



**Unity**water

Serving you today, *investing in tomorrow.*

# F8945 - WPS Commissioning Check Sheet

# F8945 - WPS Commissioning Check Sheet

## Document Details

Document Owner	Head of Asset Management
References	<a href="#">F8927</a> - WPS Commissioning Worksheet End to End Test Sheet

# F8945 - WPS Commissioning Check Sheet

## Contents

<b>Contents .....</b>	<b>3</b>
<b>General .....</b>	<b>4</b>
<b>Vendor Verification .....</b>	<b>4</b>
General .....	4
Mechanical .....	4
Civil .....	4
Factory Acceptance Testing (FAT).....	5
Electrical, Instruments and Control (E, I & C).....	5
<b>Pre-commissioning.....</b>	<b>6</b>
Preliminaries Checklist.....	6
Pre-commissioning Checklist .....	8
General .....	8
Network .....	8
Electrical, Instruments and Control (E, I & C).....	8
Mechanical .....	11
<b>Wet Testing .....</b>	<b>13</b>
Commissioning Schedule.....	13
General .....	13
Relative Level Checks .....	13
Pressure Setpoint Checks .....	13
Pump Checks .....	13
Pump Control Checks.....	14
Generator Checks.....	16
Wet Testing Signoff .....	16
<b>SAT / Performance Testing .....</b>	<b>17</b>
SAT Schedule .....	17
SAT Pre-start Checks .....	17
Relative Level Checks .....	17
Pressure Setpoint Checks .....	17
Pump Checks .....	17
SAT Signoff .....	20

# F8945 - WPS Commissioning Check Sheet

## General

In using this document, due consideration of all other relevant Unitywater Standard Drawings and Unitywater Standard Specifications should be adhered to.

## Vendor Verification

<b>PROJECT TITLE:</b>			<b>FINANCE NO:</b>
<b>General</b>			<b>Result / Init. / Date</b>
<b>Mechanical</b>			
1. Pump test results been reviewed and conform with applicable standards			OK <input type="checkbox"/>
2. Flowmeter Calibration certificate received			OK <input type="checkbox"/>
<b>Civil</b>			
3. Check pressure test on suction and discharge mains has passed			OK <input type="checkbox"/>
<b>CONSTRUCTOR</b>			
<b>Name:</b>	<b>Position:</b>	<b>Signature:</b>	<b>Date:</b>
<i>UNITYWATER SIGNOFF</i>			
<i>Name:</i>	<i>Position:</i>	<i>Signature:</i>	<i>Date:</i>

# F8945 - WPS Commissioning Check Sheet

<b>PROJECT TITLE:</b>			<b>FINANCE NO:</b>
<b>Factory Acceptance Testing (FAT)</b>			<b>Result / Init. / Date</b>
<b>Electrical, Instruments and Control (E, I &amp; C)</b>			
<b>Switchboards</b>			
1. The switchboard manufacturer has been provided with current Unitywater Standard Switchboard Drawings (OR, if "Design and Construct", the 'For Construction' drawings have been reviewed by Unitywater and provided to the switchboard manufacturer)			OK <input type="checkbox"/>
2. The switchboard manufacturer has undertaken a full point-to-point test on all switchboard wiring			OK <input type="checkbox"/>
3. The switchboard manufacturer has provided evidence of point-to-point testing in the form of marked up wiring drawings (each connection highlighted as tested)			OK <input type="checkbox"/>
4. Any changes, outcomes or additional detail resulting from FAT testing have been marked on the drawings with the highlighted test connections. Mark-ups include all available circuits, inputs, power supply voltages, labels, wire numbers, terminals etc. These marked-up drawings are labeled 'FAT'.			OK <input type="checkbox"/>
5. Cabinet and paintwork have been inspected for any visual damage			OK <input type="checkbox"/>
6. The following is as per current drawings: <ul style="list-style-type: none"> <li>Incomer arrangements</li> <li>Cable entry provisions</li> <li>Interlocking provisions</li> <li>Incomer protection (fault current rating) and discrimination</li> </ul>			OK <input type="checkbox"/>
7. Switchboard rating nameplate is attached			OK <input type="checkbox"/>
8. Switchboard Test Certificate has been checked			OK <input type="checkbox"/>
9. Software used during FAT is available			OK <input type="checkbox"/>
10. Any deficiencies have been recorded to a 'FAT punchlist register'			OK <input type="checkbox"/>
11. Any critical deficiencies have been rectified prior to site delivery			OK <input type="checkbox"/>
<b>Instrumentation</b>			
12. Calibration certificates have been received for instruments			OK <input type="checkbox"/>
<b>Software</b>			
13. Software for Outstation Type is loaded			OK <input type="checkbox"/>
14. Software blocks have been fat tested (if non standard)			OK <input type="checkbox"/>
<b>CONSTRUCTOR</b>			
<b>Name:</b>	<b>Position:</b>	<b>Signature:</b>	<b>Date:</b>
<b>UNITYWATER SIGNOFF</b>			
<b>Name:</b>	<b>Position:</b>	<b>Signature:</b>	<b>Date:</b>

