
105. Tank 8 Safety Relay Tests.	
106. Insert 24V fuse 9.	
107. Confirm R605 & R612 remain de-energized, status output signal on TB5/15 and TB5/16 is open circuit, status output signal TB6/15 and TB6/16 is open circuit and status output signal TB7/15 and TB7/16 is open circuit.	
108. Simulate a safe level in Tank 8 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS08. Confirm Relay R605 energises. Confirm Relay R612 remains de-energised. Confirm status output signal on TB5/15 and TB5/16 is made, status output signal TB6/15 and TB6/16 is made and status output signal TB7/15 and TB7/16 is open circuit.	16mA.
109. Press the West Bund reset pushbutton. Confirm Relay R612 energises. Confirm circuit made between terminals TB4/13 and TB4/14. Confirm status output signal TB7/15 and TB7/16 is made.	
110. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R605 and Relay R612 de-energise. Confirm open circuit between terminals TB4/13 and TB4/14. Confirm status output signal on TB5/15 and TB5/16 is open circuit, status output signal TB6/15 and TB6/16 is open circuit and status output signal TB7/15 and TB7/16 is open circuit.	↓15mA.
111. Simulate a safe level in Tank 8 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS08. Confirm Relay R605 energises. Confirm Relay R612 remains de-energised.	16mA.
112. Press the West Bund reset pushbutton. Confirm Relay R612 energises. Confirm circuit made between terminals TB4/13 and TB4/14. Confirm status output signal TB5/15 and TB5/16 is made. Confirm status output signal TB6/15 and TB6/16 is made. Confirm status output signal TB7/15 and TB7/16 is made.	
113. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R605 and Relay R612 de-energise. Confirm open circuit between terminals TB4/13 and TB4/14. Confirm status output signal on TB5/15 and TB5/16 is open circuit, status output signal TB6/15 and TB6/16 is open circuit and status output signal TB7/15 and TB7/16 is open circuit.	17mA
114. Reinstate a safe level in Tank 8 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS08. Confirm Relay R605 energises. Confirm Relay R612 remains de-energised.	
115. Press the West Bund reset pushbutton. Confirm system resets	
116. Confirm circuit made between terminals TB4/15 and TB4/16. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB4/15 and TB4/16	+ R612 ACTIONS
117. Replace link between TB1/1 and TB1/2.	
118. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB4/15 and TB4/16.	+ R612 ACTIONS

4.0 *Functional Testing (Cont.)*

Method Of Test	Result
119. Tank 9 Safety Relay Tests.	
120. Insert 24V fuse 10.	
121. Confirm R645 & R652 remain de-energized, status output signal on TB5/17 and TB5/18 is open circuit, status output signal TB6/17 and TB6/18 is open circuit and status output signal TB7/17 and TB7/18 is open circuit.	
122. Simulate a safe level in Tank 9 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS09. Confirm Relay R645 energises. Confirm Relay R652 remains de-energised. Confirm status output signal on TB5/17 and TB5/18 is made, status output signal TB6/17 and TB6/18 is made and status output signal TB7/17 and TB7/18 is open circuit.	16mA.
123. Press the West Bund reset pushbutton. Confirm Relay R652 energises. Confirm circuit made between terminals TB4/17 and TB4/18. Confirm status output signal TB7/17 and TB7/18 is made.	
124. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R645 and Relay R652 de-energise. Confirm open circuit between terminals TB4/17 and TB4/18. Confirm status output signal on TB5/17 and TB5/18 is open circuit, status output signal TB6/17 and TB6/18 is open circuit and status output signal TB7/17 and TB7/18 is open circuit.	15mA. 15mA
125. Simulate a safe level in Tank 9 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS09. Confirm Relay R645 energises. Confirm Relay R652 remains de-energised.	
126. Press the West Bund reset pushbutton. Confirm Relay R652 energises. Confirm circuit made between terminals TB4/17 and TB4/18. Confirm status output signal TB5/17 and TB5/18 is made. Confirm status output signal TB6/17 and TB6/18 is made. Confirm status output signal TB7/17 and TB7/18 is made.	
127. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R645 and Relay R652 de-energise. Confirm open circuit between terminals TB4/17 and TB4/18. Confirm status output signal on TB5/17 and TB5/18 is open circuit, status output signal TB6/17 and TB6/18 is open circuit and status output signal TB7/17 and TB7/18 is open circuit.	ATMA.
128. Reinstate a safe level in Tank 9 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS09. Confirm Relay R645 energises. Confirm Relay R652 remains de-energised.	16mA.
129. Press the West Bund reset pushbutton. Confirm system resets	
130. Confirm circuit made between terminals TB4/19 and TB4/20. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB4/19 and TB4/20 + R652 ACTIONS	
131. Replace link between TB1/1 and TB1/2.	
132. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB4/19 and TB4/20. + R652 ACTIONS	

4.0 *Functional Testing (Cont.)*

Method Of Test	Result
133. Tank 10 Safety Relay Tests.	
134. Insert 24V fuse 11.	
135. Confirm R685 & R692 remain de-energized, status output signal on TB5/19 and TB5/20 is open circuit, status output signal TB6/19 and TB6/20 is open circuit and status output signal TB7/19 and TB7/20 is open circuit.	
136. Simulate a safe level in Tank 10 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS10. Confirm Relay R685 energises. Confirm Relay R692 remains de-energised. Confirm status output signal on TB5/19 and TB5/20 is made, status output signal TB6/19 and TB6/20 is made and status output signal TB7/19 and TB7/20 is open circuit.	16 mA.
137. Press the West Bund reset pushbutton. Confirm Relay R692 energises. Confirm circuit made between terminals TB4/21 and TB4/22. Confirm status output signal TB7/19 and TB7/20 is made.	
138. Simulate a high tank level by reducing mA signal below 8mA. Confirm Relay R685 and Relay R692 de-energise. Confirm open circuit between terminals TB4/21 and TB4/22. Confirm status output signal on TB5/19 and TB5/20 is open circuit, status output signal TB6/19 and TB6/20 is open circuit and status output signal TB7/19 and TB7/20 is open circuit.	15mA 15mA.
139. Simulate a safe level in Tank 10 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS10. Confirm Relay R685 energises. Confirm Relay R692 remains de-energised.	16mA
140. Press the West Bund reset pushbutton. Confirm Relay R692 energises. Confirm circuit made between terminals TB4/21 and TB4/22. Confirm status output signal TB5/19 and TB5/20 is made. Confirm status output signal TB6/19 and TB6/20 is made. Confirm status output signal TB7/19 and TB7/20 is made.	
141. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm Relay R685 and Relay R692 de-energise. Confirm open circuit between terminals TB4/21 and TB4/22. Confirm status output signal on TB5/19 and TB5/20 is open circuit, status output signal TB6/19 and TB6/20 is open circuit and status output signal TB7/19 and TB7/20 is open circuit.	17mA ↑.
142. Reinstate a safe level in Tank 10 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS10. Confirm Relay R685 energises. Confirm Relay R692 remains de-energised.	16mA
143. Press the West Bund reset pushbutton. Confirm system resets	
144. Confirm circuit made between terminals TB4/23 and TB4/24. Remove link between TB1/1 and TB1/2. Confirm open circuit between terminals TB4/23 and TB4/24 + R692 Actions	
145. Replace link between TB1/1 and TB1/2.	
146. Press the East Bund reset pushbutton. Confirm circuit made between terminals TB4/23 and TB4/24. + R692 Actions	

4.0 *Functional Testing (Cont.)*

Method Of Test	Result
147. Additive Tanks Level Switch Tests.	
148. Insert 24V fuse 12.	
149. Confirm status output signal on TB5/21 and TB5/22 is open circuit and status output signal TB6/21 and TB6/22 is open circuit.	✓
150. Simulate a safe level in Tank 11 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS11. Confirm status output signal on TB5/21 and TB5/22 is made, status output signal TB6/21 and TB6/22 is made.	16mA. ✓
151. Simulate a high tank level by reducing mA signal below 8mA. Confirm status output signal on TB5/21 and TB5/22 is open circuit and status output signal TB6/21 and TB6/22 is open circuit.	7.5mA ✓
152. Simulate a safe level in Tank 11 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS11. Confirm status output signal on TB5/21 and TB5/22 is made, status output signal TB6/21 and TB6/22 is made.	16mA. ✓
153. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm status output signal on TB5/21 and TB5/22 is open circuit and status output signal TB6/21 and TB6/22 is open circuit.	✓ SHORT CIRCUIT ERR.
154. Simulate a safe level in Tank 11 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS11. Confirm status output signal on TB5/21 and TB5/22 is made status output signal TB6/21 and TB6/22 is made.	✓
155. Confirm status output signal on TB5/23 and TB5/24 is open circuit and status output signal TB6/23 and TB6/24 is open circuit.	✓
156. Simulate a safe level in Tank 18 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS18. Confirm status output signal on TB5/23 and TB5/24 is made, status output signal TB6/23 and TB6/24 is made.	16mA ✓
157. Simulate a high tank level by reducing mA signal below 8mA. Confirm status output signal on TB5/23 and TB5/24 is open circuit and status output signal TB6/23 and TB6/24 is open circuit.	7.5mA ✓
158. Simulate a safe level in Tank 18 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS18. Confirm status output signal on TB5/23 and TB5/24 is made, status output signal TB6/23 and TB6/24 is made.	16mA ✓
159. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm status output signal on TB5/23 and TB5/24 is open circuit and status output signal TB6/23 and TB6/24 is open circuit.	✓ SHORT CIRCUIT ERR.
160. Simulate a safe level in Tank 18 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS18. Confirm status output signal on TB5/23 and TB5/24 is made, status output signal TB6/23 and TB6/24 is made.	16mA. ✓

4.0 *Functional Testing (Cont.)*

Method Of Test	Result
161. Additive Tanks Level Switch Tests (cont.).	
162. Confirm status output signal on TB5/25 and TB5/26 is open circuit and status output signal TB6/25 and TB6/26 is open circuit.	
163. Simulate a safe level in Tank 18A by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS18A. Confirm status output signal on TB5/25 and TB5/26 is made, status output signal TB6/25 and TB6/26 is made.	16mA
164. Simulate a high tank level by reducing mA signal below 8mA. Confirm status output signal on TB5/25 and TB5/26 is open circuit and status output signal TB6/25 and TB6/26 is open circuit.	15mA
165. Simulate a safe level in Tank 18A by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS18A. Confirm status output signal on TB5/25 and TB5/26 is made, status output signal TB6/25 and TB6/26 is made.	16mA.
166. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm status output signal on TB5/25 and TB5/26 is open circuit and status output signal TB6/25 and TB6/26 is open circuit.	SHORT CIRCUIT ERR.
167. Simulate a safe level in Tank 18A by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS18A. Confirm status output signal on TB5/25 and TB5/26 is made, status output signal TB6/25 and TB6/26 is made.	16mA.
168. Confirm status output signal on TB5/27 and TB5/28 is open circuit and status output signal TB6/27 and TB6/28 is open circuit.	
169. Simulate a safe level in Tank 21 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS21. Confirm status output signal on TB5/27 and TB5/28 is made, status output signal TB6/27 and TB6/28 is made.	16mA.
170. Simulate a high tank level by reducing mA signal below 8mA. Confirm status output signal on TB5/27 and TB5/28 is open circuit and status output signal TB6/27 and TB6/28 is open circuit.	15mA
171. Simulate a safe level in Tank 21 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS21. Confirm status output signal on TB5/27 and TB5/28 is made, status output signal TB6/27 and TB6/28 is made.	
172. Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm status output signal on TB5/27 and TB5/28 is open circuit and status output signal TB6/27 and TB6/28 is open circuit.	SHORT CIRCUIT ERR.
173. Simulate a safe level in Tank 21 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS21. Confirm status output signal on TB5/27 and TB5/28 is made, status output signal TB6/27 and TB6/28 is made.	16mA.

4.0 *Functional Testing (Cont.)*

Method Of Test	Result
174.Additive Tanks Level Switch Tests (cont.).	
175.Confirm status output signal on TB5/29 and TB5/30 is open circuit and status output signal TB6/29 and TB6/30 is open circuit.	✓
176.Simulate a safe level in Tank 22 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS22. Confirm status output signal on TB5/29 and TB5/30 is made, status output signal TB6/29 and TB6/30 is made.	16mA. ✓
177.Simulate a high tank level by reducing mA signal below 18mA. Confirm status output signal on TB5/29 and TB5/30 is open circuit and status output signal TB6/29 and TB6/30 is open circuit.	15mA ✓
178.Simulate a safe level in Tank 22 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS22. Confirm status output signal on TB5/29 and TB5/30 is made t, status output signal TB6/29 and TB6/30 is made.	16mA. ✓
179.Simulate a fault in the level switch by increasing mA signal above 21mA. Confirm status output signal on TB5/29 and TB5/30 is open circuit and status output signal TB6/29 and TB6/30 is open circuit.	✓ SHORT CIRCUIT ERR.
180.Simulate a safe level in Tank 22 by providing a 12-16mA signal across terminals 1 and 3 on the Barrier/Trip amplifier LS22. Confirm status output signal on TB5/29 and TB5/30 is made, status output signal TB6/29 and TB6/30 is made.	16mA. ✓

Actions/Comments

ALL LS TESTED FOR OPEN + SHORT CIRCUIT + PSU/FUSE FAIL. ACTIONS AS HIGH LEVEL/FAULT.

FOLLOWING POWER CYCLE LS~~01~~ FAILED WITH MEM FAULT. UNIT REPLACED WITH OLD SPARE (VER 2.11) AND RETESTED. NEW UNIT REQ FOR SAT (VER 3.02)

PIPELINE IMPORT STRING NOT TESTED.

TRIP AMP SETUP FROM DEFAULT.

LS01, LS02, LS03, LS04, LS05, LS06, LS07, LS08 & LS09 AND LS10. R1, TRIP = 15.00, HYS = 0.15 (MIN)
R2, MAN TRIP = 17.00, HYS = 0.17 (MIN) PASSIVE.
NOTE LS01 OLD UNIT 68.8% / 81.3%.
LS11, LS18, LS18A, LS21, LS22.
R1, TRIP = 15.00, HYS = 0.15 (MIN)
R2 TRIP = 15.00, HYS = 0.15 (MIN) PASSIVE

Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	Sign	Date
Tested by	✓	25/10/13

CLIENT: Valero – Brighton Terminal	**PROJECT REF: CE303**	**DOC REF: CE303002_HDR**
PROJECT: Overfill Protection SIS	**LOCATION: HC Controls**	**DATE: 25.10.13**
PHASE : FAT	**PLANT UNIT: Logic Solver**	**PAGE: 1 OF 1**

Raised By	Date	Responsible Engineer	Ref	FAT Deviation Details	Complete (Sign)
FAT	25.10.13	P&I	1	No project specific specifications for trip amplifiers or Pilz Relays. Action: Create project specific specification for P&I Design Ltd standard.	
FAT	25.10.13	P&I	2	Terminal type not as drawing. Model numbers changed since original panel build. Action : As build drawings	
FAT	25.10.13	P&I	3	SIS label required for front of panel. Action: Supply and fit @ SAT.	
FAT	25.10.13	P&I / Installation	4	No Gland plate fitted to top of panel. Action: Installation contractor to prevent swarf entering panel.	
FAT	25.10.13	P&I	5	Trip amplifier settings changed to match Drexelbrook recommendations. Action : Record trip amplifier set up (changes from default noted in FAT) Action: Note new settinngs @ SAT.	
FAT	25.10.13	P&I	6	P&F Trip amp KFD2-CRG2-Ex1.D ver 3.02 LS01 failed. The unit initially worked but following a power cycle "err MEM" was displayed and the unit would not function. The power was cycled and program mode entered and escaped without the unit becoming healthy (Safe detected failure). Old unit fitted for installation phase (KFD2-CRG-Ex1.D ver 2.11) Action: Unit to be returned under warranty, warranty replacement to be fitted at SAT. Action: Failure report required.	

APPROVALS

P & I DESIGN LTD: D.B.Faulkner DATE: 25.10.2013

CLIENT: DATE:

CLIENT: Valero – Brighton Terminal	**PROJECT REF: CE303**	**DOC REF: CE303001_HDR**
PROJECT: Overfill Protection SIS	**LOCATION: HC Controls**	**DATE: 25.10.13**
PHASE : FAT	**PLANT UNIT: Logic Solver**	**PAGE: 1 OF 1**

This certificate covers the acceptance of the following works:-
Factory Acceptance Testing of Brighton Overfill Protection SIS panel.
Panel tested to SI157035_RPT_C - SIS Panel FAT – Brighton.

In accordance with the following specifications and conditions of contract:-
P0493001_QUO_A - New Brighton SIS Panel

We duly handover the work specified subject to the following exceptions:-
CE303002_HDR - FAT Deviation Record Sheet.
The panel has been released for the next phase – site installation. Deviations to be completed for SAT

Approvals

P & I DESIGN LTD: D.B.Faulkner DATE: 25.10.13

CLIENT: DATE:

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

GENERAL: HORN; THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE; SOLENOID VALVE; DOUBLE WOUND TRANSFORMER; VOLTMETER; HOURS RUN METER; AMMETER; FREQUENCY METER; LAMP; SIREN; BELL

ISOLATORS & TERMINALS: FUSE LINK; NEUTRAL LINK REMOVABLE; PLUG AND SOCKET; NO-LOAD SWITCHING; TERMINAL WITH DISCONNECT LINK; TERMINAL; ON-LOAD SWITCHING; FUSED SWITCH (NO-LOAD); FUSED SWITCH (ON-LOAD); FUSED SWITCH (ON LOAD) (DOUBLE BREAK)

RELAYS & TIMERS: RELAY; TIMED RELAY; NORMALLY OPEN; NORMALLY CLOSED; CHANGEOVER CONTACT; MOTOR TIMER; T.D.O.D.; INSTANT OPEN DELAYED CLOSED; INSTANT CLOSE DELAYED OPEN; CLUTCH; T.D.O.E; DELAYED OFF (N/C); DELAYED ON (N/O)

CONTACTORS & OVERLOADS: NORMALLY OPEN; NORMALLY CLOSED; MAGNETIC OVERLOAD RELAY; THERMAL OVERLOAD RELAY; CONTACTOR; MECHANICAL INTERLOCK

SWITCHES: KEY OPERATED; STOPLOCK PUSHBUTTON; PUSHBUTTON STOP; PUSHBUTTON START; NORMALLY OPEN; NORMALLY OPEN HELD CLOSED; NORMALLY CLOSED; NORMALLY CLOSED HELD OPEN; OPENS ON RISING PRESSURE; CLOSES ON RISING PRESSURE; OPENS ON RISING TEMPERATURE; OPENS ON RISING LEVEL; CLOSES ON RISING LEVEL; CLOSES ON RISING TEMPERATURE; OPENS ON INCREASING FLOW; CLOSES ON INCREASING FLOW; SWITCH CONTACT; MULTI POSITION TYPICAL 3 CIRCUIT

RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING

POWER DISTRIBUTION

FED FROM ESD SIS JUNCTION BOX WAY 27
230V 50Hz

ISOLATOR

L N E

TB-L 1A L1 LIGHT
TB-L 5A L2 SOCKET
L3 SPARE
L4 SPARE
L5 T10A HBC

TB-N N1 N2 N3 N4 N5
TB-E E1 E2 E3 E4 E5

24VDC 10 AMP

24V/1	LINE 082 / 088	0V/1
24V/2	LINE 244 / 243	0V/2
24V/3	LINE 284 / 283	0V/3
24V/4	LINE 324 / 323	0V/4
24V/5	LINE 364 / 363	0V/5
24V/6	LINE 484 / 483	0V/6
24V/7	LINE 524 / 523	0V/7
24V/8	LINE 564 / 563	0V/8
24V/9	LINE 604 / 603	0V/9
24V/10	LINE 644 / 643	0V/10
24V/11	LINE 684 / 683	0V/11
24V/12	LINE 725	0V/12
24V/13	LINE 802	0V/13
24V/14	SPARE	0V/14
24V/15	SPARE	0V/15
24V/16	SPARE	0V/16
24V/17	SPARE	0V/17
24V/18	SPARE	0V/18
24V/19	SPARE	0V/19
24V/20	SPARE	0V/20

LAST NUMBER USED : 001
SPARE TO : 019

GANTRY LOGIC PANEL – No.5
BAY A
PILZ
PNOZ 11
SAFETY CONTACTS

ESD/2 14 13 ESD/1 TB1 1 SISESD/1+
ESD/2 2 SISESD/1-
3 SISESD/2+
4 SISESD/2-
SIS ESD 2 PAIR

LAST NUMBER USED : 020
SPARE TO : 039

SITE ESD

SITE ESD TRIP & RESET
SISESD/1+ TB1 1 24V/1 — 24V/1 TB24V 1 1A
SISESD/1- 2 040
3 041
SISESD/2+ SISESD/2- 4

R088
PILZ
PNOZ s2
TB0V 1 0V/1 A2 A1 040 SEE LINE 123
SEE LINE 124
SAFETY CONTACTS
SEE LINE 247 080 14 13 082 SEE LINE 247
SEE LINE 274 087 24 23 088 SEE LINE 274
SEE LINE 276 089 34 33 090 SEE LINE 276
041 42 41 042
SEE LINE 131
AUXILIARY CONTACTS
RESET S34 042

INTERFACE CONNECTOR

PILZ
PNOZ s11
A2 A1
SAFETY CONTACTS
SEE LINE 287 100 14 13 102 SEE LINE 287
SEE LINE 314 107 24 23 108 SEE LINE 314
SEE LINE 316 109 34 33 110 SEE LINE 316
SEE LINE 327 120 44 43 122 SEE LINE 327
SEE LINE 354 127 64 63 128 SEE LINE 354
SEE LINE 367 140 74 73 142 SEE LINE 367
SEE LINE 394 147 84 83 148 SEE LINE 394
SEE LINE 396 149 94 93 150 SEE LINE 396
52 AUXILIARY CONTACTS 51

AUTO

CONTROLLED COPY 23 OCT 2013

25/10/13

LAST NUMBER USED : 042
SPARE TO : 049

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.R.R	ISSUED FOR CONSTRUCTION
B	25/06/08	P.P.	P.P.	D.S.R	D.S.R	TESTING MODIFICATIONS ADDED
C	15/09/08	D.R.P	A.N.	D.S.R	D.S.R	AS BUILT
D	31/01/12	P.L.	P.P.	D.R.P	D.R.P	TRIP AMP WIRING REVISED

PLANT: BRIGHTON STORAGE DEPOT – TANK OVERFILL SIS
TITLE: TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM MONITORING PANEL LOGIC DRAWING 1
Chevron
SHEET 1 OF 1
CLIENT DRG. No.
P&I DRG No. SI157120_DWG

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

GENERAL: HORN; SOLENOID VALVE; THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE; DOUBLE WOUND TRANSFORMER; VOLTMETER; HOURS RUN METER; AMMETER; FREQUENCY METER; LAMP; SIREN; BELL

ISOLATORS & TERMINALS: FUSE LINK; NEUTRAL LINK REMOVABLE; PLUG AND SOCKET; NO-LOAD SWITCHING; TERMINAL WITH DISCONNECT LINK; TERMINAL; ON-LOAD SWITCHING; FUSED SWITCH (NO-LOAD); FUSED SWITCH (ON-LOAD); FUSED SWITCH (ON LOAD) (DOUBLE BREAK)

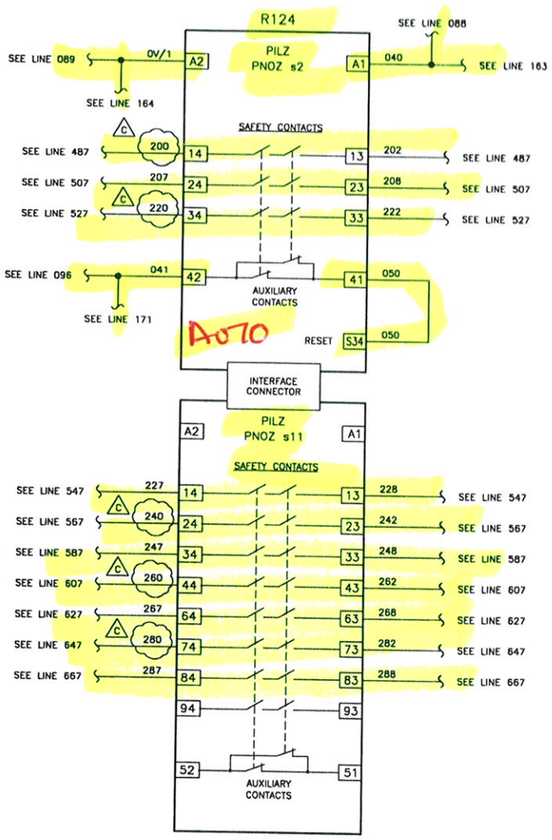
RELAYS & TIMERS: RELAY; TIMED RELAY; NORMALLY OPEN; NORMALLY CLOSED; CHANGEOVER CONTACT; MOTOR TIMER; T.D.O.D.; INSTANT OPEN DELAYED CLOSED; INSTANT CLOSE DELAYED OPEN; CLUTCH; T.D.O.E; DELAYED OFF (N/C); DELAYED ON (N/O)

CONTACTORS & OVERLOADS: NORMALLY OPEN; NORMALLY CLOSED; MAGNETIC OVERLOAD RELAY; THERMAL OVERLOAD RELAY; CONTACTOR; MECHANICAL INTERLOCK

SWITCHES: KEY OPERATED; STOPLOCK PUSHBUTTON; PUSHBUTTON STOP; PUSHBUTTON START; NORMALLY OPEN; NORMALLY OPEN HELD CLOSED; NORMALLY CLOSED; NORMALLY CLOSED HELD OPEN; OPENS ON RISING PRESSURE; CLOSES ON RISING PRESSURE; OPENS ON RISING TEMPERATURE; OPENS ON RISING LEVEL; CLOSES ON RISING LEVEL; CLOSES ON RISING TEMPERATURE; OPENS ON INCREASING FLOW; CLOSES ON INCREASING FLOW; SWITCH CONTACT; MULTI POSITION TYPICAL 3 CIRCUIT

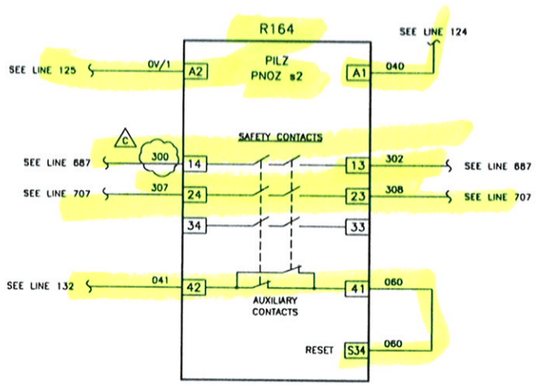
RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING

SITE ESD



LAST NUMBER USED : 050
SPARE TO : 059

SITE ESD



LAST NUMBER USED : 060
SPARE TO : 069

LAST NUMBER USED : 070
SPARE TO : 079

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25/10/13

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REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R	P.J.P	ISSUED FOR CONSTRUCTION
B	25/08/08	P.P.	P.P.	D.S.R	D.S.R	D.R.R	P.J.P	AS BUILT
C	31/01/12	P.L.	P.P.	D.R.P		D.R.P		TRIP AMP WIRING REVISED

PLANT: BRIGHTON STORAGE DEPOT – TANK OVERFILL S/S
TITLE: TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM MONITORING PANEL LOGIC DRAWING 2
Chevron
SHEET 1 OF 1
CLIENT DRG. No.
P&I DRG No. SI157121_DWG

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

GENERAL: HORN; THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE; SOLENOID VALVE; DOUBLE WOUND TRANSFORMER; VOLTMETER (V); HOURS RUN METER (HR); AMMETER (A); FREQUENCY METER (HZ); LAMP; SIREN; BELL

ISOLATORS & TERMINALS: FUSE LINK; NEUTRAL LINK REMOVABLE; PLUG AND SOCKET; NO-LOAD SWITCHING; TERMINAL WITH DISCONNECT LINK; TERMINAL; ON-LOAD SWITCHING; FUSED SWITCH (NO-LOAD); FUSED SWITCH (ON-LOAD); FUSED SWITCH (ON LOAD) (DOUBLE BREAK)

RELAYS & TIMERS: RELAY; TIMED RELAY; NORMALLY OPEN; NORMALLY CLOSED; CHANGEOVER CONTACT; MOTOR TIMER; T.D.O.D.; INSTANT OPEN DELAYED CLOSED; INSTANT CLOSE DELAYED OPEN; CLUTCH; T.D.O.E.; DELAYED OFF (N/C); DELAYED ON (N/O)

CONTACTORS & OVERLOADS: NORMALLY OPEN; NORMALLY CLOSED; MAGNETIC OVERLOAD RELAY; THERMAL OVERLOAD RELAY; CONTACTOR; MECHANICAL INTERLOCK

SWITCHES: KEY OPERATED; STOPLOCK PUSHBUTTON; PUSHBUTTON STOP; PUSHBUTTON START; NORMALLY OPEN; NORMALLY OPEN HELD CLOSED; NORMALLY CLOSED; NORMALLY CLOSED HELD OPEN; OPENS ON RISING PRESSURE; CLOSES ON RISING PRESSURE; OPENS ON RISING TEMPERATURE; OPENS ON RISING LEVEL; CLOSES ON RISING LEVEL; CLOSES ON RISING TEMPERATURE; OPENS ON INCREASING FLOW; CLOSES ON INCREASING FLOW; 1 2 3 SWITCH CONTACT; MULTI POSITION TYPICAL 3 CIRCUIT

RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING

TANK 1

LS01 — LEVEL TRANSMITTER SEE LOOP SHEET SI157170 (I.S.) — TRIP 17mA ↑ 15mA ↓ — TB24V 1A — 24V/2 — 0V/2 — TB0V — GUIDED CONTACT RELAY R245 — 841,881 — RELAY 2 — RELAY 1 — 081 — 080 — R088/1 — 082 — ESD — P+F KFD2-CRG2-Ex1.D (E)

R252 — PILZ PNOZ s2 — AUXILIARY CONTACTS — 082 — 083 — R805/1 — RESET — 084 — S34 RESET — RESET MODE AUTO — 0V/2 — 085 — 086 — 091 — 092 — SEE LINE 403 — 160 — 161 — SEE LINE 300 — SAFETY CONTACTS

INTERFACE CONNECTOR — PILZ PNOZ s8 — A2 — A1 — SAFETY CONTACTS — SEE LINE 921 — 460 — 461 — SEE LINE 921

TB3 — XV123 INTERNAL 24Vdc — 085 — ESD — 086 — XV124 INTERNAL 24Vdc — 087 — R088/2 — 088 — ESD — XV155 INTERNAL 24Vdc — 089 — R088/3 — 090 — ESD — XV156 INTERNAL 24Vdc — 091 — ESD — 092

SEE LOOP DRAWINGS SI157141, SI157142, SI157143 & SI157144

LAST NUMBER USED : 092
SPARE TO : 099

TANK 2

LS02 — LEVEL TRANSMITTER SEE LOOP SHEET SI157171 (I.S.) — TRIP 17mA ↑ 15mA ↓ — TB24V 1A — 24V/3 — 0V/3 — TB0V — GUIDED CONTACT RELAY R285 — 843,883 — RELAY 2 — RELAY 1 — 101 — 100 — R088A/1 — 102 — ESD — P+F KFD2-CRG2-Ex1.D (E)

R292 — PILZ PNOZ s2 — AUXILIARY CONTACTS — 102 — 103 — R805/2 — RESET — 104 — S34 RESET — RESET MODE AUTO — 0V/3 — 105 — 106 — 111 — 112 — SEE LINE 260 — 161 — 162 — SEE LINE 340 — SAFETY CONTACTS

INTERFACE CONNECTOR — PILZ PNOZ s8 — A2 — A1 — SAFETY CONTACTS — SEE LINE 923 — 462 — 463 — SEE LINE 923

TB3 — XV121 INTERNAL 24Vdc — 105 — ESD — 106 — XV122 INTERNAL 24Vdc — 107 — R088A/2 — 108 — ESD — XV157 INTERNAL 24Vdc — 109 — R088A/3 — 110 — ESD — XV158 INTERNAL 24Vdc — 111 — ESD — 112

SEE LOOP DRAWINGS SI157145, SI157146, SI157147 & SI157148

LAST NUMBER USED : 112
SPARE TO : 119

TANK 3

LS03 — LEVEL TRANSMITTER SEE LOOP SHEET SI157172 (I.S.) — TRIP 17mA ↑ 15mA ↓ — TB24V 1A — 24V/4 — 0V/4 — TB0V — GUIDED CONTACT RELAY R325 — 845,885 — RELAY 2 — RELAY 1 — 121 — 120 — R088A/4 — 122 — ESD — P+F KFD2-CRG2-Ex1.D (E)

R332 — PILZ PNOZ s2 — AUXILIARY CONTACTS — 122 — 123 — R805/3 — RESET — 124 — S34 RESET — RESET MODE AUTO — 0V/4 — 125 — 126 — 129 — 130 — SEE LINE 300 — 162 — 163 — SEE LINE 380 — SAFETY CONTACTS

INTERFACE CONNECTOR — PILZ PNOZ s8 — A2 — A1 — SAFETY CONTACTS — SEE LINE 925 — 464 — 465 — SEE LINE 925

TB3 — XV129 INTERNAL 24Vdc — 125 — ESD — 126 — XV130 INTERNAL 24Vdc — 127 — R088A/5 — 128 — ESD — XV159 INTERNAL 24Vdc — 129 — ESD — 130

SEE LOOP DRAWINGS SI157149, SI157150 & SI157151

LAST NUMBER USED : 130
SPARE TO : 139

CONTROLLED 23 OCT 2013 COPY FAZ

25/10/13 DRR

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REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R	P.J.P	ISSUED FOR CONSTRUCTION
B	25/06/08	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	PILZ RESET MODE ADDED
C	11/03/09	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	AS BUILT
D	31/01/12	P.L.	P.P.	D.R.P	D.R.P	D.R.P	D.R.P	TRIP AMP WIRING REVISED
E	23/10/13	P.P.	P.P.	D.S.R	DRR	D.S.R	DRR	BARRIER MODEL No. UPDATED

PLANT: BRIGHTON STORAGE DEPOT – TANK OVERFILL SIS
TITLE: TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM MONITORING PANEL LOGIC DRAWING 3
Chevron
SHEET 1 OF 1
CLIENT DRG. No.
P&I DRG No. SI157122_DWG

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

GENERAL
HORN; SOLENOID VALVE; THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE; DOUBLE WOUND TRANSFORMER; V VOLTMETER; HR HOURS RUN METER; A AMMETER; HZ FREQUENCY METER; LAMP; SIREN; BELL

ISOLATORS & TERMINALS
FUSE LINK; NEUTRAL LINK REMOVABLE; PLUG AND SOCKET; NO-LOAD SWITCHING; TERMINAL WITH DISCONNECT LINK; TERMINAL; ON-LOAD SWITCHING; FUSED SWITCH (NO-LOAD); FUSED SWITCH (ON-LOAD); FUSED SWITCH (ON LOAD) (DOUBLE BREAK)