# F8945 - WPS Commissioning Check Sheet

## Pre-commissioning

PROJECT TITLE:	FINANCE NO:
<b>Preliminaries Checklist</b>	<b>Result / Init. / Date</b>
1. Check all commissioning personnel have been inducted to site	OK <input type="checkbox"/>
2. Check risk assessments and SWMS have been produced for all Pre-commissioning and Commissioning activities	OK <input type="checkbox"/>
3. The site is safe for commissioning works to commence. Safety requirements include: <ul style="list-style-type: none"> <li>• Covers and grills installed and flush</li> <li>• Davit mounting points certified</li> <li>• Fall arrest mounting points certified</li> <li>• Handrails, fencing, gates and chains installed correctly</li> <li>• Emergency procedures available</li> <li>• Safety signage in place (PPE, Electricity, SWL, Danger etc.)</li> </ul>	OK <input type="checkbox"/>
4. Check "danger electric" marker bricks are installed at ground level and painted yellow where applicable	OK <input type="checkbox"/>
5. Discharge pipe acceptance testing according to standard and passed	OK <input type="checkbox"/>
6. Suction pipe acceptance testing according to standard and passed	OK <input type="checkbox"/>
7. 'As Constructed' survey by licenced surveyor complete	OK <input type="checkbox"/>
8. Changes to any detail as shown on the 'For Construction' drawings noted on a set of 'For Construction' drawings and marked 'As Constructed'	OK <input type="checkbox"/>
9. Current Unitywater Standard Drawings are on site (OR, if "Design and Construct", the 'For Construction' drawings have been reviewed by Unitywater)	OK <input type="checkbox"/>
10. All required civil works testing (ITPs) completed by Contracts Inspector	OK <input type="checkbox"/>
11. Operation and Maintenance Manuals have been received for Vendor supplied components and the Functional Specification is available	OK <input type="checkbox"/>
12. Electrical supply and metering available on site	OK <input type="checkbox"/>
13. Pole / pillar termination method meets all requirements	OK <input type="checkbox"/>
14. Check operation of all locks on switchboards and confirm compliance with Unitywater requirements	OK <input type="checkbox"/>
15. Check all cable supports and check for obstructions (e.g. cables not obstructing when lifting pump)	OK <input type="checkbox"/>
16. Selected control equipment is suitable for selected pump manufacturer	OK <input type="checkbox"/>
17. Test documentation for Mechanical equipment and Instrumentation has been received. These generally include: <ul style="list-style-type: none"> <li>• Factory test results</li> <li>• Test compliance certificates</li> <li>• Instrument calibration certificates</li> <li>• Warranty information</li> </ul>	OK <input type="checkbox"/>
18. FAT completed and critical punchlist items rectified	OK <input type="checkbox"/>



# F8945 - WPS Commissioning Check Sheet

<b>CONSTRUCTOR</b>			
<b>Name:</b>	<b>Position:</b>	<b>Signature:</b>	<b>Date:</b>
UNITYWATER SIGNOFF			
<b>Name:</b>	<b>Position:</b>	<b>Signature:</b>	<b>Date:</b>

# F8945 - WPS Commissioning Check Sheet

<b>PROJECT TITLE:</b>	<b>FINANCE NO:</b>									
<b>Pre-commissioning Checklist</b>	<b>Result / Init. / Date</b>									
<b>General</b>										
1. Check Preliminaries Checklist completed and signed off	OK <input type="checkbox"/>									
<b>Network</b>										
1. Check Commissioning Plan has been approved by Unitywater	OK <input type="checkbox"/>									
2. Advise Network Operations and Control Room of commencement of pre-commissioning activities and proposed timing of performance and SAT testing	OK <input type="checkbox"/>									
3. Check Network Operations and Control Room are ready for performance and SAT testing and appropriate resources are available to assist	OK <input type="checkbox"/>									
4. Confirm Network Operations are aware of impact on downstream infrastructure	OK <input type="checkbox"/>									
5. Check sufficient water is available at the source and sufficient storage is available at the destination for testing	OK <input type="checkbox"/>									
<b>Electrical, Instruments and Control (E, I &amp; C)</b>										
<b>Generators</b>										
1. Check generator mains and earth cables are installed and connected	OK <input type="checkbox"/>									
2. Record the cable insulation resistance of the 3 phases	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">L1</td> <td style="border-bottom: 1px solid black; width: 50px;"></td> <td style="text-align: right;">MΩ</td> </tr> <tr> <td style="text-align: right;">L2</td> <td style="border-bottom: 1px solid black;"></td> <td style="text-align: right;">MΩ</td> </tr> <tr> <td style="text-align: right;">L3</td> <td style="border-bottom: 1px solid black;"></td> <td style="text-align: right;">MΩ</td> </tr> </table>	L1		MΩ	L2		MΩ	L3		MΩ
L1		MΩ								
L2		MΩ								
L3		MΩ								
3. Record earth loop impedance	_____ Ω									
4. Check point-to-point phase continuity	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">R to L1</td> <td>OK <input type="checkbox"/></td> </tr> <tr> <td style="text-align: right;">W to L2</td> <td>OK <input type="checkbox"/></td> </tr> <tr> <td style="text-align: right;">B to L3</td> <td>OK <input type="checkbox"/></td> </tr> </table>	R to L1	OK <input type="checkbox"/>	W to L2	OK <input type="checkbox"/>	B to L3	OK <input type="checkbox"/>			
R to L1	OK <input type="checkbox"/>									
W to L2	OK <input type="checkbox"/>									
B to L3	OK <input type="checkbox"/>									
<b>Switchboards</b>										
<b>5. ENSURE SWITCHBOARD IS <u>NOT</u> ENERGISED</b>	OK <input type="checkbox"/>									
6. Check mains and earth cables are installed and connected	OK <input type="checkbox"/>									
7. Record the cable insulation resistance of the 3 phases	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">L1</td> <td style="border-bottom: 1px solid black; width: 50px;"></td> <td style="text-align: right;">MΩ</td> </tr> <tr> <td style="text-align: right;">L2</td> <td style="border-bottom: 1px solid black;"></td> <td style="text-align: right;">MΩ</td> </tr> <tr> <td style="text-align: right;">L3</td> <td style="border-bottom: 1px solid black;"></td> <td style="text-align: right;">MΩ</td> </tr> </table>	L1		MΩ	L2		MΩ	L3		MΩ
L1		MΩ								
L2		MΩ								
L3		MΩ								
8. Record earth loop impedance	_____ Ω									
9. Check point-to-point phase continuity	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">R to L1</td> <td>OK <input type="checkbox"/></td> </tr> <tr> <td style="text-align: right;">W to L2</td> <td>OK <input type="checkbox"/></td> </tr> <tr> <td style="text-align: right;">B to L3</td> <td>OK <input type="checkbox"/></td> </tr> </table>	R to L1	OK <input type="checkbox"/>	W to L2	OK <input type="checkbox"/>	B to L3	OK <input type="checkbox"/>			
R to L1	OK <input type="checkbox"/>									
W to L2	OK <input type="checkbox"/>									
B to L3	OK <input type="checkbox"/>									

# F8945 - WPS Commissioning Check Sheet

10. Check Incomer protection set as per design	OK <input type="checkbox"/>									
11. Check all CT and other links are in place	OK <input type="checkbox"/>									
12. Check correct glands have been utilised for cable entries	OK <input type="checkbox"/>									
13. Cable screens and earthing is as per design	OK <input type="checkbox"/>									
14. Ensure switchboard main Incomer is turned OFF and tagged	OK <input type="checkbox"/>									
15. Check MEN connection	OK <input type="checkbox"/>									
16. Turn on mains switch	OK <input type="checkbox"/>									
<b>17. ACKNOWLEDGE SWITCHBOARD IS NOW ENERGISED</b>	OK <input type="checkbox"/>									
18. Check 3 phase voltages	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; width: 50%;">AB</td> <td style="width: 20%; border-bottom: 1px solid black;"></td> <td style="text-align: right;">V</td> </tr> <tr> <td style="text-align: right;">BC</td> <td style="border-bottom: 1px solid black;"></td> <td style="text-align: right;">V</td> </tr> <tr> <td style="text-align: right;">CA</td> <td style="border-bottom: 1px solid black;"></td> <td style="text-align: right;">V</td> </tr> </table>	AB		V	BC		V	CA		V
AB		V								
BC		V								
CA		V								
<b>Lighting and GPOs</b>										
19. Check light circuit breaker conforms to electrical drawings	OK <input type="checkbox"/>									
20. GPO circuit breaker(s) conform to electrical drawings	OK <input type="checkbox"/>									
21. Check earth leakage circuit breaker has been tested and results are available	OK <input type="checkbox"/>									
22. Internal and external lights are connected and working	OK <input type="checkbox"/>									
23. Internal and external GPOs are connected and working	OK <input type="checkbox"/>									
<b>Flowmeters</b>										
24. Check calibration certificate has been received	OK <input type="checkbox"/>									
25. Check mag flow head is connected to flowmeter converter	OK <input type="checkbox"/>									
26. Check correct supply voltage available at converter	OK <input type="checkbox"/>									
27. Check analogue output is correctly connected to RTU and operating correctly	OK <input type="checkbox"/>									
28. Check totaliser output is correctly connected to RTU and operating correctly	OK <input type="checkbox"/>									
29. Check mechanical (vandal) and UV protection installed on external cable	OK <input type="checkbox"/>									
<b>Field Devices</b>										
30. Check surge protection barriers are installed (control panel and field). Pay particular attention to earth screen terminators.	OK <input type="checkbox"/>									
31. Check scaling of pressure transmitters conforms to operating pressures	OK <input type="checkbox"/>									
32. Check calibration of all analogue signals (including flow and pressure transmitters)	OK <input type="checkbox"/>									
33. Check settings of all analogue signals (alarm levels)	OK <input type="checkbox"/>									
34. Check setting of pressure switches	OK <input type="checkbox"/>									
35. Check setting of flow switches	OK <input type="checkbox"/>									