RELAYS & TIMERS
R RELAY; R T TIMED RELAY; NORMALLY OPEN; NORMALLY CLOSED; CHANGEOVER CONTACT; MOTOR TIMER; T.D.O.D.; INSTANT OPEN DELAYED CLOSED; INSTANT CLOSE DELAYED OPEN; C CLUTCH; T.D.O.E.; DELAYED OFF (N/C); DELAYED ON (N/O)

CONTACTORS & OVERLOADS
NORMALLY OPEN; NORMALLY CLOSED; MAGNETIC OVERLOAD RELAY; C CONTACTOR; THERMAL OVERLOAD RELAY; MECHANICAL INTERLOCK

SWITCHES
KEY OPERATED; STOPLOCK PUSHBUTTON; PUSHBUTTON STOP; PUSHBUTTON START; NORMALLY OPEN; NORMALLY OPEN HELD CLOSED; NORMALLY CLOSED; NORMALLY CLOSED HELD OPEN; OPENS ON RISING PRESSURE; CLOSES ON RISING PRESSURE; OPENS ON RISING TEMPERATURE; OPENS ON RISING LEVEL; CLOSES ON RISING LEVEL; CLOSES ON RISING TEMPERATURE; OPENS ON INCREASING FLOW; CLOSES ON INCREASING FLOW; 1 2 3 SWITCH CONTACT; MULTI POSITION TYPICAL 3 CIRCUIT

RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING

TANK 4

LEVEL TRANSMITTER SEE LOOP SHEET SI157173 (I.S.)
LS04
TRIP 17mA ↑ 15mA ↓
TB24V 1A 5 — 24V/5 — 0V/5 — TB0V 5
GUIDED CONTACT RELAY R365
RELAY 2
RELAY 1
R088A/T ESD
P+F KFD2-CRG2-Ex1.D
R372 PILZ PNOZ s2
AUXILIARY CONTACTS
R805/4 RESET
RESET MODE AUTO
SAFETY CONTACTS
SEE LINE 340 — SEE LINE 404
INTERFACE CONNECTOR
PILZ PNOZ s8
SAFETY CONTACTS
SEE LINE 927 — SEE LINE 927
XV126 INTERNAL 24Vdc — TB3 26 — 145
ESD — 27 — 146
XV127 INTERNAL 24Vdc — 28 — 147 — R088A/8 — 148
ESD — 29 — 148
XV160 INTERNAL 24Vdc — 30 — 149 — R088A/9 — 150
ESD — 31 — 150
XV161 INTERNAL 24Vdc — 32 — 151
ESD — 33 — 152
SEE LOOP DRAWINGS SI157152, SI157153, SI157154 & SI157155 — 38

LAST NUMBER USED : 152
SPARE TO : 159

PIPELINE IMPORT LINE

XV162 INTERNAL 24Vdc — TB4 25 — 160 — SEE LINE 260
ESD — 26 — 164 — SEE LINE 380
SPARE — 27
SEE LOOP DRAWING SI157140

LAST NUMBER USED : 164
SPARE TO : 179

NOTE
VALVE TRIPS ON ESD OR HiHi LEVEL IN TANKS 1, 2, 3, & 4

NOT TESTED. COLD LOOP ONLY

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25/10/13

LAST NUMBER USED : 180
SPARE TO : 199

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REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R	P.J.P	ISSUED FOR CONSTRUCTION
B	25/06/08	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	PILZ RESET MODE ADDED
C	11/03/09	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	AS BUILT
D	31/01/12	P.L.	P.P.	D.R.P	D.R.P	D.R.P	D.R.P	TRIP AMP WIRING REVISED
E	23/10/13	P.P.	P.P.	D.S.R	DL	D.S.R	DL	BARRIER MODEL No. UPDATED

PLANT	BRIGHTON STORAGE DEPOT – TANK OVERFILL SIS
TITLE	TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM MONITORING PANEL LOGIC DRAWING 4
	Chevron
	SHEET 1 OF 1
CLIENT DRG. No.	P&I DRG No. SI157123_DWG

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

GENERAL: HORN; THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE; SOLENOID VALVE; DOUBLE WOUND TRANSFORMER; VOLTMETER; HOURS RUN METER; AMMETER; FREQUENCY METER; LAMP; SIREN; BELL

ISOLATORS & TERMINALS: FUSE LINK; NEUTRAL LINK REMOVABLE; PLUG AND SOCKET; NO-LOAD SWITCHING; TERMINAL WITH DISCONNECT LINK; TERMINAL; ON-LOAD SWITCHING; FUSED SWITCH (NO-LOAD); FUSED SWITCH (ON-LOAD); FUSED SWITCH (ON LOAD) (DOUBLE BREAK)

RELAYS & TIMERS: RELAY; TIMED RELAY; NORMALLY OPEN; NORMALLY CLOSED; CHANGEOVER CONTACT; MOTOR TIMER; T.D.O.D.; INSTANT OPEN DELAYED CLOSED; INSTANT CLOSE DELAYED OPEN; CLUTCH; T.D.O.E.; DELAYED OFF (N/C); DELAYED ON (N/O)

CONTACTORS & OVERLOADS: NORMALLY OPEN; NORMALLY CLOSED; MAGNETIC OVERLOAD RELAY; THERMAL OVERLOAD RELAY; CONTACTOR; MECHANICAL INTERLOCK

SWITCHES: KEY OPERATED; STOPLOCK PUSHBUTTON; PUSHBUTTON STOP; PUSHBUTTON START; NORMALLY OPEN; NORMALLY OPEN HELD CLOSED; NORMALLY CLOSED; NORMALLY CLOSED HELD OPEN; OPENS ON RISING PRESSURE; CLOSES ON RISING PRESSURE; OPENS ON RISING TEMPERATURE; OPENS ON RISING LEVEL; CLOSES ON RISING LEVEL; CLOSES ON RISING TEMPERATURE; OPENS ON INCREASING FLOW; CLOSES ON INCREASING FLOW; SWITCH CONTACT; MULTI POSITION TYPICAL 3 CIRCUIT

RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING

TANK 5

LS05

LEVEL TRANSMITTER SEE LOOP SHEET SI157174 (I.S.)

TRIP 17mA ↑ 15mA ↓

TB24V 1A — 24V/6 — 0V/6 — TB0V

GUIDED CONTACT RELAY R485

RELAY 2 — RELAY 1

R124/1 ESD

P+F KFD2-CRG2-Ex1.D

R492

AUXILIARY CONTACTS

R809/1 RESET

RESET MODE AUTO

SAFETY CONTACTS

SEE LINE 929 — SEE LINE 929

PILZ PNOZ s2

XV118 INTERNAL 24Vdc — TB4 — ESD

XV119 INTERNAL 24Vdc — R124/2 ESD — ESD

SEE LOOP DRAWINGS SI157156 & SI157157

LAST NUMBER USED : 208
SPARE TO : 219

TANK 6

LS06

LEVEL TRANSMITTER SEE LOOP SHEET SI157175 (I.S.)

TRIP 17mA ↑ 15mA ↓

TB24V 1A — 24V/7 — 0V/7 — TB0V

GUIDED CONTACT RELAY R525

RELAY 2 — RELAY 1

R124/3 ESD

P+F KFD2-CRG2-Ex1.D

R532

AUXILIARY CONTACTS

R809/2 RESET

RESET MODE AUTO

SAFETY CONTACTS

SEE LINE 931 — SEE LINE 931

PILZ PNOZ s2

XV116 INTERNAL 24Vdc — TB4 — ESD

XV117 INTERNAL 24Vdc — R124A/1 ESD — ESD

SEE LOOP DRAWINGS SI157158 & SI157159

LAST NUMBER USED : 228
SPARE TO : 239

TANK 7

LS07

LEVEL TRANSMITTER SEE LOOP SHEET SI157176 (I.S.)

TRIP 17mA ↑ 15mA ↓

TB24V 1A — 24V/8 — 0V/8 — TB0V

GUIDED CONTACT RELAY R565

RELAY 2 — RELAY 1

R124A/2 ESD

P+F KFD2-CRG2-Ex1.D

R572

AUXILIARY CONTACTS

R809/3 RESET

RESET MODE AUTO

SAFETY CONTACTS

SEE LINE 933 — SEE LINE 933

PILZ PNOZ s2

XV114 INTERNAL 24Vdc — TB4 — ESD

XV115 INTERNAL 24Vdc — R124A/3 ESD — ESD

SEE LOOP DRAWINGS SI157160 & SI157161

LAST NUMBER USED : 248
SPARE TO : 259

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REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R	P.J.P	ISSUED FOR CONSTRUCTION
B	25/06/08	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	PILZ RESET MODE ADDED
C	11/03/09	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	AS BUILT
D	31/01/12	P.L.	P.P.	D.R.P	D.R.P	D.R.P	D.R.P	TRIP AMP WIRING REVISED
E	23/10/13	P.P.	P.P.	D.S.R		D.S.R		BARRIER MODEL No. UPDATED

PLANT	BRIGHTON STORAGE DEPOT – TANK OVERFILL SIS
TITLE	TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM MONITORING PANEL LOGIC DRAWING 5
	Chevron
	SHEET 1 OF 1
CLIENT DRG. No.	P&I DRG No. SI157124_DWG

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

GENERAL: HORN; THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE; SOLENOID VALVE; DOUBLE WOUND TRANSFORMER; VOLTMETER; HOURS RUN METER; AMMETER; FREQUENCY METER; LAMP; SIREN; BELL

ISOLATORS & TERMINALS: FUSE LINK; NEUTRAL LINK REMOVABLE; PLUG AND SOCKET; NO-LOAD SWITCHING; TERMINAL WITH DISCONNECT LINK; TERMINAL; ON-LOAD SWITCHING; FUSED SWITCH (NO-LOAD); FUSED SWITCH (ON-LOAD); FUSED SWITCH (ON LOAD) (DOUBLE BREAK)

RELAYS & TIMERS: RELAY; TIMED RELAY; NORMALLY OPEN; NORMALLY CLOSED; CHANGEOVER CONTACT; MOTOR TIMER; T.O.D.O.; INSTANT OPEN DELAYED CLOSED; INSTANT CLOSE DELAYED OPEN; CLUTCH; T.O.D.E.; DELAYED OFF (N/C); DELAYED ON (N/O)

CONTACTORS & OVERLOADS: NORMALLY OPEN; NORMALLY CLOSED; MAGNETIC OVERLOAD RELAY; THERMAL OVERLOAD RELAY; CONTACTOR; MECHANICAL INTERLOCK

SWITCHES: KEY OPERATED; STOPLOCK PUSHBUTTON; PUSHBUTTON STOP; PUSHBUTTON START; NORMALLY OPEN; NORMALLY OPEN HELD CLOSED; NORMALLY CLOSED; NORMALLY CLOSED HELD OPEN; OPENS ON RISING PRESSURE; CLOSES ON RISING PRESSURE; OPENS ON RISING TEMPERATURE; OPENS ON RISING LEVEL; CLOSES ON RISING LEVEL; CLOSES ON RISING TEMPERATURE; OPENS ON INCREASING FLOW; CLOSES ON INCREASING FLOW; SWITCH CONTACT; MULTI POSITION TYPICAL 3 CIRCUIT

RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING

TANK 8

LS08

LEVEL TRANSMITTER SEE LOOP SHEET SI157177 (I.S.) TRIP 17mA 15mA

TB24V 1A — 24V/9 — 23 — 261 — 16 — RELAY 2 — 17/18 — 260 — GUIDED CONTACT RELAY R605 — 0V/9 — 855,895

24V/9 — 10 — RELAY 1 — 11/12 — 261 — 260 R124A/4 262 ESD

P+F KFD2-CRG2-Ex1.D

0V/9 — TB0V 9

R612

AUXILIARY CONTACTS: A1 — 262; 41 — 264; 42 — 263 R809/4 262 RESET; S34 — 264 RESET; RESET MODE AUTO; A2 — 0V/9

265 — 14 — 13 — 266; 24 — 23; SEE LINE 935 — 474 — 34 — 33 — 475 — SEE LINE 935

SAFETY CONTACTS

PILZ PNOZ s2

XV110 INTERNAL 24Vdc — TB4 13 — 265

ESD — 14 — 266

XV111 INTERNAL 24Vdc — 15 — 267 R124A/6 268 ESD

ESD — 16 — 268

SEE LOOP DRAWINGS SI157162 & SI157163

LAST NUMBER USED : 268
SPARE TO : 279

TANK 9

LS09

LEVEL TRANSMITTER SEE LOOP SHEET SI157178 (I.S.) TRIP 17mA 15mA

TB24V 1A — 24V/10 — 23 — 281 — 16 — RELAY 2 — 17/18 — 280 — GUIDED CONTACT RELAY R645 — 0V/10 — 857,897

24V/10 — 10 — RELAY 1 — 11/12 — 281 — 280 R124A/7 282 ESD

P+F KFD2-CRG2-Ex1.D

0V/10 — TB0V 10

R652

AUXILIARY CONTACTS: A1 — 282; 41 — 284; 42 — 283 R810/1 282 RESET; S34 — 284 RESET; RESET MODE AUTO; A2 — 0V/10

285 — 14 — 13 — 286; 24 — 23; SEE LINE 937 — 476 — 34 — 33 — 477 — SEE LINE 937

SAFETY CONTACTS

PILZ PNOZ s2

XV108 INTERNAL 24Vdc — TB4 17 — 285

ESD — 18 — 286

XV109 INTERNAL 24Vdc — 19 — 287 R124A/8 288 ESD

ESD — 20 — 288

SEE LOOP DRAWINGS SI157164 & SI157165

LAST NUMBER USED : 286
SPARE TO : 299

TANK 10

LS10

LEVEL TRANSMITTER SEE LOOP SHEET SI157179 (I.S.) TRIP 17mA 15mA

TB24V 1A — 24V/11 — 23 — 301 — 16 — RELAY 2 — 17/18 — 300 — GUIDED CONTACT RELAY R685 — 0V/11 — 859,899

24V/11 — 10 — RELAY 1 — 11/12 — 301 — 300 R164/1 302 ESD

P+F KFD2-CRG2-Ex1.D

0V/11 — TB0V 11

R692

AUXILIARY CONTACTS: A1 — 302; 41 — 304; 42 — 303 R810/2 302 RESET; S34 — 304 RESET; RESET MODE AUTO; A2 — 0V/11

305 — 14 — 13 — 306; 24 — 23; SEE LINE 939 — 478 — 34 — 33 — 479 — SEE LINE 939

SAFETY CONTACTS

PILZ PNOZ s2

XV106 INTERNAL 24Vdc — TB4 21 — 305

ESD — 22 — 306

XV107 INTERNAL 24Vdc — 23 — 307 R164/2 308 ESD

ESD — 24 — 308

SEE LOOP DRAWINGS SI157166 & SI157167

LAST NUMBER USED : 308
SPARE TO : 319

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REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R	P.J.P	ISSUED FOR CONSTRUCTION
B	25/06/08	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	PILZ RESET MODE ADDED
C	30/01/08	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	ISSUED FOR CONSTRUCTION
D	31/01/12	P.L.	P.P.	D.R.P	D.R.P	D.R.P	D.R.P	TRIP AMP WIRING REVISED
E	23/10/13	P.P.	P.P.	D.S.R		D.S.R		BARRIER MODEL No. UPDATED

PLANT: BRIGHTON STORAGE DEPOT – TANK OVERFILL SIS

TITLE: TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM MONITORING PANEL LOGIC DRAWING 6

Chevron

SHEET 1 OF 1

CLIENT DRG. No.

P&I DRG No. SI157125_DWG

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

GENERAL
HORN; THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE; SOLENOID VALVE; DOUBLE WOUND TRANSFORMER; V VOLTMETER; HR HOURS RUN METER; A AMMETER; HZ FREQUENCY METER; LAMP; SIREN; BELL

ISOLATORS & TERMINALS
FUSE LINK; NEUTRAL LINK REMOVABLE; PLUG AND SOCKET; NO-LOAD SWITCHING; TERMINAL WITH DISCONNECT LINK; TERMINAL; ON-LOAD SWITCHING; FUSED SWITCH (NO-LOAD); FUSED SWITCH (ON-LOAD); FUSED SWITCH (ON LOAD) (DOUBLE BREAK)

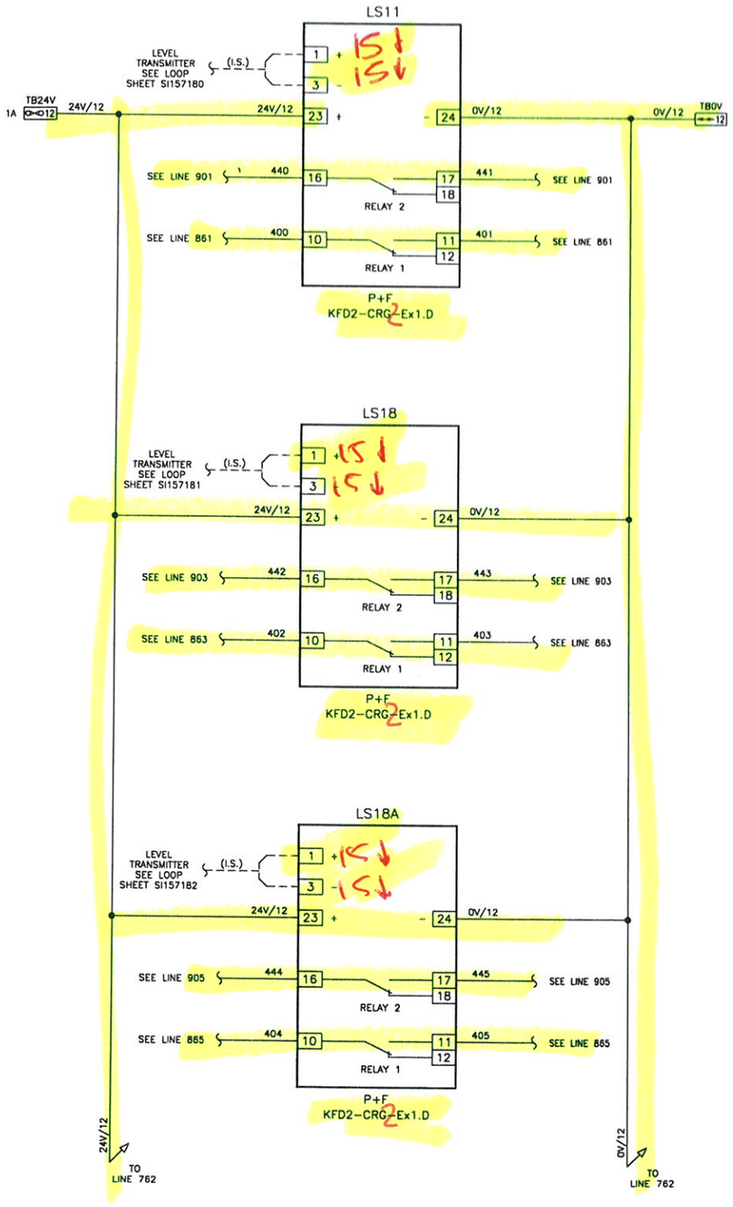
RELAYS & TIMERS
R RELAY; R T TIMED RELAY; NORMALLY OPEN; NORMALLY CLOSED; CHANGEOVER CONTACT; MOTOR TIMER; T.O.D.O. INSTANT OPEN DELAYED CLOSED; INSTANT CLOSE DELAYED OPEN; C CLUTCH; T.O.D.E. DELAYED OFF (N/C); DELAYED ON (N/O)

CONTACTORS & OVERLOADS
NORMALLY OPEN; NORMALLY CLOSED; MAGNETIC OVERLOAD RELAY; THERMAL OVERLOAD RELAY; C CONTACTOR; MECHANICAL INTERLOCK

SWITCHES
KEY OPERATED; STOPLOCK PUSHBUTTON; PUSHBUTTON STOP; PUSHBUTTON START; NORMALLY OPEN; NORMALLY OPEN HELD CLOSED; NORMALLY CLOSED; NORMALLY CLOSED HELD OPEN; OPENS ON RISING PRESSURE; CLOSES ON RISING PRESSURE; OPENS ON RISING TEMPERATURE; OPENS ON RISING LEVEL; CLOSES ON RISING LEVEL; CLOSES ON RISING TEMPERATURE; OPENS ON INCREASING FLOW; CLOSES ON INCREASING FLOW; SWITCH CONTACT; MULTI POSITION TYPICAL 3 CIRCUIT

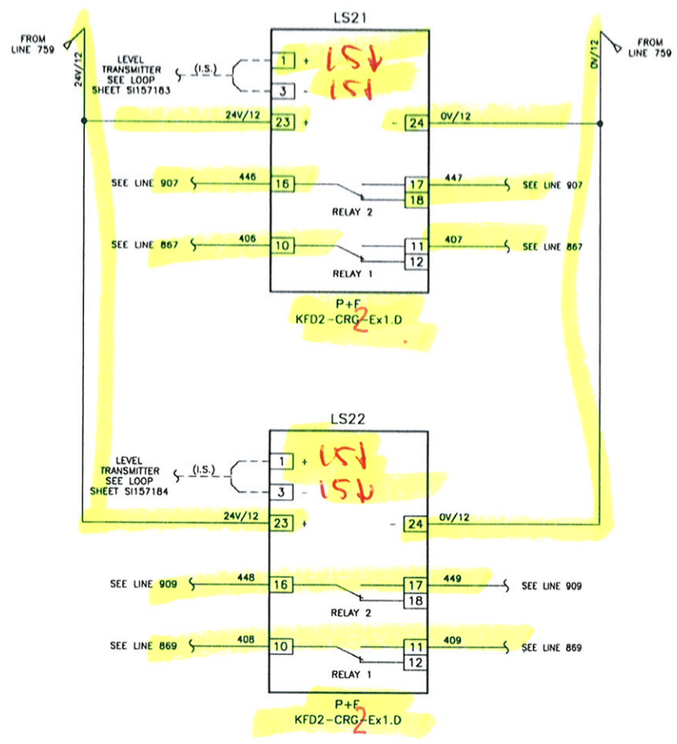
RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING

ADDITIVE TANKS



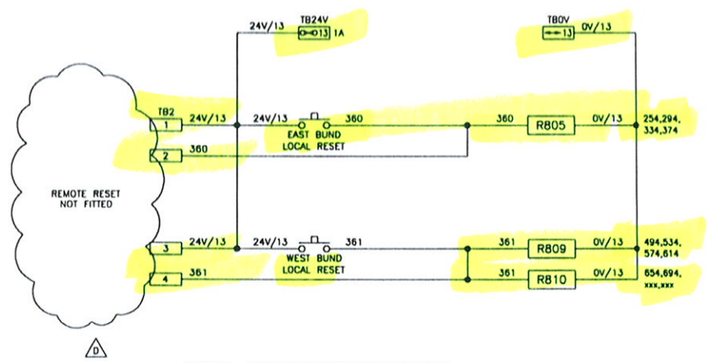
LAST NUMBER USED : 320
SPARE TO : 339

ADDITIVE TANKS



LAST NUMBER USED : 340
SPARE TO : 359

TRIP RESET



NOTE :- PUSHBUTTONS TO BE MOMENTARY ACTION

CONTROLLED COPY 23 OCT 2013

LAST NUMBER USED : 361
SPARE TO : 379

25/10/13

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REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R	P.J.P	ISSUED FOR CONSTRUCTION
B	25/06/08	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	LOOP SHEET REFERENCE ADDED
C	11/03/09	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	AS BUILT
D	12/08/11	P.L.	P.P.	D.S.R	[illegible]	P.J.P	[illegible]	UPDATE POST 2011 TEST

PLANT: BRIGHTON STORAGE DEPOT – TANK OVERFILL SIS
TITLE: TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM MONITORING PANEL LOGIC DRAWING 7
Chevron
SHEET 1 OF 1
CLIENT DRG. No.
P&I DRG No. SI157126_DWG

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

GENERAL: HORN; THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE; SOLENOID VALVE; DOUBLE WOUND TRANSFORMER; VOLTMETER; HOURS RUN METER; AMMETER; FREQUENCY METER; LAMP; SIREN; BELL

ISOLATORS & TERMINALS: FUSE LINK; NEUTRAL LINK REMOVABLE; PLUG AND SOCKET; NO-LOAD SWITCHING; TERMINAL WITH DISCONNECT LINK; TERMINAL; ON-LOAD SWITCHING; FUSED SWITCH (NO-LOAD); FUSED SWITCH (ON-LOAD); FUSED SWITCH (ON LOAD) (DOUBLE BREAK)

RELAYS & TIMERS: R RELAY; R T TIMED RELAY; NORMALLY OPEN; NORMALLY CLOSED; CHANGEOVER CONTACT; MOTOR TIMER; T.O.O.D. INSTANT OPEN DELAYED CLOSED; INSTANT CLOSE DELAYED OPEN; C CLUTCH; T.O.O.E. DELAYED OFF (N/C); DELAYED ON (N/O)

CONTACTORS & OVERLOADS: NORMALLY OPEN; NORMALLY CLOSED; MAGNETIC OVERLOAD RELAY; THERMAL OVERLOAD RELAY; C CONTACTOR; MECHANICAL INTERLOCK

SWITCHES: KEY OPERATED; STOPLOCK PUSHBUTTON; PUSHBUTTON STOP; PUSHBUTTON START; NORMALLY OPEN; NORMALLY OPEN HELD CLOSED; NORMALLY CLOSED; NORMALLY CLOSED HELD OPEN; OPENS ON RISING PRESSURE; CLOSES ON RISING PRESSURE; OPENS ON RISING TEMPERATURE; OPENS ON RISING LEVEL; CLOSES ON RISING LEVEL; CLOSES ON RISING TEMPERATURE; OPENS ON INCREASING FLOW; CLOSES ON INCREASING FLOW; SWITCH CONTACT; MULTI POSITION TYPICAL 3 CIRCUIT

RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING

ALARM ANNUNCIATOR – TANK HiHi LEVEL

841	TB5 1	380	
842	2	381	R245/1 381 — TANK 1 HiHi LEVEL
843	3	382	
844	4	383	R285/1 383 — TANK 2 HiHi LEVEL
845	5	384	
846	6	385	R325/1 385 — TANK 3 HiHi LEVEL
847	7	386	
848	8	387	R365/1 387 — TANK 4 HiHi LEVEL
849	9	388	
850	10	389	R485/1 389 — TANK 5 HiHi LEVEL
851	11	390	
852	12	391	R525/1 391 — TANK 6 HiHi LEVEL
853	13	392	
854	14	393	R565/1 393 — TANK 7 HiHi LEVEL
855	15	394	
856	16	395	R605/1 395 — TANK 8 HiHi LEVEL
857	17	396	
858	18	397	R645/1 397 — TANK 9 HiHi LEVEL
859	19	398	
860	20	399	R685/1 399 — TANK 10 HiHi LEVEL
861	21	400	
862	22	401	LS11/1 401 — TANK 11 HiHi LEVEL
863	23	402	
864	24	403	LS18/1 403 — TANK 18 HiHi LEVEL
865	25	404	
866	26	405	LS18A/1 405 — TANK 18A HiHi LEVEL
867	27	406	
868	28	407	LS21/1 407 — TANK 21 HiHi LEVEL
869	29	408	
870	30	409	LS22/1 409 — TANK 22 HiHi LEVEL
871	31		
872	32		
873	33		
874	34		
875	35		
876	36		
877	37		
878	38		
879	39		
880	40		

ALARM ANNUNCIATOR

LAST NUMBER USED : 409
SPARE TO : 419

PLC/SCADA – TANK HiHi LEVEL

881	TB6 1	420	
882	2	421	R245/2 421 — TANK 1 HiHi LEVEL
883	3	422	
884	4	423	R285/2 423 — TANK 2 HiHi LEVEL
885	5	424	
886	6	425	R325/2 425 — TANK 3 HiHi LEVEL
887	7	426	
888	8	427	R365/2 427 — TANK 4 HiHi LEVEL
889	9	428	
890	10	429	R485/2 429 — TANK 5 HiHi LEVEL
891	11	430	
892	12	431	R525/2 431 — TANK 6 HiHi LEVEL
893	13	432	
894	14	433	R565/2 433 — TANK 7 HiHi LEVEL
895	15	434	
896	16	435	R605/2 435 — TANK 8 HiHi LEVEL
897	17	436	
898	18	437	R645/2 437 — TANK 9 HiHi LEVEL
899	19	438	
900	20	439	R685/2 439 — TANK 10 HiHi LEVEL
901	21	440	
902	22	441	LS11/2 441 — TANK 11 HiHi LEVEL
903	23	442	
904	24	443	LS18/2 443 — TANK 18 HiHi LEVEL
905	25	444	
906	26	445	LS18A/2 445 — TANK 18A HiHi LEVEL
907	27	446	
908	28	447	LS21/2 447 — TANK 21 HiHi LEVEL
909	29	448	
910	30	449	LS22/2 449 — TANK 22 HiHi LEVEL
911	31		
912	32		
913	33		
914	34		
915	35		
916	36		
917	37		
918	38		
919	39		
920	40		

LAST NUMBER USED : 449
SPARE TO : 459

PLC/SCADA – SAFETY RELAY TRIPPED

921	TB7 1	460	
922	2	461	R252A/1 461 — TANK 1 SAFETY RELAY TRIPPED
923	3	462	
924	4	463	R292A/1 463 — TANK 2 SAFETY RELAY TRIPPED
925	5	464	
926	6	465	R332A/1 465 — TANK 3 SAFETY RELAY TRIPPED
927	7	466	
928	8	467	R372A/1 467 — TANK 4 SAFETY RELAY TRIPPED
929	9	468	
930	10	469	R492/3 469 — TANK 5 SAFETY RELAY TRIPPED
931	11	470	
932	12	471	R532/3 471 — TANK 6 SAFETY RELAY TRIPPED
933	13	472	
934	14	473	R572/3 473 — TANK 7 SAFETY RELAY TRIPPED
935	15	474	
936	16	475	R612/3 475 — TANK 8 SAFETY RELAY TRIPPED
937	17	476	
938	18	477	R652/3 477 — TANK 9 SAFETY RELAY TRIPPED
939	19	478	
940	20	479	R692/3 479 — TANK 10 SAFETY RELAY TRIPPED
941			
942			
943			
944			
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LAST NUMBER USED : 479
SPARE TO : 499

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25/10/13

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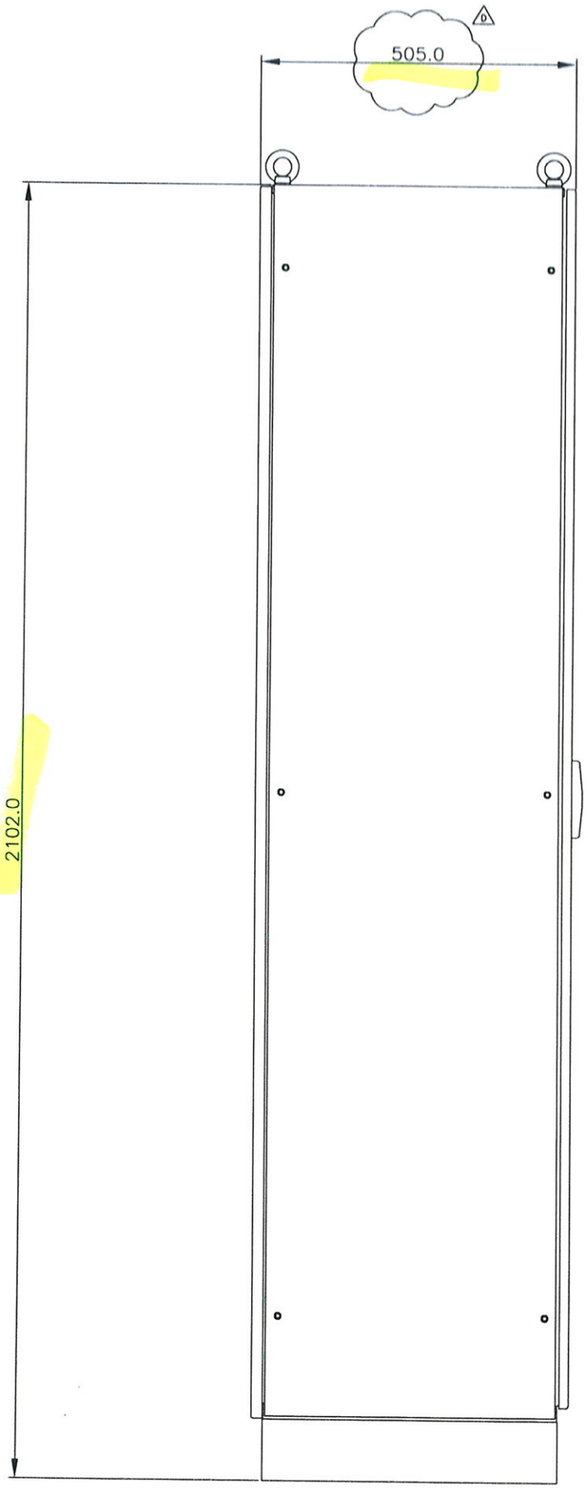
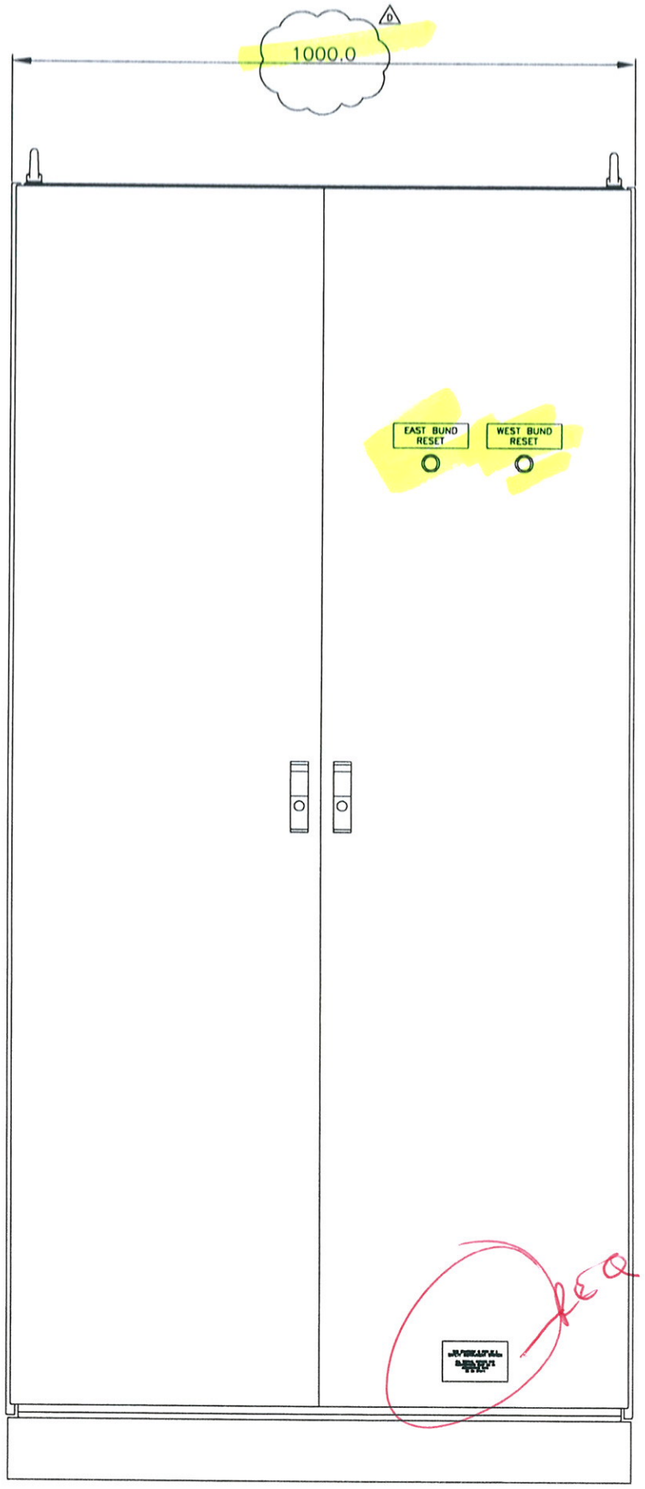
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R ISSUED FOR CONSTRUCTION
B	25/06/08	P.P.	P.P.	D.S.R		D.R.R AS BUILT

PLANT	BRIGHTON STORAGE DEPOT – TANK OVERFILL SIS
TITLE	TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM MONITORING PANEL LOGIC DRAWING 8
	Chevron
	SHEET 1 OF 1
CLIENT DRG. No.	P&I DRG No. SI157127



END ELEVATION



FRONT ELEVATION

ENCLOSURE	RITTAL TS8
	ENCLOSURE 8005.500
	SIDE PANEL 8105.235
	PLINTH FRONT 8601.800
	PLINTH SIDE 8601.050
PAINT FINISH	RAL 7035
PROTECTION	IP55
LABELS	W/B/W TRAFFOLITE
CABLE INCOMING	TOP ENTRY
CABLE OUTGOING	TOP EXIT
SUPPLY	230Vac 50hz

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23 OCT 2013
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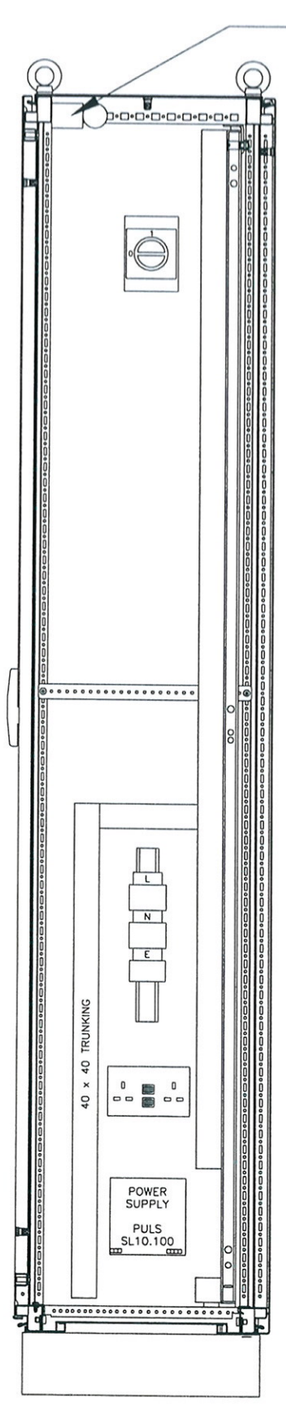
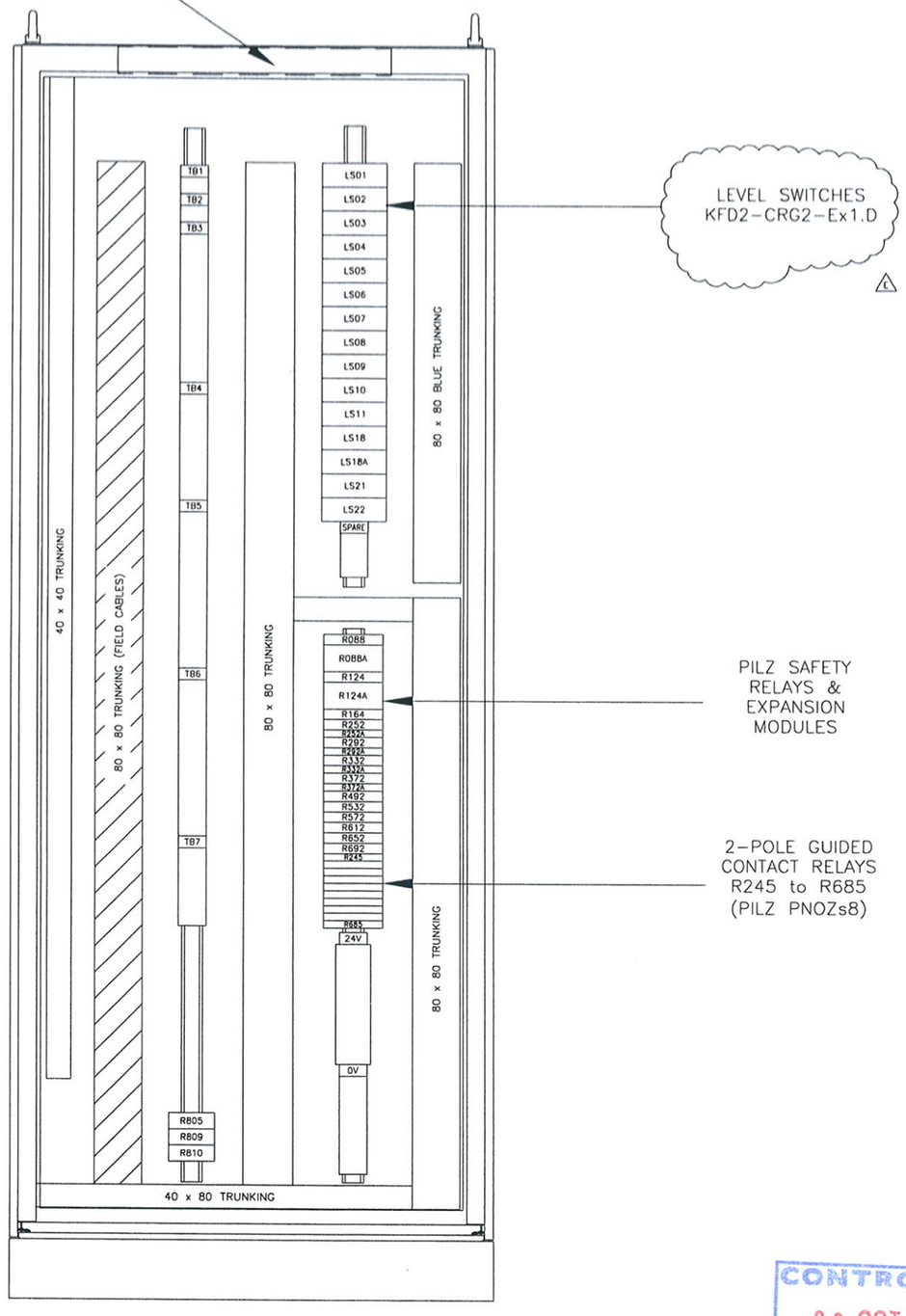
REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R	P.J.P	ISSUED FOR CONSTRUCTION
B	19/12/07	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	CLIENT COMMENTS ADDED
C	11/03/09	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	AS BUILT
D	12/08/11	P.L.	P.P.	D.S.R	D.S.R	P.J.P	P.J.P	UPDATE POST 2011 TEST

PLANT	BRIGHTON STORAGE DEPOT – TANK OVERFILL SIS
TITLE	TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM TANK MONITORING PANEL EXTERNAL LAYOUT
	Chevron
	SHEET 1 OF 1
CLIENT DRG. No.	P&I DRG No. SI157130_DWG



SIDE ELEVATION



FRONT ELEVATION
(FRONT DOOR REMOVED)

NOTES

TERMINAL BLOCKS

TB	QTY	DESCRIPTION
TB-L	5	ASK1/35
TB-N	5	ASK1/35
TB-E	5	~~EK2.5/35~~ WPE 4
24V	20	~~ASK1/35~~ WSI6
0V	20	~~SAK2.5/35~~ WTR2.5
TB-1	4	~~SAK2.5/35~~ WTR2.5
TB-2	4	~~SAK2.5/35~~ WTR2.5
TB-3	38	~~SAKR/35~~ WTR2.5
TB-4	27	~~SAKR/35~~ WTR2.5
TB-5	40	~~SAKR/35~~ WTR2.5
TB-6	40	~~SAKR/35~~ WTR2.5
TB-7	20	~~SAKR/35~~ WTR2.5
SPARE	12	~~SAK2.5/35~~ BLUE WTR2.5B

32

RELAYS

RELAY		QTY	DESCRIPTION
R805	R809	3	FINDER RELAY : 55.34.9.024.0090 BASE : 94.04
R810			
R088	R124	13	PILZ PNOZs2
R164	R252		
R292	R332		
R372	R492		
R532	R572		
R612	R652		
R692			
R088A	R124A	2	PILZ PNOZs11
R252A	R292A	14	PILZ PNOZs8
R332A	R372A		
R245	R285		
R325	R365		
R485	R525		
R565	R605		
R645	R685		

WIRING DETAILS

DESCRIPTION	
ELECTRICAL 440V / 240V AC:	
SIZE:	n/a
COLOUR:	n/a
INSTRUMENT 230Vac SUPPLIES:	
SIZE:	Suitably Rated with Minimum 0.5mm²
COLOUR:	Live (Brown) / Neutral (Blue) / Earth (Green/Yellow)
INSTRUMENT 110Vdc SUPPLIES:	
SIZE:	n/a
COLOUR:	n/a
24V DC SUPPLIES:	
SIZE:	Suitably Rated with Minimum 0.5mm²
COLOUR:	Positive (Red) / 0V (Black)
DIGITAL SWITCHED AC:	
SIZE:	n/a
COLOUR:	n/a
DIGITAL SWITCHED DC:	
SIZE:	0.5mm²
COLOUR:	White
ANALOGUE:	
SIZE:	0.5mm²
COLOUR:	Grey
CRIMPS:	
TYPE:	Bootlace or Twin Grip Insulated
FERRULES:	
TYPE:	Pre-Printed Wrap Around

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23 OCT 2013
FAT 25/10/13

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REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	21/11/07	P.P.	P.P.	D.R.R	D.S.R	D.R.R	P.J.P	ISSUED FOR CONSTRUCTION
B	21/01/08	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	LEVEL SWITCH SIZE REVISED
C	11/03/09	P.P.	P.P.	D.S.R	D.S.R	D.R.R	D.R.R	AS BUILT
D	12/08/11	P.L.	P.P.	D.S.R	D.S.R	P.J.P	D.R.R	UPDATE POST 2011 TEST
E	23/10/13	P.P.	P.P.	D.S.R		D.S.R		LEVEL SWITCH MODEL No. UPDATED

PLANT	BRIGHTON STORAGE DEPOT - TANK OVERFILL SIS
TITLE	TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM TANK MONITORING PANEL INTERNAL LAYOUT

simon
Simon Management Ltd
Priory House,
80 Station Road,
Redhill,
Surrey,
RH1 1PE.
Tel: 01737 778201

Chevron

SHEET 1 OF 1

CLIENT DRG. No.

P&I DRG No. SI157131_DWG

P & I Design Ltd

Process Instrumentation Consultancy & Design

2 Reed Street, Gladstone Industrial Estate,
Thornaby, TS17 7AF, United Kingdom.
Tel. +44 (0) 1642 617444 Fax. +44 (0) 1642 616447
Web Site: www.pidesign.co.uk

CHEVRON UK LTD.

BRIGHTON TERMINAL

GASOLINE OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM

SHUTDOWN CONDITIONS

FUNCTIONAL TESTING PROCEDURE

	Date	By	Checked	Approved	Description	Client Ref.
A	26.03.08	D.S.Regan	DRR	DRR	Original Issue	
B	17.11.08	D.S.Regan	DRR	DRR	Tankside Valves Removed	Document No. **SI157036_RPT**
C	27.07.12	D.S.Regan	DBF	DSR	Wet Testing Added	
D	30.07.12	D.S.Regan	DBF	DSR	Wet Testing Procedure Corrected	**Page 1 of 14**

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Contents

1 REVISION HISTORY

Rev	Description
A	Original Issue
B	Tankside Valves removed from test procedure. Phase 1 test only, Single Pipeline Import Valve.
C	Wet Testing Procedure Added, PFD Calculation for Imperfect testing Added.
D	Wet Testing Procedure corrected for consistency

2 INTRODUCTION

This document will form part of the Lifecycle testing documentation to ensure that the installation performs the SIF as designed.

This document will be revised with any additions to or removals from the safety instrument System throughout the life of the system.

3 FUNCTIONAL TESTING PROCEDURE – TANK 1

Purpose of Test	
To verify the operation of LS1 high level trip closes the gasoline Pipeline import valve. Note – Switch "Certify" Test feature used. Raising the tank level or removal of the switch from the tank is not required.	
Method Of Test	**Result**
1. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	✓
2. Confirm there is no gasoline import from the jetty to any tank and no transfer operations are in progress for Tank 1. (Tank feed manual block valve locked closed. – TERMINAL SHUTDOWN + CMPT-1/DRY)	✓
3. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	✓ #1
4. Reset logic solver and confirm Pilz relay R252 healthy and energised. Confirm annunciator lamp status correct.	✓
5. Confirm Pipeline valve XV162 open. Confirm valve status output correct.	✓ #2
6. Operate high level switch "Certify" Test Feature. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and R372 trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds. (R252)	XV162 (a) 85 Seconds (b) 85 Seconds #3
7. Reinstate LS1 high level switch to normal operation.	✓
8. Confirm XV162 Pipeline import valve remains closed. (WILL NOT RESPOND) (EMST Rst'd)	✓
9. Operate SIS panel trip reset pushbutton. (CAN BE RESPONDED)	✓
10. Confirm XV162 jetty import valve opens. Confirm valve position status output correct and R252 trip condition. #2	
11. Record Undisturbed/Disturbed Status of results. Delete as applicable.	Disturbed/ ~~Undisturbed~~

Actions/Comments

#1 JETTY ANN LAMP TEST.
#2 NO PLC ON SYSTEM. LOCAL CHECK ONLY.
#3 5s DELAY FROM CERTIFY KEYSWITCH.

NOTE CONTROL ROOM ANN + JETTY ANN.
SIREN + STROBE AT JETTY.

Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign**	**Date**
Tested by		18/11/13

4 FUNCTIONAL TESTING PROCEDURE – TANK 2

Purpose of Test	
To verify the operation of LS2 high level trip closes the gasoline Pipeline import valve. Note – Switch "Certify" Test feature used. Raising the tank level or removal of the switch from the tank is not required.	
Method Of Test	**Result**
12. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	✓
13. Confirm there is no gasoline import from the Pipeline to any tank and no transfer operations are in progress for Tank 2. (Tank feed manual block valve locked closed.- TERMINAL SHUTDOWN + EMPTY TANK 1)	✓
14. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	✓ #1
15. Reset logic solver and confirm Pilz relay R292 healthy and energised. Confirm annunciator lamp status correct.	✓
16. Confirm Pipeline import valve XV162 open. Confirm valve status output correct.-	✓ #2
17. Operate high level switch "Certify" Test Feature. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and ~~R372~~ R292 trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV162 (a) 8.4 Seconds (b) 8.4 Seconds #3
18. Reinstate LS2 high level switch to normal operation.	✓
19. Confirm XV162 Pipeline import valve remains closed. (WILL NOT OPEN)	✓
20. Operate SIS panel trip reset pushbutton. (FIRST BUMP)	✓
21. Confirm XV162 Pipeline import valve ~~opens~~ (CAN'T OPEN). Confirm valve position status output correct and R292 trip condition. #2	
22. Record Undisturbed/Disturbed Status of results. Delete as applicable.	Disturbed/ ~~Undisturbed~~
Actions/Comments	
# AS TANK 1	
Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign** / **Date**
Tested by	08/11/13

5 FUNCTIONAL TESTING PROCEDURE – TANK 3

Purpose of Test	
To verify the operation of LS3 high level trip closes the gasoline Pipeline import valve. Note – Switch "Certify" Test feature used. Raising the tank level or removal of the switch from the tank is not required.	
Method Of Test	**Result**
23. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	✓
24. Confirm there is no gasoline import from the Pipeline to any tank and no transfer operations are in progress for Tank 3. Tank feed manual block valve locked closed. TERMINAL SHUTDOWN + EMPTY/DRY	✓
25. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	✓ #1
26. Reset logic solver and confirm Pilz relay R332 healthy and energised. Confirm annunciator lamp status correct.	✓
27. Confirm Pipeline import valve XV162 open. Confirm valve status output correct.	✓ #2
28. Operate high level switch "Certify" Test Feature. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and ~~R372~~ R332 trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV162 (a)....8.2 Seconds (b)....8.3 Seconds #3
29. Reinstate LS3 high level switch to normal operation.	✓
30. Confirm XV162 Pipeline import valve remains closed. (WILL NOT OPEN)	✓
31. Operate SIS panel trip reset pushbutton. EASTBOUND	✓
32. Confirm XV162 Pipeline import valve ~~opens~~ CAN BE RECORDED. Confirm valve position status output correct and R332 trip condition. #2	✓
33. Record Undisturbed/Disturbed Status of results. Delete as applicable.	Disturbed/ ~~Undisturbed~~
Actions/Comments	
# AS TANK 1.	

Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign**	**Date**
Tested by		18/4/13

6 FUNCTIONAL TESTING PROCEDURE – TANK 4

Purpose of Test	
To verify the operation of LS4 high level trip closes the gasoline Pipeline import valve. Note – Switch "Certify" Test feature used. Raising the tank level or removal of the switch from the tank is not required.	
Method Of Test	**Result**
34. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	✓
35. Confirm there is no gasoline import from the Pipeline to any tank and no transfer operations are in progress for Tank 4. (Tank feed manual block valve locked closed) TERMINAL SHUTDOWN + EMPTY/DRY	✓
36. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	✓ #1
37. Reset logic solver and confirm Pilz relay R372 healthy and energised. Confirm annunciator lamp status correct.	✓
38. Confirm Pipeline import valve XV162 open. Confirm valve status output correct.	✓ #2
39. Operate high level switch "Certify" Test Feature. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and R372 trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV162 (a) 84 Seconds (b) 8 Seconds #3
40. Reinstate LS4 high level switch to normal operation.	✓
41. Confirm XV162 Pipeline import valve remains closed. (WILL NOT REOPEN)	✓
42. Operate SIS (TEST PANEL) panel trip reset pushbutton.	✓
43. Confirm XV162 Pipeline import valve opens. Confirm valve position status output correct and R372 trip condition. #2	✓
44. Record Undisturbed/Disturbed Status of results. Delete as applicable.	Disturbed/ ~~Undisturbed~~

Actions/Comments

AS TANK 1.

Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign**	**Date**
Tested by		18/4/13

7 FUNCTIONAL WET TESTING PROCEDURE

Purpose of Test	
To verify the operation of Tank 2&3 high level trip closes the gasoline Pipeline import valve. Note – Wet Test used. Raising the tank level is not required.	
Method Of Test	**Result**
45. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	✓
46. Confirm there is no gasoline import from the Pipeline to any tank and no transfer operations are in progress for Tank 2&3 Tank feed manual block valve locked closed. TERMINAL SHUTDOWN	✓
47. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	✓ #1
48. Reset logic solver and confirm Pilz relay R..✓.. healthy and energised. Confirm annunciator lamp status correct.	✓
49. Confirm Pipeline import valve XV162 open. Confirm valve status output correct.	✓ #2
50. Carefully remove level switch from tank 2&3 Dip level switch in suitable liquid.	✓ WARM.
51. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and R..... trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV 162 (a)....1....Seconds (b)..84..Seconds
52. Reinstate high level switch to normal operation.	✓
53. Confirm XV162 Pipeline import valve remains closed. (WILL NOT REOPEN)	✓
54. Operate SIS panel trip reset pushbutton. (ENSURE BOND) (CAN BE RESETTED)	✓
55. Confirm XV162 Pipeline import valve opens. Confirm valve position status output correct and R..✓.. trip condition.	✓
56. Record Undisturbed/Disturbed Status of results. Delete as applicable.	Disturbed/ ~~Undisturbed~~
Actions/Comments	
TANKS 2+3 TESTED # AS TANK 1.	
Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign** / **Date**
Tested by	19/11/13

8 PFD CALCULATION

This calculation shows that if an incomplete test is carried out at an interval of 3 years, the PFD of the SIF will no longer meet the mid-range SIL2 requirement.

Thus the wet testing procedure must be carried on at least two tanks annually to ensure that the PFD requirement is met.

P & I Design Ltd — ***Probability of Failure on Demand (PFD) Summary***

www.pidesign.co.uk — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

SAFETY INTEGRITY LEVEL REQUIRED

SIL 2

SAFETY INTEGRITY LEVEL ACHIEVED

Valid

CALCULATION SUMMARY

$PFD_{(SYS)}$ =	$PFD_{(S)}$		$PFD_{(L)}$		$PFD_{(FE)}$	
7.00E-03 =	1.34E-03	Valid	4.00E-06	Valid	4.39E-03	Valid
	0.00E+00	n/a	1.18E-03	Valid	7.40E-05	Valid
	0.00E+00	n/a	0.00E+00	n/a	0.00E+00	Valid
Valid	1.34E-03	Valid	1.19E-03	Valid	4.47E-03	Valid

SPURIOUS TRIP SUMMARY

$S.Trip_{(SYS)}$ =	$S.Trip_{(S)}$		$S.Trip_{(L)}$		$S.Trip_{(FE)}$	
9.5 =	116	Years	13158	Years	59	Years
Years	n/a	Years	257	Years	13	Years
	n/a	Years	n/a	Years	n/a	Years

P & I Design Ltd — **PFD - Sensor Subsystem Calculation Sheet 1**

www.pidesign.co.uk — Sheet Title:- Sensor - Droxelbrook Level Switch — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

Key:: Data Input Cell | Calculation Cell | Results Cell

System Architecture: 1oo1

Data Type: 2 — Failure Rate/hr (λ)

Sub System Item	Level Switch
FAILURE DATA	
Failures - Safe, Detected (λSD)	0.00E+00
Failures - Safe, Undetected (λSU)	3.00E-07
Failures - Dangerous, Detected (λDD)	6.86E-07
Failures - Dangerous, Undetected (λDU)	7.30E-08
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	
Diagnostic Coverage	
PFD Value (From Certificate)	

FAILURE CALCULATIONS	
Total Failures (λ)	1.06E-06
Safe Fail Fraction	0.93
Total Dangerous Failures (λ_D)	7.59E-07
Calculated Diagnostic Coverage (%)	90.38

SUB-SYSTEM DATA	
Mean Time to Repair (hrs)	8
Proof Test Interval (days)	1095
Fraction of detected failures that have common cause (βD)	0.0
Proof Test Coverage (C_{PT}) - %	93
Operational Lifetime of SIF (LT) - years	20.0

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	7.59E-07
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	6.86E-07
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	7.30E-08
Fraction of undetected failures that have a common cause (β)	40
Channel Downtime (t_{CE})	1271.8
Voted Group Downtime (t_{GE})	n/a
Mean Diagnostic Coverage	90.4

LOOP CRITERIA ACHIEVED	
PFD Total	**9.65E-04**
PFD Total (Imperfect Testing)	**1.34E-03**
SIL achieved (including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**116**

FAULT TOLERANCE CHECK
Conforms to Note 1: YES
Note 1: In order to reduce the fault tolerance by 1, for sensors, final elements and non-programmable logic solvers, the following must be satisfied:
1. the hardware is selected on the basis of proven technology (prior use)
2. adjustment, of process related parameters only, allowed to the user.
3. adjustment, of process related parameters, is protected by password or removeable programming link.
4. system function has SIL requirement of <4

P & I Design Ltd
www.pidesign.co.uk

Logic Solver Calculation Sheet 1
Sheet Title:- Logic Solver - PILZ Relay
Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref.	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

Key: Data Input Cell | Calculation Cell | Results Cell

System Architecture: 1oo1

Data Type: 3 — PFD Value Certified

Sub System Item	Pilz PNOZ S2 Relay
FAILURE DATA	
Failures - Safe, Detected (λSD)	
Failures - Safe, Undetected (λSU)	
Failures - Dangerous, Detected (λDD)	
Failures - Dangerous, Undetected (λDU)	
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	0.95
Diagnostic Coverage	
PFD Value (From Certificate)	4.00E-06

FAILURE CALCULATIONS	
Total Failures (λ)	n/a
Safe Fail Fraction	n/a
Total Dangerous Failures (λ_D)	n/a
Calculated Diagnostic Coverage	n/a

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	n/a
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	n/a
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	n/a
Fraction of undetected failures that have a common cause (β)	n/a
Channel Downtime (t_{CE})	n/a
Voted Group Downtime (t_{GE})	n/a
Mean Diagnostic Coverage	n/a

LOOP CRITERIA ACHIEVED	
PFD Total	**4.00E-06**
SIL achieved (Including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**13158**

FAULT TOLERANCE CHECK	Non-Programmable	
Programmable	Non Programmable	
SFF>90%	Conforms to Note 1	YES

Note 1: In order to reduce the fault tolerance by 1, for sensors, final elements and non-programmable logic solvers, the following must be satisfied:

1. the hardware is selected on the basis of proven technology (prior use)
2. adjustment, of process related parameters only, allowed to the user.
3. adjustment, of process related parameters, is protected by password or removeable programming link.
4. system function has SIL requirement of <4

P & I Design Ltd — **Logic Solver Calculation Sheet 2**

www.pidesign.co.uk — Sheet Title:- Logic Solver - Barrier — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

Key: Data Input Cell | Calculation Cell | Results Cell

System Architecture: 1oo1

Data Type: 2 — Failure Rate/hr (λ)

Sub System Item	Barrier and Trip Amp
FAILURE DATA	
Failures - Safe, Detected (λSD)	9.00E-09
Failures - Safe, Undetected (λSU)	3.47E-07
Failures - Dangerous, Detected (λDD)	8.90E-08
Failures - Dangerous, Undetected (λDU)	9.00E-08
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	
Diagnostic Coverage	
PFD Value (From Certificate)	

FAILURE CALCULATIONS	
Total Failures (λ)	5.35E-07
Safe Fail Fraction	0.83
Total Dangerous Failures (λ_D)	1.79E-07
Calculated Diagnostic Coverage	49.72

SUB-SYSTEM DATA	
Mean Time to Repair	8
Proof Test Interval (days)	1095
Fraction of detected failures that have common cause (βD)	0.0

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	1.79E-07
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	8.90E-08
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	9.00E-08
Fraction of undetected failures that have a common cause (β)	0
Channel Downtime (t_{CE})	6614.7
Voted Group Downtime (t_{GE})	4412.5
Mean Diagnostic Coverage	49.7

LOOP CRITERIA ACHIEVED	
PFD Total	**1.18E-03**
SIL achieved (including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**256.5**

FAULT TOLERANCE CHECK	Non-Programmable	
Programmable	Non Programmable	
SFF<60%	Conforms to Note 1	YES
Note 1: In order to reduce the fault tolerance by 1, for sensors, final elements and non-programmable logic solvers, the following must be satisfied:		
1. the hardware is selected on the basis of proven technology (prior use)		
2. adjustment, of process related parameters only, allowed to the user.		
3. adjustment, of process related parameters, is protected by password or removeable programming link.		
4. system function has SIL requirement of <4		

P & I Design Ltd — **Final Element Calculation Sheet 1**

www.pidesign.co.uk — Sheet Title:- Pekos Ball Valve — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

Key:: Data Input Cell | Calculation Cell | Results Cell

System Architecture: 1oo1

Data Type: 2 — Failure Rate/hr (λ)

Sub System Item	Ball valve
FAILURE DATA	
Failures - Safe, Detected (λSD)	
Failures - Safe, Undetected (λSU)	1.65E-06
Failures - Dangerous, Detected (λDD)	2.92E-07
Failures - Dangerous, Undetected (λDU)	3.34E-07
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	
Diagnostic Coverage	
PFD Value (From Certificate)	

FAILURE CALCULATIONS	
Total Failures (λ)	2.28E-06
Safe Fail Fraction	0.85
Total Dangerous Failures (λ_D)	6.26E-07
Calculated Diagnostic Coverage	46.65

SUB-SYSTEM DATA	
Mean Time to Repair	8
Proof Test Interval (days)	1095
Fraction of detected failures that have common cause (βD)	0.0

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	6.26E-07
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	2.92E-07
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	3.34E-07
Fraction of undetected failures that have a common cause (β)	0
Channel Downtime (t_{CE})	7018.8
Voted Group Downtime (t_{GE})	n/a
Mean Diagnostic Coverage	46.6

LOOP CRITERIA ACHIEVED	
PFD Total	**4.39E-03**
SIL achieved (including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**59**

FAULT TOLERANCE CHECK
Conforms to Note 1: YES
Note 1: In order to reduce the fault tolerance by 1, for Final Elements, final elements and non-programmable logic solvers, the following must be satisfied:
1. the hardware is selected on the basis of proven technology (prior use)
2. adjustment, of process related parameters only, allowed to the user.
3. adjustment, of process related parameters, is protected by password or removeable programming link.
4. system function has SIL requirement of <4

P & I Design Ltd — ***Final Element Calculation Sheet 2***

www.pidesign.co.uk — Sheet Title:- Rotork Electro/Hydraulic Actuator — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

Key:: Data Input Cell | Calculation Cell | Results Cell

System Architecture: 1oo1

Data Type: 2 — Failure Rate/hr (λ)

Sub System Item	Rotork Electro-hydraulic
FAILURE DATA	
Failures - Safe, Detected (λSD)	8.05E-06
Failures - Safe, Undetected (λSU)	5.28E-07
Failures - Dangerous, Detected (λDD)	1.49E-08
Failures - Dangerous, Undetected (λDU)	5.62E-09
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	
Diagnostic Coverage	
PFD Value (From Certificate)	

FAILURE CALCULATIONS	
Total Failures (λ)	8.60E-06
Safe Fail Fraction	0.9993
Total Dangerous Failures (λ_D)	2.05E-08
Calculated Diagnostic Coverage	72.59

SUB-SYSTEM DATA	
Mean Time to Repair	8
Proof Test Interval (days)	1095
Fraction of detected failures that have common cause (βD)	0.0

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	2.05E-08
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	1.49E-08
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	5.62E-09
Fraction of undetected failures that have a common cause (β)	0
Channel Downtime (t_{CE})	3610.3
Voted Group Downtime (t_{GE})	n/a
Mean Diagnostic Coverage	72.6

LOOP CRITERIA ACHIEVED	
PFD Total	**7.40E-05**
SIL achieved (Including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**13**

FAULT TOLERANCE CHECK
Conforms to Note 1: YES
Note 1: In order to reduce the fault tolerance by 1, for sensors, final elements and non-programmable logic solvers, the following must be satisfied:
1. the hardware is selected on the basis of proven technology (prior use)
2. adjustment, of process related parameters only, allowed to the user.
3. adjustment, of process related parameters, is protected by password or removeable programming link.
4. system function has SIL requirement of <4

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VALERO ENERGY LTD.

BRIGHTON TERMINAL

GASOLINE OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM

DOCUMENTATION AND HARDWARE VERIFICATION

TESTING PROCEDURE

Rev	Date	By	Checked	Approved	Description	Client Ref.
A	28.04.08	D.S.Regan	DRR	DRR	Original Issue	
B	09.05.11	P. Lynch	DSR	DSR	Update for 2011 test	Document No. **SI157037_RPT**
C	08.06.12	P. Lynch	DSR	DSR	Update for 2012 Test	
						Page 1 of 15

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

Contents

1.0 REVISION HISTORY

Rev	Description
A	Original Issue – To cover all equipment as original design.
B	Updated for 2011 proof test
C	Updated for 2012 proof test to include HHL instrument PCB details and hand test switch details.

2.0 INTRODUCTION

This document will form part of the Lifecycle testing documentation to ensure that the installation performs the SIF as designed.

This document will be revised with any additions to or removals from the safety instrument System throughout the life of the system.