# F8945 - WPS Commissioning Check Sheet

53. Check radio is programmed to the correct channel	Record frequency	OK <input type="checkbox"/> _____ MHz
54. Check radio configuration including stream id serial paramaters are set correctly for the Outstation and record		OK <input type="checkbox"/> _____ _____ _____ _____
55. Check data radio diagnostics communication working correctly		OK <input type="checkbox"/>
<b>Remote Telemetry Units (RTU)</b>		
56. Check unit is powered with correct polarity and voltage DC Supply(ies)		OK <input type="checkbox"/>
57. Check the UPS battery is connected and charging		OK <input type="checkbox"/>
58. Check communication is working		OK <input type="checkbox"/>
59. Check I/O is operational and conforms with current drawings		OK <input type="checkbox"/>
<b>Control System</b>		
60. Record type of control system installed (i.e. SCADAPack, MultiSmart, MT2-PC)		_____
61. Record controller information	Manufacturer Model type Serial no Firmware rev Software rev	_____ _____ _____ _____ _____
<b>End to End Testing (by Unitywater)</b>		
62. Notify control room of impending end-to-end test (minimum 5 days notice)		OK <input type="checkbox"/>
63. Check end-to-end test sheet has been reviewed and approved by control room		OK <input type="checkbox"/>
64. Complete <b>End-to-End Test Sheet</b> to verify communication to SCADA		OK <input type="checkbox"/>
<b>Mechanical</b>		
<b>General</b>		
65. Check layout conforms with 'For Construction' piping drawings		OK <input type="checkbox"/>
66. Undertake visual examination of installation and finish of all pipework, mechanical devices, valves, fittings and pump units		OK <input type="checkbox"/>
67. Check accuracy of tagging and labelling		OK <input type="checkbox"/>
68. Check functionality and accessibility of mobile crane (franna)		OK <input type="checkbox"/>
69. Ensure the pipework is free of debris capable of causing damage to mechanical equipment when pumps are started		OK <input type="checkbox"/>
70. Check accessibility of access covers and equipment for operational and maintenance purposes		OK <input type="checkbox"/>
71. Check equipment is guarded appropriately		OK <input type="checkbox"/>

# F8945 - WPS Commissioning Check Sheet

72. Check stairways, landings and access ladders comply with design requirements	OK <input type="checkbox"/>		
73. Check that all Device O&M Manuals are available	OK <input type="checkbox"/>		
74. Check that manufacturers' requirements have been met (i.e. alignment, lubrication, preparation, priming etc.)	OK <input type="checkbox"/>		
75. Check instrumentation nozzles (tappings) are provided in accordance with design (correct side of equipment e.g. US/DS)	OK <input type="checkbox"/>		
76. Check installation and operation of instrument isolation valves	OK <input type="checkbox"/>		
77. Check directional requirements (i.e. pump rotation, check valve direction etc.)	OK <input type="checkbox"/>		
78. Check pressure transmitters or gauges upstream and downstream of pump are operational	OK <input type="checkbox"/>		
<b>Flowmeter</b>			
79. Flowmeter calibration certificate received	OK <input type="checkbox"/>		
80. Check earthing straps are installed across both flowmeter flanges, earthing rings and to earth as specified by the equipment manufacturer	OK <input type="checkbox"/>		
<b>Pumps</b>			
81. Check impeller has a free shaft	OK <input type="checkbox"/>		
82. Prime pumps with water	OK <input type="checkbox"/>		
83. Check correct pump curves are on site	OK <input type="checkbox"/>		
<b>Pipework</b>			
84. Check pressure test has been undertaken according to relevant standard and passed	OK <input type="checkbox"/>		
85. Charge the main and ensure air is purged	OK <input type="checkbox"/>		
<b>CONSTRUCTOR</b>			
<b>Name:</b>	<b>Position:</b>	<b>Signature:</b>	<b>Date:</b>
UNITYWATER SIGNOFF			
<b>Name:</b>	<b>Position:</b>	<b>Signature:</b>	<b>Date:</b>

# F8945 - WPS Commissioning Check Sheet

## Wet Testing

PROJECT TITLE:	FINANCE NO:	
<b>Commissioning Schedule</b>	<b>Result / Init. / Date</b>	<b>UW Witness / Initials</b>
<b>General</b>		
1. Check Pre-commissioning Checklist completed and signed off	OK <input type="checkbox"/>	
<b>Relative Level Checks</b>		YES <input type="checkbox"/>
2. Record pump impeller centre line relative level in <b>Commissioning Worksheet</b>	OK <input type="checkbox"/>	
3. Record pressure transmitter relative level in <b>Commissioning Worksheet</b>	OK <input type="checkbox"/>	
<b>Pressure Setpoint Checks</b>		
4. Confirm pressure indicated by the upstream and downstream pressure transmitters is reflective of the actual pressure and record commissioning setpoints (operational and alarm) in <b>Commissioning Worksheet</b>	OK <input type="checkbox"/>	
<b>Pump Checks</b>		
<b>Motor Checks</b>		YES <input type="checkbox"/>
5. <u>Ensure correct parameters are set in the VFD or Soft Starter if applicable</u>	OK <input type="checkbox"/>	
6. <u>Start pump with discharge valve closed and ensure the pump is running without undue noise, vibration and temperature</u>	OK <input type="checkbox"/>	
7. <u>To ensure motor load balancing, record:</u> <div style="text-align: right; margin-left: 400px;"> <u>Pump running amps L1</u> _____ A  <u>Pump running amps L2</u> _____ A  <u>Pump running amps L3</u> _____ A </div>		
8. <u>Stop pump</u>	OK <input type="checkbox"/>	
9. <u>Complete <b>Low Power Tuning</b> (Danfoss VFD only) and record values into <b>Commissioning Worksheet (for low flow/dry pump protection)</b></u>	OK <input type="checkbox"/>	
10. Repeat steps 5 to 9 for other pumps/drives	OK <input type="checkbox"/>	
<b>Fill and Bleed Main</b>		YES <input type="checkbox"/>
11. Calculate volume of water required to fill the main	OK <input type="checkbox"/>	
12. Ensure sufficient water at source to fill pipework and perform pump operation test	OK <input type="checkbox"/>	
13. Open pump discharge valve	OK <input type="checkbox"/>	
14. Run pump and bleed air from main	OK <input type="checkbox"/>	
15. Operate each pump from 35 to 50 Hz in 5 Hz increments (if VFD type), check for abnormal movement or vibration	OK <input type="checkbox"/>	

# F8945 - WPS Commissioning Check Sheet

16. Perform visual inspection of pumps, all piping, fittings and flanged joints for leakage	OK <input type="checkbox"/>	
<b>Pump Performance and Flowmeter Calibration</b> – To verify as built pump curves and confirm flowmeter accuracy.		YES <input type="checkbox"/>
17. Verify flowmeter accuracy where practical	OK <input type="checkbox"/>	
18. Complete Pump Performance test including shutoff head	OK <input type="checkbox"/>	
19. Use <b>Commissioning Worksheet</b> to record and assess results	OK <input type="checkbox"/>	
<b>Pump Control Checks</b>		
<b>Pump Fault Test</b> - Confirm backup pump(s) come online after a duty pump fault during automatic operation. Shall be completed for all pumps.		YES <input type="checkbox"/>
20. Select all pumps to “off” position	OK <input type="checkbox"/>	
21. Ensure available water supply is sufficient for tests	OK <input type="checkbox"/>	
22. Ensure pump discharge valves are open	OK <input type="checkbox"/>	
23. Confirm all drives have no faults present	OK <input type="checkbox"/>	
24. Set Target Pressure Setpoint > current control pressure reading <i>The Target Pressure Setpoint must be set such that only one pump is required to operate.</i>	OK <input type="checkbox"/>	
25. Select Pump 1 to “automatic” position	OK <input type="checkbox"/>	
26. Confirm Pump 1 starts	OK <input type="checkbox"/>	
27. <u>Select Pump 2 to “automatic” position</u>	OK <input type="checkbox"/>	
28. <u>Fault Pump (2-1 (i.e. 1)) – i.e. open one c/b feeder for phase failure relay – fault VFD</u>	OK <input type="checkbox"/>	
29. <u>Confirm Pump (2-1 (i.e. 1)) fault displayed on HMI</u>	OK <input type="checkbox"/>	
30. <u>Confirm Pump 2 starts</u>	OK <input type="checkbox"/>	
31. Repeat Steps 27 to 30 for pumps 3, 4 and 5 (where applicable)	OK <input type="checkbox"/>	
32. Stop system – all pumps to “off” position	OK <input type="checkbox"/>	
33. Resume original Target Pressure Setpoint	OK <input type="checkbox"/>	
<b>Duty / Follow Test</b> - Determine correct pump duty & follow operation.		YES <input type="checkbox"/>
34. Select all pumps to “off” position	OK <input type="checkbox"/>	
35. Ensure available water supply is sufficient for tests	OK <input type="checkbox"/>	
36. Ensure pump discharge valves are open	OK <input type="checkbox"/>	
37. Confirm all drives have no faults present	OK <input type="checkbox"/>	
38. Set Target Pressure Setpoint > current control pressure reading	OK <input type="checkbox"/>	
39. Select all pumps to “automatic” position	OK <input type="checkbox"/>	
40. Confirm Pump 1 starts	OK <input type="checkbox"/>	