3.0 DOCUMENTATION VERIFICATION

Purpose of Test			
Verify Correct Documentation used for testing.			
Method of Test			
• Confirm documentation and revisions used for testing. • Record permit number and type (cold/hot/confined space)			
Permit To Work Number	N/A	**Permit To Work Type**	
Safety Instrument System Documentation Manual SI157007.MNL Revision			
Drawing Number	**Title**		**Revision**
SI157101	Tank Overfill Protection SIS Import East Bund Cable Overview		E G
SI157102	Tank Overfill Protection SIS West Bund Cable Overview		D F
SI157103	Tank Overfill Protection SIS Additive Tanks Cable Overview		Ø E
SI157104	Tank Overfill Protection SIS East Bund I.S. Junction Box Connection Details		Ø E
SI157105	Tank Overfill Protection SIS West Bund I.S. Junction Box Connection Details		Ø E
SI157106	Tank Overfill Protection SIS Additive Tanks I.S. Junction Box Connection Details		Ø E
SI157107	Tank Overfill Protection SIS East Bund DC Junction Box Connection Details TB1		D ✓
SI157108	Tank Overfill Protection SIS East Bund DC Junction Box Connection Details TB2		D ✓
SI157109	Tank Overfill Protection SIS West Bund DC Junction Box Connection Details		D ✓
SI157110	Tank Overfill Protection SIS Valve Power Distribution Board		D ✓
SI157111	Tank Overfill Protection SIS East Bund AC Junction Box Connection Details TB1		D ✓
SI157112	Tank Overfill Protection SIS East Bund AC Junction Box Connection Details TB2		D ✓
SI157113	Tank Overfill Protection SIS West Bund AC Junction Box Connection Details TB1		D ✓
SI157114	Tank Overfill Protection SIS West Bund AC Junction Box Connection Details TB2		D ✓
SI157115	Site Plan Showing Location of Tank Overfill SIS Equipment		B ✓
SI157116	Tank Overfill Protection SIS Rotork Valve Control Network		C ✓
Actions/Comments			
DRAWING UPDATES FOR NEW TRIP AMPS			
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)		**Sign**	**Date**
Tested by			18/11/13

3.0 Documentation Verification (Cont.)

Purpose of Test			
Verify Correct Documentation used for testing.			
Method of Test			
• Confirm documentation and revisions used for testing. • Record permit number and type (cold/hot/confined space)			
Permit To Work Number	N/A	**Permit To Work Type**	
Safety Instrument System Documentation Manual SI157007.MNL Revision			

Drawing Number	**Title**	**Revision**
SI157117	Alarm Annunciator/Monitoring Panel Cable AN001 Connection Details	C ✓
SI157118	Alarm Annunciator/Monitoring Panel Cable AN002 Connection Details	B ✓
SI157119	Alarm Annunciator/Monitoring Panel Cable AN003 Connection Details	B ✓
SI157120	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 1	¢ E
SI157121	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 2	¢ D
SI157122	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 3	¢ F
SI157123	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 4	¢ F
SI157124	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 5	¢ F
SI157125	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 6	¢ F
SI157126	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 7	¢ E
SI157127	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 8	¢ C
SI157130	Tank Overfill Protection SIS Tank Monitoring Panel External Layout	¢ E
SI157131	Tank Overfill Protection SIS Tank Monitoring Panel Internal Layout	¢ F

Actions/Comments

DRAWING UPDATES FOR NEW TRIPAMPS

Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		18/4/13

3.0 Documentation Verification (Cont.)

Purpose of Test			
Verify Correct Documentation used for testing.			
Method of Test			
• Confirm documentation and revisions used for testing. • Record permit number and type (cold/hot/confined space)			
Permit To Work Number	N/A	**Permit To Work Type**	
Safety Instrument System Documentation Manual SI157007.MNL Revision			
Drawing Number	**Title**		**Revision**
SI157140	Tank Overfill Protection SIS XV162 Pipeline Import Valve Loop Sheet		C
SI157170	Tank Overfill Protection SIS Tank 1 High Level Switch Loop Sheet		C ✓
SI157171	Tank Overfill Protection SIS Tank 2 High Level Switch Loop Sheet		C
SI157172	Tank Overfill Protection SIS Tank 3 High Level Switch Loop Sheet		C
SI157173	Tank Overfill Protection SIS Tank 4 High Level Switch Loop Sheet		C
SI157174	Tank Overfill Protection SIS Tank 5 High Level Switch Loop Sheet		C
SI157175	Tank Overfill Protection SIS Tank 6 High Level Switch Loop Sheet		C
SI157176	Tank Overfill Protection SIS Tank 7 High Level Switch Loop Sheet		C
SI157177	Tank Overfill Protection SIS Tank 8 High Level Switch Loop Sheet		C
SI157178	Tank Overfill Protection SIS Tank 9 High Level Switch Loop Sheet		C
SI157179	Tank Overfill Protection SIS Tank 10 High Level Switch Loop Sheet		C
SI157180	Tank Overfill Protection SIS Tank 11 High Level Switch Loop Sheet		C
SI157181	Tank Overfill Protection SIS Tank 18 High Level Switch Loop Sheet		C
SI157182	Tank Overfill Protection SIS Tank 18A High Level Switch Loop Sheet		C
SI157183	Tank Overfill Protection SIS Tank 21 High Level Switch Loop Sheet		C
SI157184	Tank Overfill Protection SIS Tank 22 High Level Switch Loop Sheet		C
Actions/Comments			
DRAWING UPDATES FOR NEW TRIP AMPS			
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)		**Sign**	**Date**
Tested by			18/11/13

HARDWARE VERIFICATION

3.1 Tank Sensors

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries and process connections. • Comment on changes and condition		
Tag No	**Identification**	**Result**
TANK 1		
LE01	000356	✓
PCB	385-0048-050-1T ALK003209	X
HS01	220037	✓
TANK 2		
LE02	000359	791 NEW
PCB	~~385-0048-050 ALK003569~~	
HS02	218796	✓
TANK 3		
LE03	000357	✓
PCB	385-0048-050-1T ALK003253	X
HS03	220164	✓
TANK 4		
LE04	000362	✓
PCB	385-0048-050-1T ALK003261	X
HS04	218797	✓
TANK 5		
LS05	000385	✓
PCB	385-0048-050-1T ALK003426	X
HS05	218974	✓
Actions/Comments		
PCB's NOT CHECKED - TAMPER PROOF LABELS STILL INTACT.		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		18/11/13

3.1 Tank Sensors (Cont.)

Purpose of Test
To verify the correct equipment is fitted and check its physical condition.
Method Of Test
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries and process connections. • Comment on changes and condition

Tag No	Identification	Result
TANK 6		
LS06	000399	✓ LS06 CABLE MARKER MISSING
PCB	385-0048-050-1T ALK003237	✗
HS06	220036	✓
TANK 7		
LS07	000389	✓
PCB	385-0048-050-1T ALK003424	✗
HS07	218798	✓
TANK 8		
LS08	000386	✓
PCB	385-0048-050-1T ALK003215	✗
HS08	220040	✓
TANK 9		
LS09	000382	✓
PCB	385-0048-050-1T ALK003216	✗
HS09	218823	✓
TANK 10		
LS10	000371	✓
PCB	385-0048-050-1T ALK003215	✗
HS10	220193	✓

Actions/Comments

PCB'S NOT CHECKED - TAMPER PROOF LABEL'S STILL INTACT.

Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		19/11/13

3.1 Tank Sensors (Cont.)

Purpose of Test
To verify the correct equipment is fitted and check its physical condition.
Method Of Test
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries and process connections. • Comment on changes and condition

Tag No	Identification	Result
TANK 11		
LS11	000364	✓
PCB	385-0048-050-1T ALK003212	X
HS11	218973	✓
TANK 18		
LS18	~~000373~~	793
PCB	385-0048-050-1T ALK003221	
HS18	218868	✓
TANK 18A		
LS18A	000409	✓
PCB	385-0048-050-1T ALK003260	X
HS18A	218975	✓
TANK 21		
LS21	000396	✓
PCB	385-0048-050-1T ALK003255	X
HS21	220214	✓
TANK 22		
LS22	000383	✓
PCB	385-0048-050-1T ALK003244	X
HS22	220072	✓

Actions/Comments

PCB'S NOT ~~CHANGED~~ CHECKED - TAMPER PROOF LABELS STILL INTACT.

Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		18/11/13

3.2 Valves

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries and process connections. • Comment on changes and condition		
Tag No	**Identification**	**Result**
Gasoline Pipeline Import Valve XV162		
Valve Body	WCC Pekos 530	✓
Actuator	RS202902/01	✓
Limit Switch	211107	✓
Isolator	Z53857010104	✓
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		18/11/13

3.3 Logic Solver

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment • Comment on changes and condition		
Tag No	**Identification**	**Result**
TANK 1		
R252		✓
LS01	~~10437522232088~~	~~02257 1564~~ 4800000 1190411 0
TANK 2		
R292		✓
LS02	~~10437522232~~089	022571564
TANK 3		
R332		✓
LS03	~~10437522232093~~	02257 1598
TANK 4		
R372		✓
LS04	~~10437522232098~~	022571442
TANK 5		
R492		✓
LS05	~~10437522232~~044	022571420
TANK 6		
R532		✓
LS06	~~10507523765~~067	022571543
Actions/Comments		
NO SERIAL NUMBER ON PILZ RELAY'S NON TRIP AMPS FITTED.		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)		**Sign** / **Date**
Tested by		18/11/13

3.3 Logic Solver (Cont.)

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment • Comment on changes and condition		
Tag No	**Identification**	**Result**
TANK 7		
R572		✓
LS07	10437522232047	02257 1356
TANK 8		
R612		✓
LS08	10507523765066	02257 1370
TANK 9		
R652		✓
LS09	10437522232041	02257 1410
TANK 10		
R692		✓
LS10	10507523765065	02257 1368
TANK 11		
LS11	10437522232084	02257 1493
Actions/Comments		
NO SERIAL NUMBER ON PILZ RELAYS NEW TRIP AMPS FITTED.		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		18/11/13

3.3 Logic solver (Cont.)

TANK 18		
LS18	10437522232043	022571507
TANK 18A		
LS18A	10437522232046	022571407
TANK 21		
LS21	10437522232045	21333402
TANK 22		
LS22	10437522232051	21333423
SITE ESD		
R088		✓
SITE ESD		
R124		✓
SITE ESD		
R164		✓
Actions/Comments		
NEW TRIP AMPS FITTED. NO SERIAL NO'S ON PILZ RELAYS.		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)		**Sign** / **Date**
	Tested by	18/11/13

3.4 Auxiliary Equipment

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries. • Comment on changes and condition		
Tag No	**Identification**	**Result**
Tank Import Monitoring Panel		
Panel	HC 9641.	✓
East Bund SIS AC Junction Box		
Panel	XA-GB-C007265	✓
East Bund SIS DC Junction Box		
Panel	XA-GB-C007267	✓
East Bund SIS IS Junction Box		
Panel	XA-GB-C007262	✓
Actions/Comments		
NEW IMPORT MONITORING PANEL.		

Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		18/11/13

3.4 Auxiliary Equipment (Cont.)

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries. • Comment on changes and condition		
Tag No	**Identification**	**Result**
West Bund SIS AC Junction Box		
~~Panel~~ JB	XA-GB-C007266	✓
West Bund SIS DC Junction Box		
~~Panel~~ JB	XA-GB-C007278	✓
West Bund SIS IS Junction Box		
~~Panel~~ JB	XA-GB-C007259	✓
Additive Tanks SIS IS Junction Box		
~~Panel~~ JB.	XA-GB-C007263	✓
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		18/11/13

CLIENT: Valero Terminals	**PROJECT REF: CE303**	**DOC REF: CE303004_HDR**
PROJECT: Overfill Protection SIS	**LOCATION: Brigton Terminal**	**DATE: 08.11.13**
PHASE : SAT	**PLANT UNIT: Logic Solver**	**PAGE: 1 of 3**

PICAL REF	DRAWING NUMBER	CONNECTION DRAWING DESCRIPTION	COLD TEST	DATE	HOT TEST	DATE
N/A	SI157104_DWG_E	East Bund I.S. Junction Box		18/11/13		
N/A	SI157105_DWG_E	West Bund I.S. Junction Box		18/11/13		
N/A	SI157106_DWG_E	Additive Tanks I.S. Junction Box		18/11/13		
N/A	SI157107_DWG_D	East Bund DC Junction Box TB1		18/11/13		
N/A	SI157108_DWG_D	East Bund DC Junction Box TB2		18/11/13		
N/A	SI157109_DWG_D	West Bund DC Junction Box		18/11/13		
N/A	SI157110_DWG_D	Valve Power Distribution Board		18/11/13		
N/A	SI157115_DWG_B	Equipment Location Plan		18/11/13		
N/A	SI157117_DWG_C	AN001 Annunciator Cable Connection Details		18/11/13		
N/A	SI157118_DWG_B	AN002 Annunciator Cable Connection Details		18/11/13		
N/A	SI157119_DWG_B	AN003 Annunciator Cable Connection Details		18/11/13		

CLIENT: Valero Terminals | **PROJECT REF: CE303** | **DOC REF: CE303004_HDR**

PROJECT: Overfill Protection SIS | **LOCATION: Brigton Terminal** | **DATE: 08.11.13**

PHASE : SAT | **PLANT UNIT: Logic Solver** | **PAGE: 2 of 3**

PICAL REF	DRAWING NUMBER	LOOP DESCRIPTION	COLD TEST	DATE	HOT TEST	DATE
CE303170_HDR	SI157170_DWG_D	Tank 1 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303171_HDR	SI157171_DWG_D	Tank 2 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303172_HDR	SI157172_DWG_D	Tank 3 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303173_HDR	SI157173_DWG_D	Tank 4 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303174_HDR	SI157174_DWG_D	Tank 5 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303175_HDR	SI157175_DWG_D	Tank 6 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303176_HDR	SI157176_DWG_D	Tank 7 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303177_HDR	SI157177_DWG_D	Tank 8 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303178_HDR	SI157178_DWG_D	Tank 9 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303179_HDR	SI157179_DWG_D	Tank 10 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303180_HDR	SI157180_DWG_D	Tank 11 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303181_HDR	SI157181_DWG_D	Tank 18 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303182_HDR	SI157182_DWG_D	Tank 18A High Level Switch Loop Sheet		18/11/13		19/11/13
CE303183_HDR	SI157183_DWG_D	Tank 21 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303184_HDR	SI157184_DWG_D	Tank 22 High Level Switch Loop Sheet		18/11/13		19/11/13
CE303140_HDR	SI157140_DWG_D	XV162 Pipeline Import Valve Loop Sheet		18/11/13		19/11/13

CLIENT: Valero Terminals	**PROJECT REF: CE303**	**DOC REF: CE303004_HDR**
PROJECT: Overfill Protection SIS	**LOCATION: Brigton Terminal**	**DATE: 08.11.13**
PHASE : SAT	**PLANT UNIT: Logic Solver**	**PAGE: 3 of 3**

APPROVALS

P & I DESIGN LTD: DATE: 19/11/13.

CLIENT: DATE:

CLIENT: Valero Terminals	**PROJECT REF: CE303**	**DOC REF: CE303003_HDR**
PROJECT: Overfill Protection SIS	**LOCATION: Brigton Terminal**	**DATE: 08.11.13**
PHASE : SAT	**PLANT UNIT: Logic Solver**	**PAGE: 1 OF 1**

METHOD STATEMENT

The Instrument Installation will be 'Cold' tested prior to powered Functional testing.
The PICAL System will be used to control and record the method statements and Functional tests.
Instrument Installation Conformance Control Register QSF2059 will be used for overall signatory control.
Controlled copies of relevant drawings will be used to record, by highlighting (yellow), satisfactory terminations.
Errors and omissions will be corrected and noted in red.
The controlled drawings will constitute a significant proportion of the testing records and provides an audit trail to the 'As Built' issue.

VISUAL INSPECTION

- ☑ DOORS AND LOCKS OPERATIONAL
- ☑ N/A GLAND PLATES FITTED
- ☑ CABLE GLANDS TIGHT AND COMPLETE
- ☑ CABLE NUMBERS AND CORES CORRECT
- ☑ TERMINATION RAIL CORRECT
- ☑ FUSES FITTED
- ☑ EQUIPMENT EARTHING CORRECT
- ☑ N/A TUBE BULKHEADS TIGHT
- ☑ EQUIPMENT LABELS CORRECT
- ☑ EQUIPMENT MOUNTINGS SECURE
- ☑ CABLE SPECIFICATIONS CORRECT
- ☑ CABLES TERMINATED AND TIGHT
- ☑ TERMINATIONS CRIMPED & FERRULED
- ☑ FUSE SIZES CORRECT
- ☑ SCREEN EARTHING CORRECT
- ☑ N/A TUBES TERMINATED
- ☑ N/A JUNCTION BOX LABELS CORRECT

COLD TESTING

- ☑ MAINS DISTRIBUTION CORRECT
- ☑ SIGNAL POINT TO POINT CORRECT
- ☑ N/A IS EARTHING PROVED
- ☑ 24V DC DISTRIBUTION CORRECT
- ☑ N/A COMMS POINT TO POINT CORRECT

HOT TESTING

- ☑ MAINS POWER ESTABLISHED
- ☑ SIMULATION TESTS COMPLETED (REFER PICAL SHEETS)
- ☑ N/A PRESSURE TEST COMPLETE (REFER PICAL SHEETS)
- ☑ 24V DC POWER ESTABLISHED

COMMENTS

APPROVALS

P & I DESIGN LTD: [signature] DATE: 18/11/13

CLIENT: DATE:

CONTROLLED
08 NOV 2013
COPY

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Instrument Loop Test Sheet Certificate

Certificate Number: CE303170_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE01
Location:	Brighton	**Service:**	Tank 1 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157170_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE01	LE01	LE01			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

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Instrument Loop Test Sheet Certificate

Certificate Number: CE303171_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE02
Location:	Brighton	**Service:**	Tank 2 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157171_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE02	LE02	LE02			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

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Instrument Loop Test Sheet Certificate

Certificate Number: CE303172_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE03
Location:	Brighton	**Service:**	Tank 3 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157172_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No								
Cal Cert No								

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE03	LE03	LE03			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

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Instrument Loop Test Sheet Certificate

Certificate Number: CE303173_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE04
Location:	Brighton	**Service:**	Tank 4 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157173_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE04	LE04	LE04			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

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Instrument Loop Test Sheet Certificate

Certificate Number: CE303174_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE05
Location:	Brighton	**Service:**	Tank 5 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157174_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE05	LE05	LE05			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

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Instrument Loop Test Sheet Certificate

Certificate Number: CE303175_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE06
Location:	Brighton	**Service:**	Tank 6 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157175_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE06	LE06	LE06			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

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Instrument Loop Test Sheet Certificate

Certificate Number: CE303176_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE07
Location:	Brighton	**Service:**	Tank 7 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157176_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No								
Cal Cert No								

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE07	LE07	LE07			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

P & I Design Ltd

2 Reed Street, Gladstone Industrial Estate, Thornaby,
Cleveland TS17 7AF. Tel: (01642) 617444 Fax: (01642) 616447
Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303177_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE08
Location:	Brighton	**Service:**	Tank 8 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157177_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE08	LE08	LE08			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

P & I Design Ltd

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Cleveland TS17 7AF. Tel: (01642) 617444 Fax: (01642) 616447
Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303178_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE09
Location:	Brighton	**Service:**	Tank 9 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157178_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE09	LE09	LE09			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

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Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303179_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE10
Location:	Brighton	**Service:**	Tank 10 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157179_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE10	LE10	LE10			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

P & I Design Ltd

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Cleveland TS17 7AF. Tel: (01642) 617444 Fax: (01642) 616447
Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303180_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE11
Location:	Brighton	**Service:**	Tank 11 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157180_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE11	LE11	LE11			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
Annunciator - Jetty	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

P & I Design Ltd

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Cleveland TS17 7AF. Tel: (01642) 617444 Fax: (01642) 616447
Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303181_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE18
Location:	Brighton	**Service:**	Tank 18 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157181_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No								
Cal Cert No								

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE18	LE18	LE18			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

P & I Design Ltd

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Cleveland TS17 7AF. Tel: (01642) 617444 Fax: (01642) 616447
Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303182_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE18A
Location:	Brighton	**Service:**	Tank 18A Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157182_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE18A	LE18A	LE18A			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

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Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303183_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE21
Location:	Brighton	**Service:**	Tank 21 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157183_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE21	LE21	LE21			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

P & I Design Ltd

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Cleveland TS17 7AF. Tel: (01642) 617444 Fax: (01642) 616447
Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303184_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	LE22
Location:	Brighton	**Service:**	Tank 22 Independent High Level		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157184_DWG_D

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy, annunciators reset and lamp tested.
3. Operate tank top test switch. Confirm annunciators activation and reset responses.
4. Activate each trip interlock individually confirming correct annunciators activation and reset response.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No									
Cal Cert No									

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE22	LE22	LE22			
Cal Cert No						
Function	IHLA	PowerFail	OpenCirc			
Hardware/Software	H	H	H			
Process Desired	IHLA	PowerFail	OpenCirc			
Instrument Desired	IHLA	PowerFail	OpenCirc			
Process Actual	IHLA	PowerFail	OpenCirc			
Instrument Actual	IHLA	PowerFail	OpenCirc			
Annunciator - Control Room	☑	☑	☑	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- N/A

P & I Design Ltd

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Cleveland TS17 7AF. Tel: (01642) 617444 Fax: (01642) 616447
Website: www.pidesign.co.uk Email: sales@pidesign.co.uk

Instrument Loop Test Sheet Certificate

Certificate Number: CE303140_HDR

Client:	Valero Terminals Ltd	**Date:**	19/11/2013	**Loop No:**	XV162
Location:	Brighton	**Service:**	Pipeline Import Valve		
Project No:	CE303	**Project:**	Overfill Protection SIS	**Loop Drg No:**	SI157140_DWG_C

Cap No	Serial No	Test Equipment	Cap No	Serial No	Test Equipment
1			3		
2			4		

Test Equipment Traceable to NPL Standards.

Method of Test

Prepared By: D.B.Faulkner **Approved By:** M.Morgan

Note - Listed trips also trip other equipment/processes on the terminal and will activate the terminal annunciator system.
1. Confirm no affected operations in progress and permit to work issued.
2. Confirm all interlocks healthy. With XV162 in local manual. Select manual open at XV162, confirm valve physically opens. Select manual close at XV162, confirm valve physically closes. Record opening and closing times.
3. Confirm all interlocks healthy. With XV162 in remote auto. Select open at SCADA confirm valve physically opens. Select close at SCADA confirm valve physically closes. Record opening and closing times.
4. Reopen valve, confirm valve physically open. Activate each trip interlock individually confirming valve physically closes on trip and reopens on reset.

Loop Test

Checked By: D.B.Faulkner **Witnessed By:** D.R.Pearson **Accepted By:**

Tag No	XV162	XV162		XV162	XV162		XV162	XV162	
Cal Cert No									
	Desired Position	Actual Position		Desired Time	Actual Time		Desired Time	Actual Time	
MANUAL			MANUAL			TRIP			
Open	Open	Open	C to O	N/a	N/a	O to C	92 s	85 s	
Close	Closed	Close	O to C	N/a	85 s				
AUTO			AUTO						
Open	Open	NoRemote	C to O	N/a	NoRemote				
Close	Closed	NoRemote	O to C	N/a	NoRemote				

Alarms & Trips

Alarms & Trips Source Reference: CE303001_SCH_A

Tag No	LE01	LE02	LE03	LE04	ESD	XV162
Cal Cert No	170_HDR	171_HDR	172_HDR	173_HDR		
Function	IHLA	IHLA	IHLA	IHLA	ESD	OpenCirc
Hardware/Software	H	H	H	H	H	H
Process Desired	IHLA	IHLA	IHLA	IHLA	ESD	OpenCirc
Instrument Desired	IHLA	IHLA	IHLA	IHLA	ESD	OpenCirc
Process Actual	IHLA	IHLA	IHLA	IHLA	ESD	OpenCirc
Instrument Actual	IHLA	IHLA	IHLA	IHLA	ESD	OpenCirc
XV162 Closed / inhibited	☑	☑	☑	☑	☑	☑
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

Control Valve: Fail Action:- Close

XV162 Actuator Replacement Stage 3 – Safety Instrument System Validation Checklist 8 – Site Acceptance Test				
Item No	BS EN 61511 Clause	Description	Checklist Yes-No-N/A	Comments and References
8.1	15.2.1	Has a test plan been produced to cover the following: Responsibilities for testing. Testing Criteria. Special requirements for start up, shutdown & maintenance. Component failure testing. Any special preparations or effects on operating plant during the test. Partial testing if it not possible to complete the full testing. Testing Schedule. Testing Procedures.	Yes	The new actuator has been set up and precommissioned on site as a full valve assembly by Rotork (see commissioning report) SAT requirements are to complete XV162 cold loop testing as QSF2058 and then complete a scheduled full system proof test as LF364012_RPT_A
8.2	15.2.3	Where the SIS components require measurement calibration: Has this been completed? Are the results within the required tolerance?	Not required	
8.3	15.2.4	Is the SIS documentation as the installed system?	Yes	New actuator to be checked against LF364021_SPC_B and LF364040_DWG_A DWG & SPC revised to to reflect switchbox details
8.4	15.2.4	Does the SAT testing include for the following: Checks to ensure the SIS performs during: Start up/Shut down. Loss of power/Loss of air.	Yes	Included in Proof Test Procedure LF364012_RPT_A Section 8.
8.5	15.2.4	Does the SAT testing include for the following: That the SIF performs as specified? That any external manual shutdown or non SIS functions cannot impair the operation of the SIS?	Yes	Included in Proof Test Procedure LF364012_RPT_A
8.6	15.2.4	Does the SAT testing include external interfaces: BPCS. Annunciation. Diagnostics.	Yes	Included in Proof Test Procedure LF364012_RPT_A
8.7	15.2.4	Have the following been checked for correct operation: Reset. Bypass facilities. Start up overrides.	Yes	Included in Proof Test Procedure LF364012_RPT_A
8.8	15.2.4	Following the SAT have: All test results been recorded?	Yes	See Proof Test results 10/11 Feb 2016
8.9	14.2.5	Have any modifications been necessary throughout the SAT phase and if so: Have the modifications been reviewed with the design engineers to review the impact on the SIS? and Have any associated modifications to the documentation been carried out?	No	

rotork®
Site Services

Actuator Commissioning Report

Job Number: 527914 **Contact:** LES SALVIDGE **Date:** 18-19TH JANUARY 2016
Customer: LOCAL FUELS **Engineer:** GLENN GREEN
Site Address: SHOREHAM PORT BRIGHTON MATTHEW HAMMOND

Actuator Details:	**Valve Details:**	**Gearbox Details (If applicable):**
Serial Number: RS 463901/1	Maker:	Serial Number:
Size/Type: S1-21-980-031-51-10AA	Type:	Type:
Wiring Diagram:	Size:	Ratio:
Speed: N/A	Tag Number:	
Supply Voltage:	Location:	

Installation Details:
Actuator Fitted by: ROTORK
Actuator Cabled by: DAVID JONES
Gearbox / Adaption Fitted by: —
Reducers, Blanks and Glands Installed ATEX / E Exde Rated:
Covertube Sealed:
W.T:

Primary Settings:
Close Direction: CLOCKWISE
Turns: —
Stroke Time: OPEN 53 SECS / CLOSE 99 SECS
Close Action: TORQUE
Close Torque (%): 90%
Remote Function Check: SATISFACTORY ✓
Open Action: LIMIT
Open Torque(%):
Local Function Check: SATISFACTORY ✓

Secondary Setting:

Relays	Function	Contact	Relays	Function	Contact
Switch 1	MONITOR RELAY		Switch 5		
Switch 2			Switch 6		
Switch 3			Switch 7		
Switch 4			Switch 8		

Control Systems:

	Signal Type	Indication Check
Analogue Input:		
Analogue Output:		

Comments / Further Action Required:

ESD ACTION = DE ENERGISE
ESD OVERRIDE LOCAL STOP = YES
TEMP LOSS OF ESD = CONTINUE ESD
ACTUATOR TESTED LOCALLY, LIMITS SET, ESD SETTINGS HAS ABOVE, ACTUATOR TESTED SITE ESD, ALL SATISFACTORY

Engineers Sig: _____ Customers Sig: _____ Date: _____

CLIENT: Local Fuel PLC	**PROJECT REF**:LF364	**DOC REF**: LF364003_QSF
PROJECT: XV162 Actuator Replacement	**LOCATION**: Brighton Terminal	**DATE**: 11.02.2016
PLANT SECTION: Import Pipeline	**PLANT UNIT**: SIS	**PAGE**: 1 OF 1

METHOD STATEMENT

The Instrument Installation will be 'Cold' tested prior to powered Functional testing.
The PICAL System will be used to control and record the method statements and Functional tests.
Instrument Installation Conformance Control Register QSF2059 will be used for overall signatory control.
Controlled copies of relevant drawings will be used to record, by highlighting (yellow), satisfactory terminations.
Errors and omissions will be corrected and noted in red.
The controlled drawings will constitute a significant proportion of the testing records and provides an audit trail to the 'As Built' issue.

VISUAL INSPECTION

- ☐ ~~DOORS AND LOCKS OPERATIONAL~~
- ☐ ~~GLAND PLATES FITTED~~
- ☒ CABLE GLANDS TIGHT AND COMPLETE
- ☒ CABLE NUMBERS AND CORES CORRECT
- ☒ TERMINATIONS CRIMPED & FERRULED
- ☒ FUSES FITTED
- ☒ EQUIPMENT EARTHING CORRECT
- ☐ ~~TUBE BULKHEADS TIGHT~~
- ☒ EQUIPMENT LABELS CORRECT
- ☒ EQUIPMENT MOUNTINGS SECURE
- ☒ CABLE SPECIFICATIONS CORRECT
- ☒ CABLES TERMINATED AND TIGHT
- ☐ ~~TERMINATION RAIL CORRECT~~
- ☒ FUSE SIZES CORRECT
- ☐ ~~SCREEN EARTHING CORRECT~~
- ☐ ~~TUBES TERMINATED~~
- ☐ ~~JUNCTION BOX LABELS CORRECT~~

COLD TESTING

- ☒ MAINS DISTRIBUTION CORRECT
- ☒ SIGNAL POINT TO POINT CORRECT
- ☐ ~~IS EARTHING PROVED~~
- ☒ 24V DC DISTRIBUTION CORRECT
- ☐ ~~COMMS POINT TO POINT CORRECT~~

HOT TESTING

- ☒ MAINS POWER ESTABLISHED
- ☒ 24V DC POWER ESTABLISHED
- ☒ SIMULATION TESTS COMPLETED (~~REFER PICAL SHEETS~~) REFER TO PROOF TEST
- ☐ ~~PRESSURE TEST COMPLETE (REFER PICAL SHEETS)~~

COMMENTS

See handover certificate

APPROVALS

P & I DESIGN LTD: C. Dales — DATE: 11.02.2016

CLIENT: — DATE:

CLIENT: Local Fuel PLC **PROJECT REF**:LF364 **DOC REF**: LF364004_QSF

PROJECT: XV162 Actuator Replacement **LOCATION**: Brighton Terminal **DATE**: 11.02.2016

PLANT SECTION: Import Pipeline **PLANT UNIT**: SIS **PAGE**: 1 OF 1

PICAL REF	DRAWING NUMBER	LOOP DESCRIPTION	COLD TEST	DATE	HOT TEST	DATE
n/a	LF364040_DWG_A	XV162 Pipeline Import Valve Loop Sheet	CD	11.02.16	CD	11.02.16

APPROVALS

P & I DESIGN LTD: C. Dales DATE: 11.02.16

CLIENT: DATE:

ZONE 1 II A T3 (UNLESS SPECIFIED OTHERWISE)

FIELD

PIPE TRACK WEST BUND (BASE OF TANK 8)

XV162

INTERNAL SUPPLY
- 24Vdc 5 — XC162/1
- 0Vdc 4

REMOTE CONTROLS
- ESD 25 — XC162/2
- OPEN 35
- COMMON 31
- COMMON 36

HYDRAULIC SWITCHING MODULE
- L 2 — XV162/1
- N 1 — XV162/2
- E E — XV162/3

MODBUS RS485 CONTROL CARD
- 1A 24 — VCOM162/A — Pr1
- 1B 26 — VCOM162/B — Pr1
- COMMON 23 — VCOM162/C — Pr2 — NOTE 1
- SCREEN 29 — SCN

XC162 — 2 Core

XV162/2 — 3 Core

VCOM162 — 2 Pair

HS162 ISOLATOR

MAINS AND LOOP ISOLATOR UNIT
ROTORK MKII PAK-BOX PB1

FOR DETAILS SEE ROTORK DRAWING WD08553-01

3 Core — XV162/1

2 Pair — VCOM18

2 Pair — VCOM19

DATA HIGHWAY CABLES SEE DRAWING LF364016_DWG

NOTES
1) 2nd CORE OF PAIR 2 CUT BACK AND INSULATED.

WEST BUND SIS DC JUNCTION BOX

TB1
- XC162/1 — 25 — XC162/1
- XC162/2 — 26 — XC162/2
- 27

FOR JUNCTION BOX TERMINATION DETAILS SEE DRAWING LF364009_DWG

WEST BUND SIS AC JUNCTION BOX

TB2
- XV162/1 — 12 — XV162/1
- XV162/2 — 13 — XV162/2
- XV162/3 — 14 — XV162/3
- 15
- 16

FOR JUNCTION BOX TERMINATION DETAILS SEE DRAWING LF364014_DWG

SAFE AREA

SWITCHROOM

LFS-SIS1 : TANK IMPORT MONITORING PANEL

TB4
- XC162/1 — 25 — 160
- XC162/2 — 26 — 164

FOR TRIP LOGIC SEE DRAWING LF364023_DWG

SISXC03 — 27 Core

CONTROLLED COPY 08 FEB 2016

DISTRIBUTION BOARD

SISXC04 — 15 Core
- XV162/1 — 9L1
- XV162/2 — 9L2 (NEUTRAL)
- 6A
- XV162/3 — E

FOR DISTRIBUTION BOARD DETAILS SEE DRAWING LF364010_DWG

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

CERTIFIED EQUIPMENT

TAG No.	CERTIFICATE No.	ATEX CERTIFICATION	I.S. CALCULATION
XCV162	SIRA 05 ATEX 1164X	Ex II 2 G EEx d IIB T4	N/A
HS162	SIRA 00 ATEX 1038	Ex II 2 G EEx d IIB T4	N/A
ES162	Baseefa 11ATEX 0010	Ex II 2G Ex d IICT4	

REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION
A	04/06/15	P.P.	P.P.	D.B.F		D.S.R		AS BUILT

PLANT	LOCAL FUEL PLC – THE SHOREHAM OIL TERMINAL
TITLE	TANK OVERFILL PROTECTION SAFETY INSTRUMENT SYSTEM XV162 : PIPELINE IMPORT VALVE LOOP SHEET

Local Fuel

P & I Design Ltd
Tel. 01642 617444
www.pidesign.co.uk

SHEET 1 OF 1

CLIENT DRG. No.

P&I DRG No. LF364040_DWG

P & I Design Ltd

Process Instrumentation Consultancy & Design

2 Reed Street, Gladstone Industrial Estate,
Thornaby, TS17 7AF, United Kingdom.
Tel. +44 (0) 1642 617444 Fax. +44 (0) 1642 616447
Web Site: www.pidesign.co.uk

CHEVRON UK LTD.

BRIGHTON TERMINAL

GASOLINE OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM

SHUTDOWN CONDITIONS

FUNCTIONAL TESTING PROCEDURE

	Date	By	Checked	Approved	Description	Client Ref.
A	26.03.08	D.S.Regan	DRR	DRR	Original Issue	
B	17.11.08	D.S.Regan	DRR	DRR	Tankside Valves Removed	Document No. SI157036_RPT
C	27.07.12	D.S.Regan	DBF	DSR	Wet Testing Added	
D	30.07.12	D.S.Regan	DBF	DSR	Wet Testing Procedure Corrected	Page 1 of 14

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

Contents

1 REVISION HISTORY

Rev	Description
A	Original Issue
B	Tankside Valves removed from test procedure. Phase 1 test only, Single Pipeline Import Valve.
C	Wet Testing Procedure Added, PFD Calculation for Imperfect testing Added.
D	Wet Testing Procedure corrected for consistency

2 INTRODUCTION

This document will form part of the Lifecycle testing documentation to ensure that the installation performs the SIF as designed.

This document will be revised with any additions to or removals from the safety instrument System throughout the life of the system.