# F8945 - WPS Commissioning Check Sheet

41. Confirm Pump 2 starts after time delay. <i>If pump does not start, set Target Pressure Setpoint &gt; current control pressure reading (or increase demand to drop pressure).</i>	OK <input type="checkbox"/>	
42. Repeat Step 41 for pumps 3, 4 and 5 (where applicable)	OK <input type="checkbox"/>	
43. Set Target Pressure Setpoint < current control pressure reading	OK <input type="checkbox"/>	
44. Confirm all pumps stop after time delay <i>If not all pumps stop, set Target Pressure Setpoint &lt; current control pressure reading (or decrease demand to increase pressure).</i>	OK <input type="checkbox"/>	
45. Select all pumps to "off" position	OK <input type="checkbox"/>	
46. Resume original Target Pressure Setpoint	OK <input type="checkbox"/>	
<b>Automatic Pump Cycling Test - Confirm correct pump cycling operation.</b>		YES <input type="checkbox"/>
47. Select all pumps to "off" position	OK <input type="checkbox"/>	
48. Ensure available water supply is sufficient for tests	OK <input type="checkbox"/>	
49. Ensure pump discharge valves are open	OK <input type="checkbox"/>	
50. Confirm all drives have no faults present	OK <input type="checkbox"/>	
51. Set Target Pressure Setpoint > current control pressure reading ( <i>or increase demand to drop pressure</i> )	OK <input type="checkbox"/>	
52. Record which pump is selected as Duty Pump by controller	_____	
53. Select all pumps to "automatic" position	OK <input type="checkbox"/>	
54. Confirm Duty Pump starts	OK <input type="checkbox"/>	
55. Set Target Pressure Setpoint < current control pressure reading ( <i>or decrease demand to increase pressure</i> )	OK <input type="checkbox"/>	
56. Confirm Duty Pump stops	OK <input type="checkbox"/>	
57. Record which pump is selected as Duty Pump (new) by controller	_____	
58. Set Target Pressure Setpoint > current control pressure reading ( <i>or increase demand to drop pressure</i> )	OK <input type="checkbox"/>	
59. Confirm Duty Pump starts	OK <input type="checkbox"/>	
60. Set Target Pressure Setpoint < current control pressure reading ( <i>or decrease demand to increase pressure</i> )	OK <input type="checkbox"/>	
61. Confirm Duty Pump stops	OK <input type="checkbox"/>	
62. Record which pump is selected as Duty Pump (new) by controller	_____	
63. Select all pumps to "off" position	OK <input type="checkbox"/>	
<b>Confirm Deadband Controls – Confirm specified actions upon triggering Low Low, High High, Low and High pressure levels.</b>		YES <input type="checkbox"/>
64. Specify (project specific)	OK <input type="checkbox"/>	
65. Specify (project specific)	OK <input type="checkbox"/>	
66. Specify (project specific)	OK <input type="checkbox"/>	

# F8945 - WPS Commissioning Check Sheet

<b>Other Controls</b>		YES <input type="checkbox"/>
67. Interaction with other devices (e.g. pressure / flow)	OK <input type="checkbox"/>	
<b>Generator Checks</b>		YES <input type="checkbox"/>
68. Ensure sufficient water available for test	OK <input type="checkbox"/>	
69. Ensure generator main switch is off	OK <input type="checkbox"/>	
70. Select pumps to "off" position	OK <input type="checkbox"/>	
71. Connect generator and check all connections	OK <input type="checkbox"/>	
72. Start generator and check phase direction and voltages	OK <input type="checkbox"/>	
73. Select changeover switch to generator supply	OK <input type="checkbox"/>	
74. Close main switch and check all voltages	OK <input type="checkbox"/>	
75. <u>Select Pump 1 to "automatic" and confirm correct operation</u>	OK <input type="checkbox"/>	
76. Repeat Step <b>Error! Reference source not found.</b> for other pumps <i>Note due to portable generator size potentially all pumps may not be able to run and shall be decided on an individual site basis.</i>	OK <input type="checkbox"/>	
77. Select pumps to "off" position	OK <input type="checkbox"/>	
78. Restore mains power and disconnect generator	OK <input type="checkbox"/>	
<b>Wet Testing Signoff</b>		
<b>CONSTRUCTOR</b>		
Name:	Position:	Signature: Date:
<b>UNITYWATER WITNESS</b>		
Name:	Position:	Signature: Date:
Name:	Position:	Signature: Date:
Name:	Position:	Signature: Date:

# F8945 - WPS Commissioning Check Sheet

## SAT / Performance Testing

<b>PROJECT TITLE:</b>	<b>FINANCE NO:</b>
<b>SAT Schedule</b>	<b>Result / Init. / Date</b>
<b>SAT Pre-start Checks</b>	
1. Check Wet Testing Checklist completed and signed off	OK <input type="checkbox"/>
2. Check SAT attendees are inducted to site	OK <input type="checkbox"/>
<b>Relative Level Checks</b>	
3. Record pump impeller centre line relative level in <b>Commissioning Worksheet</b>	OK <input type="checkbox"/>
4. Record pressure transmitter relative level in <b>Commissioning Worksheet</b>	OK <input type="checkbox"/>
<b>Pressure Setpoint Checks</b>	
5. Confirm pressure indicated by the upstream and downstream pressure transmitters is reflective of the actual pressure and record commissioning setpoints (operational and alarm) in <b>Commissioning Worksheet</b>	OK <input type="checkbox"/>
<b>Pump Checks</b>	
<b>Motor Checks</b>	
6. <u>Ensure correct parameters are set in the VFD or Soft Starter if applicable</u>	OK <input type="checkbox"/>
7. <u>Start pump with discharge valve closed and ensure the pump is running without undue noise, vibration and temperature</u>	OK <input type="checkbox"/>
8. <u>To ensure motor load balancing, record:</u>	
<u>Pump running amps L1</u>	_____ A
<u>Pump running amps L2</u>	_____ A
<u>Pump running amps L3</u>	_____ A
9. <u>Stop pump</u>	OK <input type="checkbox"/>
10. <u>Complete <b>Low Power Tuning</b> (Danfoss VFD only) and record values into <b>Commissioning Worksheet (for low flow/dry pump protection)</b></u>	OK <input type="checkbox"/>
11. Repeat steps 6 to 10 for other pumps/drives	OK <input type="checkbox"/>
<b>Pump Performance and Flowmeter Calibration</b> – To verify as built pump curves and confirm flowmeter accuracy.	
12. Verify flowmeter accuracy where practical	OK <input type="checkbox"/>
13. Complete Pump Performance test including shutoff head	OK <input type="checkbox"/>
14. Use <b>Commissioning Worksheet</b> to record and assess results	OK <input type="checkbox"/>

# F8945 - WPS Commissioning Check Sheet

## Pump Control Checks

**Pump Fault Test** - Confirm backup pump(s) come online after a duty pump fault during automatic operation. Shall be completed for all pumps.

15. Select all pumps to "off" position	OK <input type="checkbox"/>
16. Ensure available water supply is sufficient for tests	OK <input type="checkbox"/>
17. Ensure pump discharge valves are open	OK <input type="checkbox"/>
18. Confirm all drives have no faults present	OK <input type="checkbox"/>
19. Set Target Pressure Setpoint > current control pressure reading <i>The Target Pressure Setpoint must be set such that only one pump is required to operate.</i>	OK <input type="checkbox"/>
20. Select Pump 1 to "automatic" position	OK <input type="checkbox"/>
21. Confirm Pump 1 starts	OK <input type="checkbox"/>
22. <u>Select Pump 2 to "automatic" position</u>	OK <input type="checkbox"/>
23. <u>Fault Pump (2-1 (i.e. 1)) – i.e. open one c/b feeder for phase failure relay – fault VFD</u>	OK <input type="checkbox"/>
24. <u>Confirm Pump (2-1 (i.e. 1)) fault displayed on HMI</u>	OK <input type="checkbox"/>
25. <u>Confirm Pump 2 starts</u>	OK <input type="checkbox"/>
26. Repeat Steps 21 to 25 for pumps 3, 4 and 5 (where applicable)	OK <input type="checkbox"/>
27. Stop system – all pumps to "off" position	OK <input type="checkbox"/>
28. Resume original Target Pressure Setpoint	OK <input type="checkbox"/>
<b>Duty / Follow Test</b> - Determine correct pump duty & follow operation.	
29. Select all pumps to "off" position	OK <input type="checkbox"/>
30. Ensure available water supply is sufficient for tests	OK <input type="checkbox"/>
31. Ensure pump discharge valves are open	OK <input type="checkbox"/>
32. Confirm all drives have no faults present	OK <input type="checkbox"/>
33. Set Target Pressure Setpoint > current control pressure reading	OK <input type="checkbox"/>
34. Select all pumps to "automatic" position	OK <input type="checkbox"/>
35. Confirm Pump 1 starts	OK <input type="checkbox"/>
36. <u>Confirm Pump 2 starts after time delay.</u> <i>If pump does not start, set Target Pressure Setpoint &gt; current control pressure reading (or increase demand to drop pressure).</i>	OK <input type="checkbox"/>
37. Repeat Step 36 for pumps 3, 4 and 5 (where applicable)	OK <input type="checkbox"/>
38. Set Target Pressure Setpoint < current control pressure reading	OK <input type="checkbox"/>
39. Confirm all pumps stop after time delay <i>If not all pumps stop, set Target Pressure Setpoint &lt; current control pressure reading (or decrease demand to increase pressure).</i>	OK <input type="checkbox"/>