3 FUNCTIONAL TESTING PROCEDURE – TANK 1

Purpose of Test	
To verify the operation of LS1 high level trip closes the gasoline Pipeline import valve. Note – Switch "Certify" Test feature used. Raising the tank level or removal of the switch from the tank is not required.	
Method Of Test	**Result**
1. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	PASS
2. Confirm there is no gasoline import from the jetty to any tank and no transfer operations are in progress for Tank 1. (Tank feed manual block valve locked closed. N/A)	PASS
3. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	PASS #1
4. Reset logic solver and confirm Pilz relay R252 healthy and energised. Confirm annunciator lamp status correct.	PASS
5. Confirm Pipeline valve XV162 open. (Confirm valve status output correct. N/A)	PASS
6. Operate high level switch "Certify" Test Feature. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and R372 trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV162 (a)…9.1…Seconds (b)…9.1…Seconds
7. Reinstate LS1 high level switch to normal operation.	PASS
8. Confirm XV162 Pipeline import valve remains closed. AND CANNOT BE RE-OPENED	PASS
9. Operate SIS panel trip reset pushbutton. (EAST BUND CAN BE REOPENED)	PASS
10. Confirm XV162 jetty import valve opens. (Confirm valve position status output correct and R252 trip condition. N/A)	PASS
11. Record Undisturbed/Disturbed Status of results. Delete as applicable.	~~Disturbed~~/ Undisturbed
Actions/Comments	
#1. JETTY ANNUNCIATOR CHECKED	

Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign**	**Date**
Tested by		2Dec14

4 FUNCTIONAL TESTING PROCEDURE – TANK 2

Purpose of Test	
To verify the operation of LS2 high level trip closes the gasoline Pipeline import valve. Note – Switch "Certify" Test feature used. Raising the tank level or removal of the switch from the tank is not required.	
Method Of Test	**Result**
12. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	PASS
13. Confirm there is no gasoline import from the Pipeline to any tank and no transfer operations are in progress for Tank 2. (Tank feed manual block valve locked closed. N/A)	PASS
14. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	PASS #1
15. Reset logic solver and confirm Pilz relay R292 healthy and energised. Confirm annunciator lamp status correct.	PASS
16. Confirm Pipeline import valve XV162 open. (Confirm valve status output correct. N/A)	PASS
17. Operate high level switch "Certify" Test Feature. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and R372 trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV162 (a)..88....Seconds (b)..88....Seconds
18. Reinstate LS2 high level switch to normal operation.	PASS
19. Confirm XV162 Pipeline import valve remains closed, AND CANNOT BE RE-OPENED	PASS
20. Operate SIS panel (EAST BUND) trip reset pushbutton. CAN BE RE-OPENED	PASS
21. Confirm XV162 Pipeline import valve opens. (Confirm valve position status output correct N/A) and R292 trip condition.	PASS
22. Record Undisturbed/Disturbed Status of results. Delete as applicable.	~~Disturbed~~/ Undisturbed
Actions/Comments	
#1. JETTY ANNUNCIATOR CHECKED	

Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign**	**Date**
Tested by		2 DEC 2014

5 FUNCTIONAL TESTING PROCEDURE – TANK 3

Purpose of Test	
To verify the operation of LS3 high level trip closes the gasoline Pipeline import valve. Note – Switch "Certify" Test feature used. Raising the tank level or removal of the switch from the tank is not required.	
Method Of Test	**Result**
23. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	PASS
24. Confirm there is no gasoline import from the Pipeline to any tank and no transfer operations are in progress for Tank 3. (Tank feed manual block valve locked closed. N/A)	PASS
25. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	PASS #1
26. Reset logic solver and confirm Pilz relay R332 healthy and energised. Confirm annunciator lamp status correct.	PASS
27. Confirm Pipeline import valve XV162 open. (Confirm valve status output correct. N/A)	PASS
28. Operate high level switch "Certify" Test Feature. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and R372 trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV162 (a) 97 Seconds (b) 97 Seconds
29. Reinstate LS3 high level switch to normal operation.	PASS
30. Confirm XV162 Pipeline import valve remains closed, AND CANNOT BE RE-OPENED	PASS
31. Operate SIS panel trip reset pushbutton. (FAST BUMP CAN BE RE-OPENED)	PASS
32. Confirm XV162 Pipeline import valve opens. (Confirm valve position status output correct N/A and R332 trip condition.	PASS
33. Record Undisturbed/Disturbed Status of results. Delete as applicable.	~~Disturbed~~/ Undisturbed
Actions/Comments	
#1. JETTY ANNUNCIATOR CHECKED	

Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign**	**Date**
Tested by		2 Dec 2014

6 FUNCTIONAL TESTING PROCEDURE – TANK 4

Purpose of Test	
To verify the operation of LS4 high level trip closes the gasoline Pipeline import valve. Note – Switch "Certify" Test feature used. Raising the tank level or removal of the switch from the tank is not required.	
Method Of Test	**Result**
34. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	PASS
35. Confirm there is no gasoline import from the Pipeline to any tank and no transfer operations are in progress for Tank 4. (Tank feed manual block valve locked closed. N/A)	PASS
36. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	PASS #1
37. Reset logic solver and confirm Pilz relay R372 healthy and energised. Confirm annunciator lamp status correct.	PASS
38. Confirm Pipeline import valve XV162 open. (Confirm valve status output correct. N/A)	PASS
39. Operate high level switch "Certify" Test Feature. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and R372 trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV162 (a) 86 Seconds (b) 86 Seconds
40. Reinstate LS4 high level switch to normal operation.	PASS
41. Confirm XV162 Pipeline import valve remains closed, AND CANNOT BE RE-OPENED	PASS
42. Operate SIS panel (EAST BUND) trip reset pushbutton.	PASS
43. Confirm XV162 Pipeline import valve opens. (CAN BE RE-OPENED) Confirm valve position status output correct (N/A) and R372 trip condition.	PASS
44. Record Undisturbed/Disturbed Status of results. Delete as applicable.	~~Disturbed~~/ Undisturbed

Actions/Comments

#1. JETTY ANNUNCIATOR CHECKED.

NOTE. TANKS 5 to 11, 18, 18A, 21 AND 22 CHECKED TO BOTH ANNUNCIATORS VIA LOCAL KEYSWITCH – ALL FOUND TO WORK CORRECTLY AFTER TEST TANKS 11, 18, 18A, 21 AND 22 WERE REMOVED FROM THE SYSTEM VIA WIRING MODIFICATION AT THEIR ASSOCIATED BARRIERS UNDER THE REQUEST OF THE SYSTEM OWNER.

Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign**	**Date**
Tested by	[signature]	2 Dec 2014

7 FUNCTIONAL WET TESTING PROCEDURE

Purpose of Test	
To verify the operation of Tank ..1&4.. high level trip closes the gasoline Pipeline import valve. Note – Wet Test used. Raising the tank level is not required.	
Method Of Test	**Result**
45. Confirm the area around the tank is safe and clean for the use of none IS battery operated/mains powered test equipment and for the opening of non I.S enclosures.	PASS
46. Confirm there is no gasoline import from the Pipeline to any tank and no transfer operations are in progress for Tank ..1&4.. Tank feed manual block valve locked closed. N/A	
47. Operate the lamp test pushbutton on the Control Room Annunciator and confirm all lamps illuminating.	PASS #1
48. Reset logic solver and confirm Pilz relay R..... healthy and energised. Confirm annunciator lamp status correct.	PASS
49. Confirm Pipeline import valve XV162 open. Confirm valve status output correct. N/A	PASS
50. Carefully remove level switch from tank ..1&4.. Dip level switch in suitable liquid. (WATER)	PASS
51. Confirm XV162 Pipeline import valve closed. Confirm valve status output shows correct valve position and R..... trip condition. Record times from trip initiation to valve closed (a) and valve travelling time (b). Target times (a) ** (b) 92 seconds.	XV162 (a) 84 Seconds (b) 84 Seconds TK1/TK4
52. Reinstate high level switch to normal operation.	PASS
53. Confirm XV162 Pipeline import valve remains closed, AND CANNOT RE-OPEN	PASS
54. Operate SIS panel trip reset pushbutton. (LAST BUND)	PASS
55. Confirm XV162 Pipeline import valve opens. Confirm valve position status output correct and R..... trip condition. (CAN BE RE-OPENED)	PASS
56. Record Undisturbed/Disturbed Status of results. Delete as applicable.	Disturbed/~~Undisturbed~~
Actions/Comments	

Approvals (Note: Signature Indicates Acceptance Of Test With Actions/Comments Noted)	**Sign**	**Date**
Tested by		3 Dec 2014

8 PFD CALCULATION

This calculation shows that if an incomplete test is carried out at an interval of 3 years, the PFD of the SIF will no longer meet the mid-range SIL2 requirement.

Thus the wet testing procedure must be carried on at least two tanks annually to ensure that the PFD requirement is met.

P & I Design Ltd ***Probability of Failure on Demand (PFD) Summary***

www.pidesign.co.uk Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

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SAFETY INTEGRITY LEVEL REQUIRED

SIL 2

SAFETY INTEGRITY LEVEL ACHIEVED

Valid

CALCULATION SUMMARY

$PFD_{(SYS)}$	=	$PFD_{(S)}$		$PFD_{(L)}$		$PFD_{(FE)}$	
7.00E-03	=	1.34E-03	Valid	4.00E-06	Valid	4.39E-03	Valid
		0.00E+00	n/a	1.18E-03	Valid	7.40E-05	Valid
		0.00E+00	n/a	0.00E+00	n/a	0.00E+00	Valid
Valid		1.34E-03	Valid	1.19E-03	Valid	4.47E-03	Valid

SPURIOUS TRIP SUMMARY

$S.Trip_{(SYS)}$	=	$S.Trip_{(S)}$		$S.Trip_{(L)}$		$S.Trip_{(FE)}$	
9.5	=	116	Years	13158	Years	59	Years
Years		n/a	Years	257	Years	13	Years
		n/a	Years	n/a	Years	n/a	Years

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PFD - Sensor Subsystem Calculation Sheet 1

Sheet Title:- Sensor - Drexelbrook Level Switch — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref.	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

Key:: Data Input Cell | Calculation Cell | Results Cell

System Architecture: 1oo1

Data Type: 2 — Failure Rate/hr (λ)

Sub System Item	Level Switch
FAILURE DATA	
Failures - Safe, Detected (λSD)	0.00E+00
Failures - Safe, Undetected (λSU)	3.00E-07
Failures - Dangerous, Detected (λDD)	6.86E-07
Failures - Dangerous, Undetected (λDU)	7.30E-08
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	
Diagnostic Coverage	
PFD Value (From Certificate)	

FAILURE CALCULATIONS	
Total Failures (λ)	1.06E-06
Safe Fail Fraction	0.93
Total Dangerous Failures (λ_D)	7.59E-07
Calculated Diagnostic Coverage (%)	90.38

SUB-SYSTEM DATA	
Mean Time to Repair (hrs)	8
Proof Test Interval (days)	1095
Fraction of detected failures that have common cause (βD)	0.0
Proof Test Coverage (C_{PT}) . %	93
Operational Lifetime of SIF (LT) - years	20.0

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	7.59E-07
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	6.86E-07
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	7.30E-08
Fraction of undetected failures that have a common cause (β)	40
Channel Downtime (t_{CE})	1271.8
Voted Group Downtime (t_{GE})	n/a
Mean Diagnostic Coverage	90.4

LOOP CRITERIA ACHIEVED	
PFD Total	**9.65E-04**
PFD Total (Imperfect Testing)	**1.34E-03**
SIL achieved (Including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**116**

FAULT TOLERANCE CHECK
Conforms to Note 1: YES
Note 1: In order to reduce the fault tolerance by 1, for sensors, final elements and non-programmable logic solvers, the following must be satisfied:
1. the hardware is selected on the basis of proven technology (prior use)
2. adjustment, of process related parameters only, allowed to the user.
3. adjustment, of process related parameters, is protected by password or removeable programming link.
4. system function has SIL requirement of <4

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Logic Solver Calculation Sheet 1

Sheet Title:- Logic Solver - PILZ Relay — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref.	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

Key:	Data Input Cell	Calculation Cell	Results Cell

System Architecture: 1oo1

Data Type: 3 — PFD Value Certified

Sub System Item	Pilz PNOZ S2 Relay
FAILURE DATA	
Failures - Safe, Detected (λSD)	
Failures - Safe, Undetected (λSU)	
Failures - Dangerous, Detected (λDD)	
Failures - Dangerous, Undetected (λDU)	
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	0.95
Diagnostic Coverage	
PFD Value (From Certificate)	4.00E-06

FAILURE CALCULATIONS	
Total Failures (λ)	n/a
Safe Fail Fraction	n/a
Total Dangerous Failures (λ_D)	n/a
Calculated Diagnostic Coverage	n/a

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	n/a
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	n/a
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	n/a
Fraction of undetected failures that have a common cause (β)	n/a
Channel Downtime (t_{CE})	n/a
Voted Group Downtime (t_{GE})	n/a
Mean Diagnostic Coverage	n/a

LOOP CRITERIA ACHIEVED	
PFD Total	**4.00E-06**
SIL achieved (Including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**13158**

FAULT TOLERANCE CHECK	Non-Programmable	
Programmable	Non Programmable	
SFF>90%	Conforms to Note 1	YES
Note 1: In order to reduce the fault tolerance by 1, for sensors, final elements and non-programmable logic solvers, the following must be satisfied:		
1. the hardware is selected on the basis of proven technology (prior use)		
2. adjustment, of process related parameters only, allowed to the user.		
3. adjustment, of process related parameters, is protected by password or removeable programming link.		
4. system function has SIL requirement of <4		

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Sheet Title:- **Logic Solver Calculation Sheet 2**
Logic Solver - Barrier
Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

Key: Data Input Cell | Calculation Cell | Results Cell

System Architecture: 1oo1

Data Type: 2 — Failure Rate/hr (λ)

Sub System Item	Barrier and Trip Amp
FAILURE DATA	
Failures - Safe, Detected (λSD)	9.00E-09
Failures - Safe, Undetected (λSU)	3.47E-07
Failures - Dangerous, Detected (λDD)	8.90E-08
Failures - Dangerous, Undetected (λDU)	9.00E-08
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	
Diagnostic Coverage	
PFD Value (From Certificate)	

FAILURE CALCULATIONS	
Total Failures (λ)	5.35E-07
Safe Fail Fraction	0.83
Total Dangerous Failures (λ_D)	1.79E-07
Calculated Diagnostic Coverage	49.72

SUB-SYSTEM DATA	
Mean Time to Repair	8
Proof Test Interval (days)	1095
Fraction of detected failures that have common cause (βD)	0.0

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	1.79E-07
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	8.90E-08
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	9.00E-08
Fraction of undetected failures that have a common cause (β)	0
Channel Downtime (t_{CE})	6614.7
Voted Group Downtime (t_{GE})	4412.5
Mean Diagnostic Coverage	49.7

LOOP CRITERIA ACHIEVED	
PFD Total	**1.18E-03**
SIL achieved (Including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**256.5**

FAULT TOLERANCE CHECK	Non-Programmable
Programmable	Non Programmable
SFF<60%	Conforms to Note 1: YES
Note 1: In order to reduce the fault tolerance by 1, for sensors, final elements and non-programmable logic solvers, the following must be satisfied:	
1. the hardware is selected on the basis of proven technology (prior use)	
2. adjustment, of process related parameters only, allowed to the user.	
3. adjustment, of process related parameters, is protected by password or removeable programming link.	
4. system function has SIL requirement of <4	

P & I Design Ltd — **Final Element Calculation Sheet 1**

www.pidesign.co.uk — Sheet Title:- Pekos Ball Valve — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

Key:: Data Input Cell | Calculation Cell | Results Cell

System Architecture: 1oo1

Data Type: 2 — Failure Rate/hr (λ)

Sub System Item	Ball valve
FAILURE DATA	
Failures - Safe, Detected (λSD)	
Failures - Safe, Undetected (λSU)	1.65E-06
Failures - Dangerous, Detected (λDD)	2.92E-07
Failures - Dangerous, Undetected (λDU)	3.34E-07
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	
Diagnostic Coverage	
PFD Value (From Certificate)	

FAILURE CALCULATIONS	
Total Failures (λ)	2.28E-06
Safe Fail Fraction	0.85
Total Dangerous Failures (λ_D)	6.26E-07
Calculated Diagnostic Coverage	46.65

SUB-SYSTEM DATA	
Mean Time to Repair	8
Proof Test Interval (days)	1095
Fraction of detected failures that have common cause (βD)	0.0

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	6.26E-07
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	2.92E-07
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	3.34E-07
Fraction of undetected failures that have a common cause (β)	0
Channel Downtime (t_{CE})	7018.8
Voted Group Downtime (t_{GE})	n/a
Mean Diagnostic Coverage	46.6

LOOP CRITERIA ACHIEVED	
PFD Total	**4.39E-03**
SIL achieved (Including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**59**

FAULT TOLERANCE CHECK
Conforms to Note 1: YES
Note 1: In order to reduce the fault tolerance by 1, for Final Elements, final elements and non-programmable logic solvers, the following must be satisfied:
1. the hardware is selected on the basis of proven technology (prior use)
2. adjustment, of process related parameters only, allowed to the user.
3. adjustment, of process related parameters, is protected by password or removeable programming link.
4. system function has SIL requirement of <4

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Sheet Title:- **Final Element Calculation Sheet 2** — Rotork Electro/Hydraulic Actuator — Version 5.6

Project:	Chevron Texaco	Originator:	DSR
Client:	Simon Management	Checked:	DRR
Client Ref:	Brighton Terminal	Approved:	DRR
Document:	SI157007_CAL	Issue:	B
SIS Number:		Date:	27/07/2012

P & I DESIGN

Key::	Data Input Cell	Calculation Cell	Results Cell

System Architecture: 1oo1

Data Type: 2 — Failure Rate/hr (λ)

Sub System Item	Rotork Electro-Hydraulic
FAILURE DATA	
Failures - Safe, Detected (λSD)	8.05E-06
Failures - Safe, Undetected (λSU)	5.28E-07
Failures - Dangerous, Detected (λDD)	1.49E-08
Failures - Dangerous, Undetected (λDU)	5.62E-09
MTBF all failure modes (hours)	
Safe split fraction (0 to 1.0)	
Diagnostic Coverage	
PFD Value (From Certificate)	

FAILURE CALCULATIONS	
Total Failures (λ)	8.60E-06
Safe Fail Fraction	0.9993
Total Dangerous Failures (λ_D)	2.05E-08
Calculated Diagnostic Coverage	72.59

SUB-SYSTEM DATA	
Mean Time to Repair	8
Proof Test Interval (days)	1095
Fraction of detected failures that have common cause (βD)	0.0

CALCULATED DATA	
Total System Dangerous Failure ($\lambda_{D(group)}$)	2.05E-08
Total System Dangerous Detected Failure ($\lambda_{DD(group)}$)	1.49E-08
Total System Dangerous Undetected Failure ($\lambda_{DU(group)}$)	5.62E-09
Fraction of undetected failures that have a common cause (β)	0
Channel Downtime (t_{CE})	3610.3
Voted Group Downtime (t_{GE})	n/a
Mean Diagnostic Coverage	72.6

LOOP CRITERIA ACHIEVED	
PFD Total	**7.40E-05**
SIL achieved (including Fault Tolerance)	**Valid**
Spurious Trip Rate (years)	**13**

FAULT TOLERANCE CHECK
Conforms to Note 1: YES
Note 1: In order to reduce the fault tolerance by 1, for sensors, final elements and non-programmable logic solvers, the following must be satisfied:
1. the hardware is selected on the basis of proven technology (prior use)
2. adjustment, of process related parameters only, allowed to the user.
3. adjustment, of process related parameters, is protected by password or removeable programming link.
4. system function has SIL requirement of <4

P & I Design Ltd

Process Instrumentation Consultancy & Design

2 Reed Street, Gladstone Industrial Estate,
Thornaby, TS17 7AF, United Kingdom.
Tel. +44 (0) 1642 617444 Fax. +44 (0) 1642 616447
Web Site: www.pidesign.co.uk

VALERO ENERGY LTD.

BRIGHTON TERMINAL

GASOLINE OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM

DOCUMENTATION AND HARDWARE VERIFICATION

TESTING PROCEDURE

Rev	Date	By	Checked	Approved	Description	Client Ref.
A	28.04.08	D.S.Regan	DRR	DRR	Original Issue	
B	09.05.11	P. Lynch	DSR	DSR	Update for 2011 test	Document No. **SI157037_RPT**
C	08.06.12	P. Lynch	DSR	DSR	Update for 2012 Test	**Page 1 of 15**

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

Contents

1.0 REVISION HISTORY

Rev	Description
A	Original Issue – To cover all equipment as original design.
B	Updated for 2011 proof test
C	Updated for 2012 proof test to include HHL instrument PCB details and hand test switch details.

2.0 INTRODUCTION

This document will form part of the Lifecycle testing documentation to ensure that the installation performs the SIF as designed.

This document will be revised with any additions to or removals from the safety instrument System throughout the life of the system.

3.0 DOCUMENTATION VERIFICATION

Purpose of Test			
Verify Correct Documentation used for testing.			
Method of Test			
• Confirm documentation and revisions used for testing. • Record permit number and type (cold/hot/confined space)			
Permit To Work Number	GW7970	**Permit To Work Type**	COLD
Safety Instrument System Documentation Manual SI157007.MNL Revision			

Drawing Number	**Title**	**Revision**
SI157101	Tank Overfill Protection SIS Import East Bund Cable Overview	~~E~~ H
SI157102	Tank Overfill Protection SIS West Bund Cable Overview	~~D~~ G
SI157103	Tank Overfill Protection SIS Additive Tanks Cable Overview	~~D~~ E
SI157104	Tank Overfill Protection SIS East Bund I.S. Junction Box Connection Details	~~D~~ F
SI157105	Tank Overfill Protection SIS West Bund I.S. Junction Box Connection Details	~~D~~ F
SI157106	Tank Overfill Protection SIS Additive Tanks I.S. Junction Box Connection Details	~~D~~ F
SI157107	Tank Overfill Protection SIS East Bund DC Junction Box Connection Details TB1	~~D~~ E
SI157108	Tank Overfill Protection SIS East Bund DC Junction Box Connection Details TB2	~~D~~ E
SI157109	Tank Overfill Protection SIS West Bund DC Junction Box Connection Details	~~D~~ E
SI157110	Tank Overfill Protection SIS Valve Power Distribution Board	~~D~~ E
SI157111	Tank Overfill Protection SIS East Bund AC Junction Box Connection Details TB1	~~D~~ E
SI157112	Tank Overfill Protection SIS East Bund AC Junction Box Connection Details TB2	~~D~~ E
SI157113	Tank Overfill Protection SIS West Bund AC Junction Box Connection Details TB1	~~D~~ E
SI157114	Tank Overfill Protection SIS West Bund AC Junction Box Connection Details TB2	~~D~~ E
SI157115	Site Plan Showing Location of Tank Overfill SIS Equipment	~~B~~ C
SI157116	Tank Overfill Protection SIS Rotork Valve Control Network	C

Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		3Dec14

3.0 Documentation Verification (Cont.)

Purpose of Test			
Verify Correct Documentation used for testing.			
Method of Test			
• Confirm documentation and revisions used for testing. • Record permit number and type (cold/hot/confined space)			
Permit To Work Number	GW7970	**Permit To Work Type**	COLD
Safety Instrument System Documentation Manual SI157007.MNL Revision			
Drawing Number	**Title**		**Revision**
SI157117	Alarm Annunciator/Monitoring Panel Cable AN001 Connection Details		C
SI157118	Alarm Annunciator/Monitoring Panel Cable AN002 Connection Details		B
SI157119	Alarm Annunciator/Monitoring Panel Cable AN003 Connection Details		B
SI157120	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 1		E
SI157121	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 2		D
SI157122	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 3		F
SI157123	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 4		F
SI157124	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 5		F
SI157125	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 6		F
SI157126	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 7		E
SI157127	Tank Overfill Protection SIS Monitoring Panel Logic Drawing 8		C
SI157130	Tank Overfill Protection SIS Tank Monitoring Panel External Layout		E
SI157131	Tank Overfill Protection SIS Tank Monitoring Panel Internal Layout		F
Actions/Comments			
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)		**Sign**	**Date**
Tested by			3Dec14

3.0 Documentation Verification (Cont.)

Purpose of Test			
Verify Correct Documentation used for testing.			
Method of Test			
• Confirm documentation and revisions used for testing. • Record permit number and type (cold/hot/confined space)			
Permit To Work Number	GW7970	**Permit To Work Type**	COLD
Safety Instrument System Documentation Manual SI157007.MNL Revision			
Drawing Number	**Title**		**Revision**
SI157140	Tank Overfill Protection SIS XV162 Pipeline Import Valve Loop Sheet		B D
SI157170	Tank Overfill Protection SIS Tank 1 High Level Switch Loop Sheet		B D
SI157171	Tank Overfill Protection SIS Tank 2 High Level Switch Loop Sheet		B D
SI157172	Tank Overfill Protection SIS Tank 3 High Level Switch Loop Sheet		B D
SI157173	Tank Overfill Protection SIS Tank 4 High Level Switch Loop Sheet		B D
SI157174	Tank Overfill Protection SIS Tank 5 High Level Switch Loop Sheet		B D
SI157175	Tank Overfill Protection SIS Tank 6 High Level Switch Loop Sheet		B D
SI157176	Tank Overfill Protection SIS Tank 7 High Level Switch Loop Sheet		B D
SI157177	Tank Overfill Protection SIS Tank 8 High Level Switch Loop Sheet		B D
SI157178	Tank Overfill Protection SIS Tank 9 High Level Switch Loop Sheet		B D
SI157179	Tank Overfill Protection SIS Tank 10 High Level Switch Loop Sheet		B D
SI157180	Tank Overfill Protection SIS Tank 11 High Level Switch Loop Sheet		B D
SI157181	Tank Overfill Protection SIS Tank 18 High Level Switch Loop Sheet		B D
SI157182	Tank Overfill Protection SIS Tank 18A High Level Switch Loop Sheet		B D
SI157183	Tank Overfill Protection SIS Tank 21 High Level Switch Loop Sheet		B D
SI157184	Tank Overfill Protection SIS Tank 22 High Level Switch Loop Sheet		B D
Actions/Comments			
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)		**Sign**	**Date**
Tested by			3 Dec 14

HARDWARE VERIFICATION

3.1 Tank Sensors

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries and process connections. • Comment on changes and condition		
Tag No	**Identification**	**Result**
TANK 1		
LE01	000356	PASS
PCB	385-0048-050-1T ALK003209	N/A
HS01	220037	PASS
TANK 2		
LE02	~~000359~~ 791	PASS
PCB	385-0048-050 ALK003569	N/A
HS02	218796	PASS
TANK 3		
LE03	000357	PASS
PCB	385-0048-050-1T ALK003253	N/A
HS03	220164	PASS
TANK 4		
LE04	000362	PASS
PCB	385-0048-050-1T ALK003261	N/A
HS04	218797	PASS
TANK 5		
LS05	000385	PASS
PCB	385-0048-050-1T ALK003426	N/A
HS05	218974	PASS
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		3 Dec 14

3.1 Tank Sensors (Cont.)

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries and process connections. • Comment on changes and condition		
Tag No	**Identification**	**Result**
TANK 6		
LS06	000399	PASS
PCB	385-0048-050-1T ALK003237	N/A
HS06	220036	PASS
TANK 7		
LS07	000389	PASS
PCB	385-0048-050-1T ALK003424	N/A
HS07	218798	PASS
TANK 8		
LS08	000386	PASS
PCB	385-0048-050-1T ALK003215	N/A
HS08	220040	PASS
TANK 9		
LS09	000382	PASS
PCB	385-0048-050-1T ALK003216	N/A
HS09	218823	PASS
TANK 10		
LS10	000371	PASS
PCB	385-0048-050-1T ALK003215	N/A
HS10	220193	PASS
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		22ce14

3.1 Tank Sensors (Cont.)

Purpose of Test
To verify the correct equipment is fitted and check its physical condition.
Method Of Test
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries and process connections. • Comment on changes and condition

Tag No	Identification	Result
TANK 11		
LS11	000364	PASS
PCB	385-0048-050-1T ALK003212	N/A
HS11	218973	PASS
TANK 18		
LS18	000~~373~~ 793	PASS
PCB	385-0048-050-1T ALK003221	N/A
HS18	218868	PASS
TANK 18A		
LS18A	000409	PASS
PCB	385-0048-050-1T ALK003260	N/A
HS18A	218975	PASS
TANK 21		
LS21	000396	PASS
PCB	385-0048-050-1T ALK003255	N/A
HS21	220214	PASS
TANK 22		
LS22	000383	PASS
PCB	385-0048-050-1T ALK003244	N/A
HS22	220072	PASS
Actions/Comments		

Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		30/6/14

3.2 Valves

Purpose of Test
To verify the correct equipment is fitted and check its physical condition.
Method Of Test
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries and process connections. • Comment on changes and condition

Tag No	Identification	Result
Gasoline Pipeline Import Valve XV162		
Valve Body	WCC Pekos 530	PASS
Actuator	RS202902/01	PASS
Limit Switch	211107	PASS #1
Isolator	Z53857010104	PASS

Actions/Comments

#1. LIMIT SWITCH LID HAS LOST PAINT AND IS SHOWING SIGNS OF CORROSION.

Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		3 Dec 14

3.3 Logic Solver

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment • Comment on changes and condition		
Tag No	**Identification**	**Result**
TANK 1		
R252		PASS
LS01	~~10437522232088~~	1190911O PASS
TANK 2		
R292		PASS
LS02	10437522232089	2571564 PASS
TANK 3		
R332		PASS
LS03	10437522232093	2571598 PASS
TANK 4		
R372		PASS
LS04	10437522232098	2571442 PASS
TANK 5		
R492		PASS
LS05	10437522232044	2571420 PASS
TANK 6		
R532		PASS
LS06	10507523765067	2571543 PASS
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		3Dec14

3.3 Logic Solver (Cont.)

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment • Comment on changes and condition		
Tag No	**Identification**	**Result**
TANK 7		
R572		PASS
LS07	10437522232047	2571356 PASS
TANK 8		
R612		PASS
LS08	10507523765066	2571370 PASS
TANK 9		
R652		PASS
LS09	10437522232041	2571410 PASS
TANK 10		
R692		PASS
LS10	10507523765065	2571368 PASS
TANK 11		
LS11	10437522232084	2571493 PASS
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		3 Dec 14

3.3 Logic solver (Cont.)

TANK 18		
LS18	10437522232043	2571507 PASS
TANK 18A		
LS18A	10437522232046	2571407 PASS
TANK 21		
LS21	10437522232045	1333402 PASS
TANK 22		
LS22	10437522232051	1333423 PASS
SITE ESD		
R088		PASS
SITE ESD		
R124		PASS
SITE ESD		
R164		PASS
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		3 Dec 14

3.4 Auxiliary Equipment

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries. • Comment on changes and condition		
Tag No	**Identification**	**Result**
Tank Import Monitoring Panel		
Panel	HC 9641	PASS
East Bund SIS AC Junction Box		
Panel	XA-GB-C007265	PASS
East Bund SIS DC Junction Box		
Panel	XA-GB-C007267	PASS
East Bund SIS IS Junction Box		
Panel	XA-GB-C007262	PASS
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		30 Oct 14

3.4 Auxiliary Equipment (Cont.)

Purpose of Test		
To verify the correct equipment is fitted and check its physical condition.		
Method Of Test		
• Verify Tamperproof label still intact. To be fitted on 1st test to avoid further disturbance to system investigating Serial numbers • Verify Serial Number(S/N)/Model Number (M/N)of fitted equipment (If above not correct) • Confirm equipment tagged correctly • Check physical condition of equipment and mountings • Check cable entries. • Comment on changes and condition		
Tag No	**Identification**	**Result**
West Bund SIS AC Junction Box		
~~Panel~~ J/B	XA-GB-C007266	PASS
West Bund SIS DC Junction Box		
~~Panel~~ J/B	XA-GB-C007278	PASS
West Bund SIS IS Junction Box		
~~Panel~~ J/B	XA-GB-C007259	PASS
Additive Tanks SIS IS Junction Box		
~~Panel~~ J/B	XA-GB-C007263	PASS
Actions/Comments		
Approvals (Note: Signature indicates acceptance of test with actions/comments noted)	**Sign**	**Date**
Tested by		3 Dec 14

CLIENT: Local Fuel	**PROJECT REF:LF364**	**DOC REF: LF364001_HDR_A**
PROJECT: Annual Proof Testing 2016	**LOCATION: Brighton**	**DATE: 11.02.16**
PLANT SECTION: Site	**PLANT UNIT: All Tanks**	**PAGE: 1 OF 1**

This certificate covers the acceptance of the following works:-
Annual SIS Proof Testing 2016

In accordance with the following specifications and conditions of contract:-
LF364 – Consultancy Services

We duly handover the work specified subject to the following exceptions:-
Import Valve XV162 Communications cable "VCOM162" found to be showing steel wire armour at actuator gland entry. Cable removed and left in switchroom as Modbus communications is not used.

Additive tank high levels found to be linked out at the barrier in SIS panel.

Approvals

P & I DESIGN LTD: C.Dales DATE: 11.02.16

CLIENT: DATE: 11.02.16

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Process Instrumentation Consultancy & Design

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LOCAL FUEL PLC

THE SHOREHAM OIL TERMINAL

STORAGE TANK OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM LFS-SIS1

DOCUMENTATION VERIFICATION

Rev	Date	By	Checked	Approved	Description	Local Fuel Ref.
A	20.05.15	D B.Faulkner	M.Morgan	Local Fuel	Original Issue	Document No. **LF364011_RPT**

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

Contents

1 REVISION HISTORY

Rev	Description
A	Original Issue
B	
C	
D	
E	

This document will be revised with any additions to or removals from LFS-SIS1 throughout the operational lifecycle of the system.

2 INTRODUCTION

This document provides a procedure for documentation verification to ensure that the Safety Instrument System Life Cycle complies with the requirements of the standard BS EN 61511.

3 SCOPE

Client / Company	-	Local Fuel PLC
Location / Facility	-	The Shoreham Oil Terminal
Plant Unit	-	Spirt Bund / Distillate Bund
Service	-	Storage Tank Overfill Protection
SIS Tag No	-	LFS-SIS1
SIF's Tag No's	-	SIF-1, SIF-2, SIF-3 & SIF-4
SIL	-	2

Lifecycle Stages

Stage 4	-	BS EN 61511 Clause 16 - SIS Operation and Maintenance

Audience
This document has been produced for use by competent persons knowledgeable in testing Safety Instrument Systems.

Brief System Description
SIF's under test are to prevent the overfill of storage tanks when on import.
The system is classified as SIL2.
Full system description in LF364001_MNL The Shoreham Oil Terminal LF-SIS1

Procedure
This procedure outlines the necessary steps required to verify the correct documentation used for testing and identify modifications to the system since last testing phase.

Detailed in this report are the methods of test for documentation associated with LFS-SIS1. The results of these tests will be recorded in this report, historical data will be recorded in report reference LF364013_RPT - LFS-SIS1 Operation, Maintenance and Modification Lifecycle and schedule reference LF364004_SCH - LFS-SIS1 Testing Lifecycle Matrix.

All faults should be reported to the system keeper. If further work is required the system keeper will initiate it.

4 DEFINITIONS AND ABBREVIATIONS

The following definitions and abbreviations apply to this document.

BPCS	Basic Process Control System
Logic Solver	Part of the SIS that performs one or more logic functions, e.g. safety relay, trip amplifier
Proof Test	Periodic testing to detect failures in a safety instrumented system
Protection Layer	A mechanism that reduces risk by control, prevention or mitigation
Sensor	Part of the SIS which measures the process condition
SIF	Safety Instrumented Function – A function with a specified safety integrity level which is necessary to achieve functional safety
SIL	Safety integrity level – A numerical number, 1 to 4 stipulating the level of integrity the system shall perform to, 1 being the lowest 4 the highest
SIS	Safety Instrument System – A SIS comprises of sensors, logic solvers and final elements
1ooN	SIS made up of N independent channels, which are so connected, that any single channel is sufficient to perform the correct safety instrumented function
2ooN	SIS made up of N independent channels, which are so connected, that any two of the channels are required to perform the correct safety instrumented function
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
PFD	Probability of Failing on Demand
ESV	Emergency Shutdown Valves
HMI	Human Machine Interface (Visual display screen)
P&ID	Piping & Instrumentation Diagram
SCH	Schedule
PTW	Permit to Work
RAMS	Risk Assessment and Method Statement

5 PREPARATION

Controlled copies of the following documentation will be required :-
LF364001_REG – LFS-SIS1 Drawing Register
LF364002_REG – LFS-SIS1 Report Register
LF364003_REG – LFS-SIS1 Specification Register

A controlled copy of this procedure will be used to carry out the testing and will form part of the lifecycle testing documentation.
Controlled copies of all documentation required for testing to be attached.

6 DOCUMENTATION VERIFICATION

Purpose of Test			
Pre physical on site testing check of documentation to verify correct documentation to be used for testing and identify modifications to the system since last testing phase. *Incorrect or updated documentation may lead to incomplete testing or undesirable effects on other site systems and terminal operation.*			
Controlled Copy Documentation Required			
LF364001_REG – LFS-SIS1 Drawing Register LF364002_REG – LFS-SIS1 Report Register LF364003_REG – LFS-SIS1 Specification Register			
Step	**Method of Test**	**Acceptance Criteria**	**Pass (✓) Fail (x) Initial**
6.1	Compare system documentation to registers. Highlight documentation checked on controlled copy of registers. Review changes since last testing phase as documented in LF364013_RPT - LFS-SIS1 Operation, Maintenance and Modification Lifecycle.	Documentation available and auditable. Documentation revisions reflex installed system. *Comment any issues in section 6.2 and review / rectify prior to starting site work*	✓ CD
6.2	Comments/Defects/ Remedial Actions – Report ALL to System Keeper		

Tested by	**Position**	**Qualification**	**Sign**	**Date**
C·DALES	INST ENG	Bangy Hons Inst+C		09.02.16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	**Position**	**Qualification**	**Sign**	**Date**
D.W.INSOR				

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Web Site: www.pidesign.co.uk

LOCAL FUEL PLC

THE SHOREHAM OIL TERMINAL

STORAGE TANK OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM LFS-SIS1

SHUTDOWN CONDITIONS PROOF TESTING

Rev	Date	By	Checked	Approved	Description	Local Fuel PLC Ref.
A	20.05.15	D.B Faulkner	M.Morgan	Local Fuel PLC	Original Issue	Document No. **LF364012_RPT**

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

Contents

1 REVISION HISTORY

Rev	Description
A	Original Issue

This document will be revised with any additions to or removals from LFS-SIS1 throughout the operational lifecycle of the system.

2 INTRODUCTION

This document provides a procedure for shutdown condition functional proof testing to ensure that the Safety Instrument System Life Cycle complies with the requirements of the standard BS EN 61511.

BS EN 61511-1:2004 Clause 3.2.58 - Proof testing is a test performed to reveal undetected faults in a safety instrumented system (SIS) so that, if necessary, the SIS can be restored to its designed functionality.

By revealing all undetected faults, the PFD is effectively 'reset' back to the designed value.

3 SCOPE

Client / Company	-	Local Fuel PLC
Location / Facility	-	The Shoreham Oil Terminal
Plant Unit	-	Spirt Bund / Distillate Bund
Service	-	Storage Tank Overfill Protection
SIS Tag No	-	LFS-SIS1
SIF's Tag No's	-	SIF-1, SIF-2, SIF-3 & SIF-4
SIL	-	2

Lifecycle Stages

Stage 4	-	BS EN 61511 Clause 16 - SIS Operation and Maintenance

Audience
This document has been produced for use by competent persons knowledgeable in testing Safety Instrument Systems.

Brief System Description
SIF's under test are to prevent the overfill of storage tanks when on import.
The system is classified as SIL2.
Full system description in LF364001_MNL Shoreham Oil Terminal LFS-SIS1

Procedure
This procedure outlines the necessary steps required to verify the correct equipment is installed, the physical condition of the installed equipment and the functional operation performs the SIF's as designed.

Detailed in this report are the methods of test for each SIF.

The results of these tests will be recorded in this report, historical data will be recorded in report reference LF364013_RPT - LFS-SIS1 Operation, Maintenance and Modification Lifecycle and schedule reference LF364004_SCH - LFS-SIS1 Testing Lifecycle Matrix.

This report details shutdown condition testing whilst no transfer to the tanks is in operation.

All faults should be reported to the functional safety manager, with minor repairs carried out if practicable. If further maintenance work is required the functional safety manager will initiate it.

4 DEFINITIONS AND ABBREVIATIONS

The following definitions and abbreviations apply to this document.

BPCS	Basic Process Control System
Logic Solver	Part of the SIS that performs one or more logic functions, e.g. safety relay, trip amplifier
Proof Test	Periodic testing to detect failures in a safety instrumented system
Protection Layer	A mechanism that reduces risk by control, prevention or mitigation
Sensor	Part of the SIS which measures the process condition
SIF	Safety Instrumented Function – A function with a specified safety integrity level which is necessary to achieve functional safety
SIL	Safety integrity level – A numerical number, 1 to 4 stipulating the level of integrity the system shall perform to, 1 being the lowest 4 the highest
SIS	Safety Instrument System – A SIS comprises of sensors, logic solvers and final elements
1ooN	SIS made up of N independent channels, which are so connected, that any single channel is sufficient to perform the correct safety instrumented function
2ooN	SIS made up of N independent channels, which are so connected, that any two of the channels are required to perform the correct safety instrumented function
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
PFD	Probability of Failing on Demand
XV	Emergency Shutdown Valves
SCADA	Human Machine Interface (Visual display screen)
P&ID	Piping & Instrumentation Diagram
SCH	Schedule
PTW	Permit to Work
RAMS	Risk Assessment and Method Statement

5 PREPARATION

All Health and Safety / Permit To Work systems must be implemented before commencing testing. LF364014_RPT – LFS-SIS1 RAMS is to be submitted for approval prior to the site testing.

LFS-SIS1 is completely independent of the BPCS, no overrides or special preparations are required to facilitate uncompromised testing.

Controlled copies of the following documentation will be required:-
LF364012_RPT - LFS-SIS1 Shutdown Conditions Proof Testing (this procedure)
LF364002_SCH - LFS-SIS1 Instrument Schedule
LF364003_SCH - LFS-SIS1 Testing Matrix

LF364011_RPT - LFS-SIS1 Documentation Verification to be completed prior to each period of testing to confirm correct revisions of documentation.

A controlled copy of this procedure will be used to carry out the testing and will form part of the lifecycle testing documentation.

Controlled copies of all documentation required for testing to be attached. In addition to procedures documented in this report calibration certificates, engineers' reports are to be issued to each item as applicable.

The functional testing will be controlled and documented by a technician in radio contact with testers in the switchroom and at field equipment locations as required.

6 HARDWARE VERIFICATION

Purpose of Test			
To verify the correct equipment is fitted and no unauthorised modifications have been carried out. To verify equipment physical condition and fitness for purpose. To verify equipment is identified as being part of a SIS with a label to caution unauthorised works. *Equipment may not function correctly if incorrect designed/rated equipment is installed.* *Equipment may not function correctly if damaged or modified.* *Equipment not identified as SIS may not be reported to the system keeper following works by maintenance / contractors.*			
Controlled Copy Documentation Required			
LF364002_SCH - LFS-SIS1 Instrument Schedule			
Step	**Method of Test**	**Acceptance Criteria**	**Pass (✓) Fail (x) Initial**
6.0	Review procedure with operations and testing personnel.	All personnel familiarised with the scope of works and responsibilities. *Comment any issues in section 6.6 and review / rectify prior to starting testing.*	✓ CD
6.1	Confirm plant preparations satisfactory prior to each period of work and following changes in plant conditions or operations. *Record PTW No.....HW 3256.....*	Conditions satisfied as detailed on PTW and RAMS. *Comment any issues in section 6.6 and review / rectify prior to starting any site work.*	✓ CD
6.2	Confirm equipment is identified correctly by comparing against information on LF364002_SCH. Record method used to identify equipment on controlled copy of LF364002_SCH by Highlighting verified identification. "Tag No" "Site Specific" and / or "Serial No" etc.	Equipment identified as LF364002_SCH, Labelling and tagging correct. SIS identification correct. *Comment issues / observations in section 6.6.*	✓ CD
6.3	Confirm equipment is identified as being part of a SIS with suitable warning label to caution unauthorised works not in accordance with BS EN 61511. Record compliance on controlled copy of LF364002_SCH by Highlighting SIS Identification column.	SIS identification correct. *Comment issues / observations in section 6.6.*	✓ CD
6.4	Confirm no visible signs of system and equipment modification (including dip switch / jumper settings), relocation, or not fit for purpose. Highlight equipment checked on controlled copy of LF364002_SCH in "P&I Drawing Reference" column & on P&IDs.	No visible signs of modification or relocation. Equipment is clean and of sound physical condition, mountings, cable entries and process connections are fit for designed purpose with unrestricted access. *Comment issues/ observations in section 6.6.*	✓ CD

6.5	Confirm no visible signs of additional plant or parallel systems which could affect the SIS or invalidate testing.	No new additional plant equipment or BPCS systems. *Comment any issues in section 6.6.and review / rectify prior to starting functional testing.*	✓CD
6.6	Comments/Defects/ Remedial Actions – Report ALL to System Keeper		

VALVE XV162 COMMS CABLE VCOM162 FOUND [redacted] SHOWING STEEL ARMOUR AT THE ACTUATOR ENTRY. CABLE REMOVED AND STORED IN SWITCHROOM AS MODBUS IS NOT USED

Tested by	Position	Qualification	Sign	Date
C.DALES	INST ENG	Berg Hons Inst+C		09.2.16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	Position	Qualification	Sign	Date
DWINSOR				

7 AS FOUND FUNCTIONAL PROOF TESTING PROCEDURE

7.1 Valve Performance As Found

Purpose of Test

To verify the correct undisturbed operation of FINAL ELEMENT valves as found prior to multiple operation during SIF testing.
To verify correct DIAGNOSTICS information.
To verify correct Manual and Emergency Shutdown operation of FINAL ELEMENT valves.
If this test is not performed 'as found' undetected faults may not be revealed.
If valve target time is exceeded the tank could overfill following shutdown.
If valve target time is reduced the dockline could overpressure (surge) following shutdown.
Diagnostic information not displayed correctly could result in undetected tank overfill, system unavailability or incorrect operational response.
Valves not operating correctly in manual or following Site ESD could initiate a tank overfill and may not close if a demand is made on the overfill protection system.

Controlled Copy Documentation Required

LF364003_SCH - LFS-SIS1 Testing Matrix
Record all results on Sheet 2.

Step	Method of Test	Acceptance Criteria	Pass (✓) Fail (x) Initial
7.1.1	Review procedure with operations and testing personnel.	All personnel familiarised with the scope of works and responsibilities. *Comment any issues in section 7.1.8 and review / rectify prior to starting testing.*	✓ CD
7.1.2	Confirm plant preparations satisfactory prior to each period of work and following changes in plant conditions or operations. *Record PTW No.....* HW 3256	Conditions satisfied as detailed on PTW and RAMS. *Comment any issues in section 7.1.8 and review / rectify prior to starting any site work.*	✓ CD
7.1.3	Confirm system healthy and reset by comparing against information on LF364003_SCH Sheet 1.	System reset as detailed on LF364003_SCH Sheet 1. *Comment differences from LF364003_SCH or if found in tripped state in section 7.1.8.*	✓ CD
7.1.4	Open each valve under test. Sections 7.1.4 to 7.1.7 to be completed for each valve under test individually prior to starting next valve.	Valve physical action found smooth with full operation of valve stem. *Comment poor action / sticking in section 7.1.8.*	✓ CD
		Opening time – No specific requirement. *Comment times >115 seconds in section 7.1.8.*	55s ✓ CD
		Correct FINAL ELEMENT valve position and DIAGNOSTICS as detailed on LF364003_SCH Sheet 2. *Comment differences from SCH in section 7.1.8.*	✓ CD

Valve Performance As Found Continued on page 10

Step	Method of Test	Acceptance Criteria	Pass (✓) Fail (x) Initial
7.1.5	Trip valve under test via simulation of monitoring panel ESD by removing fuse 24V/1. Note – This will close all valves controlled via LFS-SIS1.	Valve physical action found smooth with full operation of valve stem. *Comment poor action / sticking in section 7.1.8.*	✓ CD
		Valve status ESD Tripped on Local display. *Comment failure in section 7.1.8.*	✓ CD
		Closing times for overfill and surge protection within set limits as detailed on LF364003_SCH Sheet 2. *Comment failures in section 7.1.8. Record Physical Closing Time and Physical Travel Time.*	2 MINS 4 SECS *
		Correct FINAL ELEMENT valve position and DIAGNOSTICS as detailed on LF364003_SCH Sheet 2. *Comment differences from SCH in section 7.1.8.*	✓ CD
7.1.6	Reopen valve.	System remains tripped inhibiting from reopening FINAL ELEMENT valves. *Comment failure in section 7.1.8.*	✓ CD
7.1.7	Replace fuse 24V/1.	FINAL ELEMENT valves remain closed. *Comment failure in section 7.1.8.*	✓ CD
7.1.8	Comments/Defects/ Remedial Actions – Report ALL to System Keeper		

"ESD ACTIVE" SHOWN ON LOCAL DISPLAY, HOWEVER ON RESET OF ESD, MESSAGE STAYS. MESSAGE CLEARS ON SENDING OPEN COMMAND TO VALVE

NOTE: This is normal behaviour on newer actuators. MM.

*. Closing time outside specified limits. Reviewed & specified limits amended - see management of functional safety plan MM.

Tested by	Position	Qualification	Sign	Date
C. DALES	INST ENG	BENG HONS INST+C		10/02/16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	Position	Qualification	Sign	Date
D. DAVIS				

7.2 Drexelbrook Sensor As Found Manufacturers Test Terminal Functional Testing

Purpose of Test			
To verify the SIF operates correctly prior to any disturbance. SIF is SENSOR ELEMENT trips & inhibits the FINAL ELEMENT(s) to the safe state as specified. Method of activation is by operation of the manufacturers test facility To verify the correct DIAGNOSTICS information. *If this test is not performed 'as found' undetected faults may not be revealed.* *If sensing element defective the tank could overfill if a demand is made on the overfill protection system.* *If response target time is exceeded the tank could overfill following demand.* *Diagnostic information not displayed correctly could result in undetected tank overfill, system unavailability or incorrect operational response.*			
Controlled Copy Documentation Required			
LF364003_SCH - LFS-SIS1 Testing Matrix Record results on LF364003_SCH Sheets 2 & 3.			
Step	**Method of Test**	**Acceptance Criteria**	**Pass (✓) Fail (x) Initial**
7.2.1	Review procedure with operations and testing personnel.	All personnel familiarised with the scope of works and responsibilities. *Comment any issues in section 7.2.7 and review / rectify prior to starting testing.*	✓ CD
7.2.2	Confirm plant preparations satisfactory prior to each period of work and following changes in plant conditions or operations. *Record PTW No…* HW 3256	Conditions satisfied as detailed on PTW and RAMS. *Comment any issues in section 7.2.7 and review / rectify prior to starting any site work.*	✓ CD
7.2.3	Confirm system healthy and reset by comparing against information on LF364003_SCH Sheet 1.	System reset as detailed on LF364003_SCH Sheet 1. *Comment differences from SCH or if found in tripped state in section 7.2.7.*	✓ CD
7.2.4	Confirm all final element valves tripped by the initiator under test are open.	Correct FINAL ELEMENT valve position and DIAGNOSTICS as detailed on LF364003_SCH Sheet 3. *Comment differences from SCH in section 7.2.7.*	✓ CD
7.2.5	Operate and release HS Test Switch The sensing element will initiate a test sequence on rising edge of test switch. Test sequence = 5 seconds self-test 2 seconds alarm condition Returns to healthy state	Valve action found smooth with full operation of valve stem. *Comment poor action / sticking in section 7.2.7.*	✓ CD
		Valve status ESD Tripped on Local display. *Comment failure in section 7.2.7.*	✓ CD
		System trips closing and inhibiting from reopening FINAL ELEMENT valves and initiating DIAGNOSTICS as detailed on LF364003_SCH Sheet 2 & 3. *Comment differences from SCH in section 7.2.7*	✓ CD
		XV Closing times for overfill and surge protection within set limits. *Comment failures in section 7.2.7.* *Record Physical Closing Time and Physical Travel Time.*	2 MINS 4 SECS ✓ CD

Drexelbrook Sensor As Found Manufactures Test Terminal Functional Testing Continued on page 12

Step	Method of Test	Acceptance Criteria	Pass (✓) Fail (x) Initial
7.2.6	Activate system associated Bund reset and confirm valves enabled by opening and closing.	System reset as detailed on LF364003_SCH Sheet 1. *Comment differences from SCH in section 7.2.7.*	✓ CD
7.2.7	Comments/Defects/ Remedial Actions – Report ALL to System Keeper		

ADDITIVE TANKS LINKED HEALTHY AT BARRIER AS TANKS ARE NOT IN USE AND WILL NOT BE USED IN FUTURE

Tested by	Position	Qualification	Sign	Date
C. DALES	INST ENG	Beng Hons INST + C		10.2.16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	Position	Qualification	Sign	Date

7.3 Drexelbrook Sensor As Found Physical Test Functional Testing

Physical testing of Drexelbrook sensors required minimum of every 8 years.
Refer to LF364004_SCH - LFS-SIS1 Testing Lifecycle Matrix for scheduling.

Purpose of Test			
To verify the SIF operates correctly under simulated process conditions. SIF is SENSOR ELEMENT trips & inhibits the FINAL ELEMENT(s) to the safe state as specified. Method of activation is by physically removing the sensor element. To verify the correct DIAGNOSTICS information. *If sensing element defective the tank could overfill if a demand is made on the overfill protection system.* *If response target time is exceeded the tank could overfill following demand.* *Diagnostic information not displayed correctly could result in undetected tank overfill, system unavailability or incorrect operational response.* *If a physical test not carried out every 8 years the PDF of the system will fall outside of the defined SIL.*			
Controlled Copy Documentation Required			
LF364003_SCH - LFS-SIS1 Testing Matrix Record results on LF364003_SCH Sheets 2 & 4.			
Step	**Method of Test**	**Acceptance Criteria**	**Pass (✓) Fail (x) Initial**
7.3.1	Review procedure with operations and testing personnel.	All personnel familiarised with the scope of works and responsibilities. *Comment any issues in section 7.3.8 and review / rectify prior to starting testing.*	N/A
7.3.2	Confirm plant preparations satisfactory prior to each period of work and following changes in plant conditions or operations. *Record PTW No…* HW 3256	Conditions satisfied as detailed on PTW and RAMS. *Comment any issues in section 7.3.8 and review / rectify prior to starting any site work.*	N/A
7.3.3	Confirm system healthy and reset by comparing against information on LF364003_SCH Sheet 1	System reset as detailed on LF364003_SCH Sheet 1. *Comment differences from SCH or if found in tripped state in section 7.3.8.*	N/A
7.3.4	Confirm all final element valves tripped by the initiator under test are open.	Correct FINAL ELEMENT valve position and DIAGNOSTICS as detailed on LF364003_SCH Sheet 2. *Comment differences from SCH in section 7.3.8.*	N/A

Drexelbrook Sensor As Found Physical Test Functional Testing Continued on page 14

Step	Method of Test	Acceptance Criteria	Pass (✓) Fail (x) Initial
7.3.5	Remove probe from tank and touch end against tank top.	Valve action found smooth with full operation of valve stem. *Comment poor action / sticking in section 7.3.8.*	N/A
		Valve status ESD Tripped on Local display. *Comment failure in section 7.3.8.*	N/A
		System trips closing and inhibiting from reopening FINAL ELEMENT valves and initiating DIAGNOSTICS as detailed on LF364003_SCH Sheets 2 & 4. *Comment differences from SCH in section 7.3.8*	N/A
		Time from test initiation to trip activation <=2 seconds. *Comment failures in section 7.3.8.*	N/A
		XV Closing times for overfill and surge protection with set limits as detailed on LF364003_SCH Sheet 2. *Comment failures in section 7.3.8. Record Physical Closing Time and Physical Travel Time.*	N/A
7.3.6	Confirm probe length correct and inspection condition. Replace probe in tank as found. CRITICAL Step : Independent confirmation required to verify probe replaced in tank as found.	System remains tripped inhibiting from reopening FINAL ELEMENT valves. Independent verification to countersign LF364003_SCH to confirm as found replacement. *Comment failure in section 7.3.8.*	N/A
7.3.7	Activate system associated Bund reset and confirm valves enabled by opening and closing.	System reset as detailed on LF364003_SCH Sheet 1. *Comment differences from SCH in section 7.3.8.*	N/A

Drexelbrook Sensor As Found Physical test Functional Testing Continued on page 15

7.3.8	Comments/Defects/ Remedial Actions – Report ALL to System Keeper

TEST N/A AS TEST HAS BEEN COMPLETED IN RECENT YEAR/S

Tested by	Position	Qualification	Sign	Date
C. DALES	INST ENG	BEng HONS INST+C		10.2.16

System Keeper Acknowledgement
(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	Position	Qualification	Sign	Date

Independent Critical Step Verification
(Note: Signature confirms independent verification of all critical steps)

Accepted by	Position	Qualification	Sign	Date
D W. INSOR				

8 FAILURE MODE TESTING PROCEDURE

8.1 Failure Mode Functional Testing

Purpose of Test			
To verify the correct FAILURE MODES of the System Description system. To verify correct failure DIAGNOSTICS information. *Diagnostic information not displayed correctly could result in undetected tank overfill, system unavailability or incorrect operational response.*			
Controlled Copy Documentation Required			
LF364003_SCH - LFS-SIS1 Testing Matrix Record results on LF364003_SCH Sheet 5 & 6. Loop Sheets as listed on LF364001_REG - LFS-SIS1 Drawing Register			
Step	**Method of Test**	**Acceptance Criteria**	**Pass (✓) Fail (x) Initial**
8.1.1	Review procedure with operations and testing personnel.	All personnel familiarised with the scope of works and responsibilities. *Comment any issues in section 8.1.6 and review / rectify prior to starting testing.*	✓ CD
8.1.2	Confirm plant preparations satisfactory prior to each period of work and following changes in plant conditions or operations. *Record PTW No...* Hw 3256	Conditions satisfied as detailed on PTW and RAMS. *Comment any issues in section 8.1.6 and review / rectify prior to starting any site work.*	✓ CD
8.1.3	Confirm system healthy and reset by comparing against information on LF364003_SCH Sheet 1.	System reset as detailed on LF364003_SCH Sheet 1. *Comment differences from SCH or if found in tripped state in section 8.1.6.*	✓ CD
8.1.4	Confirm all final element valves tripped by the initiator under test are open.	Correct FINAL ELEMENT valve position and DIAGNOSTICS display at control room SCADA as detailed on LF364003_SCH Sheet 2. *Comment differences from SCH in section 8.1.6.*	✓ CD
8.1.5	Initiate and reset each FAILURE MODE as detailed on LF364003_SCH Sheets 5 & 6. Highlight tests completed on controlled copy of LF364003_SCH Sheets 5 & 6.	ACTION and DIAGNOSTICS as detailed on LF364003_SCH Sheets 5 & 6. System Reset as detailed on LF364003_SCH Sheet 1. *Comment differences from SCH in section 8.1.6*	✓ CD

Failure Mode Functional Testing Continued on page 17

8.1.6	Comments/Defects/ Remedial Actions – Report ALL to System Keeper

Tested by	Position	Qualification	Sign	Date
C.DALES	INST ENG	Beng HONS INST+C		10.2.16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	Position	Qualification	Sign	Date

9 PREVENTATIVE MAINTENANCE

Purpose of Test
To complete any recommended preventative maintenance as required. *No specific preventative maintenance required, this section to be reviewed and expanded as required.*
Controlled Copy Documentation Required

Step	Method of Test	Acceptance Criteria	Pass (✓) Fail (x) Initial
9.1			
9.2	Comments/Defects/ Remedial Actions – Report ALL to System Keeper		

Tested by	Position	Qualification	Sign	Date
C DALES	INST ENG	Bsc(Hons) IMST+C		11.2.16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	Position	Qualification	Sign	Date
D WILSON				

10 AS LEFT FUNCTIONAL PROOF TESTING PROCEDURE

10.1 Drexelbrook Sensor As left Manufacturers Test Terminal Functional Testing

Purpose of Test			
To verify the SIF operates correctly following system disturbance. SIF is SENSOR ELEMENT trips & inhibits the FINAL ELEMENT(s) to the safe state as specified. Method of activation is by operation of the manufacturers test facility To verify the correct DIAGNOSTICS information. *If sensing element defective the tank could overfill if a demand is made on the overfill protection system.* *If response target time is exceeded the tank could overfill following demand.* *Diagnostic information not displayed correctly could result in undetected tank overfill, system unavailability or incorrect operational response.*			
Controlled Copy Documentation Required			
LF364003_SCH - LFS-SIS1 Testing Matrix. Record results on LF364003_SCH Sheet 3.			
Step	**Method of Test**	**Acceptance Criteria**	**Pass (✓) Fail (x) Initial**
10.1.1	Review procedure with operations and testing personnel.	All personnel familiarised with the scope of works and responsibilities. *Comment any issues in section 10.1.7 and review / rectify prior to starting test.*	
10.1.2	Confirm plant preparations satisfactory prior to each period of work and following changes in plant conditions or operations. *Record PTW No…* HW 3256	Conditions satisfied as detailed on PTW and RAMS. *Comment any issues in section 10.1.7 and review / rectify prior to starting any site work.*	
10.1.3	Confirm system healthy and reset by comparing against information on LF364003_SCH Sheet 1.	System reset as detailed on LF364003_SCH Sheet 1. *Comment differences from SCH or if found in tripped state in section 10.1.7.*	
10.1.4	Confirm all final element valves tripped by the initiator under test are open.	Correct FINAL ELEMENT valve position and DIAGNOSTICS as detailed on LF364003_SCH Sheet 2. *Comment differences from SCH in section 10.1.7.*	

Drexelbrook Sensor As left Manufactures Test Terminal Functional Testing Continued on page 20

Step	Method of Test	Acceptance Criteria	Pass (✓) Fail (x) Initial
10.1.5	Operate and release HS Test Switch The sensing element will initiate a test sequence on rising edge of test switch. Test sequence = 5 seconds self-test 2 seconds alarm condition Returns to healthy state	Valve action found smooth with full operation of valve stem. *Comment poor action / sticking in section 10.1.7.*	✓ CD
		Valve status ESD Tripped on Local display. *Comment failure in section 10.1.7.*	✓ CD
		System trips closing and inhibiting from reopening FINAL ELEMENT valves and initiating DIAGNOSTICS as detailed on LF364003_SCH Sheet 2&3. *Comment differences from SCH in section 10.1.7*	✓ CD
		XV Closing times for overfill and surge protection with set limits as detailed on LF364003_SCH Sheet 2. *Comment failures in section 10.1.7.* *Record Physical Closing Time and Physical Travel Time.*	✓ CD
10.1.6	Activate system associated Bund reset and confirm valves enabled by opening and closing.	System reset as detailed on LF364003_SCH Sheet 1. *Comment differences from SCH in section 10.1.7.*	✓ CD
10.1.7	Comments/Defects/ Remedial Actions – Report ALL to System Keeper		

Tested by	Position	Qualification	Sign	Date
C. DALES	INST ENG	Beng Hons INST+C		11.2.16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	Position	Qualification	Sign	Date
D W. INST				

10.2 Emergency Shutdown As left

Purpose of Test			
To verify the correct operation of the manual terminal Emergency Shutdown system as left following multiple operation during SIF testing . To verify correct DIAGNOSTICS information.			
Controlled Copy Documentation Required			
LF364003_SCH - LFS-SIS1 Testing Matrix Record results on LF364003_SCH Sheet 2.			
Step	**Method of Test**	**Acceptance Criteria**	**Pass (✓) Fail (x) Initial**
10.2.1	Review procedure with operations and testing personnel.	All personnel familiarised with the scope of works and responsibilities. *Comment any issues in section 10.2.6 and review / rectify prior to starting testing.*	✓ CD
10.2.2	Confirm plant preparations satisfactory prior to each period of work and following changes in plant conditions or operations. *Record PTW No...* HW 3256	Conditions satisfied as detailed on PTW and RAMS. *Comment any issues in section 10.2.6 and review / rectify prior to starting any site work.*	✓ CD
10.2.3	Confirm ESD system relays healthy and reset.	ESD system relays reset as detailed on LF364003_SCH Sheet 1. *Comment differences from LF364003_SCH in section 10.2.6.*	✓ CD
10.2.4	Initiate Terminal ESD *Comment activation method* PUSHBUTTON	ESD system relays de-energise as detailed on LF364003_SCH Sheet 2. *Comment differences from LF364003_SCH in section 10.2.6.*	✓ CD
10.2.5	Reset Terminal ESD and confirm system healthy and reset.	ESD system relays reset as detailed on LF364003_SCH Sheet 1. *Comment differences from LF364003_SCH in section 10.2.6.*	✓ CD
10.2.6	Comments/Defects/ Remedial Actions – Report ALL to System Keeper		

Tested by	**Position**	**Qualification**	**Sign**	**Date**
C·DALES	INST ENG	Barg Hons Inst C		11·2·16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	**Position**	**Qualification**	**Sign**	**Date**

11 DOCUMENTATION & HANDOVER

Purpose of Test			
To update the lifecycle documentation. Handover System			
Documentation Required			
LF364013_RPT - LFS-SIS1 Operation, Maintenance and Modification Lifecycle LF364004_SCH - LFS-SIS1 Testing Lifecycle Matrix			
Step	**Method of Test**	**Acceptance Criteria**	**Pass (✓) Fail (x) Initial**
11.1	Review testing with system keeper.	System Keeper to sign all sections.	✓ CD
11.2	Update LF364013_RPT - LFS-SIS1 Operation, Maintenance and Modification Lifecycle	Updated	✓ CD
11.3	Update LF364004_SCH - LFS-SIS1 Testing Lifecycle Matrix	Updated	✓ CD
11.4	Issue copy of testing documentation to System Keeper	Issued	✓ CD
11.5	Handover system to Operations, sign off PTW	System keeper sign off completed, operations aware of system status.	✓ CD
11.6	Comments		

Tested by	**Position**	**Qualification**	**Sign**	**Date**
C. DALES	INST ENG	Bang Hons Inst+C		11.02.16

System Keeper Acknowledgement

(Note: Signature confirms System keeper is advised of Comments/Defects/Remedial Actions and will initiate terminal procedures for rectification works and/or isolation of plant as required)

Accepted by	**Position**	**Qualification**	**Sign**	**Date**
D. O'NEIL				

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Web Site: www.pidesign.co.uk

LOCAL FUEL PLC

THE SHOREHAM OIL TERMINAL

STORAGE TANK OVERFILL PROTECTION

SAFETY INSTRUMENT SYSTEM LFS-SIS1

OPERATION, MAINTENANCE AND MODIFICATION LIFECYCLE

Rev	Date	By	Checked	Approved	Description	Local Fuel PLC Ref.
A	20.05.15	D.B.Faulkner	M.Morgan	Local Fuel PLC	Original Issue	Document No. **LF364013_RPT**

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

CONTENTS

1 REVISION HISTORY

Rev	Description
A	Original Issue Following 2014 Proof Test

This document will be revised with any additions to or removals from the SIS throughout the operational lifecycle of the system.

2 INTRODUCTION

This document provides an overview and summery report to ensure that the Safety Instrument System Life Cycle complies with the requirements of the standard BS EN 61511.

3 SCOPE

Client / Company	-	Local Fuel PLC
Location / Facility	-	The Shoreham Oil Terminal
Plant Unit	-	Spirt Bund / Distillate Bund
Service	-	Storage Tank Overfill Protection
SIS Tag No	-	LFS-SIS1
SIF's Tag No's	-	SIF-1, SIF-2, SIF-3 & SIF-4
SIL	-	2
Lifecycle Stages		
Stage 4	-	BS EN 61511 Clause 16 - SIS Operation and Maintenance
Stage 5	-	BS EN 61511 Clause 17 - SIS modification

Detailed in this report are the lifecycle phases, methods of data collection and operational review.

System performance data is collected to analyse and review the performance of the system and components against the criteria used for design.

The analysis of the lifecycle phases will be documented in this report and historical data will be recorded on LF364004_SCH - LFS-SIS1 Testing Lifecycle Matrix. The correct documenting of system testing provides historical system performance data in order that testing frequencies and procedures can be verified or modified as required.

The system is owned by Local Fuel PLC. The lifecycle is the responsibility of the system owners.

Lifecycle Phases at Stage 4 -

Proof Testing
- Document Verification
- Hardware Verification
- Shutdown Conditions Proof Testing
- Process Conditions Proof Testing

Preventative Maintenance
Functional Safety Meetings / Reviews /Faults and Activations
Stage 4 Operation and Maintenance - Function Safety Assessment

Lifecycle Phases at Stage 5 -

Stage 5 Modification - Function Safety Assessment
(Testing phases to be allocated at Stage 5 FSA as required)

4 DEFINITIONS AND ABBREVIATIONS

The following definitions and abbreviations apply to this document.

BPCS	Basic Process Control System
Logic Solver	Part of the SIS that performs one or more logic functions, e.g. safety relay, trip amplifier
Proof Test	Periodic testing to detect failures in a safety instrumented system
Protection Layer	A mechanism that reduces risk by control, prevention or mitigation
Sensor	Part of the SIS which measures the process condition
SIF	Safety Instrumented Function – A function with a specified safety integrity level which is necessary to achieve functional safety
SIL	Safety integrity level – A numerical number, 1 to 4 stipulating the level of integrity the system shall perform to, 1 being the lowest 4 the highest
SIS	Safety Instrument System – A SIS comprises of sensors, logic solvers and final elements
1ooN	SIS made up of N independent channels, which are so connected, that any single channel is sufficient to perform the correct safety instrumented function
2ooN	SIS made up of N independent channels, which are so connected, that any two of the channels are required to perform the correct safety instrumented function
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
PFD	Probability of Failing on Demand
ESV	Emergency Shutdown Valves
HMI	Human Machine Interface (Visual display screen)
P&ID	Piping & Instrumentation Diagram
SCH	Schedule
PTW	Permit to Work
RAMS	Risk Assessment and Method Statement

5 LIFECYCLE PHASE – STAGE 4

5.1 Proof Testing

The purpose of the this proof testing is to reveal dangerous undetected failures and confirm the correct operation of known safe detected failures so that, if necessary, the SIS can be restored to its designed functionality. During normal operation, components of the SIS are subject to the possibility of random hardware failures. These failures may be safe failures that could lead to spurious trips or dangerous failures that may prevent the SIS operating correctly when required. Dangerous failures may not be revealed and therefore there may be no indication that these failures exist. The failure modes of all components cannot be fully accounted for therefore these can only be confidently revealed by carrying out a full end to end proof test by simulating the process conditions as closely as possible. Detected failure diagnostics not functioning correctly could result in the system not being available to operations when there is a process requirement.

Testing will be carried out in accordance with the following guidance:-

Proof Testing of Safety Instrumented Systems in the Onshore Chemical / Specialist Industry OG-00054 and Principles for proof testing of safety instrumented systems in the chemical industry. Contract Research Report - 428/2002. Prepared by ABB Ltd. for the Health and Safety Executive.

The following is an extraction from the report 428/2002, Section 4.2.4 Conclusions and Recommendations:

Based on the research, the following recommendations are made:

- a method of SIS initiation should be adopted which adequately establishes that the SIS would operate under operating conditions;
- where reasonably practicable, SIS initiation should be via manipulation of the process variable using process fluids. The provision of facilities for achieving this should be considered during design of SIS;
- the initiation of SIS should not involve placing the process in a state where failure of the SIS under test could lead to a hazardous situation;
- SIS should be proof tested as found rather than being disturbed, thereby reducing the potential for unrealistic tests, loss of as found system failure data and introduction of faults on system reinstatement.

In the testing procedures we have followed these recommendation as far as possible.

Trip Initiation
The methods of initiating SIS are many and varied but whatever the method it must provide adequate confidence that the SIS would be initiated if required under operating conditions. A distinction must be drawn between manipulation of the process variable and manipulation of the process. Manipulation of the process variable without driving the process into a potentially hazardous situation should be achieved where reasonably practicable. Manipulation of the process may be necessary to provide a realistic test of functionality but this must be accompanied by a risk assessment to ensure that the probability of achieving an unsafe state remains acceptably low. Equally, any departure from realistic operating

conditions during proof testing must be accounted for within the safety integrity assessment of the SIS.

It is not considered that testing of the level switches by raising the levels in the tanks will be routinely carried out. It is recommended however, that during hydrostatic testing or insurance inspections on each tank, the water level be taken up to and beyond the high level switch to prove operation of the switch in-situ. This test to be documented in accordance with the testing procedures.

5.1.1 Document Verification

Document Verification – Check of documentation to verify correct documentation used for testing and identify modifications to the system since last testing phase.

5.1.2 Hardware Verification

Hardware Verification – Check to verify no unauthorised modifications have been carried out and verify physical condition and fitness for purpose.

5.1.3 Shutdown Conditions Proof Testing

Shutdown Conditions Functional Proof Testing – Functional test of the system whist the process is not active, e.g no flow through final element valves, process not taken to trip point. Test switches and /or process simulation used to complete test, this is a partial test only and may not reveal all undetected faults. System diagnostics and known safe failures are tested at this phase.

The Sensing Element Liquiphant's are tested by using the Test button facility of the Nivotester unit as per the manufacturers recommendations. A full wet test is carried out periodically as detailed in section 8.

5.1.4 Process Conditions Proof Testing

Process Conditions Functional Proof Testing – Functional test of the SIS whilst the process is active. E.g Final elements closed against process flow / Process is allowed to reach the trip point activating final elements to bring the process to a safe state.

5.2 Preventative Maintenance

Preventative Maintenance required to keep the hardware operational and satisfy regulations.
No specific preventative maintenance activities identified.
Regulations - ATEX electrical inspections to be carried out in line with the Facility's schedule.

5.3 Functional Safety Meetings / Reviews / Faults and Activations

A review should be carried following any genuine activation, serious trip or on detection of a system fault.

5.4 Stage 4 Operation and Maintenance Functional Safety Assessment

Stage 4 Operation and Maintenance - Function Safety Assessments to carry out as scheduled.

6 LIFECYCLE PHASE – STAGE 5

6.1 Stage 5 Modification Functional Safety Assessment

Stage 5 Modification - Function Safety Assessment to be carried out prior to any system modification, testing phases to be allocated at Stage 5 FSA as required.

7 RESPONSIBILITIES

The system is owned by Local Fuel PLC (System Keeper). The testing and acceptance is the responsibility of the system owners. The testing is to be performed by a competent technician appointed by the system keeper. It is the responsibility of Local Fuel PLC to make the tanks available for testing. Local Fuel PLC is responsible for the issuing, accepting and signing off of "Permits to Work" under their current health and safety procedures. Local Fuel PLC is responsible for initiating testing prior to and following maintenance.

The system keeper will appoint a competent person to independently confirm critical steps.

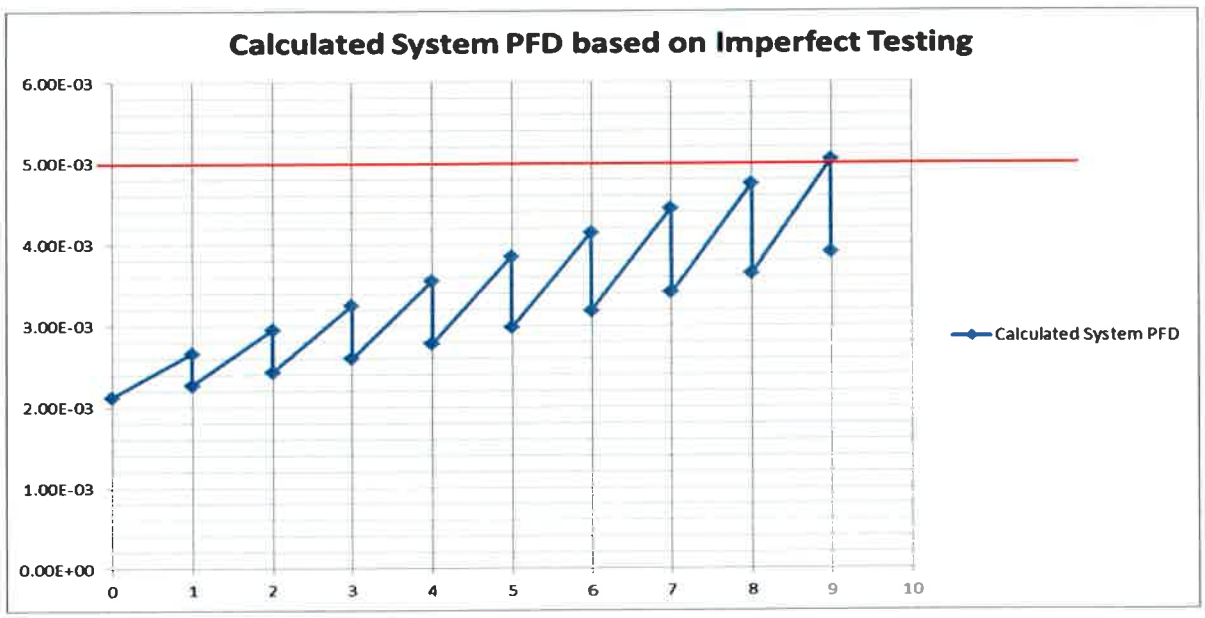
It is the responsibility of the system keeper to report any defects of SIL rated equipment to the manufacturer. The system keeper is also responsible for maintaining the life cycle documentation relating to this procedure.

8 SCHEDULING

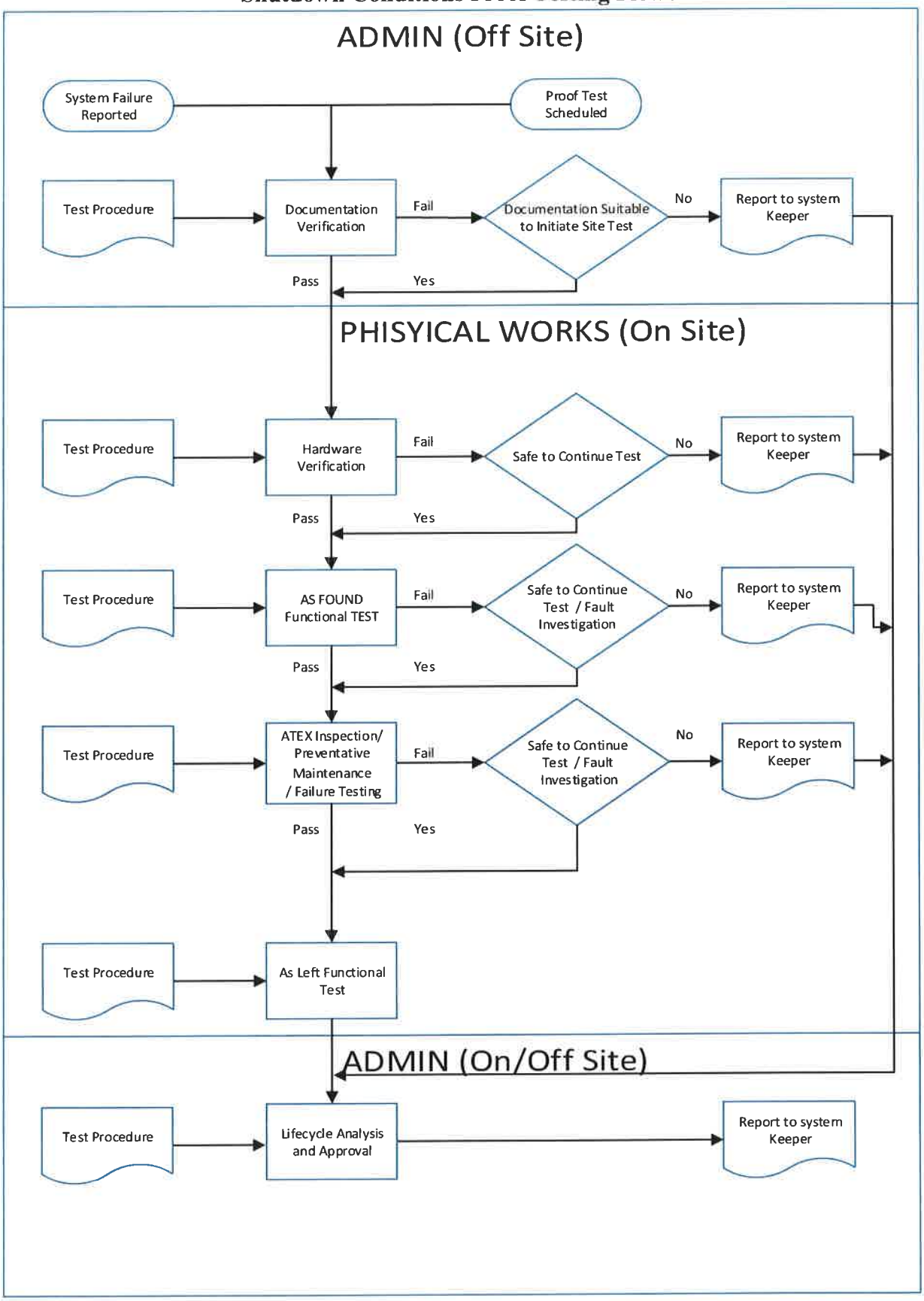
Frequency / Test Reference	Prior to Proof Testing	12 Monthly	60 Monthly	Following System Fault or Activation	Modification
LF364011_RPT - LFS-SIS1 Documentation Verification	✓	✓		✓*	
LF364012_RPT - LFS-SIS1 Shutdown Conditions Proof Testing		✓		✓*	
Physical testing of SENSING ELEMENTS			✓		
Stage 4 Functional Safety Assessment			✓		
Stage 5 Functional Safety Assessment					✓
LF364013_RPT - LFS-SIS1 Operation, Maintenance and Modification Lifecycle	✓	✓		✓	✓
LF364004_SCH - LFS-SIS1 Testing Lifecycle Matrix	✓	✓		✓*	✓

Testing required if any part of the system disturbed, replaced or maintained outside of the above schedule. *As required following review of fault/ activation.

The Safe Fail Fraction of the Drexelbrook level switch is 93%. Thus as a worst case, if all dangerous undetected failures are not detected during the annual test, the proof test coverage can be assumed as 93%. For this case, the following graph shows that the PFD_{calc} for the system remains acceptable (below 5 x 10^{-3}) for at least 8 years.



Shutdown Conditions Proof Testing Flowchart



9 LIFECYCLE SUMMARY

Lifecycle Phase	Dates	Brief Description	Next Scheduled Date
Logic Solver FAT	25.10.13	Factory Acceptance Test by P&I Design Ltd at Panel Manufactures Facility Documentation - SI157035_RPT_C FAT CC 23.10.13 CE303001_HDR - Logic Solver FAT Handover Certificate 25_10_13 CE303002_HDR - Logic Solver FAT Deviation Record Sheet 25_10_13	N/A
SAT	18.11.13 to 19.11.13	Site Acceptance Test by P&I Design Ltd Documentation - CE303003_HDR - SAT Method Statement Instrument CE303004_HDR - SAT Instrument Installation Conformance Control CE303006_HDR - SAT Handover Certificate 20_11_2013 SI157036_RPT_D Functional Testing CC 08.11.13 SI157037_RPT_C Documentation & Hardware Testing CC 15.11.13	N/A
2014 Proof Test	02.12.14 to 03.12.14	Annual Proof Test by P&I Design Ltd Documentation - SI157036_RPT_D - Shutdown Conditions Functional Testing - Brighton CC25_11_14 SI157037_RPT_C - Documentation & Hardware Verification - Brighton CC25_11_14	December 2015

10 SYSTEM MODIFICATIONS

Modification Initiation Date	Brief Description	Project Reference / Modification Sheet No	Status (Proposed, in progress, completed).

11 FAULTS AND ACTIVATIONS

Fault / Activation Date	Report Reference	Brief Description	Action

K CONTROLS LTD

XV162 LIMIT SWITCH MN: SBZ026033 BASEEFA 11ATEX0010
SN: 120402/005 ATEX II 2GD Exd IICT4

INSTRUMENT SCHEDULE

Tag No	Service	Instrument Spec SPC	SIS Identification BS EN 61511 Warning Label	Manufacturer	Model Number	Serial Number	Atex Certification	Atex Certificate No	Site Specific CompEx (TPL)	P & I Drawing Local Fuel PLC (REV)	Loop Drawing _DWG	I/O Requirement Tank Import Monitoring Panel DI	DO	AI	AO	Address	Comms	Notes D = Digital, A = Analogue, I = In, O = Out S = Software, H = Hardwired
LFS-SIS1	**Local Fuel PLC - The Shoreham Oil Terminal Storage Tank Overfill Protection Safety Instrument System**																	
	Pipeline Import																	
	Gasoline Pipeline																	
XV162	Block Valve	LF364006_SPC	Min 1 Per Assembly	WCC Pekos	530		N/A	N/A	TBC	TBC	LF364040_DWG							10" Block Valve
XV162	Actuator	LF364021_SPC	Min 1 Per Assembly	Rotork Skilmatic	SI-2 1-Q80-031-51-10AG	RS463901	ATEX II 2 G Exd IIB T4	TBC	TBC	TBC	LF364040_DWG							2) SIRA 07 ATEX 1323X
XV162 3	Rotary Position Monitor	LF364021_SPC	Min 1 Per Assembly	Westlock	2245	211107	ATEX II 2 GD EEx d IIB T4	TBC	TBC	TBC	LF364040_DWG							3) SIRA 00ATEX 1038
XV162	Isolator	N/A	Min 1 Per Assembly	TBC	TBC	Z53857010104	TBC	TBC	TBC	TBC								
	Infrastructure / Common																	
LFS-SIS1	Tank Import Monitoring Panel	N/A	Front of Panel	HC Controls		HC 9641	N/A	N/A	TBC	TBC	N/A							
AN001	Annunciator	LF364005_SPC	Front of Panel	Omniflex	C1480 OMNI16C		N/A	N/A	TBC	TBC	N/A							
	East Bund SIS AC Junction Box	LF364056_SPC	Required	Weidmuller	~~TB12-200EEx'e'~~	XA-GB-C007265	~~ATEX II 2 G EEx'e'~~	TBC	TBC	TBC	N/A							
	East Bund SIS DC Junction Box	LF364058_SPC	Required	Weidmuller	~~TB12-200EEx'e'~~	XA-GB-C007267	~~ATEX II 2 G EEx'e'~~	TBC	TBC	TBC	N/A							
	East Bund SIS IS Junction Box	LF364060_SPC	Required	Weidmuller	~~TB10A-150EEx'e'~~	XA-GB-C007262	~~ATEX II 2 G EEx'e'~~	TBC	TBC	TBC	N/A							
	West Bund SIS AC Junction Box	LF364057_SPC	Required	Weidmuller	~~TB12-200EEx'e'~~	XA-GB-C007266	~~ATEX II 2 G EEx'e'~~	TBC	TBC	TBC	N/A							
	West Bund SIS DC Junction Box	LF364059_SPC	Required	Weidmuller	~~TB11A-200EEx'e'~~	XA-GB-C007278	~~ATEX II 2 G EEx'e'~~	TBC	TBC	TBC	N/A							
	West Bund SIS IS Junction Box	LF364061_SPC	Required	Weidmuller	~~TB11-150EEx'e'~~	XA-GB-C007259	~~ATEX II 2 G EEx'e'~~	TBC	TBC	TBC	N/A							
	Additive Tanks SIS IS Junction Box	LF364062_SPC	Required	Weidmuller	~~TB10A-150EEx'e'~~	XA-GB-C007263	~~ATEX II 2 G EEx'e'~~	TBC	TBC	TBC	N/A							4) II 2GD EEx e II Ex tD A21 T6 85°C TB262615
	Manual Shutdown																	
	Terminal ESD																	
R088	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s2	TBC	N/A	N/A	N/A	TBC	N/A							
R088A	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s11	TBC	N/A	N/A	N/A	TBC	N/A							
R124	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s2	TBC	N/A	N/A	N/A	TBC	N/A							
R124A	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s11	TBC	N/A	N/A	N/A	TBC	N/A							
R164	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s2	TBC	N/A	N/A	N/A	TBC	N/A							6) TB303015
Tank 1	**Gasoline Storage Tank**																	5) TB352220
SIF-1	Tank 1 Independent High Level																	4) TB453820
LE01	RF Impedance Level Switch	LF364001_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000356	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X	TBC	TBC	LF364070_DWG							PCB 385-0048-050-1T ALK003209, Switch Length 1136mm
HS01	Certify Key Switch	N/A	Required	TBC	TBC	220037	TBC	TBC	TBC	TBC	LF364070_DWG							
LS01	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1.D	11904110	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701	N/A	TBC	LF364070_DWG							
R245	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s8	TBC	N/A	N/A	N/A	TBC	LF364070_DWG							
R252	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s2	TBC	N/A	N/A	N/A	TBC	LF364070_DWG							
R252A	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s8	TBC	N/A	N/A	N/A	TBC	LF364070_DWG							
AN001/R1C1	"Tank 1 High High Level" Alarm Window	LF364005_SPC	Front of Panel	Omniflex	N/A	N/A	N/A	N/A	N/A	TBC	LF364070_DWG							
Tank 2	**Gasoline Storage Tank**																	
SIF-2	Tank 2 Independent High Level																	
LE02	RF Impedance Level Switch	LF364001_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000791	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X	TBC	TBC	LF364071_DWG							PCB 385-0048-050 ALK003569, Switch Length 1636mm
HS02	Certify Key Switch	N/A	Required	TBC	TBC	218796	TBC *	TBC * *	TBC	TBC	LF364071_DWG							* Ex II 2G EEx eb mb IIC T6
LS02	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1.D	2571564	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701	N/A	TBC	LF364071_DWG							* * PTB00 ATEX 1068
R285	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s8		N/A	N/A	N/A	TBC	LF364071_DWG							
R292	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s2		N/A	N/A	N/A	TBC	LF364071_DWG							
R292A	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s8		N/A	N/A	N/A	TBC	LF364071_DWG							
AN001/R1C2	"Tank 2 High High Level" Alarm Window	LF364005_SPC	Front of Panel	Omniflex			N/A	N/A	N/A	TBC	LF364071_DWG							
Tank 3	**Gasoline Storage Tank**																	
SIF-3	Tank 3 Independent High Level																	
LE03	RF Impedance Level Switch	LF364001_SPC	Required	Drexelbrook	S2RLT20001DC1Z	000357	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X	TBC	TBC	LF364072_DWG							385-0048-050-1T ALK003253, Switch Length 1496mm
HS03	Certify Key Switch	N/A	Required	TBC	TBC	220164	TBC *	TBC * *	TBC	TBC	LF364072_DWG							
LS03	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1.D	2571598	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701	N/A	TBC	LF364072_DWG							
R325	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s8		N/A	N/A	N/A	TBC	LF364072_DWG							
R332	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s2		N/A	N/A	N/A	TBC	LF364072_DWG							
R332A	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s8		N/A	N/A	N/A	TBC	LF364072_DWG							
AN001/R1C3	Tank 3 High High Level Alarm Window	LF364005_SPC	Front of Panel	Omniflex			N/A	N/A	N/A	TBC	LF364072_DWG							
Tank 4	**Gasoline Storage Tank**																	
SIF-4	Tank 4 Independent High Level																	
LE04	RF Impedance Level Switch	LF364001_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000362	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364073_DWG							385-0048-050-1T ALK003261 Switch Length 1195mm
HS04	Certify Key Switch	N/A	Required			218797	*			TBC	LF364073_DWG							
LS04	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1.D	2571442	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364073_DWG							
R365	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s8		N/A	N/A		TBC	LF364073_DWG							
R372	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s2		N/A	N/A		TBC	LF364073_DWG							
R372A	Safety Relay	LF364007_SPC	Front of Panel	PILZ	s8		N/A	N/A		TBC	LF364073_DWG							
AN001/R1C4	"Tank 4 High High Level" Alarm Window	LF364005_SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364073_DWG							

CONTROLLED
08 FEB 2016
COPY

NOTES	REVISION	DATE	BY	CHECKED	APPROVED	DESCRIPTION
Information to be confirmed	A	20 05 15	DBF	DSR	Local Fuel PLC	Original Issue
(TPL) Tamper Proof Label	B	05 02 16	MM	DBF	Local Fuel PLC	XV162 actuator changed

PLANT	The Shoreham Oil Terminal
TITLE	LFS-SIS1 Storage Tank Overfill Protection
P & I DESIGN	Local Fuel
SHEET 1 OF 3	REF NO LF364002_SCH

INSTRUMENT SCHEDULE

Tag No	Service	Instrument Spec SPC	SIS Identification BS EN 61511 Warning Label	Manufacturer	Model Number	Serial Number	Atex Certification	Atex Certificate No	Site Specific CompEx (TPL)	P & I Drawing Local Fuel PLC (REV)	Loop Drawing DWG	I/O Requirement Tank Import Monitoring Panel DI	DO	AI	AO	Address	Comms	Notes D = Digital, A = Analogue, I = In, O = Out S = Software, H = Hardwired,
LFS-SIS1	**Local Fuel PLC - The Shoreham Oil Terminal Storage Tank Overfill Protection Safety Instrument System**																	
Tank 5	**Distillate Storage Tank**																	
	Tank 5 Independent High Level																	
LE05	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000385	ATEX II 1GD EEx ia IIC T5			TBC	LF364074_DWG							385-0048-050-1T ALK003426, Switch Length 489mm
HS05	Certify Key Switch	N/A	Required			218974		**		TBC	LF364074_DWG							* LRII 26 CEx 0LM IIC T6 ** PTB 00 ATEX 1068
LS05	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571420	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364074_DWG							
R485	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s8		N/A	N/A		TBC	LF364074 DWG							
R492	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s2		N/A	N/A		TBC	LF364074 DWG							
AN001/R2C1	"Tank 5 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364074 DWG							
Tank 6	**Distillate Storage Tank**																	
	Tank 6 Independent High Level																	
LE06	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000399	ATEX II 1GD EEx ia IIC T5			TBC	LF364075_DWG							385-0048-050-1T ALK003424, Switch Length 869mm
HS06	Certify Key Switch	N/A	Required			22036				TBC	LF364075 DWG							
LS06	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571543	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364075_DWG							
R525	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s8		N/A	N/A		TBC	LF364075 DWG							
R532	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s2		N/A	N/A		TBC	LF364075 DWG							
AN001/R2C2	"Tank 6 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364075 DWG							
Tank 7	**Distillate Storage Tank**																	
	Tank 7 Independent High Level																	
LE07	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000389	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364076_DWG							385-0048-050-1T ALK003424, Switch Length 759mm
HS07	Certify Key Switch	N/A	Required			218798				TBC	LF364076 DWG							
LS07	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571356	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364076_DWG							
R565	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s8		N/A	N/A		TBC	LF364076 DWG							
R572	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s2		N/A	N/A		TBC	LF364076 DWG							
AN001/R2C3	"Tank 7 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364076 DWG							
Tank 8	**Distillate Storage Tank**																	
	Tank 8 Independent High Level																	
LE08	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000386	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364077_DWG							385-0048-050-1T ALK003215, Switch Length 1503mm
HS08	Certify Key Switch	N/A	Required			220040				TBC	LF364077 DWG							
LS08	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571370	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364077_DWG							
R605	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s8		N/A	N/A		TBC	LF364077 DWG							
R612	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s2		N/A	N/A		TBC	LF364077 DWG							
AN001/R2C4	"Tank 8 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364077 DWG							
Tank 9	**Distillate Storage Tank**																	
	Tank 9 Independent High Level																	
LE09	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000382	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364078_DWG							385-0048-050-1T ALK003216, Switch Length 1018mm
HS09	Certify Key Switch	N/A	Required			218823				TBC	LF364078 DWG							
LS09	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571410	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364078_DWG							
R645	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s8		N/A	N/A		TBC	LF364078 DWG							
R652	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s2		N/A	N/A		TBC	LF364078 DWG							
AN001/R3C1	"Tank 9 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364078 DWG							
Tank 10	**Distillate Storage Tank**																	
	Tank 10 Independent High Level																	
LE010	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000371	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364079_DWG							385-0048-050-1T ALK003215, Switch Length 808mm
HS010	Certify Key Switch	N/A	Required			220193				TBC	LF364079 DWG							
LS010	IS Barrier / Switch Unit	LF364008_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571368	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364079_DWG							
R685	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s8		N/A	N/A		TBC	LF364079 DWG							
R692	Safety Relay	LF364007 SPC	Front of Panel	PILZ	s2		N/A	N/A		TBC	LF364079 DWG							
AN001/R3C2	"Tank 10 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364079 DWG							

NOTES	REVISION	DATE	BY	CHECKED		APPROVED		DESCRIPTION	PLANT	The Shoreham Oil Terminal
Information to be confirmed	A	20 05 15	DBF	DSR		Local Fuel PLC		Original Issue	TITLE	LFS-SIS1 Storage Tank Overfill Protection
(TPL) Tamper Proof Label	B	05 02 16	MM	DBF		Local Fuel PLC		XV162 actuator changed	P & I DESIGN	Local Fuel
									SHEET 2 OF 3	REF N0 LF364002_SCH

INSTRUMENT SCHEDULE

Tag No	Service	Instrument Spec _SPC	SIS Identification BS EN 61511 Warning Label	Manufacturer	Model Number	Serial Number	Atex Certification	Atex Certificate No	Site Specific CompEx (TPL)	P & I Drawing Local Fuel PLC (REV)	Loop Drawing _DWG	I/O Requirement Tank Import Monitoring Panel DI	DO	AI	AO	Address	Comms	Notes D = Digital, A = Analogue, I = In, O = Out S = Software, H = Hardwired,
LFS-SIS1	**Local Fuel PLC - The Shoreham Oil Terminal Storage Tank Overfill Protection Safety Instrument System**																	
Tank 11	**Additive Storage Tank**																	
	Tank 11 Independent High Level																	
LE11	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000364	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364080_DWG							385-0048-050-1T ALK003212, Switch Length TBCmm
HS11	Certify Key Switch	N/A	Required			218973				TBC	LF364080 DWG							
LS11	IS Barrier / Switch Unit	LF364009_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571493	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364080_DWG							
AN001/R3C3	"Tank 11 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364080 DWG							
Tank 18	**Additive Storage Tank**																	
	Tank 18 Independent High Level																	
LE18	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DI1Z	000793	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364081_DWG							385-0048-050-1T ALK003221, Switch Length TBCmm
HS18	Certify Key Switch	N/A	Required			218868				TBC	LF364081 DWG							
LS18	IS Barrier / Switch Unit	LF364009_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571507	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364081_DWG							
AN001/R3C4	"Tank 18 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364081 DWG							
Tank 18A	**Additive Storage Tank**																	
	Tank 18A Independent High Level																	
LE18A	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000409	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364082_DWG							385-0048-050-1T ALK003260, Switch Length TBCmm
HS18A	Certify Key Switch	N/A	Required			218975				TBC	LF364082 DWG							
LS18A	IS Barrier / Switch Unit	LF364009_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	2571407	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364082_DWG							
AN001/R4C1	"Tank 18A High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364082 DWG							
Tank 21	**Additive Storage Tank**																	
	Tank 21 Independent High Level																	
LE021	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DB1Z	000396	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364083_DWG							385-0048-050-1T ALK003255, Switch Length TBCmm
HS021	Certify Key Switch	N/A	Required			220214				TBC	LF364083 DWG							
LS021	IS Barrier / Switch Unit	LF364009_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	1333402	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364083_DWG							
AN001/R4C2	"Tank 21 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364083 DWG							
Tank 22	**Additive Storage Tank**																	
	Tank 22 Independent High Level																	
LE022	RF Impedance Level Switch	LF364002_SPC	Required	Drexelbrook	S2RLT20001DK1Z	000383	ATEX II 1GD EEx ia IIC T5	Nemko03ATEX1612X		TBC	LF364084_DWG							385-0048-050-1T ALK003244, Switch Length TBCmm
HS022	Certify Key Switch	N/A	Required			220072				TBC	LF364084 DWG							
LS022	IS Barrier / Switch Unit	LF364009_SPC	Front of Panel	Pepperl & Fuchs	KFD2-CRG2-Ex1 D	1333423	ATEX II (1) GD [EEx ia] IIC	TUV01ATEX1701		TBC	LF364084_DWG							
AN001/R4C3	"Tank 22 High High Level" Alarm Window	LF364005 SPC	Front of Panel	Omniflex			N/A	N/A		TBC	LF364084 DWG							

NOTES	REVISION	DATE	BY	CHECKED		APPROVED		DESCRIPTION	PLANT	The Shoreham Oil Terminal
Information to be confirmed	A	20 05 15	DBF	DSR		Local Fuel PLC		Original Issue	TITLE	LFS SIS1 Storage Tank Overfill Protection
(TPL) Tamper Proof Label	B	05 02 16	MM	DBF		Local Fuel PLC		XV162 actuator changed	P & I DESIGN	Local Fuel
									SHEET 3 OF 3	REF NO LF364002_SCH

DESCRIPTION	TAG	TYPE	CALIBRATION	UNITS	SET	ORIGIN
MANUAL SHUTDOWN						
Terminal ESD	N/A	ESD	N/A	N/A	Healthy	
SIS AUTOMATIC SHUTDOWN						
Tank 1 Independent High Level	LE01	Probe	N/A	mm	<10111	
Tank 2 Independent High Level	LE02	Probe	N/A	mm	<9711	
Tank 3 Independent High Level	LE03	Probe	N/A	mm	<9881	
Tank 4 Independent High Level	LE04	Probe	N/A	mm	<10152	
FUTURE AUTOMATIC SHUTDOWN - ALARM ONLY						
Tank 5 Independent High Level	LE05	Probe	N/A	mm	<10761	
Tank 6 Independent High Level	LE06	Probe	N/A	mm	<10381	
Tank 7 Independent High Level	LE07	Probe	N/A	mm	<10381	
Tank 8 Independent High Level	LE08	Probe	N/A	mm	<9662	
Tank 9 Independent High Level	LE09	Probe	N/A	mm	<10162	
Tank 10 Independent High Level	LE10	Probe	N/A	mm	<10162	
ALARMS						
Tank 11 Independent High Level	LE11	Probe	N/A	%	<95	
Tank 18 Independent High Level	LE18	Probe	N/A	%	<95	
Tank 18A Independent High Level	LE18A	Probe	N/A	%	<95	
Tank 21 Independent High Level	LE21	Probe	N/A	%	<95	
Tank 22 Independent High Level	LE22	Probe	N/A	%	<95	

DESCRIPTION	SIS FINAL ELEMENTS	Pipeline Import Valve	Tank 1 Import Valve (Future)	Tank 1 Export Valve (Future)	Tank 1 VRU Feed Valve (Future)	Tank 1 VRU Return Valve (Future)	Tank 2 Import Valve (Future)	Tank 2 Export Valve (Future)	Tank 2 VRU Feed Valve (Future)	Tank 2 VRU Return Valve (Future)	Tank 3 Import Valve (Future)	Tank 3 Export Valve (Future)	Tank 3 PUL Return Valve (Future)	Tank 4 Import Valve (Future)	Tank 4 Export Valve (Future)	Tank 4 VRU Feed Valve (Future)	Tank 4 VRU Return Valve (Future)
TAG		XV162	XV123	XV124	XV155	XV156	XV121	XV122	XV157	XV158	XV129	XV130	XV159	XV126	XV127	XV160	XV161
ACTION		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
MANUAL SHUTDOWN																	
Terminal ESD		H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
SIS AUTOMATIC SHUTDOWN																	
Tank 1 Independent High Level		H	H			H											
Tank 2 Independent High Level		H					H			H							
Tank 3 Independent High Level		H									H		H				
Tank 4 Independent High Level		H												H			H
FUTURE AUTOMATIC SHUTDOWN - ALARM ONLY																	
Tank 5 Independent High Level																	
Tank 6 Independent High Level																	
Tank 7 Independent High Level																	
Tank 8 Independent High Level																	
Tank 9 Independent High Level																	
Tank 10 Independent High Level																	
ALARMS																	
Tank 11 Independent High Level																	
Tank 18 Independent High Level																	
Tank 18A Independent High Level																	
Tank 21 Independent High Level																	
Tank 22 Independent High Level																	

DESCRIPTION	Tank 5 Import Valve (Future)	Tank 5 Export Valve (Future)	Tank 6 Import Valve (Future)	Tank 6 Export Valve (Future)	Tank 7 Import Valve (Future)	Tank 7 Export Valve (Future)	Tank 8 Import Valve (Future)	Tank 8 Export Valve (Future)	Tank 9 Import Valve (Future)	Tank 9 Export Valve (Future)	Tank 10 Import Valve (Future)	Tank 10 Export Valve (Future)
TAG	XV118	XV119	XV116	XV117	XV114	XV115	XV110	XV111	XV108	XV109	XV106	XV107
ACTION	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
MANUAL SHUTDOWN												
Terminal ESD	H	H	H	H	H	H	H	H	H	H	H	H
SIS AUTOMATIC SHUTDOWN												
Tank 1 Independent High Level												
Tank 2 Independent High Level												
Tank 3 Independent High Level												
Tank 4 Independent High Level												
FUTURE AUTOMATIC SHUTDOWN - ALARM ONLY												
Tank 5 Independent High Level	H											
Tank 6 Independent High Level			H									
Tank 7 Independent High Level					H							
Tank 8 Independent High Level							H					
Tank 9 Independent High Level									H			
Tank 10 Independent High Level											H	
ALARMS												
Tank 11 Independent High Level												
Tank 18 Independent High Level												
Tank 18A Independent High Level												
Tank 21 Independent High Level												
Tank 22 Independent High Level												

DESCRIPTION	SIS DIGNOSTICS MONITORING PANEL	Trip Amplifier Display	ESD Safety Relays R088, R124 & R164	SIS RESET	East Bund Reset Pushbutton (Monitoring Panel)	West Bund Reset Pushbutton (Monitoring Panel)	SIS DIGNOSTICS - CONTROL ROOM ANNUNCIATO	Window (Row/Colum)	BPCS DIGNOSTICS - JETTY ANNUNCIATOR	Window (Row/Colum)	BPCS DIGNOSTICS - CONTROL ROOM SCADA	"Alarms" Screen	"Tank xx IHLA" (Note 6)	NOTES
TAG		LSxx	Relay No					AN001		AN001				
ACTION		>15 <17 mA	Energised		Enabled	Enabled		Reset		Reset			Alarm Reset	
MANUAL SHUTDOWN														
Terminal ESD			H											ESD affects other terminal systems
SIS AUTOMATIC SHUTDOWN														
Tank 1 Independent High Level		H			H			H(1/1)		H			S	Note 1
Tank 2 Independent High Level		H			H			H(1/2)		H			S	Note 1
Tank 3 Independent High Level		H			H			H(1/3)		H			S	Note 1
Tank 4 Independent High Level		H			H			H(1/4)		H			S	Note 1
FUTURE AUTOMATIC SHUTDOWN - ALARM ONLY														
Tank 5 Independent High Level		H				H		H(2/1)		H			S	Note 1
Tank 6 Independent High Level		H				H		H(2/2)		H			S	Note 1
Tank 7 Independent High Level		H				H		H(2/3)		H			S	Note 1
Tank 8 Independent High Level		H				H		H(2/4)		H			S	Note 1
Tank 9 Independent High Level		H				H		H(3/1)		H			S	Note 1
Tank 10 Independent High Level		H				H		H(3/2)		H			S	Note 1
ALARMS														
Tank 11 Independent High Level		H						H(3/3)		H			S	Note 1
Tank 18 Independent High Level		H						H(3/4)		H			S	Note 1
Tank 18A Independent High Level		H						H(4/1)		H			S	Note 1
Tank 21 Independent High Level		H						H(4/2)		H			S	Note 1
Tank 22 Independent High Level		H						H(4/3)		H			S	Note 1

LF364012_RPT - LFS-SIS1 Shutdown Conditions Proof Testing - Healthy State

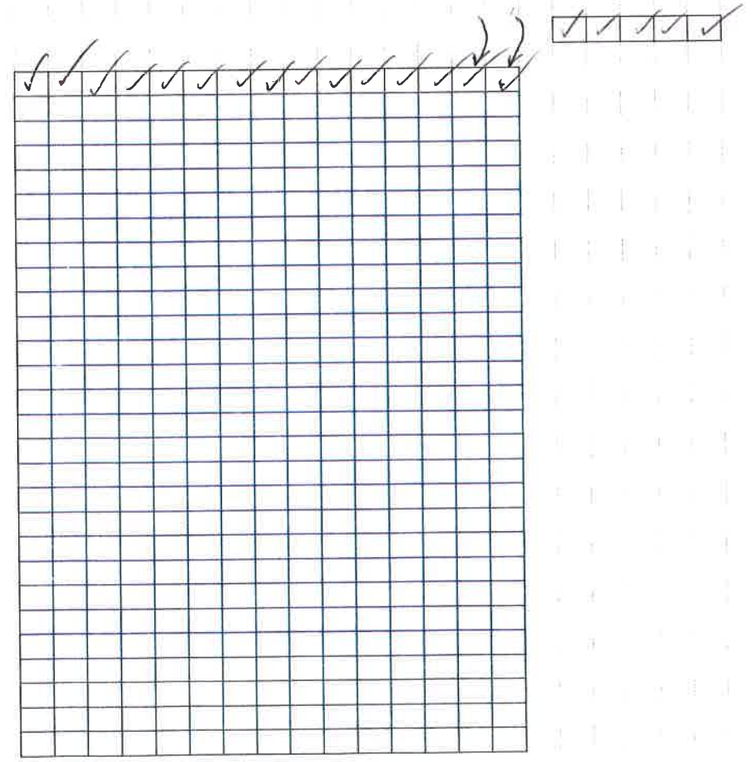
ABBREVIATIONS	NOTES
SIS - Safety Instrument System	(1) Reset Required to clear alarms
OIC - Output Input Fault	(2) Results P (or ✓) = Pass, C = Comments, F (or X) = Fail
ESD - Emergency Shutdown	(3) xx = Tank Number under test only
LB - Line Break	*(4) Future (Italics, Blue fill). Review if installed.*
SC - Short Circuit	(5)
H - Hardwired / Hardware	(6)
S - Software	

REFERENCE DRAWINGS	REV	DATE	BY	DRN	CHK'D	APPD	DESCRIPTION
	A	08 04 15	DBF	DBF	MM	LF PLC	As Built Original Issue for Review

PLANT	Local Fuel PLC - The Shoreham Oil Terminal
TITLE	Overfill Protection LFS-SIS1 Testing Matrix
P & I DESIGN	Local Fuel
CLIENT DRG	SHEET 1 OF 6
	REF NO. LF364003_SCH

DESCRIPTION	TAG	TYPE	CALIBRATION	UNITS	SET	ORIGIN	
MANUAL SHUTDOWN							
Terminal ESD	N/A	ESD	N/A	N/A	Activated		H
Gasoline pipeline Import Valve	XV162	Travel	N/A	s	>60 < 92		
Tank 1 Import Valve (Future)	*XV123*	*Travel*	*N/A*	*s*			
Tank 1 Export Valve (Future)	*XV124*	*Travel*	*N/A*	*s*			
Tank 1 VRU Feed Valve (Future)	*XV155*	*Travel*	*N/A*	*s*			
Tank 1 VRU Return Valve (Future)	*XV156*	*Travel*	*N/A*	*s*			
Tank 2 Import Valve (Future)	*XV121*	*Travel*	*N/A*	*s*			
Tank 2 Export Valve (Future)	*XV122*	*Travel*	*N/A*	*s*			
Tank 2 VRU Feed Valve (Future)	*XV157*	*Travel*	*N/A*	*s*			
Tank 2 VRU Return Valve (Future)	*XV158*	*Travel*	*N/A*	*s*			
Tank 3 Import Valve (Future)	*XV129*	*Travel*	*N/A*	*s*			
Tank 3 Export Valve (Future)	*XV130*	*Travel*	*N/A*	*s*			
Tank 3 PUL Return Valve (Future)	*XV159*	*Travel*	*N/A*	*s*			
Tank 4 Import Valve (Future)	*XV126*	*Travel*	*N/A*	*s*			
Tank 4 Export Valve (Future)	*XV127*	*Travel*	*N/A*	*s*			
Tank 4 VRU Feed Valve (Future)	*XV160*	*Travel*	*N/A*	*s*			
Tank 4 VRU Return Valve (Future)	*XV161*	*Travel*	*N/A*	*s*			
Tank 5 Import Valve (Future)	*XV118*	*Travel*	*N/A*	*s*			
Tank 5 Export Valve (Future)	*XV119*	*Travel*	*N/A*	*s*			
Tank 6 Import Valve (Future)	*XV116*	*Travel*	*N/A*	*s*			
Tank 6 Export Valve (Future)	*XV117*	*Travel*	*N/A*	*s*			
Tank 7 Import Valve (Future)	*XV114*	*Travel*	*N/A*	*s*			
Tank 7 Export Valve (Future)	*XV115*	*Travel*	*N/A*	*s*			
Tank 8 Import Valve (Future)	*XV110*	*Travel*	*N/A*	*s*			
Tank 8 Export Valve (Future)	*XV111*	*Travel*	*N/A*	*s*			
Tank 9 Import Valve (Future)	*XV108*	*Travel*	*N/A*	*s*			
Tank 9 Export Valve (Future)	*XV109*	*Travel*	*N/A*	*s*			
Tank 10 Import Valve (Future)	*XV106*	*Travel*	*N/A*	*s*			
Tank 10 Export Valve (Future)	*XV107*	*Travel*	*N/A*	*s*			

ACTION	TAG	DESCRIPTION	Section	LF364012_RPT - Shutdown Conditions Proof Test
		BPCS DIAGNOSTICS - CONTROL ROOM SCADA		**As Found**
Mimic	*TBC*	*Valve Under Test*	7 1 1	Procedure Review (P.C or X XV under test)
			7 1 2	Plant Preparations (P C or X XV under test)
			7 1 3	Healthy and Reset (P.C or X XV under test)
		SIS DIAGNOSTICS MONITORING PANEL	7 1 4	XV Action / Diagnostics (P C or X XV under test)
De-Energised	Relay No	ESD Safety Relays R088 R124 & R164	7 1 5	XV Action / Diagnostics (P.C or X XV under test)
			7 1 5	Physical Closing Time (in seconds)
			7 1 5	Physical Travel Time (in seconds)
			7 1 6	XV Remains Closed / inhibited (P C or X XV under tes
			7 1 7	XV Remains Closed (P.C or X XV under test)
			7 2 5	XV Action / Diagnostics (P.C or X XV under test)
			7 2 5	Physical Closing Time (in seconds)
			7 2 5	Physical Travel Time (in seconds)
			7 3 5	XV Action / Diagnostics (P C or X XV under test)
			7 3 5	Physical Closing Time (in seconds)
			7 3 5	Physical Travel Time (in seconds)
				As Left
			10 2 1	Procedure Review (P.C or X XV under test)
			10 2 2	Plant Preparations (P.C or X XV under test)
			10 2 3	Healthy and Reset (P.C or X XV under test)
			10 2 4	Terminal ESD (P.C or X)
			10 2 5	Terminal ESD Reset (P.C or X)



INTIAL & DATE ON COMPLETION

LF364012_RPT - LFS-SIS1 Shutdown Conditions Proof Testing - Valve Performance

ABBREVIATIONS
SIS - Safety Instrument System
OIC - Output Input Fault
ESD - Emergency Shutdown
LB - Line Break
SC - Short Circuit
H - Hardwired / Hardware
S - Software

NOTES
(1) Reset Required to clear alarms
(2) Results P (or ✓) = Pass, C = Comments, F (or X) = Fail
(3) xx = Tank Number under test only.
(4) Future (Italics, Blue fill). Review if installed.
(5)
(6)

REFERENCE DRAWINGS		REV	DATE	BY	DRN	CHK'D		APPD		DESCRIPTION
		A	08.04.15	DBF	DBF	MM		LF PLC		As Built Original Issue for Review

PLANT	Local Fuel PLC - The Shoreham Oil Terminal
TITLE	Overfill Protection LFS-SIS1 Testing Matrix
	P & I DESIGN
	Local Fuel
	SHEET 2 OF 6
CLIENT DRG	REF N0 LF364003_SCH

SIS TEST FUNCTION MANUFACTURES TEST FACILITY

DESCRIPTION	TAG	TYPE	CALIBRATION	UNITS	SET	ORIGIN
Tank 1 Certify Test Switch	HS01	KeySw	N/A	N/A	Test	
Tank 2 Certify Test Switch	HS02	KeySw	N/A	N/A	Test	
Tank 3 Certify Test Switch	HS03	KeySw	N/A	N/A	Test	
Tank 4 Certify Test Switch	HS04	KeySw	N/A	N/A	Test	
Tank 5 Certify Test Switch	HS05	KeySw	N/A	N/A	Test	
Tank 6 Certify Test Switch	HS06	KeySw	N/A	N/A	Test	
Tank 7 Certify Test Switch	HS07	KeySw	N/A	N/A	Test	
Tank 8 Certify Test Switch	HS08	KeySw	N/A	N/A	Test	
Tank 9 Certify Test Switch	HS09	KeySw	N/A	N/A	Test	
Tank 10 Certify Test Switch	HS10	KeySw	N/A	N/A	Test	
Tank 11 Certify Test Switch	HS11	KeySw	N/A	N/A	Test	
Tank 18 Certify Test Switch	HS18	KeySw	N/A	N/A	Test	
Tank 18A Certify Test Switch	HS18A	KeySw	N/A	N/A	Test	
Tank 21 Certify Test Button	LE21	KeySw	N/A	N/A	Test	
Tank 22 Certify Test Button	LE22	KeySw	N/A	N/A	Test	

SIS FINAL ELEMENTS (DESCRIPTION / TAG / ACTION)

DESCRIPTION	Pipeline Import Valve XV162 Close / Inhibit	*Tank 1 Import Valve (Future) XV123 Close / Inhibit*	*Tank 1 VRU Return Valve (Future) XV156 Close / Inhibit*	*Tank 2 Import Valve (Future) XV121 Close / Inhibit*	*Tank 2 VRU Return Valve (Future) XV158 Close / Inhibit*	*Tank 3 Import Valve (Future) XV129 Close / Inhibit*	*Tank 3 PUL Return Valve (Future) XV159 Close / Inhibit*	*Tank 4 Import Valve (Future) XV126 Close / Inhibit*	*Tank 4 VRU Return Valve (Future) XV161 Close / Inhibit*	*Tank 5 Import Valve (Future) XV118 Close / Inhibit*	*Tank 6 Import Valve (Future) XV116 Close / Inhibit*	*Tank 7 Import Valve (Future) XV114 Close / Inhibit*	*Tank 8 Import Valve (Future) XV110 Close / Inhibit*	*Tank 9 Import Valve (Future) XV108 Close / Inhibit*	*Tank 10 Import Valve (Future) XV106 Close / Inhibit*
Tank 1 Certify Test Switch	H	*H*	*H*												
Tank 2 Certify Test Switch	H			*H*	*H*										
Tank 3 Certify Test Switch	H					*H*	*H*								
Tank 4 Certify Test Switch	H							*H*	*H*						
Tank 5 Certify Test Switch										*H*					
Tank 6 Certify Test Switch											*H*				
Tank 7 Certify Test Switch												*H*			
Tank 8 Certify Test Switch													*H*		
Tank 9 Certify Test Switch														*H*	
Tank 10 Certify Test Switch															*H*
Tank 11 Certify Test Switch															
Tank 18 Certify Test Switch															
Tank 18A Certify Test Switch															
Tank 21 Certify Test Button															
Tank 22 Certify Test Button															

DESCRIPTION	SIS DIGNOSTICS MONITORING PANEL: Trip Amplifier Display LSxx 8 mA	SIS DIGNOSTICS - CONTROL ROOM ANNUNCIATO: Window (Row/Colum) AN001 Activated	BPCS DIGNOSTICS - JETTY ANNUNCIATOR: Window AN001 Activated	BPCS DIGNOSTICS - CONTROL ROOM SCADA: "Alarms" Screen	*"Tank xx IHLA" (Note 6) Activated*
Tank 1 Certify Test Switch	H	H(1/1)	H		*S*
Tank 2 Certify Test Switch	H	H(1/2)	H		*S*
Tank 3 Certify Test Switch	H	H(1/3)	H		*S*
Tank 4 Certify Test Switch	H	H(1/4)	H		*S*
Tank 5 Certify Test Switch	H	H(2/1)	H		*S*
Tank 6 Certify Test Switch	H	H(2/2)	H		*S*
Tank 7 Certify Test Switch	H	H(2/3)	H		*S*
Tank 8 Certify Test Switch	H	H(2/4)	H		*S*
Tank 9 Certify Test Switch	H	H(3/1)	H		*S*
Tank 10 Certify Test Switch	H	H(3/2)	H		*S*
Tank 11 Certify Test Switch	H	H(3/3)	H		*S*
Tank 18 Certify Test Switch	H	H(3/4)	H		*S*
Tank 18A Certify Test Switch	H	H(4/1)	H		*S*
Tank 21 Certify Test Button	H	H(4/2)	H		*S*
Tank 22 Certify Test Button	H	H(4/3)	H		*S*

TESTING RESULTS

LF364012_RPT - Shutdown Conditions Proof Test (Section / Action)

DESCRIPTION	As Found: Procedure Review (P,C or F tank under test) 7 2 1 Confirm	Plant Preparations (P,C or F tank under test) 7 2 2 Confirm	Healthy and Reset (P,C or F tank under test) 7 2 3 Confirm	XV's Open (P,C or F tank under test) 7 2 4 Comfirm	Test (P,C or F tank under test) 7 2 5 Confirm	Reset and enable XV's (P,C or F tank under test) 7 2 6 Confirm	As Left: Procedure Review (P,C or F tank under test) 10 1 1 Confirm	Plant Preparations (P,C or F tank under test) 10 1 2 Confirm	Healthy and Reset (P,C or F tank under test) 10 1 3 Confirm	XV's Open (P,C or F tank under test) 10 1 4 Comfirm	Test (P,C or F tank under test) 10 1 5 Confirm	Reset and enable XV's (P,C or F tank under test) 10 1 6 Confirm	INTIAL & DATE ON COMPLETION
Tank 1 Certify Test Switch	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Tank 2 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 3 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 4 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 5 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 6 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 7 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 8 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 9 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 10 Certify Test Switch	✓	✓	✓	✓	✓	✓							
Tank 11 Certify Test Switch	C	C	C	C	C	C							
Tank 18 Certify Test Switch	C	C	C	C	C	C							
Tank 18A Certify Test Switch	C	C	C	C	C	C							
Tank 21 Certify Test Button	C	C	C	C	C	C							
Tank 22 Certify Test Button	C	C	C	C	C	C							

LF364012_RPT - LFS-SIS1 Shutdown Conditions Proof Testing - Drexelbrook Manufacturers Test Facility Functional Testing

ABBREVIATIONS	NOTES
SIS - Safety Instrument System	(1) Reset Required to clear alarms.
OIC - Output Input Fault	(2) Results P (or ✓) = Pass, C = Comments, F (or X) = Fail
ESD - Emergency Shutdown	(3) xx = Tank Number under test only
LB - Line Break	*(4) Future (Italics, Blue fill). Review if installed.*
SC - Short Circuit	(5)
H - Hardwired / Hardware	(6)
S - Software	

REFERENCE DRAWINGS		REV	DATE	BY	DRN	CHK'D		APPD		DESCRIPTION
		A	08 04 15	DBF	DBF	MM		LF PLC		As Built Original Issue for Review

PLANT Local Fuel PLC - The Shoreham Oil Terminal
TITLE Overfill Protection LFS-SIS1 Testing Matrix

P & I DESIGN

Local Fuel

CLIENT DRG

SHEET 3 OF 6

REF NO LF364003_SCH

DESCRIPTION	TAG	TYPE	CALIBRATION	UNITS	SET	ORIGIN
SIS 5 YEARLY PHYSICAL TEST FUNCTION TEST			**Length**			
Tank 1 Independent High Level	LE01	Touch	1136	mm	Test	
Tank 2 Independent High Level	LE02	Touch	1636	mm	Test	
Tank 3 Independent High Level	LE03	Touch	1496	mm	Test	
Tank 4 Independent High Level	LE04	Touch	1195	mm	Test	
Tank 5 Independent High Level	LE05	Touch	489	mm	Test	
Tank 6 Independent High Level	LE06	Touch	869	mm	Test	
Tank 7 Independent High Level	LE07	Touch	759	mm	Test	
Tank 8 Independent High Level	LE08	Touch	1503	mm	Test	
Tank 9 Independent High Level	LE09	Touch	1018	mm	Test	
Tank 10 Independent High Level	LE10	Touch	808	mm	Test	
Tank 11 Independent High Level	LE11	Touch	TBC	mm	Test	
Tank 18 Independent High Level	LE18	Touch	TBC	mm	Test	
Tank 18A Independent High Level	LE18A	Touch	TBC	mm	Test	
Tank 21 Independent High Level	LE21	Touch	TBC	mm	Test	
Tank 22 Independent High Level	LE22	Touch	TBC	mm	Test	

SIS FINAL ELEMENTS / SIS DIAGNOSTICS / BPCS DIAGNOSTICS (ACTION / TAG / DESCRIPTION)

Tag (Description)	Close / Inhibit XV162 (Pipeline Import Valve)	*Close / Inhibit XV123 (Tank 1 Import Valve (Future))*	*Close / Inhibit XV156 (Tank 1 VRU Return Valve (Future))*	*Close / Inhibit XV121 (Tank 2 Import Valve (Future))*	*Close / Inhibit XV158 (Tank 2 VRU Return Valve (Future))*	*Close / Inhibit XV129 (Tank 3 Import Valve (Future))*	*Close / Inhibit XV159 (Tank 3 PUL Return Valve (Future))*	*Close / Inhibit XV126 (Tank 4 Import Valve (Future))*	*Close / Inhibit XV161 (Tank 4 VRU Return Valve (Future))*	*Close / Inhibit XV118 (Tank 5 Import Valve (Future))*	*Close / Inhibit XV116 (Tank 6 Import Valve (Future))*	*Close / Inhibit XV114 (Tank 7 Import Valve (Future))*	*Close / Inhibit XV110 (Tank 8 Import Valve (Future))*	*Close / Inhibit XV108 (Tank 9 Import Valve (Future))*	*Close / Inhibit XV106 (Tank 10 Import Valve (Future))*	SIS DIAGNOSTICS MONITORING PANEL: 8 mA LSxx (Trip Amplifier Display)	SIS DIAGNOSTICS - CONTROL ROOM ANNUNCIAT: Activated AN001 (Window (Row/Colum))	BPCS DIAGNOSTICS - JETTY ANNUNCIATOR: Activated AN001 (Window)	BPCS DIAGNOSTICS - CONTROL ROOM SCADA: "Alarms" Screen: *Activated ("Tank xx IHLA" (Note 6))*
LE01	H	*H*	*H*													H	H(1/1)	H	*S*
LE02	H			*H*	*H*											H	H(1/2)	H	*S*
LE03	H					*H*	*H*									H	H(1/3)	H	*S*
LE04	H							*H*	*H*							H	H(1/4)	H	*S*
LE05										*H*						H	H(2/1)	H	*S*
LE06											*H*					H	H(2/2)	H	*S*
LE07												*H*				H	H(2/3)	H	*S*
LE08													*H*			H	H(2/4)	H	*S*
LE09														*H*		H	H(3/1)	H	*S*
LE10															*H*	H	H(3/2)	H	*S*
LE11																H	H(3/3)	H	*S*
LE18																H	H(3/4)	H	*S*
LE18A																H	H(4/1)	H	*S*
LE21																H	H(4/2)	H	*S*
LE22																H	H(4/3)	H	*S*

TESTING RESULTS — **LF364012_RPT - Shutdown Conditions Proof Test**

Action / Section	Confirm 7 3 1 Procedure Review (P,C or F tank under test)	Confirm 7 3 2 Plant Preparations (P,C or F tank under test)	Confirm 7 3 3 Healthy and Reset (P,C or F tank under test)	Confirm 7 3 4 XV's Open (P,C or F tank under test)	Confirm 7 3 5 Test (P,C or F tank under test)	Confirm 7 3 6 Inspect & Replace Probe (P,C or F tank under test)	Critical 7 3 6 Inspect & Replace Probe (P,C or F tank under test)	Confirm 7 3 7 Reset and enable XV's (P,C or F tank under test)	INTIAL & DATE ON COMPLETION
LE01	C	C	C	C	C	C	C	C	
LE02	C	C	C	C	C	C	C	C	
LE03	C	C	C	C	C	C	C	C	
LE04	C	C	C	C	C	C	C	C	
LE05	C	C	C	C	C	C	C	C	
LE06	C	C	C	C	C	C	C	C	
LE07	C	C	C	C	C	C	C	C	
LE08	C	C	C	C	C	C	C	C	
LE09	C	C	C	C	C	C	C	C	
LE10	C	C	C	C	C	C	C	C	
LE11	C	C	C	C	C	C	C	C	
LE18	C	C	C	C	C	C	C	C	
LE18A	C	C	C	C	C	C	C	C	
LE21	C	C	C	C	C	C	C	C	
LE22	C	C	C	C	C	C	C	C	

LF364012_RPT - LFS-SIS1 Shutdown Conditions Proof Testing - Physical Functional Testing

ABBREVIATIONS	NOTES
SIS - Safety Instrument System	(1) Reset Required to clear alarms
OIC - Output Input Fault	(2) Results P (or ✓) = Pass, C = Comments, F (or X) = Fail
ESD - Emergency Shutdown	(3) xx = Tank Number under test only
LB - Line Break	*(4) Future (Italics, Blue fill). Review if installed*
SC - Short Circuit	(5)
H - Hardwired / Hardware	(6)
S - Software	

REFERENCE DRAWINGS	REV	DATE	BY	DRN	CHK'D	APPD	DESCRIPTION
	A	08 04 15	DBF	DBF	MM	LF PLC	As Built Original Issue for Review

PLANT Local Fuel PLC - The Shoreham Oil Terminal
TITLE Overfill Protection LFS-SIS1 Testing Matrix

P & I DESIGN

Local Fuel

SHEET 4 OF 6
CLIENT DRG
REF NO LF364003_SCH

DESCRIPTION	TAG	TYPE	CALIBRATION	UNITS	SET	ORIGIN
FAILURE MODES						
Tank 1 Short / Open Circuit	LE01	SC / LB	N/A	N/A	SC / LB	
Tank 2 Short / Open Circuit	LE02	SC / LB	N/A	N/A	SC / LB	
Tank 3 Short / Open Circuit	LE03	SC / LB	N/A	N/A	SC / LB	
Tank 4 Short / Open Circuit	LE04	SC / LB	N/A	N/A	SC / LB	
Tank 5 Short / Open Circuit	LE05	SC / LB	N/A	N/A	SC / LB	
Tank 6 Short / Open Circuit	LE06	SC / LB	N/A	N/A	SC / LB	
Tank 7 Short / Open Circuit	LE07	SC / LB	N/A	N/A	SC / LB	
Tank 8 Short / Open Circuit	LE08	SC / LB	N/A	N/A	SC / LB	
Tank 9 Short / Open Circuit	LE09	SC / LB	N/A	N/A	SC / LB	
Tank 10 Short / Open Circuit	LE10	SC / LB	N/A	N/A	SC / LB	
Tank 11 Short / Open Circuit	LE11	SC / LB	N/A	N/A	SC / LB	
Tank 18 Short / Open Circuit	LE18	SC / LB	N/A	N/A	SC / LB	
Tank 18A Short / Open Circuit	LE18A	SC / LB	N/A	N/A	SC / LB	
Tank 21 Short / Open Circuit	LE21	SC / LB	N/A	N/A	SC / LB	
Tank 22 Short / Open Circuit	LE22	SC / LB	N/A	N/A	SC / LB	
AC PSU Fuse Fail	L/5	Fail	N/A	N/A	Fail	
ESD DC Fuse Fail	24V/1	Fail	N/A	N/A	Fail	
Tank 1 DC Fuse Fail	24V/2	Fail	N/A	N/A	Fail	
Tank 2 DC Fuse Fail	24V/3	Fail	N/A	N/A	Fail	
Tank 3 DC Fuse Fail	24V/4	Fail	N/A	N/A	Fail	
Tank 4 DC Fuse Fail	24V/5	Fail	N/A	N/A	Fail	
Tank 5 DC Fuse Fail	24V/6	Fail	N/A	N/A	Fail	
Tank 6 DC Fuse Fail	24V/7	Fail	N/A	N/A	Fail	
Tank 7 DC Fuse Fail	24V/8	Fail	N/A	N/A	Fail	
Tank 8 DC Fuse Fail	24V/9	Fail	N/A	N/A	Fail	
Tank 9 DC Fuse Fail	24V/10	Fail	N/A	N/A	Fail	
Tank 10 DC Fuse Fail	24V/11	Fail	N/A	N/A	Fail	
Tank 11, 18, 18A, 21 & 22 DC Fuse	24V/12	Fail	N/A	N/A	Fail	

ACTION	TAG	DESCRIPTION
		SIS FINAL ELEMENTS
Close / Inhibit	XV162	Pipeline Import Valve
Close / Inhibit	*XV123*	*Tank 1 Import Valve (Future)*
Close / Inhibit	*XV156*	*Tank 1 VRU Return Valve (Future)*
Close / Inhibit	*XV121*	*Tank 2 Import Valve (Future)*
Close / Inhibit	*XV158*	*Tank 2 VRU Return Valve (Future)*
Close / Inhibit	*XV129*	*Tank 3 Import Valve (Future)*
Close / Inhibit	*XV159*	*Tank 3 PUL Return Valve (Future)*
Close / Inhibit	*XV126*	*Tank 4 Import Valve (Future)*
Close / Inhibit	*XV161*	*Tank 4 VRU Return Valve (Future)*
Close / Inhibit	*XV118*	*Tank 5 Import Valve (Future)*
Close / Inhibit	*XV116*	*Tank 6 Import Valve (Future)*
Close / Inhibit	*XV114*	*Tank 7 Import Valve (Future)*
Close / Inhibit	*XV110*	*Tank 8 Import Valve (Future)*
Close / Inhibit	*XV108*	*Tank 9 Import Valve (Future)*
Close / Inhibit	*XV106*	*Tank 10 Import Valve (Future)*
		SIS DIAGNOSTICS MONITORING PANEL
>17 mA	LSxx	Trip Amplifier Display SC
<15 mA	LSxx	Trip Amplifier Display LB
De-Energised	Relay No	ESD Safety Relays R088, R124 & R164
		SIS DIAGNOSTICS - CONTROL ROOM ANNUNCIAT
Activated	AN001	Window (Row/Colum)
		BPCS DIAGNOSTICS - JETTY ANNUNCIATOR
Activated	AN001	Window
		BPCS DIAGNOSTICS - CONTROL ROOM SCADA
		"Alarms" Screen
Activated		*"Tank xx IHLA" (Note 3)*
		TESTING RESULTS
Action	**Section**	**LF364012_RPT - Shutdown Conditions Proof Test**
Confirm	8 1 1	Procedure Review (P,C or F tank under test)
Confirm	8 1 2	Plant Preparations (P,C or F tank under test)
Confirm	8 1 3	Healthy and Reset (P,C or F tank under test)
Confirm	8 1 4	All XV's Open (P,C or F tank under test)
Confirm	8 1 5	SIF / Diagnostics (P,C or F tank under test)

INTIAL & DATE ON COMPLETION

LF364012_RPT - LFS-SIS1 Shutdown Conditions Proof Testing - Failure Mode Functional Testing

ABBREVIATIONS
SIS - Safety Instrument System
OIC - Output Input Fault
ESD - Emergency Shutdown
LB - Line Break
SC - Short Circuit
H - Hardwired / Hardware
S - Software

NOTES
(1) Reset Required to clear alarms.
(2) Results P (or ✓) = Pass, C = Comments, F (or X) = Fail
(3) xx = Tank Number under test only.
(4) Future (Italics, Blue fill). Review if installed.
(5)
(6)

REFERENCE DRAWINGS	REV	DATE	BY	DRN	CHK'D	APPD	DESCRIPTION
	A	08.04.15	DBF	DBF	MM	LF PLC	As Built Original Issue for Review

PLANT	Local Fuel PLC - The Shoreham Oil Terminal
TITLE	Overfill Protection LFS-SIS1 Testing Matrix
P & I DESIGN	Local Fuel
CLIENT DRG	SHEET 5 OF 6
	REF NO LF364003_SCH

DESCRIPTION	TAG	TYPE	CALIBRATION	UNITS	SET	ORIGIN	ACTION	TAG	DESCRIPTION
									SIS FINAL ELEMENTS
							Close / Inhibit	XV162	Pipeline Import Valve
FAILURE MODES							Enabled	*XV123*	*Tank 1 Import Valve (Future)*
AC PSU Fuse Fail	L/5	Fail	N/A	N/A	Fail		Enabled	*XV124*	*Tank 1 Export Valve (Future)*
ESD DC Fuse Fail	24V/1	Fail	N/A	N/A	Fail		Enabled	*XV155*	*Tank 1 VRU Feed Valve (Future)*
XV162 ESD Open Circuit	TB4/25 - 26	LB	N/A	N/A	Fail		Enabled	*XV156*	*Tank 1 VRU Return Valve (Future)*
XV162 ESD DB Power Fail	9L1	Tripped	N/A	N/A	Tripped		Enabled	*XV121*	*Tank 2 Import Valve (Future)*
							Enabled	*XV122*	*Tank 2 Export Valve (Future)*
							Enabled	*XV157*	*Tank 2 VRU Feed Valve (Future)*
							Enabled	*XV158*	*Tank 2 VRU Return Valve (Future)*
							Enabled	*XV129*	*Tank 3 Import Valve (Future)*
							Enabled	*XV130*	*Tank 3 Export Valve (Future)*
							Enabled	*XV159*	*Tank 3 PUL Return Valve (Future)*
							Enabled	*XV126*	*Tank 4 Import Valve (Future)*
							Enabled	*XV127*	*Tank 4 Export Valve (Future)*
							Enabled	*XV160*	*Tank 4 VRU Feed Valve (Future)*
							Enabled	*XV161*	*Tank 4 VRU Return Valve (Future)*
							Enabled	*XV118*	*Tank 5 Import Valve (Future)*
							Enabled	*XV119*	*Tank 5 Export Valve (Future)*
							Enabled	*XV116*	*Tank 6 Import Valve (Future)*
							Enabled	*XV117*	*Tank 6 Export Valve (Future)*
							Enabled	*XV114*	*Tank 7 Import Valve (Future)*
							Enabled	*XV115*	*Tank 7 Export Valve (Future)*
							Enabled	*XV110*	*Tank 8 Import Valve (Future)*
							Enabled	*XV111*	*Tank 8 Export Valve (Future)*
							Enabled	*XV108*	*Tank 9 Import Valve (Future)*
							Enabled	*XV109*	*Tank 9 Export Valve (Future)*
							Enabled	*XV106*	*Tank 10 Import Valve (Future)*
							Enabled	*XV107*	*Tank 10 Export Valve (Future)*

TESTING RESULTS		
Action	Section	LF364012_RPT - Shutdown Conditions Proof Test
Confirm	8 1 1	Procedure Review (P,C or F tank under test)
Confirm	8 1 2	Plant Preparations (P,C or F tank under test)
Confirm	8 1 3	Healthy and Reset (P,C or F tank under test)
Confirm	8 1 4	All XV's Open (P,C or F tank under test)
Confirm	8 1 5	SIF / Diagnostics (P,C or F tank under test)

INTIAL & DATE ON COMPLETION

LF364012_RPT - LFS-SIS1 Shutdown Conditions Proof Testing - Failure Mode Functional Testing

ABBREVIATIONS	NOTES
SIS - Safety Instrument System	(1) Reset Required to clear alarms
OIC - Output Input Fault	(2) Results P (or ✓) = Pass, C = Comments, F (or X) = Fail
ESD - Emergency Shutdown	(3) xx = Tank Number under test only.
LB - Line Break	*(4) Future (Italics, Blue fill). Review if installed.*
SC - Short Circuit	(5)
H - Hardwired / Hardware	(6)
S - Software	

REFERENCE DRAWINGS		REV	DATE	BY	DRN	CHK'D		APPD		DESCRIPTION
		A	08 04 15	DBF	DBF	MM		LF PLC		As Built Original Issue for Review

PLANT	Local Fuel PLC - The Shoreham Oil Terminal
TITLE	Overfill Protection LFS-SIS1 Testing Matrix
	P & I DESIGN
	Local Fuel
	SHEET 6 OF 6
CLIENT DRG	REF NO. LF364003_SCH