# F8945 - WPS Commissioning Check Sheet

40. Select all pumps to "off" position	OK <input type="checkbox"/>
41. Resume original Target Pressure Setpoint	OK <input type="checkbox"/>
<b>Automatic Pump Cycling Test - Confirm correct pump cycling operation.</b>	
42. Select all pumps to "off" position	OK <input type="checkbox"/>
43. Ensure available water supply is sufficient for tests	OK <input type="checkbox"/>
44. Ensure pump discharge valves are open	OK <input type="checkbox"/>
45. Confirm all drives have no faults present	OK <input type="checkbox"/>
46. Set Target Pressure Setpoint > current control pressure reading (or increase demand to drop pressure)	OK <input type="checkbox"/>
47. Record which pump is selected as Duty Pump by controller	_____
48. Select all pumps to "automatic" position	OK <input type="checkbox"/>
49. Confirm Duty Pump starts	OK <input type="checkbox"/>
50. Set Target Pressure Setpoint < current control pressure reading (or decrease demand to increase pressure)	OK <input type="checkbox"/>
51. Confirm Duty Pump stops	OK <input type="checkbox"/>
52. Record which pump is selected as Duty Pump (new) by controller	_____
53. Set Target Pressure Setpoint > current control pressure reading (or increase demand to drop pressure)	OK <input type="checkbox"/>
54. Confirm Duty Pump starts	OK <input type="checkbox"/>
55. Set Target Pressure Setpoint < current control pressure reading (or decrease demand to increase pressure)	OK <input type="checkbox"/>
56. Confirm Duty Pump stops	OK <input type="checkbox"/>
57. Record which pump is selected as Duty Pump (new) by controller	_____
58. Select all pumps to "off" position	OK <input type="checkbox"/>
<b>Confirm Deadband Controls – Confirm specified actions upon triggering Low Low, High High, Low and High pressure levels.</b>	
59. Specify (project specific)	OK <input type="checkbox"/>
60. Specify (project specific)	OK <input type="checkbox"/>
61. Specify (project specific)	OK <input type="checkbox"/>
<b>Other Controls</b>	
62. Interaction with other devices (e.g. pressure / flow)	OK <input type="checkbox"/>
<b>Generator Checks</b>	
63. Ensure sufficient water available for test	OK <input type="checkbox"/>
64. Ensure generator main switch is off	OK <input type="checkbox"/>
65. Select pumps to "off" position	OK <input type="checkbox"/>

# F8945 - WPS Commissioning Check Sheet

66. Connect generator and check all connections	OK <input type="checkbox"/>
67. Start generator and check phase direction and voltages	OK <input type="checkbox"/>
68. Select changeover switch to generator supply	OK <input type="checkbox"/>
69. Close main switch and check all voltages	OK <input type="checkbox"/>
70. <u>Select Pump 1 to "automatic" and confirm correct operation</u>	OK <input type="checkbox"/>
71. Repeat Step <b>Error! Reference source not found.</b> for other pumps <i>Note due to portable generator size potentially all pumps may not be able to run and shall be decided on an individual site basis.</i>	OK <input type="checkbox"/>
72. Select pumps to "off" position	OK <input type="checkbox"/>
73. Restore mains power and disconnect generator	OK <input type="checkbox"/>
<b>SAT Signoff</b>	
To verify completion of all SAT items to the satisfaction of Stakeholders.	
<b>CONSTRUCTOR</b>	
Name:	Position:
Signature:	Date:
<b>UNITYWATER WITNESS (Commissioning)</b>	
Name:	Position:
Signature:	Date:
<b>UNITYWATER WITNESS (Operations)</b>	
Name:	Position:
Signature:	Date:
<b>UNITYWATER WITNESS (Electrical)</b>	
Name:	Position:
Signature:	Date:
<b>UNITYWATER WITNESS (SCADA)</b>	
Name:	Position:
Signature:	Date:
<b>UNITYWATER WITNESS (Mechanical)</b>	
Name:	Position:
Signature:	Date: