

2	COMMISSIONING CHECKLISTS	3
2.1	CHECKLISTS SAMPLES.....	3
2.1.1	AUH Pre-Functional Checklist	4
2.1.2	FCU Pre-commissioning and Start-Up Check Sheet.....	10
2.1.3	VAV/CAV Pre-commissioning Check Sheet.....	14
2.1.4	Outdoor Unit Pre-commissioning Check Sheet.....	16
2.1.5	PCU Start- Up Report	18
2.1.6	Cooling Tower Checklist	26
2.1.7	Water Cooled Chillers Checklists	30
2.1.8	Outdoor Unit Checklist.....	37
2.1.9	VRF Checklist.....	38
2.1.10	Circulating Pumps Checklist	40
2.1.11	Pressurisation Units.....	45
2.1.12	Extract Fan Check Sheet.....	48
2.1.13	Energy Meter Check Sheet.....	51
2.1.14	Humidifier Checklist.....	54
2.1.15	Cooling Tower Water Softener Commissioning Report	61
2.1.16	Fuel System Pre-checks	63
2.1.17	Leak Detection Commissioning Report	66
2.1.18	Vacuum De-gasser Checklist.....	69
2.1.19	Packaged Ozone Plant Integrated Ride Stream Filter.....	72
2.1.20	Laboratory Humidifier	75
2.1.21	Outdoor Unit Pre-commissioning Check Sheet.....	78
2.1.22	DX Unit Commissioning Report	80
2.1.23	RACU Pre-commissioning	81
2.1.24	Mini Reverse Osmosis.....	87
2.1.25	Cooling Tower Reverse Osmosis.....	90
2.1.26	Vehicle Exhaust Test Sheet.....	98
2.1.27	Circuit Breaker Test Report	100
2.1.28	Current Transformer Test Report.....	101
2.1.29	HV-Ductor Report	103
2.1.30	Metering Checks and Micrologic Test Report.....	105
2.1.31	Power Correction Factor Test Report.....	107
2.1.32	Lighting Control System (LCS) Check list	110
2.1.33	ATS Check Sheet	117
2.1.34	HV-Ductor Report	123
2.1.35	Metering Checks and Micrologic Test Report.....	125
2.1.36	CB Pre-commissioning Check Sheet	127
2.1.37	Energisation Checks Form.....	128
2.1.38	UPS Module Tests.....	130
2.1.39	EL Functional Test Report.....	132
2.1.40	DB Pre - Check Sheet.....	133
2.1.41	Ion & Silver Copper Water Treatment Pre-Commissioning Report	134
2.1.42	Hot Water pumps Pre-Commissioning Report	136
2.1.43	Camera Pre-checks	138
2.1.44	WorkStation Pre-checks	139

2.1.45 System & Storage Manager Pre-checks	140
2.1.46 Booster Set Pumps Commissioning Report	141
2.1.47 Workstation Functional Test	142
2.1.48 System Manager Functional Test	143
2.1.49 Booster Pumps Pre-Commissioning Report.....	144
2.1.50 Fixed Box / Dome / PTZ Camera Functional Test.....	146
2.1.51 MSFD & MD Functional Test	147
2.1.52 CCTV System Cause and Effect Test.....	149
2.1.53 Pump Pre-Commissioning Check Report.....	151
2.1.54 Storage Manager Functional Test.....	153
2.1.55 ANPR Camera Functional Test.....	154
2.1.56 PAVA System Check List.....	155
2.1.57 Integration Test CCTV & EACS	158
2.1.58 Fix Camera Functional Test.....	159
2.1.59 PTZ Camera Functional Test.....	160
2.1.60 EHW Pre-Commissioning Report.....	161
2.1.61 Wireless LAN Controllers Test Sheet.....	163
2.1.62 Energisation Checks Form	165
2.1.63 External Sump Pumps Pre-Commissioning Report.....	167
2.1.64 RAID ,NTP Server And Cameras Configuration.....	170
2.1.65 Check list for Testing and commissioning of Motor control centres	173
2.1.66 Access Points Functional Test Report	174
2.1.67 Pre-commissioning check list – Stand pipe system – Fire Fighting	180
2.1.68 Panic Alarm System Check List	181
2.1.69 EACS/CCTV Integration Inspection Check List.....	182
2.1.70 Intruder Detection System Check List	183
2.1.71 External Sump Pump Commissioning Report	184
2.1.72 Client Workstation checklist.....	185
2.1.73 Hot Water Circulating Pumps Commissioning Report	186
2.1.74 Sprinkler system Commissioning checklist.....	187
2.1.75 Access Controlled Door checklist.....	194
2.1.76 VFD Commissioning Report	195
2.1.77 Transfer Pump (TF) Commissioning Report.....	197
2.1.78 Secondary Condensate Pump (UPA) Commissioning Report.....	199

2 COMMISSIONING CHECKLISTS

2.1 CHECKLISTS SAMPLES

- 1 Attached are several checklists for MEP and Special Systems.
- 2 All Contracts Conditions, Requirements and Clauses shall take precedence over these minimal requirements checklists.
- 3 All these checklists are to be considered for guidance and not governing any directions. Manufacturers recommendations along with the Owner representative and PMCM can accept as is or modify as required.
- 4 For voltages and frequencies, regulations and requirements of Kahramaa and relevant authorities should be taken into account.

2.1.1 AUH Pre-Functional Checklist

Appendix 1 - AHU Pre-Functional Checklist

AHU Pre-Functional Checklist		

S/N	DESCRIPTION	STATUS	REMARKS
MODEL VERIFICATION			
FAN		VFD	
Manufacturer:		Manufacturer:	
Model:		Model:	
Serial No		Serial No	
Motor Make:		Rated Power :.....kW	
Motor Power Rating:.....kW		Rated Voltage:.....V	
Motor Voltage:.....V		Rated Current:.....A	
Motor Phase:		Frequency:.....Hz	
Motor Current:.....A		Power Factor (if any):.....	
Fan Speed:.....rpm		Asset Tag (if any):.....	
Pulley Size:			
INSTALLATION CHECKS			
1	Verify Units is installed on a level foundation ie no slope or unevenness	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Verify AHU Casing condition good: no dents and door gaskets installed	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Verify Access doors close tightly - no leaks	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Verify unit is permanently affixed with identification tag.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Verify unit is precisely aligned and the front side of the modules must be exactly parallel to each other	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6	Verify Maintenance access acceptable for unit and components	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7	Verify assembly of the units is completed as per manufacturer recommendations	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8	Check that modules are connected well with all bolts supplied to ensure air tightness	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9	Verify that module connections are joined properly by supplied sealing materials	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

10	Verify that any holes in sections are sealed with silicone	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
11	Confirm that the coil pipe fittings are properly tightened and sealed	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
12	Verify that U-traps are installed on drain connection.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
13	Check depth of trap as per approved and calculated selection. Designmm	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
14	Verify that Supply / Return air ducts are supported properly	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
15	Verify air handling connections (Canvas/Flexible) are symmetrical and stress free	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
16	Check Instrumentation (if any) installed according to specification (thermometers, pressure gages, flow meters, etc.)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
17	Verify Dampers closes freely without any obstruction. Ensure these are left fully open.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
18	Verify Dampers actuators locate at correct locations	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
19	Verify Dampers actuators access for maintenance and operation suitable and adequate	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
20	Verify Dampers actuators correctly identified and labelled	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
21	Verify ducting is completed and ensure all dampers in full position	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

ELECTRICAL CHECKS

1	Verify power and control wiring installed correctly and tight for the below: 1. Fans 2. Electric Heaters 3. Humidifiers 4. Lighting 5. Actuators	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Test power supply to ensure compliance with motor requirements	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Verify Proper grounding installed for components and unit (if applicable)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Verify Starter overload breakers installed and correct size	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Verify All control devices, pneumatic tubing and wiring complete	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6	Verify VFDs installed, tested and ready for operation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7	Verify Drive size matches motor size	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8	Record VFD nameplate	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

SUPPLY \ EXHAUST FAN CHECKS				
1	Verify Any outside visible damages visible, record if any	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
2	Check Belt-Tension & condition is acceptable, if not adjust accordingly	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
3	Verify Fan Chamber is clean and ready for use	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
4	Verify Plastic plugs in the door frame plus outside panel holes if any	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
5	Verify Cable connection of the micro switch on the right hand side of motor	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
6	Ensure that Transportation locks are removed	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
7	Verify anti vibration mounting for any signs of deflection	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
8	Verify any gaps between panels, if so close/seal with silicone	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
9	Verify correct alignment of the fan and motor is acceptable	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
COOLING COIL CHECKS				
1	Verify any obvious coil damages, coils are clean and fins are in good condition	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
2	Verify Plastic plugs in the door frame plus outside panel holes if any	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
3	Check Air vent and drain vent fixed in the coil outlet and inlet respectively	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
4	Verify Gasket and the outer black rubber covering in the coil outlet and inlet fixed	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
5	Verify Any gaps between panels, if so close with silicone.	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
6	Check Pipe fittings complete and pipes properly supported.	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
7	Check no leaking apparent around fittings	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
8	Verify Control Valve actuator access for maintenance and operation suitable and adequate	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
9	Verify Control Valve actuator correctly identified and labelled	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
FILTER CHAMBER CHECKS				
1	Verify any obvious damages, mention if any	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
2	Verify Plastic plugs in the door frame plus outside panel holes if any	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
3	Verify Filter pressure differential measuring device installed and functional (magnahelic, inclined manometer, etc.)	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	

4	Verify Filters clean and tight fitting.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Verify Bag filter condition and record rating (if shown)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
JET SPRAY HUMIDIFIER CHECKS			
1	Verify any obvious damages on the control panel and jet nozzles, mention if any.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Verify Plastic plugs in the door frame plus outside panel holes if any.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Verify power supply cabling connected properly and tagged.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Verify water supply pipework correctly installed as per design.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Record data from nameplate of humidifier. Manufacturer: Model: Serial No:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
ELECTRICAL BATERRY			
1	Verify heating element for any damages during transportation or installation of AHU cubicles	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Verify nameplate rating and compare with approved Material Submittal	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Verify power supply cabling connected properly and tagged.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
<u>REMARKS</u>			

Appendix 2 - AHU Functional Test Form

AHU Functional Test Form			
S/N	DESCRIPTION	STATUS	REMARKS
MODEL VERIFICATION			
FAN		VFD	
Manufacturer:		Manufacturer:	
Model:		Model:	
Serial No		Serial No	
Motor Make:		Rated Power :kW	
Motor Power Rating:.....kW		Rated Voltage:.....V	
Motor Voltage:.....V		Rated Current:.....A	
Motor Phase:		Frequency:.....Hz	
Motor Current:.....A		Power Factor (if any):.....	
Fan Speed:.....rpm		Asset Tag (if any):.....	
INITIAL RUN (LIGHT LOAD)			
1	Verify fan rotation if correct	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Verify and record parameters below: i. Power Kw ii. Voltage V iii. Phase iv. Frequency Hz v. Running Current A vi. Fan Speed rpm	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Verify motor, drive and fan are free from vibration or excessive noise	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Verify no overheating of motor and bearings	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

NORMAL RUN				
1	Verify and record parameters below: i. Power Kw ii. Voltage V iii. Phase iv. Frequency Hz v. Running Current A vi. Fan Speed rpm		Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Verify motor, drive and fan are free from vibration or excessive noise		Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Verify no overheating of motor and bearings		Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Using Pitot tube verify parameters below: i. Static Pressure: Pa Calculated: Pa Actual: Pa ii. Air Volume: l/s Calculated: l/s Actual: l/s		Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Verify and confirm that there is no air leakage on the unit		Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6	Verify and confirm that all accessories (gauges) are working properly		Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7	Confirm that air handling unit is well secured to its supports.		Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8	Verify the HOA switch properly activates and deactivates the unit		Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
REMARKS				

2.1.2 FCU Pre-commissioning and Start-Up Check Sheet

Appendix 1 - FCU Pre-commissioning Check Sheet

FCU Pre-commissioning Check Sheet			
S/L	CHECK LIST	STATUS	REMARKS
Model Verification			
1	<p>Verify and record nameplate of Fan Coil Unit as per below:</p> <p>As Specification/Material Submittal</p> <ol style="list-style-type: none"> 1. Manufacturer: 2. Model: 3. Serial No: 4. Motor Make: 5. Motor Power :.....kW 6. Motor Voltage:.....V 7. Motor Current:.....A 8. Motor Frequency:.....Hz 9. Motor speed:.....rpm 10. Motor Power Factor:..... 11. Asset Tag (if any):..... 	<p>Ok <input type="checkbox"/> Not Ok <input type="checkbox"/></p> <p>As Actual installation</p> <ol style="list-style-type: none"> 1. Manufacturer: 2. Model: 3. Serial No: 4. Motor Make: 5. Motor Power :.....kW 6. Motor Voltage:.....V 7. Motor Current:.....A 8. Motor Frequency:.....Hz 9. Motor speed:.....rpm 10. Motor Power Factor:..... 11. Asset Tag (if any):..... 	
General Checks			
2	Ensure that FCU is locally isolated	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
3	Ensure and verify packing has been removed from fan coil unit	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
4	Verify and ensure that fan coil units and associated components are properly secured.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
5	Verify Property equipment Tag number and nameplate is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
6	Verify Surrounding and unit surface condition Clean & tidy before testing.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
7	Verify Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
8	Visually verify units condition acceptable (damages during transportation or installation)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
9	Verify Anti-vibration mountings installed correctly (if applicable).	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
Electrical Checks			
10	Confirm all systems are correctly earthed to specification prior to startup	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
11	Verify the electrical and control wiring completed, tested and energized up to the	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

	spur/switch.		
12	Visually verify that all the electrical connections are tight	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
13	Ensure that all power and control wiring has been completed in detail in accordance with the circuit diagram(s)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
14	Verify and record Spur/Switch Overload protection CurrentA	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
15	Check over all push buttons and confirm ready for operation, test all buttons are operational	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
16	Check Power line circuit breakers or fuses have proper ratings for equipment installed.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
17	Record incoming power supply rating Voltage:.....V Current:.....A	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
18	Verify and ensure LOTO procedure are in place and implemented	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

Air Distribution Checks

19	Ensure Ductwork completed and signed off	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
20	Verify sections of flexible duct are not formed into tight bends (if applicable)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
21	Verify the installation of the false ceiling is complete	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
22	Verify the room has adequate return air grilles installed	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
23	Ensure all fan coil unit is switched to their design fan speed	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
24	Verify all volume control dampers (VCD) in diffusers or ducting and fire dampers (FD) are set to fully open	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
25	Verify filters and fans are clean (Note: filters generally need to be cleaned before commissioning)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
26	Verify cooling coil damper is fully open on air-side fan coil units	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
27	Verify Fresh air supply ductwork installed correctly	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

Water Distribution Checks

28	Verify pipework with ancillaries all installed and signed off	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
29	To ensure that the hydronic system is tested, flushed and vented.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
30	Verify that air has been bled from heating and cooling coils of the FCU	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
31	Verify all pipework and pipe joints are sound, free of any apparent leak	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
32	Verify flow and return pipes are connected the correct way around	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

33	Ensure that the measuring flow rate devices are fitted the correct way around (if applicable)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
34	To ensure the strainers are cleaned and re-instated	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

ARAB ENGINEERING BUREAU

Appendix 2 - FCU Start-Up Check Sheet

FCU Start-Up Check Sheet			
S/L	CHECK LIST	STATUS	REMARKS
1	Verify LOTO Permits in hand signed off	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
2	Verify permit to work in hand and signed off (if applicable)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
3	Verify fan rotation if correct by checking air supplied from the diffusers	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
4	Verify and record parameters below:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
5	1. Verify and Record Incoming Power supplied to Isolator. Voltage.....V 2. Running CurrentA Speed Setting:..... 3. Running CurrentA Speed Setting:..... 4. Running CurrentA Speed Setting:..... 		
6	Verify motor, drive and fan are free from vibration or excessive noise	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
7	Visually verify and confirm that there is no air leakage on the ducting system	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
8	Verify and record any imbalance in the voltage.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

2.1.3 VAV/CAV Pre-commissioning Check Sheet

Appendix 1 - VAV/CAV Pre-commissioning Check Sheet

VAV/CAV Pre-commissioning Check Sheet			
S/L	CHECK LIST	STATUS	REMARKS
Model Verification			
	Verify and record data of VAV/CAV Unit as per below:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	As Specification/Material Submittal 12. Manufacturer: 13. Model: 14. Serial No: 15. Handing Side: 16. VAV/CAV Size: 17. Heater Battery Panel Tag no(if any): 18. IUC/PR Panel Tag no:	As Actual installation 1. Manufacturer: 2. Model: 3. Serial No: 4. Handing Side: 5. VAV/CAV Size: 6. Heater Battery Panel Tag no(if any): 7. IUC/PR Panel Tag no:	
General Checks			
1.	Visually check any damages during transportation or installation,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify Surrounding and unit surface condition Clean & tidy before testing,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify adequate room space for operation and maintenance purpose,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify Property equipment Tag number and nameplate is fixed and readable,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify permanent access door location acceptable (where installed),	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify and record Handing of the VAV/CAV Unit Approved Handing:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify and record size of VAV/CAV unit, Approved Size:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Confirm VAV or CAV installed as the Air flow direction of the system,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify and confirm VAV has Heater elements installed,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify VAV/CAV Motorised Actuator installed and wired correctly,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify and check condition and status of averaging airflow Flow Grid	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Ensure up and down stream duct completed with all accessories and signed off,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
	Verify all volume control dampers (VCD) in diffusers or ducting and fire dampers (FD) are set to fully open position,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

	Verify Differential Pressure Switch installed across the VAV or CAV.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify Primary Air Handling Unit tested and ready for operation.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify straight duct length at inlet of VAV/CAV units. Minimum 1x Diameter is required	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	

ELECTRICAL CHECKS

1.	Verify control panels installed as per BMS schematic requirements	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify the electrical and control wiring completed, tested up to the spur/switch/Isolator,	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Confirm all panels are correctly earthed to specification prior to energisation,	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Visually verify that all the electrical connections are tight,	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify VAV or CAV wired to Intelligent Unitary Controllers (IUC),PR Panel or AHU. Tag No:.....	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify and record Heater Control Panel Voltage, Current, Phase and Isolator Identification tag Voltage:.....V	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify Field sensors installed, wired correctly and ready for operation.(temperature sensors DPS,...) as per BMS schematics	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify and ensure LOTO procedure are in place and implemented,	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	

Remarks:

2.1.4 Outdoor Unit Pre-commissioning Check Sheet

Appendix 1 - Outdoor Unit Pre-commissioning Check Sheet

Outdoor Unit Pre-commissioning Check Sheet			

S/L	CHECK LIST	STATUS	REMARKS
Installation Checks			
1	Visually check for any potential damages during transportation, storage or installation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
2	Property equipment Tag number is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
3	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
4	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
5	Visually check the pipework runs for any obvious damages or non-compliance of installation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
6	To ensure that commissioning access is available and suitable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
7	Check the outdoor unit's air intake is clear with no obstruction.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
8	Verify Mounting/support system and vibration isolation are free of movement	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
9	Check that floor gully and all drainage traps are clear and ready for service (if applicable)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
10	Check all cooling coils for obvious damages during installation and delivery.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
11	Verify Condenser fan blades for any obvious damages or obstruction.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
12	Verify all refrigerant pipework are completed, tested, vacuumed charged and insulated.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
13	Verify piping is properly sized, sloped, trapped as shown in the piping schematics	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
14	Check Drain line connected and pitched per local code.(if applicable)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
15	Check ducting completed and ready for use	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
16	Check fasteners that motors—some may have become loose during shipment	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
17	Installation materials and tools have been removed from equipment (literature, shipping materials, construction materials, tools, etc.)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
Electrical Checks			
18	Confirm all systems are correctly earthed to specification prior to startup	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

19	Verify the electrical and control wiring completed, tested and energized up to the isolator.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
20	Verify isolators are installed correctly and labelled.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
21	Verify and record Isolator Overload protection CurrentA	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
22	Supply voltage and phase matches equipment nameplate.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
23	Verify and Record Incoming Power supplier to Isolator. L1-L2.....V L2-L3.....V L1-L3.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
24	Check over all push buttons and confirm ready for operation, test all buttons are operational	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
25	Check Power line circuit breakers or fuses have proper ratings for equipment installed.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
26	Check Control wiring connections completed between indoor evaporator and heat rejection equipment.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

Remarks:

2.1.5 PCU Start- Up Report

Appendix 1 - PCU Start- Up Report

PCU Start-Up Report			
S/L	CHECK LIST	STATUS	REMARKS
CHECK OF THE UNIT CONDITIONS AT ARRIVAL			
1.1	The unit characteristics are responding to the order	Yes <input type="checkbox"/> No <input type="checkbox"/>	
1.2	Packing is in good condition	Yes <input type="checkbox"/> No <input type="checkbox"/>	
1.3	External unit is in good condition	Yes <input type="checkbox"/> No <input type="checkbox"/>	
1.4	Unit envelope documentation is present	Yes <input type="checkbox"/> No <input type="checkbox"/>	
1.5	Air filters are present and in good condition	Yes <input type="checkbox"/> No <input type="checkbox"/>	
1.6	Internal panels are in good condition	Yes <input type="checkbox"/> No <input type="checkbox"/>	
1.7	Internal main components are visually in good condition	Yes <input type="checkbox"/> No <input type="checkbox"/>	
1.8	Note about problem/defective part:		
LAYING OF THE REFRIGERANT LINES AND POSITIONING OF THE CONDENSER UNIT			
2.1	Gas discharge lines circuits 1/2	Ext diam mm	
2.2	Insulated Gas lines circuits 1/2	Yes <input type="checkbox"/> No <input type="checkbox"/>	
2.3	Liquid lines circuits 1/2	xt diam mm	
2.4	Insulated Liquid lines circuits 1/2	Yes <input type="checkbox"/> No <input type="checkbox"/>	
2.5	Lines length – circuits 1/2		m
2.6	Number of curves on pipes circuit 1/2	C1-n°	
		C2-n°	

2.7	Number of siphons on gas pipes line circuit 1/2	C1-n°	
		C2-n°	
2.8	Int/Ext units height difference circuit 1/2		m
2.9	Bottom Condenser	Yes <input type="checkbox"/> No <input type="checkbox"/>	
2.10	Condenser air flow direction circuit ½(Ho/Ve)	Vert <input type="checkbox"/> Hor <input type="checkbox"/>	
2.11	No Return valve present on liquid line circuit 1/2	Yes <input type="checkbox"/> No <input type="checkbox"/>	
2.12	Min Distance between condensers		m
2.13	Note about problem/defective part:		
UNIT CIRCUITS/VACUUM AND REFRIGERANT PRE-CHARGE			
3.1	Verify that the refrigerant circuits ½ of the internal unit was factory pressurized at 2 bars (only air condenser units) before proceeding with line pipes connections	Yes <input type="checkbox"/> No <input type="checkbox"/>	
3.2	Verify that the refrigerant circuits ½ of the external unit was factory pressurized at 2 bars (only air condenser units) before proceeding with pipes connections	Yes <input type="checkbox"/> No <input type="checkbox"/>	
3.3	Sealing Check of complete ref. system(only air cooled system)	Yes <input type="checkbox"/> No <input type="checkbox"/>	
3.4	Vacuum value measured (abs.mbar) circuit 1/2	N/A <input type="checkbox"/>	mbar
3.5	Refrigerant (**) type and quantity charge circuit 1/2	Ref 	C1-kg C2-kg
3.6	Note about problem/defective part:		
WATER CONDENSER CHECK (W/F/H UNIT ONLY)			
4.1	Water circuit sealing check on exchanger cond. Circuit ½	Yes <input type="checkbox"/> No <input type="checkbox"/>	

CHILLED WATER COIL CHECK (F/D/H UNIT ONLY)			
5.1	Water circuit pressure and sealing check	Yes <input type="checkbox"/>	No <input type="checkbox"/>
5.2	Water circuit pressure		Bar
CONDENSATE DRAIN CHECK			
6.1	Trap presence check	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6.2	Correct water discharge check	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6.3	Water connection sealing check	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6.4	Condensate drain pump sealing check (if present)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6.5	Note about problem/defective part:		
CHECK THE ELECTRICAL SUPPLY BEFORE UNIT POWER ACTIVATION			
7.1	Check all the terminal tightening	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7.2	Internal check: components on electrical panel are undamaged	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7.3	Internal unit check: the cable size is at least the minimum required by the supply voltage and installation type	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7.4	Internal primary power voltage: (between V-N if present) V1,V2,V3,V DC		
7.5	Frequency Hz (50hz or 60 Hz) (***)		
7.6	Internal check: main voltage phases sequences L1,L2,L3,N on the main switch and in all the drivers (automatic switch/Contractors) L1-NV L1-L2V L2-NV L2-L3V L3-NV L1-L3V	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7.7	Internal unit check: secondary power voltage (between V-N if present) V1, V2, V3 V DC		
7.8	External unit check: electrical components are undamaged	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7.9	External unit check: that all the electrical screws are tightened.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7.10	Note about problem/defective part:		

AUXILLIARY CIRCUIT – CHECK THE PARAMETER SET IN THE ELECTRONIC CONTROL				
8.1	Control board and control display lighting		Yes <input type="checkbox"/>	No <input type="checkbox"/>
8.2	Check parameters following unit parameters		Yes <input type="checkbox"/>	No <input type="checkbox"/>
8.3	Active alarm code number(short description on below field note)		Yes <input type="checkbox"/>	No <input type="checkbox"/>
8.4	Software release installed			
8.5	Second set point			°C
8.6	ΔT between room/outdoor			°C
8.7	ΔT between room/ FC type			°C
8.8	ΔT between room/ FC Fluid			°C
8.9	Second set point			°C
8.10	Team work Mode connections (Mode No,1,2) (****)			Mode
8.11	Temperature and Humidity set point			°C
8.12	Temperature and Humidity PB			RH%
8.13	Dehumidification enabled		Yes <input type="checkbox"/>	No <input type="checkbox"/>
8.14	Parameter number or display initial of the modified parameters	Value	Parameter number or display initial of the modified parameters	Value
8.15				
8.16				
8.17				
8.18				
8.19				
8.20				
8.21				
8.22				

8.23				
8.24				
8.25				
8.26	Note about problem/defective part:			

CHECK THE COMPONENT CORRECT OPERATION

9.1	Datacenter ambient humidity/temperature		°C		RH%
9.2	External ambient temperature	Yes <input type="checkbox"/>	No <input type="checkbox"/>		°C
9.3	Evaporator fans failure alarm check	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
9.4	Evaporator fan rotation direction check	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
9.5	Evaporator fan Power Voltage in standard operation: (V-N)/ V1,V2, V3				
9.6	Evaporator fan Power Voltage in Dehumidification: (V-N)/ V1,V2, V3				
9.7	Ev. Fan 1 abs.current: I1, I2, I3				
9.8	Ev. Fan 2 abs.current: I1, I2, I3				
9.9	Ev. Fan 3 abs.current: I1, I2, I3				
9.10	Ev. Fan 4 abs.current: I1, I2, I3				
9.11	Analog signal 0-10V standard operation (ONLY EC FAN)				V
9.12	Analog signal 0-10V in dehumidified operation (ONLY EC FAN)				V
9.13	Analog signal 0-10V in No power operation (ONLY EC FAN)				V
9.14	Inlet unit , check for air recirculation absence	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
9.15	Condenser unit main power voltage(V-N)/ V1,V2, V3				
9.16	Condenser fan direction check	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
9.17	Condenser Fan 1 absorbed current : I1, I2 , I3				
9.18	Condenser Fan 2 absorbed current : I1, I2 , I3				

9.19	Condenser Fan 3 absorbed current : I1, I2 , I3			
9.20	Condenser Fan 4 absorbed current : I1, I2 , I3			
9.21	Note about problem/defective part:			

REFRIGERANT CIRCUIT 1

10.1	Check crankcase heater has been activated at least 4 hrs before compressor activation	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
10.2	Check comp rotating direction (scroll only)_	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
10.3	Compressor voltage: (V_N) / V1, V2, V3			
10.4	Current abs current: I!, I2, I3			
10.5	Suction Pressure			Bar
10.6	Liquid pressure on liquid receiver			Bar
10.7	Superheat			K
10.8	Subcooling			K
10.9	Discharge Temperature			°C
10.10	<u>Condenser C1</u>			
10.11	Check for hot air circulation	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
10.12	Fan speed control pressure/voltage set point		Bar	V
10.13	Fan speed control pressure/voltage operating mode (if in stable condition)		Bar	V
10.14	On-Off pressure switch set points		Volt	Bar
10.15	Cond water valve On-Off activation check	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
10.16	HP pressure switch calibration check	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
10.17	LP pressure switch calibration check	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
10.18	NB: Digital scroll compressor must run at 100% during startup			
10.19	Check compressor / valve modulation (only digital scroll)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

10.20	Check electronic TX valve set up (if Present)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
10.21	Condenser water Inlet/Outlet temperature (W/F?H UNIT ONLY)	IN		OUT
10.22	Check for evaporator air temperature DT	Air in		Air out
REFRIGERANT CIRCUIT 2				
11.1	Check crankcase heater has been activated at least 4 hrs before compressor activation	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
11.2	Check comp rotating direction (scroll only)_	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
11.3	Compressor voltage: (V_N) / V1, V2, V3			
11.4	Current abs current: I1, I2, I3			
11.5	Suction Pressure			Bar
11.6	Liquid pressure on liquid receiver			Bar
11.7	Superheat			K
11.8	Subcooling			K
11.9	Discharge Temperature			°C
11.10	<u>Condenser C2</u>			
11.11	Check for hot air circulation	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
11.12	Fan speed control pressure/voltage set point		Bar	V
11.13	Fan speed control pressure/voltage operating mode (if in stable condition)		Bar	V
11.14	On-Off pressure switch set points		Volt	Bar
11.15	Cond water valve On-Off activation check	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
11.16	HP pressure switch calibration check	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
11.17	LP pressure switch calibration check	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
11.18	NB: Digital scroll compressor must run at 100% during startup			
11.19	Check compressor / valve modulation (only digital scroll)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
11.20	Check electronic TX valve set up (if Present)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

11.21	Condenser water Inlet/Outlet temperature (W/F?H UNIT ONLY)	IN		OUT	
11.22	Check for evaporator air temperature DT	Air in		Air out	
HUMIDIFIER CHECK (IF INSTALLED)					
12.1	Charge solenoid valve act. check	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
12.2	Discharge solenoid valve check	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
12.3	Water discharge sealing check	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
12.4	Power voltage: (V-N) / V1, V2, V3				
12.5	Absorbed current:I1, I2, I3				

Refrigerant Type (**)	Power Supply Frequency (***)	Team Work Mode (****)
R420c	50 Hz	NO
R22	60 Hz	1
R134a		2
R410a		

Test Instrument(s) SL.NO:

Type:

Due calibration date

Test Instrument(s) SL.NO:

Type:

Due calibration date

REMARKS

.....

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.....

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2.1.6 Cooling Tower Checklist

Appendix 1 - Cooling Tower Pre-commissioning Check Sheet

Cooling Tower Pre-commissioning Check Sheet			
S/L	CHECK LIST	STATUS	REMARKS
MODEL VERIFICATION			
1	Verify and Record Nameplate data as per Below:	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	i. Manufacturer:		
	ii. Model:		
	iii. Serial Number:		
	iv. Motor Make:		
	v. Motor Power Rating Design : 37 kW Site: kW		
	vi. Motor Voltage: Design : 415 V Site: V		
	vii. Motor Phase: Design : 3 Ph Site : Ph		
	viii. Motor Current: Design : 67.3 A Site: A		
	ix. Fan Speed: Design : 1500 rpm Site: rpm		
	x. Pulley Size:		
	xi. Additional Equipment Details:		
GENERAL CHECKS			
2	To ensure that the Cooling Towers is isolated from the SDP or the VFD	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
3	Property equipment Tag number and nameplate are fixed and readable	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
4	Adequate room space for operation and maintenance purpose	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
5	Surrounding and unit surface condition Clean & tidy before testing	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
6	Verify and check air inlet for any obstruction	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
7	Verify Fan belts adjusted to correct tension	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
8	Verify Fan shaft collars installed and tight	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

9	Verify Fan lubricated sufficiently	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
10	Inspect all doors, panels, and sections for corrosion, dents, scratches, fit, and missing hardware.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
11	Verify and ensure that Cooling Towers and associated components are properly secured	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
12	Visually verify units condition acceptable (damages during transportation or installation)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
13	Verify Anti-vibration mountings installed correctly (if applicable).	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
14	Ensure the anti-vibration transport restraints are removed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
15	Verify Temperature and pressure gauges installed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
16	Verify Pipe fittings and accessories completed and tight	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
17	Ensure Isolation valves and balancing valves installed as per spec	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
18	Verify Valves correctly labeled as per approved tagging	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
19	Verify Pipes not supported on Cooling Tower connections	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
20	Ensure flexible connections are free from any stress caused by the pipe or cooling tower alignment.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
21	Verify Piping type and flow direction labelled on piping	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
22	Verify Hydronic system flushing complete & strainers cleaned	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
23	Check for any visible water leaks	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
24	Verify piping insulated correctly, witnessed and signed off.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
25	Verify Drift eliminators conditions prior to fan start up	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
26	Verify Water treatment ready and operational	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
27	Verify Cooling Tower Basin Bleed Off valve status	<input type="checkbox"/> Open <input type="checkbox"/> Closed	

ELECTRICAL CHECKS

1	Verify all systems are correctly earthed to specification prior to start-up	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
2	Verify the electrical and control wiring completed, tested and energized up to the VFD or Isolators	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
3	Visually verify that all the electrical connections are tight	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
4	Ensure that all power and control wiring has been completed in detail in accordance with the circuit diagram(s)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
5	Verify Motor wiring is as per factory wiring diagram (execute motor Megger Test after prolonged shut down)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
6	Verify and record Spur/Switch/Isolator Overload protection rating	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
7	Check over all push buttons and confirm ready for operation, test all buttons are operational	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

8	Record Motor line voltage for all three phase of the incoming power supply rating to VFD of the Fan. L1-N V L1-L2 V L2-N..... V L2-L3..... V L3-N..... V L1-L3..... V	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
9	Record Line voltage and current of the Spray pump isolator/spur. Design : Voltage:.....V Current:...4.72....A Site : Voltage:.....V Current:.....A	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
10	Verify and ensure LOTO procedure are in place and implemented.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
11	Verify VFD powered (wired to controlled equipment). Record Asset no:	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
12	Verify VFD interlocked to control system (checked by installer)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
13	Ensure Drive location not subject to excessive temperature (high/low), moisture, or dirt.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
14	Ensure Drive size matches motor size	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
15	Verify Motor is rated for use with VFDs	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
16	Check Internal setting designating the model is correct	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
17	Check Shutdown interlocks between VFD & motor verified to be operational	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
18	Verify Separate conduit for VFD incoming power & outgoing motor leads	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
19	Verify the VFD setting conforms to Cooling Tower Electrical requirements	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
20	Verify no disconnection means installed between VFD & Motor.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
SPRAY PUMP SYSTEM			
1	Verify Water treatment Equipment operational (both Water softener and Packaged Ozone Plant Integrated Ride Stream Filter)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
2	Verify and ensure CT Make up water booster set operation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
3	Fill the Tank and observe ball valve functionality	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
4	Verify Overflow is not obstructed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
5	Verify and check for any leaks	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
6	Visually verify Spray nozzle conditions.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
7	Verify Circulation piping condition	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
8	Verify Tower basin access adequate	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
9	Spray water inlet strainer installed and clean	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
10	Verify Makeup water supply piped, tested and flushed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

Appendix 2 - Cooling Tower Start-Up Report

Cooling Tower Start-Up Report			
S/L	CHECK LIST	STATUS	REMARKS
SPRAY PUMP			
1.	Start pump and record parameters below: Design : Voltage:.....V Current:.....A Site : Voltage:.....V Current:.....A	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
2.	Verify connected pipe connection on water inlet for any leakage	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
3.	Check Water flow to the different inlet pipes of the cooling tower is balance (to avoid dry operation) equal inlet pressures	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
4.	Verify spray system and spray pattern	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
COOLING TOWER FAN			
5.	Verify Motor data against motor name plate	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
i.	Running Current : Design : 67.3 A Site: A	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
ii.	Voltage: Design : 415 V Site: V	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
6.	Start fan	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
i.	Verify Fan rotation verified correct under normal operation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
ii.	Verify and check fan free from any abnormal vibration	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
iii.	Verify and check fan free from any unusual noise	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
7.	Measure & record line to line voltage, all phases L1-NV L1-L2V L2-NV L2-L3V L3-NV L1-L3V	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
8.	Verify Motorized valves (if Any), dampers and float switches functionality	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
9.	Verify no drift from CT discharge	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
10.	Verify no leaks on both the air and water side	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

2.1.7 Water Cooled Chillers Checklists

Appendix 1 - Water Cooled Chillers Pre-checks

Water Cooled Chillers Pre-checks		

S/L	CHECK LIST	STATUS	REMARKS
Installation Checks			
1	Unit(s) installed on a level surface.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
2	All accessories fitted.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
3	Machine(s) checked for visible damage.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
Evaporator Piping Checks			
4	Chilled water piping connected to the unit(s).	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
5	Piping connected to the system and/or air handling units	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
6	Pressure gauges, thermometers and Binder points fitted on both sides of the evaporator.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
7	Air vents and drains fitted.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
8	Pumps run and tested for quantity.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
9	Check and Record the following parameters below: <i>Design evaporator flow rate : L/S</i> <i>Design evaporator press. Drop: KPA</i> <i>Site measured flow rate L/S</i> <i>Site measured press. Drop: KPA</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
Condenser Piping Checks			
10	Condenser water piping connected to the unit(s).	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
11	Piping connected to the system and/or air handling units	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
12	Pressure gauges, thermometers and Binder points fitted on both sides of the condenser	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
13	Water supply connected for filling the systems.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
14	Air vents and drains fitted.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
15	Pumps run and tested for quantity.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
16	Condenser water piping connected to the unit(s).	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

17	Check and Record the following parameters below: <i>Design Condenser flow rate :L/S</i> <i>Design Condenser press. Drop:.....KPA</i> <i>Site measured flow rate.....L/S</i> <i>Site measured press. Drop:.....KPA</i>	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
<i>Electrical Checks</i>				
18	Three phase power supply(s) installed and connected as in wiring diagrams.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
19	Single phase power supply(s) installed and connected as in wiring diagrams	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
20	All control and interlock wiring installed as in wiring diagrams.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
21	All control wiring tested for faults.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
22	Where necessary, all fuses sized and fitted.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
23	Interconnecting power and control wiring diagram enclosed.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
24	System can be operated at 75% of full load condition.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	

REMARKS

Appendix 2 - Water Cooled Chiller Commissioning Report

BUILDING ADDRESS	<input type="text"/>
CUSTOMER	<input type="text"/>
UNIT MODEL	<input type="text"/>
CUST.REFERENCE	<input type="text"/>
SERIAL NUMBER	<input type="text"/>
ASSET TAG NUMBER	<input type="text" value="S1-CH-01"/>
REFRIGERANT TYPE [SEE OWU]	<input type="text"/>
REFRIGERANT CHARGE, KG	<input type="text"/>
EVAPORATOR TYPE	<input type="text"/>
CONDENSER TYPE	<input type="text"/>
COMPRESSOR MODEL NUMBER	<input type="text"/>
NOMINAL VOLTAGE AND RLA	<input type="text"/>
COMPRESSOR SERIAL NUMBER	<input type="text"/>
BUILDING NR	<input type="text"/>
EQUIPMENT SALES ORDER	<input type="text"/>
TECHNICIAN NAME	<input type="text"/>
COMMUNICATION WITH A CPC/BMS SYSTEM	<input type="text"/>
TECHNICIAN NAME	<input type="text"/>
UNIT STARTED ON	<input type="text"/>
UNIT DELIVERED ON	<input type="text"/>
UNITWARRANTY EXPIRES ON	<input type="text"/>
COMMUNICATION WITH A CPC/BMS SYSTEM	<input type="text"/>

1. PRE-STARTUP OPERATIONS

DESIGN VALUES

ACTUAL
VALUES

CHILLED WATER LOOP

- Inlet and outlet gauges, with proper reading scale
- Vibration eliminators installed
- Thermometer water inlet
- Thermometer water outlet
- Strainer
- Volume of water circuit
- Flow control switch is operative
- Water pump interlock
- Water pump operated by chiller control
- Actual glycol type and %

<input type="text"/>	kPa	<input type="text"/>	kPa
<input type="text"/>		<input type="text"/>	m ³
<input type="text"/>	%	<input type="text"/>	%

CONDENSER WATER LOOP

- Inlet and outlet gauges, with proper reading scale
- Thermometer water inlet
- Thermometer water outlet
- Control of Minimum water temperature
- Actual glycol type and %
- Vibration eliminators installed
- Strainer
- Flow control switch is operative
- Water pump interlock
- Water pump operated by chiller control

<input type="text"/>	kPa	<input type="text"/>
<input type="text"/>		<input type="text"/>
<input type="text"/>		<input type="text"/>
<input type="text"/>	kPa	

ELECTRICAL POWER SUPPLY CIRCUIT

- L 1 - L 2
- L 2 - L 3
- L 3 - L 1
- Control power Supply Volts
- Control modules power supply
- Power supply protection breaker settings
- Main Power wiring cross-section size
- Main Power wiring type

A magn.

UNIT OFF

<input type="text"/>	V
<input type="text"/>	A Therm
<input type="text"/>	mm ²

UNIT ON

<input type="text"/>	V
<input type="text"/>	A

STARTER PANEL

- Correct phase sequence is verified in every passages
- Wiring connection have been tightened?
- Check main disconnect switch operations
- Check main disconnect switch aux contact operations
- Check electrical continuity of power circuit
- Designed RLA (label)
- CT ratio has been checked (record ratio)

<input type="checkbox"/>	
<input type="checkbox"/>	A

MOTOR INSULATION (NEVER APPLY MEGGER TO MACHINES UNDER VACUUM)

- Terminal stud 1 vs ground MO
- Terminal stud 2 vs ground MO
- Terminal stud 3 vs ground MO
- Terminal stud 4 vs ground MO
- Terminal stud 5 vs ground MO
- Terminal stud 6 vs ground MO
- Terminal stud 1 vs terminal 2 MO
- Terminal stud 2 vs terminal 3 MO
- Terminal stud 3 vs terminal 1 MO

ckt 1	ckt 2

CONTROL SYSTEM

- Wiring connection have been tightened?
- Check and set HP switch, 1st stage
- Check and set HP switch, 2st stage
- Check and set UCM
- Trim RLA setting
- Dry-Run Starter
- Test UCM safeties
- Gas pump check

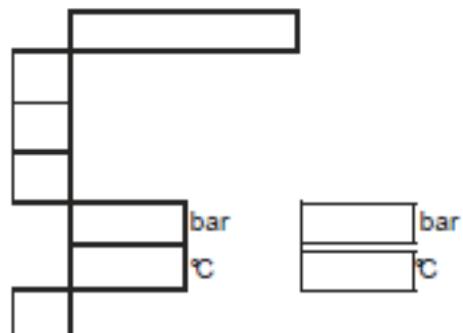
<input type="checkbox"/>	Trip points
	bar
	bar
	Amp

2. CHECKS AND SETTINGS OF CHILLER UNIT

UNIT ASSEMBLY

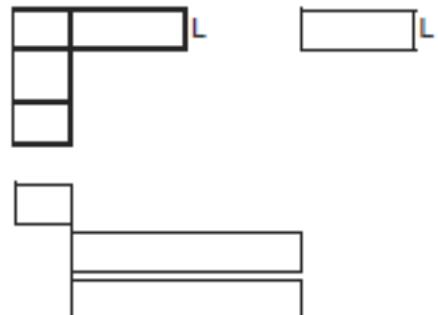
- Chiller foundation
- Unit is levelled within acceptable limits (see IOM)?
- Shipping mounts removal
- General unit control
- Refrigerant unit charge check at ambient temperature of
- Leaks search

VALUES



LUBRICATION CIRCUIT

- Charge Oil Oil type:
- Oil and evaporator heaters operate and draw design current?
- Oil and refrigerant valves are open or throttled as needed.?
- Control of operations of oil solenoid valve
- Oil filter model
- Refrigerant filter model



REFRIGERANT CIRCUIT

- Oil and refrigerant valves are open or throttled as needed.?



EVAPORATOR

- Check sensors and transducers
- Record pressure setting for safety valve HP



CONDENSER

- Check sensors and transducers
- Record pressure setting for safety valve HP



3. CHILLER OPERATING PARAMETERS

2.1.8 Outdoor Unit Checklist

Appendix 1- Outdoor Unit Pre-commissioning Check Sheet

Outdoor Unit Pre-commissioning Check Sheet		

Item	Check list	Accepted	Not	N/A
1	Confirm that punch list and construction checklist if any have been completed			
2	Confirm that all preservation/packaging measures have been removed			
3	Ensure system cleanliness and condition for startup/running of system			
4	Confirm all systems are correctly earthed to specification prior to startup			
5	Check that floor gully and all drainage traps are clear and ready for service			
6	Confirm that indoor unit (including internal equipment compartments) is clear and ready for use.			
7	Check all cooling coils are completed			
8	The units are installed as per the latest drawings			
9	All refrigerant pipework is completed, tested and insulated			
10	The unit is clean internally and externally			
11	Condenser fan air intake spacing is adequate and has no obstructions			
12	Mounting/support system and vibration isolation are free of movement			
13	All the coil fins are clean and no damages			
14	Controllers are installed			
15	Electrical wiring completed , tested and energised upto the isolator			
16	Condenser fan rotation direction is correct			
17	Motors rotating freely without any abnormal noise or smell			
18	Overload protection (Size and setting correct)			
19	Check over all push buttons and confirm ready for operation, test all buttons are operational			
20				
21				
22				
23				

REMARKS

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2.1.9 VRF Checklist

Appendix 1 – VRF Start-Up & Commissioning Report

VRF Start-Up & Commissioning Report				

System No:		Type:	Serviced Area:		
Master Unit				Slave Unit 1	
Model No.			Model No.		
Serial No.			Serial No.		
System Voltage				System Voltage	
Phase (v)				Phase (v)	
L1-N	L2-N	L3-N	L1-L2	L1-N	L2-N
			L1-L3		L1-L3
			L2-L3		L2-L3
System Amps.				System Amps.	
Cooling		Heating		Cooling	Heating
L1	L2	L3	L1	L1	L1
			L2		L2
			L3		L3
Compressor Status		Compressor Status		Compressor Status	
Inv.		Inv		Inv	
Std.		Std.		Std	
Slave Unit 2				System Refrigerant Charge (Kg)	
Model No.					
Serial No.				Size	Factor
System Voltage				1/4"	6.4
					0.02
					2
Phase (v)				3/8"	9.5
					0.05
					9
L1-N	L2-N	L3-N	L1-L2	1/2"	12.7
			L1-L3	5/8"	15.9
			L2-L3	3/4"	19.1
System Amps.				7/8"	22.2
					0.26
					0.37

Cooling			Heating		A + B =		
L1	L2	L3	L1				
			L2				
			L3		Total Refrigerant Charge (Kg)		
Compressor Status			Compressor Status		Calculated Additional Charge		
Inv.		Inv.		Precharge			
Std.		Std.		Total			

INDOOR UNIT DATA								
No .	Locatio n	Model No.	Serial No.	Group No	Voltag e	Amp s	Temperature (c)	
							Air Inlet	Air Outlet
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

Normal Temperature Air Outlet 8 °C ~ 15 °C

FIELD SETTINGS

Cool / Heat Select :

Dip Switch 1 - 1:

REMARKS

.....
.....
.....

2.1.10 Circulating Pumps Checklist

Appendix 1 - Circulating Pumps Pre-Commissioning Report

Circulating Pumps Pre-Commissioning Report					
PUMP NAMEPLATE DETAILS			MOTOR NAMEPLATE DETAILS		
Type			Type		
Model No	DT Code	Model No	DT Code		
Imp Dia		kW	V	FLA	Hz
Q,m ³ /h	Q,m ³ /h	RPM	DE brg	NDE brg	
Made In		Made In			
S/N	DESCRIPTION	STATUS		REMARKS	
General					
1	Check the pumps from damage occurred during the installation.	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
2	Property equipment Tag number is fixed and readable.	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
3	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
4	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
5	Water is available to operate the pump for at least 30 min.	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
6	Check arrows on the pump housing if corresponds with system flow direction	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
7	Verify no visible leaks on the pipework and system installation	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
8	Check air vents, Expansion Vessels and air separators installed in the vicinity	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
Electrical					
9	Verify the terminal box orientation for maintenance purpose	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
10	Check inverter and isolator installed correctly and ready for use	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
11	Check power cable and termination labelled and correctly installed	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		
12	Check the installed disconnection point between starter and motor without interrupting motor operation	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>		

13	Verify Lock Out tag Out procedure in place and permits available	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
14	Verify that the power wiring is in compliance to Motor wiring diagram.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
14	Record VFD nameplate as per below			
	I. Manufacturer:			
	II. Serial No:			
	III. Asset Tag No:			
	IV. Power rating:			
	V. Voltage Rating:			
	VI. Current Rating:			
Mechanical				
15	Verify hydronic pipework tested, flushed and vented	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
16	Check Pump base frame is rigidly secured to inertia base with aligned anti-vibes	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
17	Check alignment of flexible connections to pipework system	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
18	Suction piping layout avoids air lock and turbulence.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
19	Inlet and outlet pipe supports are properly installed.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
20	Pipe flanges are aligned without strain against the pump flanges and flexible connections.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
21	Verify Isolation Valves installed and tagged on both side of the pump	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
22	Verify Pressure gauges installed on suction and discharge side.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
23	Verify Pipework is insulated and labeled	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
REMARKS				
.....				
.....				
.....				

Appendix 2 - Circulating Pumps Commissioning Report

Circulating Pumps Commissioning Report			
S/N	DESCRIPTION	STATUS	REMARKS
Controls (VFD) Checks			
1	Record VFD nameplate as per below		
	VII. Manufacturer:		
	VIII. Serial No:		
	IX. Asset Tag No:		
	X. Power rating: kW		
	XI. Voltage Rating: V		
	XII. Current Rating: A		
2	Verify and Record VFD Set Points Parameters		
	I. Motor Frequency: Hz		
	II. Motor Power: kW		
	III. Motor Voltage: V		
	IV. Motor Current: A		
	V. Nominal Motor Speed: rpm		
	VI. Maximum Frequency: Hz		
	VII. Motor thermal Current: A		
	VIII. Acceleration Time: sec		
	IX. Deceleration Time: sec		
General Checks			
3	Check and record incoming cables power supply to Pump motor energized (only for 1 Phase pumps) Voltage: V Current: A	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
4	Check and record incoming cables power supply to Pump motor energized (only for 3 Phase pumps) L1-N V L1-L2 V	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

	L2-N..... V L2- L3..... V L3-N..... V L1- L3..... V		
5	Verify and record Rotation of pump <i>Clockwise</i> <input type="checkbox"/> <i>Anti-Clockwise</i> <input type="checkbox"/>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
6	Verify Isolator of pump is functional when activated.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
7	Record and Measure any imbalance (If any)	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
8	Check for any unusual noise during operation	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

END USER :			Date:				
Project:			RFIT No:				
Installation:			IFC Tag No:				
Application :							
PUMP TYPE:			MODEL:		DT CODE:		
IMP DIA:		Q, m3/H:	H, Mh:		MADE:		
MOTOR TYPE:			MODEL:		DT CODE:		
KW:	V:	FLA:	Hz:	RPM:	MADE:		
CONTROLLER:			START METHOD:				
VOLT:	FREQ:	OLR:	RAMP UP/DOWN, Sec:				
PERFORMANCE DATA		PUMP 1	PUMP 2	PUMP 3	PUMP 4	PUMP 5	PUMP 6
Closed valve pr., Bar							
Closed valve Amps							
Rated flow test, m3/H							
Inlet pr., Bar							
Outlet pr., Bar							
Diff. pr., Bar							
Operating Amps							
Voltage, V							
Frequency, Hz							
Max. flow test, m3/H							
Inlet pr., Bar							
Outlet pr., Bar							
Diff. pr., Bar							
Operating Amps							
Voltage, V							
Frequency, Hz							

COMMENTS:

ARAB ENGINEERING BUREAU

2.1.11 Pressurisation Units

Appendix 1 - Pressurisation Units Pre-Commissioning Report

Pressurisation Units Pre-Commissioning Report					
PUMP NAMEPLATE DETAILS		MOTOR NAMEPLATE DETAILS			
Type	Type				
Model No	DT Code	Model No	DT Code		
Imp Dia		kW	V	FLA	Hz
Q,m3/h	Q,m3/h	RPM	DE brg	NDE	
Made In	Made In				
General					
Check the PU from damage occurred during installation or transportation			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Property equipment Tag number is fixed and readable.			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Adequate room space for operation and maintenance purpose			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Surrounding and unit surface condition Clean & tidy before use.			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Water is available to operate the pump for at least 30 min.			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check arrows on the pump housing if corresponds with system flow			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Verify no visible leaks on the pipework and system installation			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Electrical					
Verify the terminal box orientation for maintenance purpose			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check inverter and isolator installed correctly and ready for use			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check power cable and termination labelled and correctly installed			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Verify Log Out tag Out procedure in place and permits available			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Pipework					
Check hydraulic pipework tested, flushed and vented			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check PU base frame is rigidly secured to inertia base with aligned anti-			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Suction piping layout avoids air lock and turbulence.			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Inlet and outlet pipe supports are properly installed.			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Pipe flanges are aligned without strain against the pump flanges.			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Isolation Valves installed on both side of the pump			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Verify Pressure gauges installed on suction and discharge side.			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Verify and check for any unusual noise or abnormalities to the pump			Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
REMARKS					
.....					
.....					

Appendix 2 - Pressurisation Units Commissioning Report

Pressurisation Unit Commissioning Report			
IMPRESS PRESSURISATION SET			
NAME PLATE			
Type / Model No		Serial No / Prod Date	Made In
Pump Type	Pump no & Prod Date (mm/YY)	Motor Part No / kW	Application
GENERAL PARAMETERS			
Measure and record supply voltage: Design <u>415 V</u>		Actual recorded	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/>
Measure and record frequency: Design <u>50 Hz</u>		Actual recorded	<u>Hz</u>
Measure and record running current: Actual recorded		<u>A</u>	
Record electrical phase: Design <u>3 Phase</u>		Actual recorded	<u>Phase</u>
Record Motor rating: Design <u>0.75 kW</u>		Actual Recorded	<u>kW</u>
Check and record System Design Pressure: <u>Bar</u>			
Record fluid Temperature: <u>Celsius</u>			
System content volume: Design <u>75000 l</u>		Actual offered	<u>l</u>
Direction of rotation Pump 1	Anti Clock-Wise <input type="checkbox"/>	Clock-Wise <input type="checkbox"/>	
Direction of rotation Pump 2	Anti Clock-Wise <input type="checkbox"/>	Clock-Wise <input type="checkbox"/>	
CONTROL PARAMETERS AND SETTINGS			
Operating Set pressure:		Design _____	Actual Recorded
Differential pressure:		Design _____	Actual Recorded
Pump hold off time:		Design _____	Actual Recorded
No of pumps:		Design _____	Actual Offered
Low water reset time:		Design _____	Actual Recorded
24 HR pump run test:		Design _____	Actual Recorded
Pressure low level alarm ON:		Design _____	Actual Recorded
Pressure low level alarm OFF:		Design _____	Actual Recorded
Pressure high level alarm ON:		Design _____	Actual Recorded
Pressure high level alarm OFF:		Design _____	Actual Recorded
Leak alarm pre-set time:		Design _____	Actual Recorded
Service hours:		Design _____	Actual Recorded
Leak alarm window:		Design _____	Actual Recorded
Pump test:		Design _____	Actual Recorded
Pump test ON/OFF.		Design _____	Actual Recorded

OPERATING PARAMETERS			
Operating current at nominal flow Pump No: 1 Actual recorded <u>A</u>			
Operating current at nominal flow Pump No: 2 Actual recorded <u>A</u>			
Pump alternation :	Pressure tank:	Pre-charge press:	
EXPANSION VESSEL 1			
NAME PLATE			
Type / Model No	Serial No / Prod Date	Made In	
Vessel Type	Prod Date (mm/YY)	Part No / kW	Application
GENERAL PARAMETERS			
Pre-Charge : <u>Bar</u>	Gas Type re-fill:.....		
Vessel Size: <u>l</u>	Fluid Temp: <u>Celcius</u>		
EXPANSION VESSEL 2 (if applicable)			
NAME PLATE			
Type / Model No	Serial No / Prod Date	Made In	
Vessel Type	Prod Date (mm/YY)	Part No / kW	Application
GENERAL PARAMETERS			
Pre-Charge : <u>Bar</u>	Gas Type re-fill:.....		
Vessel Size: <u>l</u>	Fluid Temp: <u>Celcius</u>		
EXPANSION VESSEL 3 (if applicable)			
NAME PLATE			
Type / Model No	Serial No / Prod Date	Made In	
Vessel Type	Prod Date (mm/YY)	Part No / kW	Application
GENERAL PARAMETERS			
Pre-Charge : <u>Bar</u>	Gas Type re-fill:.....		
Vessel Size: <u>l</u>	Fluid Temp: <u>Celcius</u>		
EXPANSION VESSEL 1			
REMARK			

2.1.12 Extract Fan Check Sheet

Appendix 1 - Pre-commissioning Check Sheet Extract Fan

Pre-commissioning Check Sheet Extract Fan			
S/L	CHECK LIST	STATUS	REMARKS
Model Verification			
1	Verify and record nameplate of Fan Motor as per below:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> <input type="checkbox"/>	
	As Specification/Material Submittal <ol style="list-style-type: none"> 1. Manufacturer: 2. Model: 3. Serial No: 4. Motor Make: 5. Motor Power : kW 6. Motor Voltage: V 7. Motor Current: A 8. Motor Frequency: Hz 9. Motor speed: rpm 10. Motor Power Factor: 11. Asset Tag (if any): 	As Actual installation <ol style="list-style-type: none"> 1. Manufacturer: 2. Model: 3. Serial No: 4. Motor Make: 5. Motor Power : kW 6. Motor Voltage: V 7. Motor Current: A 8. Motor Frequency: Hz 9. Motor speed: rpm 10. Motor Power Factor: 11. Asset Tag (if any): 	
2	Verify and record nameplate of VFD/DOL as per below:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> <input type="checkbox"/>	
	<ol style="list-style-type: none"> 1. Manufacturer: 2. Model: 3. Serial No: 4. Asset Tag (if any): 		
Installation Checks			
3	Verify Property equipment Tag number and nameplate is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
4	Verify Surrounding and unit surface condition Clean & tidy before testing.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
5	Verify Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
6	Verify Fan Casing condition good: no dents,etc...	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
7	Verify Fans suction and discharge connections (Canvas/Flexible) are symmetrical and stress free.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
8	Verify ducting is completed and ensure all dampers (VCD,MSFD,FD etc...) in full open position	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
9	Verify Anti-vibration mountings installed correctly (if applicable).	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

10	Verify and confirm Axial flow fans installed for correct air flow direction	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
11	Check alignment of pulleys ,belt tension and couplings	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
12	Verify drive guards are fitted and access for speed measurement provided	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

Electrical Checks

13	Confirm all systems are correctly earthed to specification prior to startup	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
14	Check & Inspect the Power supply Disconnection installed and labelled	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
15	Check all cable terminations are all tight	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
16	Verify controller drive installed correctly and rating matches motors.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
17	Verify the electrical and control wiring completed, tested and energized up to the isolator.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
18	Verify and record Isolator Overload protection CurrentA	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
19	Ensure supplied voltage and phase matches equipment nameplate.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
20	Verify and Record Incoming Power supplier to Isolator. L1-L2.....V L2-L3.....V L1-L3.....V	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
21	Check over all push buttons and confirm ready for operation, test all buttons are operational	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
22	Check Power line circuit breakers or fuses have proper ratings for equipment installed.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
23	Verify and ensure LOTO procedure are in place and implemented	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
24	Confirm all systems are correctly earthed to specification prior to startup	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
25	Check & Inspect the Power supply Disconnection installed and labelled	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

Remarks

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Appendix 2 - Start-Up Check Sheet Extract Fan

Start-Up Check Sheet Extract Fan			
S/L	CHECK LIST	STATUS	REMARKS
GENERAL CHECKS			
1	Verify LOTO Permits in hand signed off	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
2	Verify permit to work in hand and signed off (if applicable)	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
INITIAL RUN (Light Load)			
3	Verify fan rotation if correct	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
4	Verify and record parameters below:	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	1. Verify and Record Incoming Power supplied to Isolator. L1-L2..... V L2-L3..... V L1-L3..... V 2. Frequency Hz Running Current A		
5	Verify motor, drive and fan are free from vibration or excessive noise		
6	Verify no overheating of motor and bearings		
NORMAL RUN (Normal Operation)			
7	Verify and record parameters below:	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	1. Verify and Record Incoming Power supplied to Isolator. L1-L2..... V L2-L3..... V L1-L3..... V 2. Frequency Hz 3. Running Current A		
8	Verify motor, drive and fan are free from vibration or excessive noise		
9	Verify no overheating of motor and bearings		
10	Visually verify and confirm that there is no air leakage on the ducting system		
11	Verify and record any imbalance in the voltage.		

2.1.13 Energy Meter Check Sheet

Appendix 1 - Pre-commissioning Check Sheet Energy Meter

Pre-commissioning Check Sheet Energy Meter		

S/L	CHECK LIST	STATUS	REMARKS
Model Verification			
1	Verify and record nameplate of Energy Meter as per below: As Specification/Material Submittal 12. Manufacturer: 13. Model: 14. Serial No: 15. Motor Voltage:.....V 16. Motor Current:.....A 17. Motor Frequency:.....Hz 18. Asset Tag (if any):.....	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> Ok <input type="checkbox"/>	
			As Actual Installation 12. Manufacturer: 13. Model: 14. Serial No: 15. Motor Voltage:.....V 16. Motor Current:.....A 17. Motor Frequency:.....Hz 18. Asset Tag (if any):.....
General Checks			
2	Verify Property equipment Tag number and nameplate is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
3	Verify Surrounding and unit surface condition Clean & tidy before testing.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
4	Verify Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
5	Visually verify units condition acceptable (damages during transportation or installation)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
6	Verify and record incoming power supply. Voltage:.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
7	Verify and confirm energy meters installed on the correct Chiller Water Line with correct flow direction of flow indicated on the body of the meter.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
8	Verify Ultraflow orientation acceptable. Ultra flow should not be mounted with the plastic case pointing upwards or downwards.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
9	Verify Energy Meter installed correctly with 2 no isolating valves on each side and a metering station	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
10	Verify the temp sensors installed correctly as per Manufacturer requirements.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
11	Verify the temperature sensors wired correctly	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
12	Verify the temperature sensors in the protection pockets/thermos wells on the respective pipe line the sealing is acceptable to avoid manipulation/misreading of the meter operation and meter cumulative data	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
13	Verify and record MULTICAL display mounted on Ultra flow or remotely mounted	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

14	Verify Chiller Water Pipework tested, flushed and vented.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
15	Check Chilled water system operation and circulating	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<u>REMARKS</u>			
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ARAB ENGINEERING BUREAU

Appendix 2 - Commissioning Check Sheet Energy Meter

Functional Check Sheet Energy Meter			
S/L	CHECK LIST	STATUS	REMARKS
METER CONFIGURATION			
1	Set Date & Time on the meter	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Reset the Meter run hour & fault Time Counters.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
COMMISSIONING			
3	Verify the isolating valves open	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Verify the cooling system and installation for tightness and vent carefully (if required)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	Verify if any apparent error code displayed and troubleshoot. <i>Record error (If Any):</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	Verify and record temperature sensor readings MULTICAL <i>Flow Temp:..... °C. Return Temp:..... °C</i> BMS Head End <i>Flow Temp:..... °C. Return Temp:..... °C</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	Verify and record Flow rate readings MULTICAL <i>Flow rate:..... l/s</i> MANOMETER READING <i>Flow rate:..... l/s</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8	Verify and record Cooling Capacity readings MULTICAL <i>Cooling Capacity:..... kW</i> By Calculation <i>Cooling Capacity:..... kW</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
9	Check the MULTICAL Display for any negative or reverse flow. If displayed re-verify piping not crossed over or the Flowmeter incorrectly installed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
10	Check the Meter display for any negative temperatures difference (Delta T). If negative temperature displayed, re-verify the sensors mounted on correct piping.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
REMARKS			

2.1.14 Humidifier Checklist

Appendix 1 - Humidifier Pre-Commissioning Report

HUMIDIFIER PRE-COMMISSIONING REPORT			

S/N	DESCRIPTION	STATUS	REMARKS
1.	VERIFY AND RECORD NAME PLATE DATA 19. Manufacturer: 20. Model: 21. Serial No: 22. Power :.....kW 23. Voltage:.....V 24. Current:.....A	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
HUMIFOG CONTROLLER PANEL CHECKS			
1.	Property equipment Tag number is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2.	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3.	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4.	Visually check for any potential damages during transportation, storage or installation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5.	Visually verify Level (alignment) of the Humifog Cabinet.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6.	Verify power and control wiring installed correctly and tight as per circuit diagram.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7.	Verify Proper grounding installed for components and unit (if applicable),	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8.	Verify installation is as per manufacturer recommendations	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
ELECTRICAL CHECKS			
1.	Verify power and control wiring installed correctly and tight.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2.	Verify Proper grounding installed for components and unit if applicable	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3.	Verify all control devices, pneumatic tubing and wiring complete	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4.	Verify Electrical Components tight and no obvious damage	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5.	Verify Solenoid valves wiring completed and tight	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6.	Verify link cable between master and slave unit completed and tight	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

7.	Verify DOL installed, tested and ready for operation.	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
8.	Record DOL nameplate	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
9.	Verify Drive size matches Humifog Panel rating requirements	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
MECHANICAL CHECKS				
1.	Verify any obvious damages or blockage on the jet nozzles,	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
2.	Verify Pipework material comply with manufacturer recommendation	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
3.	Verify Pipework installation tightness	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
4.	Verify Water Circuit Components tight and no obvious damage (Only applicable to Master Unit).	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
5.	Verify and confirm nozzle distribution rack is less than 50 m away from the master panel	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
6.	Verify atomization rack drain solenoid valves installed.	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
7.	Verify isolation valve installed at inlet of Humifog water connection (recommended)	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
8.	Verify pipework hydro tested to the required pressure rating	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
9.	Verify supply line to Humifog installed, tested and signed off,	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
10.	Verify Mini RO system inspected, signed off and ready for use,	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
11.	Verify and record the Inlet water pressure to Humifog via the valve station on the upstream of the Mini RO unit. Should be ≥ 3 bars	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
12.	Verify Drain pipe and drain bypass connected to drain system	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
13.	Verify Mini RO water supply parameters comply with Humifog recommended Water supply characteristics	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
14.	Ensure pipework flushed and disinfected prior to operation of mini RO and Humidifier	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	

REMARKS

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Appendix 2 - Humidifier Commissioning Report

HUMIDIFIER COMMISSIONING REPORT			
S/N	DESCRIPTION	STATUS	REMARKS
■■■■■	Verify and record name plate data Manufacturer: Model: Serial No: Power :kW Voltage:.....V Current:.....A DOL Asset Tag Ref:..... ■■■■■	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
■■■■■	Verify and record Main incomer voltage & current . Voltage :V Current :A	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
PUMP SETTING			
■■■■■	Set and Record Pump Setting Operating Mode		
a.	Flow Rate Control <input type="checkbox"/> Constant Pressure Control <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Record Set Point Pressure Range between 20-80 Bars <i>Pressure Set Point:.....Bar</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
■■■■■	Set and Record Pump Water Supply Set points	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
a.	Delay at Start Up <input type="checkbox"/> Delay in Steady Operation <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Record time delay Set Point Range between 1-999 seconds <i>Time Delay:.....Sec</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Warning Threshold <input type="checkbox"/> Alarm Threshold <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Record threshold conductivity value set Point Range between 1 -2000 μS <i>Conductivity Threshold:..... μS</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
PUMP SETTING SPECIAL FUNCTION			
■■■■■	Set and Record Pump Filling set points	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
a.	Enable the function for filling the filling system . ON <input type="checkbox"/> OFF <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set and record the fill cycle duration. Ranges between 1-60 minutes <i>Fill Cycle:.....Min</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

	Set and Record Auto wash set points		
a.	Emptying mode <input type="checkbox"/> Daily Wash Mode <input type="checkbox"/> Periodic Wash Mode <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set and record the time or period of Auto Wash. Ranges between 1-168 Hours <i>Time/Period:</i> <i>Hour</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set and record the duration of washing cycle. Ranges between 1-60 Min <i>Duration:</i> <i>Min</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
ZONE – CONFIGURATION INPUTS			
	Set and Record Zone Setting configuration.		
a.	Record the type of operation <i>Humidity control</i> <input type="checkbox"/> <i>Humid+Limit Humid control</i> <input type="checkbox"/> <i>Humid+Limit Temp control</i> <input type="checkbox"/> <i>Temperature control</i> <input type="checkbox"/> <i>Temp+Limit Humid control</i> <input type="checkbox"/> <i>Temp+Limit Temp control</i> <input type="checkbox"/> <i>External signal</i> <input type="checkbox"/> <i>Ext signal + Lim Humid</i> <input type="checkbox"/> <i>Ext signal + Lim Temp</i> <input type="checkbox"/> <i>External ON/OFF</i> <input type="checkbox"/> <i>Ext ON/OFF + Lim Humid</i> <input type="checkbox"/> <i>Ext ON/OFF + Lim Temp</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Enable display on Info screen of the value measured by the Aux probe. <i>ON</i> <input type="checkbox"/> <i>OFF</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Configure and record the control signals set points/parameters	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
a.	Configure type of signal generated by the probe. <i>NTC</i> <input type="checkbox"/> <i>0 to 135oh</i> <input type="checkbox"/> <i>0-1V</i> <input type="checkbox"/> <i>0-10V</i> <input type="checkbox"/> <i>4-20mA</i> <input type="checkbox"/> <i>0-20mA</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set min/max probe Values. Set point range between 0% to 100%. <i>Value:</i> <i>%</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set probe offset Values. Set point range between 0% to 100%. <i>Probe off se:</i> <i>%</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Limit the control signals set points/parameters		
a.	Configure type of signal generated by the probe. <i>NTC</i> <input type="checkbox"/> <i>0 to 135oh</i> <input type="checkbox"/> <i>0-1V</i> <input type="checkbox"/> <i>0-10V</i> <input type="checkbox"/> <i>4-20mA</i> <input type="checkbox"/> <i>0-20mA</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

	Set min/max probe Values. Set point range between 0% to 100%. <i>Value:</i>%	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set probe offset Values. Set point range between 0% to 100%. <i>Probe off se:</i>%	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Configure the Aux signals set points/parameters		
a.	Configure type of signal generated by the probe. <i>NTC</i> <input type="checkbox"/> <i>0 to 135oh</i> <input type="checkbox"/> <i>0-1V</i> <input type="checkbox"/> <i>0-10V</i> <input type="checkbox"/> <i>4-20mA</i> <input type="checkbox"/> <i>0-20mA</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set min/max probe Values. Set point range between 0% to 100%. <i>Value:</i>%	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set probe offset Values. Set point range between 0% to 100%. <i>Probe off se:</i>%	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
ZONE – SPECIAL FUNCTIONS			
	Set and record special zone functions		
a.	<i>Alarm relay logic</i> <input type="checkbox"/> <i>Flow switch logic</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set user interface language setting. <i>Italian</i> <input type="checkbox"/> <i>English</i> <input type="checkbox"/> <i>French</i> <input type="checkbox"/> <i>German</i> <input type="checkbox"/> <i>Spanish (if available)</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Show language selection at start-up <i>Enabled</i> <input type="checkbox"/> <i>Disabled</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set Minimum value of proportional control signal. Ranges from 5 to 80 % <i>Min Value:</i>%	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set and configure pressure relief set points	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
a.	Enable pressure relief <i>Enabled</i> <input type="checkbox"/> <i>Disabled</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set and record pressure relief Pressure relief duration. Ranges from 1-999 Sec <i>Duration:</i>sec	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Configure rotation of the atomising line/manifold		
a.	Set and configure atomising line/Manifold rotation <i>Enabled</i> <input type="checkbox"/> <i>Disabled</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Atomising line/manifold activation time. Ranges from 1 – 999 Secs <i>Time:</i>Secs	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

ZONE – DISTRIBUTION SYSTEM			
■	Configure and set rack steps flow rate		
a.	Capacity setting for the first step of the system. Ranges from 0 – 120 kg/H <i>Flow rate:</i>kg/H	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Capacity setting for the second step of the system. Ranges from 0 – 120 kg/H <i>Flow rate:</i>kg/H	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Capacity setting for the third step of the system. Ranges from 0 – 120 kg/H <i>Flow rate:</i>kg/H	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Capacity setting for the fourth step of the system. Ranges from 0 – 120 kg/H <i>Flow rate:</i>kg/H	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Capacity setting for the fifth step of the system. Ranges from 0 – 120 kg/H <i>Flow rate:</i>kg/H	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Capacity setting for the sixth step of the system. Ranges from 0 – 120 kg/H <i>Flow rate:</i>kg/H	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
ZONE – SUPERVISOR			
■	Set and configure remote control		
a.	Identifier for BMS network. Ranges between 0-200. Identifier no:.....	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set and record Communication Speed. 1200 bps <input type="checkbox"/> 2400 bps <input type="checkbox"/> 4800 bps <input type="checkbox"/> 9600 bps <input type="checkbox"/> 19200 bps <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set the communication protocol <i>Carel</i> <input type="checkbox"/> <i>Modbus</i> <input type="checkbox"/> <i>RS232</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Enable ON/OFF from BMS <i>Enabled</i> <input type="checkbox"/> <i>Disabled</i> <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
ZONE – EXTERNAL ALARMS			
■	Set and configure water treatment alarm logic		
a.	N.O. = (normally open) when connecting humiFog will show the Water treatment alarm if the connection is interrupted <input type="checkbox"/> N.C. = (normally closed) when connecting humiFog will show the Water treatment alarm if the connection is not interrupted (contact closed) <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

REMOTE ZONE SETTING			
██████	Record addition zone activation and network address (ranges between 1-32)		
a.	Zone 2: Yes <input type="checkbox"/> No <input type="checkbox"/> Network Address :.....		
	Zone 3: Yes <input type="checkbox"/> No <input type="checkbox"/> Network Address :.....		
	Zone 4: Yes <input type="checkbox"/> No <input type="checkbox"/> Network Address :.....		
	Zone 5: Yes <input type="checkbox"/> No <input type="checkbox"/> Network Address :.....		
	Zone 6: Yes <input type="checkbox"/> No <input type="checkbox"/> Network Address :.....		

REMARKS:

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2.1.15 Cooling Tower Water Softener Commissioning Report

Appendix 1 - Cooling Tower Water Softener Commissioning Report

Cooling Tower Water Softener Commissioning Report		
CONTROL PANEL		
Measure and record supply voltage: Design <u>240 V</u>	Actual recorded _____	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/>
Measure and record running current: Design <u>A</u>	Actual recorded _____	<u>A</u>
Check and record Phase : Design <u>1 Phase</u>	Actual recorded _____	
Calculate and record Incoming Power: Design <u>180 W</u>	Actual Calculated _____	<u>W</u>
HE 1.5 120 SOFTENER (TWIN)		
Check manifold pipework for correct installation	Ok <input type="checkbox"/>	
Not Ok <input type="checkbox"/>		
Check softener controllers settings	Ok <input type="checkbox"/>	
<input type="checkbox"/> Not Ok <input type="checkbox"/>		
Visually check the softener vessels for any damages		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check and verify the diaphragm of valves open and close smoothly	Ok <input type="checkbox"/>	
<input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check the position and installation of the Impulse water meter	Ok <input type="checkbox"/>	
<input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check and record Inlet Operating Pressure: <u>Bar</u>		
Check and record Outlet Operating Pressure: <u>Bar</u>		
Check and record Operating flow: Design <u>4 l/s</u>	Actual recorded _____	<u>l/s</u>
Check and record Controller Settings	Back Rate: Design <u>2.2 l/s</u>	Actual recorded _____ <u>l/s</u>
	Back Wash : Design <u>10mins</u>	Actual recorded _____ <u>mins</u>
	Salt Injection: _____	<u>Minutes</u>
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Rinse: _____	<u>Minutes</u>
	Ok <input type="checkbox"/> No Ok <input type="checkbox"/>	
Brine Refill: _____	<u>Minutes</u>	
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Initiate regeneration cycle and monitor all steps		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check and test the hardness level from softener unit	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>

REMARKS

ARAB ENGINEERING BUREAU

2.1.16 Fuel System Pre-checks

Appendix 1 - Fuel System Pre-checks

Fuel System Pre-checks			
S/N	DESCRIPTION	STATUS	REMARKS
Bulk Fuel Storage Tanks Checks			
1	Adequate room space for operation and maintenance purpose.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Ensure Ultronic Sonic Level installed correctly and verify calibration certificate	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Verify 80mm Overfill protection Solenoid Valve on each tank.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Verify Filling cabinet installed correctly installed.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6	Record Filing Point on cabinet to ground floor. <i>Design : 750 mm</i> <i>Actual:.....mm</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7	Verify control cabling terminals tight and properly installed.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8	Verify Access Hatches accessible and clear of obstruction	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
Fuel Transfer Pump Checks			
1	Adequate room space for operation and maintenance purpose.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Check the pumps from obvious damages occurred during the installation.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Property equipment Tag number is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Check arrows on the pump housing if corresponds with system flow direction	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6	Check Pump base frame is rigidly secured to inertia base with aligned anti-vibes	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7	Verify Isolation Valves installed and tagged on both side of the pump	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

8	Check the integrity of the foundation, there should be no visible cracks. Concrete plinth must be completely horizontal and flat. (if applicable)	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
9	Check the lubrication of pump and drives if stored long time.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
10	Ensure the voltage; frequency and no. Phase power supply is matching the name plate of the equipped.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
11	Check alignment and make sure that the alignment is within tolerance between the driver and pump.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
12	Rotate pump shaft manually to confirm free rotation of shaft.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
13	Check the entire pumping system to verify that the proper inlet and discharge valves are fully open, and that the drain valves and other auxiliary valves are closed.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
14	Verify and Record Pump Data Nameplate	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Pump 1: 25. Manufacturer: 26. Model: 27. Serial No: 28. Type: 29. Motor Power :..... kW 30. Motor Voltage:..... V 31. Motor Current:..... A 32. Motor Frequency:..... Hz 33. Motor speed:..... rpm 34. Type of Starter:..... 35. Condition of Bearing:..... 36. Asset Tag (if any):.....		
	Pump 2: 1. Manufacturer: 2. Model: 3. Serial No: 4. Type: 5. Motor Power :..... kW 6. Motor Voltage:..... V 7. Motor Current:..... A 8. Motor Frequency:..... Hz 9. Motor speed:..... rpm 10. Type of Starter:..... 11. Condition of Bearing:..... 12. Asset Tag (if any):.....		
Day and Dump Tanks Checks			
1	Verify Tanks are installed as per approved drawings.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
2	Verify that the float switches are installed and set correctly	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

3	Verify that bonded wall installed and of adequate size.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
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Piping Checks				
1	Verify distribution pipework air tested at 50Psi	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
2	Inlet and outlet pipe supports are properly installed.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
3	Pipe flanges are aligned without strain against the pump flanges and flexible connections.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
4	Verify Pressure gauges installed on suction and discharge side.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
5	Make sure to proper connections of suction and discharge lines. Ensure all fasteners are tightened.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
6	Verify Strainer clean and free of debris	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
7	Ensure that labels and signs are installed accordingly	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
8	Check the entire pumping system to verify that the proper inlet and discharge valves are fully open, and that the drain valves and other auxiliary valves are closed.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
Electrical Checks				
1	Verify the terminal box orientation for maintenance purpose	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
2	Check isolators installed correctly and ready for use	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
3	Check power cable and termination labelled and correctly installed	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
4	Verify Lock Out tag Out procedure in place and permits available	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
6	Verify Control cables installed correctly as per schematics	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
7	Check the circuit wiring connections, terminals and proper earthing equipment prior to final energization.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
8	Check the wiring of the motor, and briefly turn on the power to make sure that the pump rotates in the direction of the rotation arrow.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	

2.1.17 Leak Detection Commissioning Report

Appendix 1- Leak Detection Commissioning Report

Leak Detection Commissioning Report			
S/N	DESCRIPTION	STATUS	REMARKS
1	Record Control Panel Details:		
	<i>Manufacturer:</i> <i>Serial No.:</i> <i>Wall/Rack mounted:</i> <i>Circuits used:</i> <i>Type of Sensor:</i> <i>Total number of sensors:</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Verify Control Panel function		
	<i>Alarm Sound</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	<i>LED ignites</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	<i>Touch screen function</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	<i>Dry contact</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Verify configuration		
	<i>Valid passwords</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	<i>Relays to BMS</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Verify installation		
	<i>Fixing of Sensor</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	<i>Labelling of Sensor</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	<i>Labelling of DG-DTC</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	<i>Labelling of Jumper cable</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

5	Simulate Leak		
	<i>Plug in the Yellow Simulation Plug</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Digital Unit</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>LED Ignites</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Alarm sound</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Dry Contact</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
6	Simulate cable break		
	<i>Plug in the Yellow Simulation Plug</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Digital Unit</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>LED Ignites</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Alarm sound</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Dry Contact</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
5	Simulate Power failure		
	<i>Switch off the Power Supply</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Dry Contact</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
6	Record relays used		
	<i>R1</i> <input type="checkbox"/>		
	<i>R2</i> <input type="checkbox"/>		
	<i>R3</i> <input type="checkbox"/>		
	<i>R4</i> <input type="checkbox"/>		
	<i>R5</i> <input type="checkbox"/>		
	<i>R6</i> <input type="checkbox"/>		
	<i>R7</i> <input type="checkbox"/>		

	<i>R8</i> <input type="checkbox"/>		
7	Verify and record protected area circuits and sensors		
	<i>Circuit 1</i> <i>Sensor 1-01 Location:</i> <i>Sensor 1-02 Location:</i> <i>Sensor 1-03 Location:</i> <i>Sensor 1-04 Location:</i> <i>Sensor 1-05 Location:</i> 	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Circuit 2</i> <i>Sensor 2-01 Location:</i> <i>Sensor 2-02 Location:</i> <i>Sensor 2-03 Location:</i> <i>Sensor 2-04 Location:</i> <i>Sensor 2-05 Location:</i> 	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	<i>Circuit 3</i> <i>Sensor 3-01 Location:</i> <i>Sensor 3-02 Location:</i> <i>Sensor 3-03 Location:</i> <i>Sensor 3-04 Location:</i> <i>Sensor 3-05 Location:</i> 	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

2.1.18 Vacuum De-gasser Checklist

Appendix 1- Vacuum De-gasser Pre-Commissioning Report

Vacuum De-gasser Pre-Commissioning Report			
System details			
Model	System type	Max Operating Temperatures	Maximum Operating pressure
Vacuum Degasser			
General			
Property equipment Tag number is fixed and readable.		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Adequate room space for operation and maintenance purpose		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Surrounding and unit surface condition Clean & tidy before use.		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Check the system is rigidly supported to prevent vertical , horizontal or lateral movement		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
		N/A <input type="checkbox"/>	
Electrical			
Unit connected to Electrical Supply		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Local isolation installed & with live supply		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
1 phase 240V		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
3 phase 415V		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
BMS contacts connected		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Supply voltage	Frequency	Current (A).....	
Breaker protection (A).....	Absorbed		
Hydraulic			
Unit connected to flow pipework		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Unit connected to Return pipework		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Unit connected on inlet side of circulating pump		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Connections made to side of pipework a minimum of 500mm apart		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Connecting pipework, Minimum of 20mm increasing in diameter for distances over 5mtr each		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
		N/A <input type="checkbox"/>	
Connected to Mains Cold water supply		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Back Flow protection installed to comply with water bylaws (not		<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
System Content (L).....	System	Ambient temperature (° C).....	
System fluid temperature (° C).....			

Appendix 2- Vacuum De-gasser Commissioning Report

Vacuum De-gasser Commissioning Report				
Vacuum degasser information				
Model	Serial number	Application	Unit Reference (if any)	
System details: Enter these where known				
Operating Pressure	Max temp	Static height [m]	Max kW Input	System Volume
Checklist				
Hydraulic		Tick	Electrical	
Inlet/outlet connections correct			Power supply correct	
Isolation Valves fitted to inlet/outlet			Local isolation installed	
Unit connected in flow or return			BMS contacts connected	
Refill connection correct (Refill models only)				
Over flow pipework connected S4 only				
Back flow protection installed (Refill models only. Not applicable to S4 models).			<i>Note: This certificate only records if a Backflow protection device is installed. It is the sole responsibility of the installing contractor to confirm that this device conforms with the correct "Category of Risk" as defined</i>	
Settings: Enter below the parameters set on control panel.				
All Units		Refill Units		
Language		P Max (enter max. syst. Pressure)		
Date		Psystem desired (Cold fill pressure)		
Weekday		Refill pressure (Usually Psystem desired less 0.2bar)		
Time		Refill Alarm (amount of fluid per event) Not S4		
Auto start(s)		Refill alarm after (continuos mins refilling)		
Block time(s) day		Max. refill freq. (no of times per day)		
Block time(s) week		Indicate number and size of Expansion vessels installed		
Block time(s) year		Pre-charge pressure correct & entered onto vessel label		
Commissioning				
Pump vented of air (not S4)		Confirm rotation of pump correct (3 phase units)		
Error 7 Run Dry test completed (not S4)		Inlet valve (B) setting Number (not S4 units)		
Solenoid Opens / Closes		Outlet valve (A) setting Number (not S4 units)		
Max pressure recorded on internal Gauge		Internal Pressure Gauge left turned on isolation valve		
Vacuum pressure achieved		Clients rep instructed on Operation of unit		
Air expelled from unit		User manual included		
Flushing Stage record	<i>Automatic Mode</i> <input type="checkbox"/>	<i>Manual Mode</i> <input type="checkbox"/>	<i>working</i> <input type="checkbox"/>	<i>not working</i> <input type="checkbox"/>
Vacuum Stage record	<i>Automatic Mode</i> <input type="checkbox"/>	<i>Manual Mode</i> <input type="checkbox"/>	<i>working</i> <input type="checkbox"/>	<i>not working</i> <input type="checkbox"/>

Appendix 3- Vacuum De-gasser start-up and commissioning Report

VACUM SYSTEM STAR-UP AND COMMISSIONING REPORT			
S/L	CHECK LIST	STATUS	REMARKS
	Verify and record direction motor rotation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Test and record power supply voltage L1-L2.....V L2-L3.....V L1-L3.....V	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Test and record power supply current L1.....A L2.....A L3.....A	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Record initial and final Vacuum Level Set points. Initial : Final :	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Open each terminal valve to verify pilot cable signal functioning which initiate the vacuum system start.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Close each terminal valve to verify pilot cable signal functioning, which initiate the vacuum system stop.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Open all terminal valves simultaneously to simulate the maximum capacity. Observe any abnormalities and record	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Test and record voltage and current at maximum operation		
1.	Test and record power supply voltage L1-L2.....V L2-L3.....V L1-L3.....V	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
2.	Test and record power supply current L1.....A L2.....A L3.....A	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify and record the provided safety interlocks, overheating controls, vacuum controls and false air valves functional wherever possible.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Operate the remote controller to initiate the Vacuum System and observe	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Demonstrate Auto empty operation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Confirm Installation completed and acceptable	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Confirm interface completed and acceptable	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Acknowledge unit has been started, functioning and free from visible defects	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

2.1.19 Packaged Ozone Plant Integrated Ride Stream Filter

Appendix 1 - Packaged Ozone Plant Integrated Ride Stream Filter Pre-commissioning Checks

Packaged Ozone Plant Integrated Ride Stream Filter Pre-commissioning Checks				
Item	Description	Status		Remarks
		<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
1	Visually check for any damages during transportation or installations.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
2	Property equipment Tag number is fixed and readable.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
3	Removal of the packing and to ensure that the system is free from transportation damages	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
4	Verify surrounding and unit surface condition Clean & tidy before use.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
5	The skid location has adequate dimensions to accommodate also the possible additional equipment required for water treatment	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
6	The equipment room will have easy access to facilitate normal maintenance and service requirements and shifting the equipment to the installation point.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
7	The skid location is suitably illuminated, ventilated and complete with drain line to gutter	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
8	The Packaged Skid is positioned on a plinth suitable for the operating weight.	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
9	An open drain able to let the rinse/reject drain flow by gravity according to the flow rates given in the technical submittal is available	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
10	Check raw water pressure to be within the permitted values	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
11	Check that all the elements are correctly assembled on the skid	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
12	Check the Skid s connected to the piping system as shown in the dimensional drawing, taking care that the piping size of inlet, & outlet corresponds to specifications	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
13	Check if all the instruments are correctly installed as per the skid diagram	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	
14	Check the skid for leaks and rectify if any	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>	

15	Ensure the system is rigidly supported to prevent vertical , horizontal or lateral movement	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
16	Check if bypass line has been provided	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
17	check Installed skid away from direct sources of heat, sunlight and moisture	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
18	Removal of the packing and to ensure that the system is free from transportation damages	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
19	Verify surrounding and unit surface condition Clean & tidy before use.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
20	Check if the electrical connections are as per the circuit diagram	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

ARAB ENGINEERING BUREAU

Appendix 2 - Packaged Ozone Plant Integrated Ride Stream Filter Commissioning Report

Packaged Ozone Plant Integrated Ride Stream Filter Commissioning Report				
Item	Description	Status		Remarks
		Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
1	Before start up that water is flowing through the line	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
2	Open the doors and open the valve V301. Verify that the switch on the oxygen generator is in position 1. Close the doors	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
3	Open the valves V902, V-904, V-801, V-201	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
4	Close the valves V904-V802	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
5	Turn in the position "1" ON the selector "main switch"	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
6	Turn in the position "LOC" the selector "selection mode"	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
7	Push the blue button "auxiliary on"	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
8	Turn in position "1" the selector "compressor start up".	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
9	Turn in position "1" the selector "pump start up". With valve V201 regulate the flow to 200 NL/hr. With valve V802 regulate the water flow in the cell redox probe	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
10	Turn in position "1" the selector "ozone start up".	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
11	Turn the selector selection mode in position "LOC"	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
12	Regulate the ozone production by potentiometer "ozone production local regulation"	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
13	Ozone production is related to the potentiometer value (da. O a 1000)	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
14	Commission the system	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	

2.1.20 Laboratory Humidifier

Appendix 1 - Laboratory Humidifier Pre-Commissioning Report

LABORATORY HUMIDIFIER PRE-COMMISSIONING REPORT			

S/N	DESCRIPTION	STATUS	REMARKS
VERIFY AND RECORD NAME PLATE DATA			
2.	37. Manufacturer: 38. Model: 39. Serial No: 40. Power :.....kW 41. Voltage:.....V 42. Current:.....A	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
CONTROLLER CHECKS			
1.	Property equipment Tag number is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2.	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3.	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4.	Visually check for any potential damages during transportation, storage or installation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5.	Verify power and control wiring installed correctly and tight as per circuit diagram.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6.	Test and record power supply at isolator incomings to ensure compliance with Units requirements	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7.	Verify Proper grounding installed for components and unit (if applicable),	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8.	Ensure other items do not obstruct the air path of the ventilation slots of the panel. It is recommend to have a space all-around of >40mm	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9.	Verify installation is as per manufacturer recommendations	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
REVERSE OSMOSIS			
1.	Property equipment Tag number is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2.	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3.	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4.	Visually check for any potential damages during transportation, storage or installation,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

5.	Check if all colour-tubing connections are tight and not twisted.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6.	Verify water used is demineralised water below 5µS/cm (conductivity) by verifying the system chlorination report	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7.	Verify on the main branch valve arrangement pressure reducing valve gauges that the water supply pressure to the RO system and the Humidifier, is between 0.5 Bar and 6 Bar as recommended.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8.	Verify and ensure a drain line installed on the ducting including a Syphon trap or recommended alternative	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9.	Ensure all pipework connections from domestic system to RO and from RO to humidifier are correctly installed, firm and safe.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
10.	Verify drain line from RO piped correctly to drain line. (no direct connection to drain but use of a funnel or similar fitting) and trap installed (if applicable).	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
11.	Verify Pipework pressure test	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
12.	Verify Piping system flushed and chlorinated	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
13.	Verify RO filters conditions new and clean	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

ULTRASONIC HUMIDIFIER CHECKS

1.	Property equipment Tag number is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2.	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3.	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4.	Visually check for any potential damages during transportation, storage or installation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5.	Verify installation of humidifier is in horizontal position	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6.	Verify the casing flow direction is in line with the airflow path.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7.	Check and ensure sufficient clearance is provided above humidifier to enable removal of the mist collector for inspection purposes and cleaning of the water tanks	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8.	Verify installation is as per manufacturer recommendations	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9.	Verify drain pipework by conducting a gravity drain.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

Appendix 2 - Laboratory Humidifier Commissioning Report

LABORATORY HUMIDIFIER COMMISSIONING REPORT			
S/N	DESCRIPTION	STATUS	REMARKS
1	Verify and record name plate data 43. Manufacturer: 44. Model: 45. Serial No: 46. Power :.....kW 47. Voltage:.....V 48. Current:.....A	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Check Electrical Connections in ENS humidifier unit and control panel	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Check electrical Board in humidifier and control panel	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Check main voltage in USM Control panel	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Check water line connections and tightness	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6	Check all water control valves for proper operation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7	Check water pressure and leakages in the water supply and drain lines	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8	Check conductivity measures, room temp and rH%	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9	Check Control panel Installed location and humidifiers	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
10	Check Operation of Control and parameters and Humidifiers	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
11	Check all control parameters before Switching on humidifiers	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
12	Check all room Sensors for proper operation of humidifiers	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
13	Verify RO operation counter hours operate correctly.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

2.1.21 Outdoor Unit Pre-commissioning Check Sheet

Appendix 1 - Outdoor Unit Pre-commissioning Check Sheet

Outdoor Unit Pre-commissioning Check Sheet		

S/L	CHECK LIST	STATUS	REMARKS
<i>Model Verification</i>			
1	Verify and record nameplate of Outdoor as per below: 49. Manufacturer: 50. Model: 51. Serial No: 52. Power : kW 53. Voltage: V 54. Current: A 55. Frequency: Hz 56. Power Factor: 57. Asset Tag (if any):	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
<i>General Checks</i>			
1	Verify Property equipment Tag number and nameplate is fixed and readable.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Verify Surrounding and unit surface condition Clean & tidy before testing.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Verify Adequate room space for operation and maintenance purpose	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Confirm that all preservation/packaging measures have been removed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	Confirm that indoor unit (including internal equipment compartments) is clear and ready for use.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	Verify piping system completed and pressure tested, vacuumed and charged.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	Condenser fan air intake spacing is adequate and has no obstructions	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8	Mounting/support system and vibration isolation are free of movement	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
9	All the coil fins are clean and no damages	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

10	Confirm all systems are correctly earthed to specification prior to startup	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
11	Verify the electrical and control wiring completed, tested and energized up to the isolator.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
12	Verify and record Isolator Overload protection CurrentA	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
13	Check over all push buttons and confirm ready for operation, test all buttons are operational	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
14	Check Power line circuit breakers or fuses have proper ratings for equipment installed.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
15	Verify and ensure LOTO procedure are in place and implemented	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

2.1.22 DX Unit Commissioning Report

Appendix 1 - DX Unit Commissioning Report

DX Unit Commissioning Report			
S/L	CHECK LIST	STATUS	REMARKS
1	Verify and record nameplate of System as per below: 58. Manufacturer: 59. Outdoor Model: 60. Outdoor Serial No: 61. Indoor Model: 62. Indoor Serial No: 63. Compressor Model: 64. Compressor Serial No:	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
2	Record approx. length of piping.m	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
3	Record type of refrigerant.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
4	Record suction and discharge line pipe size: Suction.....mm Discharge.....mm	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
5	Record the following:		
6	<i>Indoor Unit</i> Power Supply:.....V Off Coil Temperature:.....C On Coil Temperature:.....C Room Temperature:.....C	<i>Outdoor Unit</i> Power Supply:.....V Voltage during Operation.....V Press High:.....Bar Press Low:.....Bar Running Current:.....A Ambient Temperature:.....C	
7	Observe system are free from vibration or excessive noise	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

2.1.23 RACU Pre-commissioning

Appendix 1 - RACU Pre-commissioning Check Sheet

RACU Pre-commissioning Check Sheet			
S/L	CHECK LIST	STATUS	REMARKS
Model Verification			
	Verify and record nameplate of RACU as per below:	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	As Specification/Material Submittal 65. Manufacturer: 66. Model: 67. Serial No: 68. Motor Make: 69. Motor Power :..... kW 70. Motor Voltage:..... V 71. Motor Current:..... A 72. Motor Frequency:..... Hz 73. Motor speed:..... rpm 74. Motor Power Factor:..... 75. Asset Tag (if any):.....	As Actual installation 19. Manufacturer: 20. Model: 21. Serial No: 22. Motor Make: 23. Motor Power :..... kW 24. Motor Voltage:..... V 25. Motor Current:..... A 26. Motor Frequency:..... Hz 27. Motor speed:..... rpm 28. Motor Power Factor:..... 29. Asset Tag (if any):.....	
General Checks			
1.	Ensure that RACU is isolated either from the spur or DB breaker	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Ensure and verify packing has been removed from RACU unit	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify and ensure that RACU unit and associated components are properly secured.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify Property equipment Tag number and nameplate is fixed and readable.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify Surrounding and unit surface condition Clean & tidy before testing.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify Adequate room space for operation and maintenance purpose	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Visually verify units condition acceptable (damages during transportation or installation)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify Anti-vibration mountings installed correctly (if applicable).	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify and check piping supported correctly	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
Electrical Checks			

1.	Confirm all systems are correctly earthed to specification prior to startup	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify mains power supply been installed, connected, phase rotation checked, and power available at isolators.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Visually verify that all the electrical connections are tight	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Ensure that all power and control wiring has been completed in detail in accordance with the circuit diagram(s)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify and record Spur/Switch Overload protection CurrentA	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check over all push buttons and confirm ready for operation, test all buttons are operational	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check Power line circuit breakers or fuses have proper ratings for equipment installed.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify the interconnection cables (Denconet) been installed utilising correct Belden type cable and left for GEA connection.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Record incoming power supply rating L1-N.....V L1-L2.....V L2-N.....V L1-L3.....V L3-N.....V L2-L3.....V	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify and ensure LOTO procedure are in place and implemented	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
Ducting Checks			
1.	Ensure Ductwork and NRD completed and signed off	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify sections of flexible duct are not formed into tight Bends (if applicable)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify the installation of the false ceiling is complete	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify the room has adequate return air grilles installed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Ensure all RACU is switched to their design fan speed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify all volume control dampers (VCD) in diffusers or ducting and fire dampers (FD) are set to fully open	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify filters and fans are clean (Note: filters generally need to be cleaned before commissioning)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify maintenance/replacement accessibility around the Carbon filter is acceptable	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify Fresh air supply ductwork installed correctly	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify transfer grilles and carbon filters installed where applicable	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
Pipework Distribution Checks			
1.	Verify pipework with ancillaries all installed and signed off	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	To ensure that the hydronic system is tested, flushed and vented.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

	Verify that air has been bled from heating and cooling coils of the FCU	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify all pipework and pipe joints are sound, free of any apparent leak	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify flow and return pipes are connected the correct way around	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Ensure that the measuring flow rate devices are fitted the correct way around (if applicable)	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify if mains cold water supply pipework connected and pressure available (equipment with humidifiers only)	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Verify drainage/condensate pipework tested, connected and ready for use	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
	Are condensate pumps fitted and tested with electrical supply and pipework and has internal packing been removed	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<u>REMARKS</u>			

Appendix 2 - RACU Commissioning Report

Section A: 1 copy for completion by contracts engineer in respect of each model or variant on site.					
<u>All boxes in section A to be completed before handing - sending to commissioning engineer.</u>					
End User's Name		End User's Name			
Induction Required					
Client's Name		Client's Name			
Installer's Name					
Site Address					
Site Contact's name					
Site Contact's Tel No			Site Contact's Tel No		
Air Balance	Yes / No		Air Balance	Yes / No	
Air Balance	Yes / No		Supply Only	Yes / No	
Water Balance	Yes / No		Supply & Install	Yes / No	
Design RA Condition	Temperature C		Design RA Condition	Humidity % RH	
Design Total Cooling	Kilowatts		Design Sensible Cooling	Kilowatts	
RACU Model No			Heat Rejection Model No		
Parking on Site					
Special Instructions			Do Site Specific RAM's apply		
Asset Tag No:	00-RACU-01A		Drawing No:		

Section B: For completion by commissioning engineer for each unit on site before starting commissioning.
MANDATORY

RACU Serial No:		Heat Rejection Serial No:	
RACU Location:		RACU Site Reference:	
Heat Load Available During Commissioning Process			
Check piping installation complies with O&M manual & Approved Code of Practice-DX Installations			Initial Box =
Check & confirm interconnecting wiring and unit mains power supply matches contract wiring diagram			Initial Box =
Work may not proceed until the above checks have been completed and the initial box filled in and the contract technical data has been added. All instrumentation must be covered by a current calibration certificate including pressure gauges, vacuum gauges, thermometers, airflow meters, ammeter, multimeter, etc.			

Electrical Power Supply					Units	
L1 Mains Supply Voltage	V		L3 Mains Supply Voltage	V		
L2 Mains Supply Voltage	V		Control Circuit Voltage	V		
Fan Motor Currents						
Fan Motor 1 Current Min	Amps	Phase 1	Phase 2	Phase 3	Measurement of air volumes and the amperages of all fans in both minimum speed and maximum	

Fan Motor 1 Current Min	A				<u>speed is mandatory - no exceptions are permitted.</u>
Fan Motor 2 Current Min	A				
Fan Motor 2 Current Min	A				
Fan Motor 3 Current Min	A				
Fan Motor 3 Current Min	A				

Air Volume Checks					
Measured Air Volume	m ³ /s		Air On Temperature	°C	
Max Fan Speed Setting	% or V		Air Off Temperature	°C	
Min Fan Speed Setting	% or V		Air Flow Fail Setting Check	Yes/No	
Dehum Fan Speed	% or V				
Room Distribution Checked	Yes/No		Filter Change	Mbar/Pa	
Glycol Circuit (if option fitted)			Option Fitted to Machine	Yes/No	
Pump Make			Pump Model		
Pump Suction Pressure	Bar		Pump Delivery Pressure	Bar	
Design Flowrate	Lps		Actual Flowrate	Lps	
Design Exp Vessel Pressure	Bar		Actual Exp Vessel Pressure	Bar	
Drycooler Target Setting	°C		Local Isolators Fitted	Yes / No	
Fluid Inlet Temperature	°C		Fluid Outlet Temperature	°C	
Auto Air Vents Fitted	Yes / No		Air Vents Checked	Yes / No	
Glycol Concentration	%		Double Reg Valve Setting	No / kpa	
Controls					
Temperature Set Point	°C		Humidity Set Point	%RH	
Dead Zone T	°C		Dead Zone RH	%RH	
Proportional Band T	°C		Proportional Band RH	%RH	
Oil Recovery Time (SIAM only)	Seconds		Controller Software Vers	Number	
Sensor Calibration T	°C		Sensor Calibration RH	%RH	
Strategy Selected	P or PI		Type of control selected	T or TH	
Software Settings Entered	Yes / No		Network Number of Unit	Number	
Network Connected	Yes / No		Type of Comm's Card		
Comms Card Fitted	Yes / No		Hum and RH Control Enabled	Yes / No	
Discharge Transducer Reading	Bar		Discharge Transducer Calibration	Bar	
Suction Transducer Reading	Bar		Suction Transducer Calibration	Bar	
Suction Sensor Reading	°C		Suction Sensor Calibration	°C	
Chilled Water (if option fitted)			Option Fitted to Machine	Yes/No	

CW Flowrate	Lps		Double Reg Valve Setting	No / kpa	
CW Water Inlet Temp.	°C		CW Water Outlet Temp	°C	
Electric Heating (if option fitted)			Option Fitted to Machine	Yes/No	
Thyristor Control Fitted	Yes/No		Heater 2 Current	A	
Heater 1 Current	A		Heater 3 Current	A	

Humidifier (if option fitted)		Option Fitted to Machine	Yes/No	
L1 Humidifier Current	A	Water Supply Conductivity	Ms	
L2 Humidifier Current	A	Bottle Type	kg	
L3 Humidifier Current	A	% Output Set	%	
Bottle Conductivity Range	Ms	Bottle Part Number	Number	
Condensate Pump Drain (if option fitted)			Option Fitted to Machine	Yes/No
Gravity or Pumped		Pump Model		
System Lift		Function Test Pass / Fail		

Please initial box below to certify and confirm that the listed functional tests have been carried out on the equipment

Low pressure transducer set correctly & functions		Head pressure control function & setting correct	
High pressure transducer set correctly & functions		High temperature alarm set and function operating	
High pressure switch set correctly & functions		Low temperature alarm set and function operating	
Airflow failure transducer set correctly & functions		Filter blocked transducer set correctly & functions	
Water detection operates (if fitted & laid out)		Alarm output relays set up and operating correctly	
Layout of the suction lines has been checked		Superheat stable and correctly set as TI & OEM	
Discharge line temperature sensor fixing checked		System correctly evacuated before charging	
Discharge line traps fitted if required		Any additional oil added taken from new can	
Requirement for crankcase heating checked		System fully leak tested after commissioning	
Fans free from vibration at all speeds		Condensers correctly installed	
Discharge pressure is at least 1.8 times suction pressure		Pressure transducer readings checked	
DQA892 Multi Denco Charging procedure followed		Spare	

You are verifying that key issues - functions have been checked and conform to the requirements-settings in the O & M manual

2.1.24 Mini Reverse Osmosis

Appendix 1 - Mini Reverse Osmosis Pre-check List

Mini Reverse Osmosis Pre-check List				
Comments				
1	To review the location so that to ensure the equipment room is of adequate dimensions to accommodate also the possible additional equipment required for water treatment.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
2	The equipment room will have easy access to facilitate normal maintenance and service requirements and shifting the equipment to the installation point.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
3	Property equipment Tag number is fixed and readable.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
4	To ensure that the equipment room is suitably illuminated, ventilated and complete with drain line to gutter	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
5	Removal of the packing and to ensure that the system is free from transportation damages	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
6	Verify surrounding and unit surface condition Clean & tidy before use.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
7	Locate the RO system on a vertical surface suitable to support the operating weight.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
8	To arrange an open drain point able to let the rinse drain flow by gravity.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
9	To review provided power supply is of an electric plug of 220 V, 50 Hz, single phase current with earthing	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
10	To check raw water pressure within the permitted values	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
11	Connect the Mini RO to the piping system in the vertical position, taking care that the piping size of inlet, outlet corresponds to specifications.	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
12	Ensure the system is rigidly supported to prevent vertical , horizontal or lateral movement	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
13	Check if bypass line has been provided	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
14	Install the pre filter cartridge in the housing	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
15	Install the feed flow meter on the pre filter	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	
16	Install the flow meter cable	<input type="checkbox"/> Ok	<input type="checkbox"/> Not Ok	

17	Install the RO membranes ensuring no damage to the O-rings	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
18	Install the control panel indoor away from direct sources of heat, sunlight and moisture	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
19	Mount the control panel on a vertical rigid surface capable of supporting its weight	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
20	Connect the power supply to the control panel	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
21	Connect the power lead between the control panel and the Mini RO	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

ARAB ENGINEERING BUREAU

Appendix 2 - Mini Reverse Osmosis Commissioning Report

Mini Reverse Osmosis Commissioning Report		

RO CONTROLLER		
Measure and record supply voltage: Design <u>240 V</u>	Actual recorded _____	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/>
Measure and record running current: Actual recorded _____	A	
Check and record Phase : Design <u>1 Phase</u>	Actual recorded _____	
Calculate and record Incoming Power: Design <u>0.55 kW</u>	Actual Calculated _____	

REVERSE OSMOSIS E1 G1 2S		
Check and verify water is flowing through the line before switch on of the unit	Supply: Mains <input type="checkbox"/> Temporary <input type="checkbox"/>	
Check and verify inlet valves for any water leaks. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Configure and record the system settings	Alarm Settings	
	Clock Settings	
	Cycle Settings	
Check and record the RO inlet Pressure: Min Required <u>1.38 Bar</u>	Actual recorded _____	Bar
Check and record the RO Outlet Pressure: Max Required <u>3.5 Bar</u>	Actual recorded _____	Bar
Calibrate flow rate : Required <u>80 l/hr</u>	Actual recorded _____	l/hr
Select Control function configuration		
Check and record the Permeate pH: Design <u>3-11</u>	Actual recorded _____	
Check and record permeate hardness: Design <u>_____</u>	Actual recorded _____	
Check and record permeate conductivity: Design <u>20 µS/cm</u>	Actual recorded _____	µS/cm

2.1.25 Cooling Tower Reverse Osmosis

Appendix 1 - Cooling Tower Reverse Osmosis Pre-commissioning Report

Cooling Tower Reverse Osmosis Pre-commissioning Report				
BREAK TANK				
Tag No	Model/Type	Serial No/Prod Date	Application	Made In
1	Verify any damages during transportation or installation			Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
2	Verify inlet and outlet installation			Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
3	Tank adequately supported and levelled			Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
4	Float switches fitted and operational.			Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
5	Verify Cooling Tower Blow Down pumps are commissioned and operational			Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
CRN 5-8 PUMP				
Tag No	Model/Type	Serial No/Prod Date	Application	Made In
1	Check the installation of pump with respect to the following aspects			
	i. Approach for the operation			
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	ii. Approach for the maintenance			
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
2	Check the soft water header location with respect to the pump location.			
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
3	Check pump skid, Necessary control valve installation and piping work.			
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
4	Check that the interconnecting piping is properly supported			
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
5	Check electrical cabling at their support			
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
6	Check the flow direction of the pump			
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
7	Verify surrounding and unit surface condition Clean & tidy before use.			
	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			

Coagulant Dosing Basic 2 40				
Tag No	Model/Type	Serial No/Prod Date	Application	Made In
1	Check location of Dosing system. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
2	Check Interconnecting Piping and support. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
3	Check Dosing tank / tank support, if any. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
4	Check the installation of dosing system with respect to following aspect			
	i. Approach for operation. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	ii. Approach for maintenance. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	iii. Approach for Chemical preparation. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			

Activated Carbon Filter HE UR 21				
Tag No	Model/Type	Serial No/Prod Date	Application	Made In
1	Check that the interconnecting piping is properly supported Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
2	Check the position and installation of all instruments Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
3	Check the installation Culligan water Filter with respect to the following aspects			
	i. Approach for operation. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	ii. Approach for the maintenance frontal pipe work. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	iii. Approach for the Programmer controller. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	iv. Electrical support. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	v. Frontal pipe work support. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	vi. Drain pipe work. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	vii. Gap between the units for easy access. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	Check that all associated pipe work is adequately supported. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
	Check that the equipment is properly supported. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			

HE 1.5 120 Softener (Twin)				
Tag No	Model/Type	Serial No/Prod Date	Application	Made In
1	Check that the interconnecting piping is properly supported. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>			
2	Check the position and installation of all instruments			
3	Check the installation Culligan water duplex softener with respect to the following aspects:			

	i. Approach for operation. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	ii. Approach for the maintenance frontal pipe work. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	iii. Approach for the Programmer controller. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	iv. Electrical support. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	v. Frontal pipe work support. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	vi. Drain pipe work. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	vii. Gap between the units for easy access. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	viii. Approach for the salt addition to the Brine tank. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
4	Check that all associated pipe work is adequately supported. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
5	Check that the equipment is properly supported. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>

Dosing System Basic 2 40					
	Tag No	Model/Type	Serial No/Prod Date	Application	Made In
1	Check the dosing system location with respect to Filters location. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				
2	Check the dosing pump location and the controls for the automatic operation Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				
3	Check that the interconnecting piping is properly supported Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				
4	Check the installation of the dosing system with respect to the following aspects:				
	i. Approach for the operation. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				
	ii. Approach for the maintenance. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				
	iii. Electrical support. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				
	iv. Check that all associated pipe work is adequately supported. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				
	v. Check that the equipment is properly supported. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				

RO System MFP 4 3300					
	Tag No	Model/Type	Serial No/Prod Date	Application	Made In
1	Check the position and installation of RO skid				
2	Check that the interconnecting piping is properly supported				
3	Check the installation Culligan RO with respect to the following aspects:				
	i. Approach for operation. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>				

	ii.	Approach for the maintenance of total system . Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	iii.	Approach for the Programmer controller. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	iv.	Electrical Panel Installation. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	v.	Internal pipe work support. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	vi.	Check the installation of Membrane vessels and end caps. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	vii.	Drain pipe work. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	viii.	Check the installation of Flow meter, pressure gauges, pressure switches Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	ix.	Check the Installation of solenoid Valve. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	x.	Check the installation of high pressure pump. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	xi.	Check the installation of reject & product pipeline. Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	xii.	Check the installation of RO permeate Tank Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>

Appendix 2 - Cooling Tower Reverse Osmosis Commissioning Report

Cooling Tower Reverse Osmosis Commissioning Report		

MAIN CONTROL PANEL Q11663		
Measure and record supply voltage: Design <u>415 V</u>	Actual recorded _____	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/>
Measure and record running current: Design <u>5.6 A</u>	Actual recorded _____ A	
Check and record Phase : Design <u>3Phase</u>	Actual recorded _____	
Calculate and record Incoming Power: Actual Calculated _____ kW		

BREAK TANK		
Verify Cooling Tower 1 blow down pump discharging		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Verify Cooling Tower 2 blow down pump discharging		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Verify Cooling Tower 3 blow down pump discharging		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Verify Cooling Tower 4 blow down pump discharging		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Verify Cooling Tower 5 blow down pump discharging		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		

CRN 5-8 PUMP		
Measure and record supply voltage: Required <u>230 V</u>	Actual recorded _____	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/> Main Control Panel Q11663 <input type="checkbox"/>
Measure and record frequency: Design <u>50 Hz</u>	Actual recorded _____ Hz	
Measure and record running current: Actual recorded _____ A		
Calculate and record Incoming Power: Required <u>1.1 kW</u>	Actual Calculated _____ kW	
Check and record System rating Pressure: _____ Bar		
Check and record System volume: Design <u>2.5 m3/hr @ 4 Bar</u>	Actual recorded _____ m3/hr @ _____ Bar	
Direction of rotation : Anti Clock-Wise <input type="checkbox"/> Clock-Wise <input type="checkbox"/>		
Check Installation of Pump for operation and maintenance		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check NRV installation direction is correct as per the requirement		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check the inlet and outlet valves are open		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		

Check the operation of the pump Auto/Manual condition
Ok Not Ok

PRECHLORINATION DOSING BASIC 2 40

Measure and record supply voltage: Required <u>230 V</u>	Actual recorded <u>V</u>	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/>
Measure and record frequency: Required <u>50 Hz</u>	Actual recorded <u>Hz</u>	
Measure and record running current: Actual recorded <u>A</u>		
Calculate and record Incoming Power: Required <u>66 W</u>	Actual recorded <u>W</u>	
Fill Dosing Tank with the chlorine:		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check and record chemical content:		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Set and record dosing rate and adjust if required		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check and record the controller settings and concentration rate		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Initiate Dosing and monitor level before discharge		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		

COAGULANT DOSING BASIC 2 40

Measure and record supply voltage: Design <u>230 V</u>	Actual recorded <u>V</u>	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/> Main Control Panel Q11663 <input type="checkbox"/>
Measure and record frequency: Design <u>50 Hz</u>	Actual recorded <u>Hz</u>	
Measure and record running current: Actual recorded <u>A</u>		
Calculate and record Incoming Power: Required <u>66 W</u>	Actual recorded <u>W</u>	
Fill and record Dosing Tank with the requisite chemical		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check and verify chemical content		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Set dosing rate and adjust if required		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check the controller settings and concentration rate		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Initiate Dosing and monitor level before discharge		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		

ACTIVATED CARBON FILTER HE UR21

Check manifold pipework for correct installation
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
Check filters controllers at right settings
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
Visually check the filters vessels for any damages
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
Check and verify the installation of valve position
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
Check and verify the installation of and distribution of the media

Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check and record Inlet Operating Pressure: <u>Bar</u>		
Check and record Inlet Outlet Pressure: <u>Bar</u>		
Check and verify Controller Settings	Back Wash:	
	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>
	Ideal:	
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
	Rinse:	
	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>
	Backwash Schedule and time	
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Initiate backwash cycle and monitor all steps		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check and verify the outlet parameters		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
HE 1.5 120 SOFTENER (TWIN)		
Check manifold pipework for correct installation		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check softener controllers settings		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Visually check the softener vessels for any damages		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check and verify the diaphragm of valves open and close smoothly		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check the position and installation of the Impulse water meter		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check and record Inlet Operating Pressure: <u>Bar</u>		
Check and record Inlet Outlet Pressure: <u>Bar</u>		
Check and record Controller Settings	Back Wash: <u>Minutes</u>	
	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>
	Salt Injection: <u>Minutes</u>	
	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>
Rinse: <u>Minutes</u>		
	Ok <input type="checkbox"/>	No Ok <input type="checkbox"/>
Brine Refill: <u>Minutes</u>		
	Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>
Initiate regeneration cycle and monitor all steps		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	
Check and test the hardness level from softener unit		
Ok <input type="checkbox"/>	Not Ok <input type="checkbox"/>	

ANTISCALANT DOSING BASIC 2 40		
Measure and record supply voltage: Required <u>230 V</u>	Actual recorded <u>V</u>	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/> Main Control Panel Q11663 <input type="checkbox"/>
Measure and record frequency: Required <u>50 Hz</u>	Actual recorded <u>Hz</u>	
Measure and record running current: Actual recorded <u>A</u>		
Calculate and record Incoming Power: Required <u>66 W</u>	Actual recorded <u>W</u>	

Fill Dosing Tank with the requisite chemical
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
Check and record chemical content
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
Set and record dosing rate and adjust if required
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
Check and record the controller settings and concentration rate
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
Initiate Dosing and monitor level before discharge
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>

REVERSE OSMOSIS MFP 43300		
Measure and record supply voltage: Design <u>415V</u>	Actual recorded _____	Supply:Mains <input type="checkbox"/> Generator <input type="checkbox"/> Main Control Panel Q11663 <input type="checkbox"/>
Measure and record frequency: Design <u>50 Hz</u>	Actual recorded _____ Hz	
Measure and record running current: Actual recorded _____ A		
Calculate and record Incoming Power : Required <u>4.2 kW</u>	Actual recorded _____ kW	
Check the RO Pump operation		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check the Booster Pump operation		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Check and verify system operation		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Cut in Pressure: <u>Bar</u>		
Check and record pump Auto mode	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
Cut off Pressure: <u>Bar</u>		
Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>		
Throttle the flow control to achieve desired flow rate: Required <u>2200 l/hr</u> Actual recorded <u>l hr</u>		
Check and record the RO inlet Pressure: Design <u>Bar</u>	Actual recorded <u>Bar</u>	
Check and record the RO Outlet Pressure: Design <u>Bar</u>	Actual recorded <u>Bar</u>	
Check and record Permeate Flow: Design <u>2000 l/hr</u>	Actual recorded <u>l/hr</u>	
Check and record the Reject Flow: Design <u>l/hr</u>	Actual recorded <u>l/hr</u>	
Check and record Re-circulation Flow: Design <u>l/hr</u>	Actual recorded <u>l/hr</u>	
Check and record the Permeate pH: Design <u>3-11</u>	Actual recorded	
Check and record permeate hardness: Design <u>_____</u>	Actual recorded	
Check and record permeate conductivity: Design <u>100 - 1000 µS/cm</u>	Actual recorded <u>µS/cm</u>	

2.1.26 Vehicle Exhaust Test Sheet

Appendix 1 - Vehicle Exhaust Test Sheet

VEHICLE EXHAUST TEST SHEET			
S/N	DESCRIPTION	STATUS	REMARKS
PRE- CHECKS			
1.	Verify and record name plate: Model: Serial No:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2.	Check the Vehicle Exhaust System for damage occurred during the installation and delivery	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3.	Property equipment Tag number is fixed and readable	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4.	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5.	Surrounding and unit surface condition Clean & tidy before use	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6.	Verify ducting system completed and includes Non Return Damper	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7.	Verify that the exhaust duct bellmouth is fitted with a grid prevent foreign material to get through the duct,	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8.	Verify Hose are not damaged or split	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9.	Verify hose length complies with approved material submittals	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
10.	Check the wiring termination connections labelled and correctly installed secure.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
11.	Verify that power is tested and ready for use	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
12.	Verify and Record Incoming Power supply to Isolator	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
13.	Verify and record Incoming Current	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
14.	Check and ensure that the power supplied is suitable to the motors	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
15.	Verify that the power wiring is in compliance to Motor wiring diagram	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
16.	Verify Infra-Red (IR) Transmitter has battery installed or charged for use	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

17.	Verify and ensure LOTO procedure are in place and implemented	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
18.	Confirm all systems are correctly earthed to specification prior to start-up	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
FUNCTIONAL TEST			
1.	Set the remote controller	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	Open the hand control and set one of 8 codes	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	Then aim it against the reel indicator and push the SET button (minimum 7s). The indicator verifies by green flashing light for approx. 2s	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2.	verify uncoiling and coiling functions of the hose to ensure that it corresponds to the press button arrows on the hand control.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	Adjust the limit positions for coiled and uncoiled hose (if necessary)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3.	Operate the hose and fan	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	With the use of the IR remote controller aim at the coded Hose and press DOWN	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	The fan starts shall start at the upper limit for the hose (fan start is indicated by fixed green light)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	The hose moves downwards which is indicated by fixed red light	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	Release the DOWN button when the required hose length has been coiled out.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	Press the UP button, the hose moves upwards which is indicated by fixed red light.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
•	Release the UP button at required upper hose position	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4.	Observe and note any abnormalities.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

2.1.27 Circuit Breaker Test Report

Appendix 1 - Circuit Breaker Test Report

CIRCUIT BREAKER TEST REPORT			
Cubicle :		CB Sr. No :	
<i>Insulation Resistance Test – CB Close</i>			
Test Voltage	Test Duration	Test Connection	Insulation Resistance
1000 V DC	1 Min	CB CLOSE – R To Y + B To E	
		CB CLOSE – Y To R + B To E	
		CB CLOSE – B To Y + R To E	
<i>Insulation Resistance Test – CB Open</i>			
Test Voltage	Test Duration	Test Connection	Insulation Resistance
1000 V DC	1Min	CB OPEN – R To R'	
		CB OPEN – Y To Y'	
		CB OPEN – B To B'	
<i>Contact Resistance Test</i>			
Test Connection	Contact Resistance		
CB CLOSE – R TO R'			
CB CLOSE – Y TO Y'			
CB CLOSE – B TO B'			
<i>Micrologic Protection Unit Tests</i>			
** Report attached			
CB FUNCTIONAL CHECKS			
Sr.No.	Description		Results
1	Visual Inspection of panel		
2	Check Cleanliness of the equipment.		
3	CB Operation (Rack-out/Service/Test)		
3	Circuit Conformity & Op. checks w.r.t. Drawings		
5	Control/Tripping /Indication Circuit checks		

2.1.28 Current Transformer Test Report

Appendix 1 - Current Transformer Test Report

CURRENT TRANSFORMER TEST REPORT					
Cubicle No:					
CT Serial Nos.	R Phase –	Y Phase – T		B Phase – T	
CT CORE	CT Core 1 (1S1 – 1S2)			CT Core 2 (2S1 – 2S2)	
FUNCTION					
RATIO					
BURDEN					
CLASS					
Installation Checks					
SI No.	Description			Result	
1	Inspect CT for Mechanical Damage				
2	Check & Ensure that all Connections are tight				
3	Check Strapping Connections and Earth Link				
Insulation Resistance Test					
Description	Applied	Duration		R	Y
Secondary Core 1 To E	500 V	60 Sec			
Secondary Core 2 To E					
Sec. Core 1 To Core 2					
Primary To Secondary (C1)	1 KV	60 Sec			
Primary To Secondary (C2)					
Parameters	CT Core 1 (1S1 – 1S2)			CT Core 2 (2S1 – 2S2)	
	R Phase	Y Phase	B Phase	R Phase	Y Phase

Winding Resi. Rct (W)	W	W	W	W	W	W
Inj. Primary Current (A)	A	A	A	A	A	A
Measured Sec. Current	mA	mA	mA	mA	mA	mA
Ratio Error (%)	%	%	%	%	%	%
Polarity Check						
V Knee (V)	V	V	V	V	V	V
I Knee (mA)	mA	mA	mA	mA	mA	mA
REMARKS						

2.1.29 HV-Ductor Report

Appendix 1 - HV-Ductor Report

HV-DUCTOR REPORT					
Cubicle / Switchboard Ref :			Sr. No :		
Bus-Bar Tie-In Torque Checks					
SI No	Bus-Bar Jointing	R	Y	B	N
1	Joint-1	Nm	Nm	Nm	Nm
2	Joint-2	Nm	Nm	Nm	Nm
3	Joint-3	Nm	Nm	Nm	Nm
4	Joint-4	Nm	Nm	Nm	Nm
5	Joint-5	Nm	Nm	Nm	Nm
6	Joint-6	Nm	Nm	Nm	Nm
7	Joint-7	Nm	Nm	Nm	Nm
8	Joint-8	Nm	Nm	Nm	Nm
9	Joint-9	Nm	Nm	Nm	Nm
10	Joint-10	Nm	Nm	Nm	Nm

****Torque (Nm) to be apply as per the bolt Size and should be s per instructed in Installation Manual**

Bus-Bar Tie-In Contact Resistance Measurements					
SI No	Test Connection	R	Y	B	N
1	Joint-1	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
2	Joint-2	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
3	Joint-3	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
4	Joint-4	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
5	Joint-5	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
6	Joint-6	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
7	Joint-7	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
8	Joint-8	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
9	Joint-9	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
10	Joint-10	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
11	Joint-11	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$

REMARKS

Signature:					
Name:					
Title:					
Date:					

Switch Board High Voltage Test Results

SI No	Test Unit	R	Y	B	N
1	Connection	R to Y+B+E	R to Y+B+E	R to Y+B+E	R to Y+B+E
2	IR test before pressure test (1KV for 1 Min)				
3	HV pressure test voltage-kV				
4	Duration of Test(min)	1 Min	1 Min	1 Min	1 Min
5	Leakage current observed (mA)	mA	mA	mA	mA
6	IR test after pressure test (1KV for 1 Min)				

****HV Test to be carried out @ 80 % of the HV Test Value at FAT (80% of Ud)**

HV Test includes panel enclosure, bus-bars, CTs & breaker/contactor. The following precautions need to be taken care, before starting the test.

- a) A visual inspection will be made to ensure the surface dust and moisture has been removed from the component under test.
- b) Ensure the component is isolated from other connected system, which may feedback to other components or circuits not under test.
- c) A check shall be made to verify the ground for the component under test and test equipment being connected to the system ground.
- d) CT's secondary terminals shall be shorted.
- e) VT's & surge arresters shall be isolated from the equipment under test.
- f) Mark out the area and assure nobody enters during test.
- g) I/C Circuit breakers should be racked in and closed.
- h) Busbar should be fully mounted tightened and shields between phases & between phases and earth should be in place. Moreover bus-bars covers should be in place.
- i) All earthing switches related to the equipment under test should be open.
- j) Busbar conductivity test shall be performed
- k) Insulation resistance test shall be done before and after the test
- l) After each test the subject under test should be discharged to ground.

The required test voltage shall be raised slowly and maintained for one minute between one phase and other phases connected to ground and then reduced slowly to zero. Testing shall be repeated for the other phases as mentioned above. During each test leakage current should be recorded

2.1.30 Metering Checks and Micrologic Test Report

Appendix 1 - Metering Checks Test Report

METERING CHECKS TEST REPORT	

SL. No. : **TYPE** :

AMMETER TYPE : **CT RATIO** :

RATING : **METER SCALE** :

CLASS OF ACCURACY :

FEEDER	AMMETER SERIAL No	INJECTED CURRENT (A)	ACTUAL READING (A)	EXPECTED READING (A)	% Error

SL. No. : **TYPE** :

VOLTMETER TYPE : **VT RATIO** :

RATING : **METER SCALE** :

CLASS OF ACCURACY :

FEEDER	AMMETER SERIAL No	INJECTED CURRENT (A)	ACTUAL READING (A)	EXPECTED READING (A)	% Error

REMARKS

Appendix 2 - Micrologic Test Report

MICROLOGIC TEST REPORT					
BREAKER NAME PLATE DATA					
Mfg :	Family		Breaker Type:		
Standard:	Interrupt Rating:		Serial number:		
TRIP UNIT DATA					
Family:	Type:	Serial:			
TRIP UNIT BASIC PROTECTION SETTINGS					
Parameter	As Found	As Left	As Tested	I^2t	Current Level
Sensor Rating (In)			A	A	
LT Switch setting (Io)			xIn		A
Long time Pickup(Ir)			xIn		A
Long time Delay (tr)			Sec.		
Inverse Definite Min. Time Lag(Idmt)					
Short time Pickup(Isd,Im)			xIr		A
Short time Delay (tsd)			Sec.		
Instantaneous Pickup(Ii)			xIn		A
Ground fault pickup (Ig)			xIn		A
Ground fault Delay(tg)			Sec.		
Ground fault Push to Trip Button					
FFTK File Name :			Automatic Test Results		
Parameter	Test Current Level	Trip Time	Status		
Long time Pickup (Ir)					
Short time Pickup (Isd,Im)					
Instantaneous Pickup(Ii)					
Ground fault pickup (Ig)					
REMARKS					

2.1.31 Power Correction Factor Test Report

Appendix 1 - Power Correction Factor Test Report

Power Correction Factor Test Report

Ambient Conditions

Activity/Sector:
Residential Building *Office* *Factory* *Hotel/Hospitals*
Installation Conditions:
Outdoor *Indoor* *In an Electrical Room* *With air Conditioner*
Maximum Ambient temperature:.....C

Installation Conditions

Network Voltage:.....V Frequency:.....Hz Short Circuit Power:.....kA
THD:.....%

Incoming Power Cables Characteristics (Type and Size):.....

Operating Conditions

Since:..... Normal Operation

Capacitor bank to be checked

Manufacturer: SE FZE RECTIPHASE Other:.....

Capacitor bank references:

Serial N°:..... Year of manufacture :.....

Reference:.....

Electrical characteristics of the bank :

Total rated power :.....kvar Rated voltage :.....V Frequency : 50Hz
 60Hz

Insulation level :.....KV (...../.....)

For automatic banks :

Electrical steps :.....x.....KVar

Physical steps :.....x.....KVar

.....x.....KVar

Connection diagram: Delta

Protection device of the bank:

Incomer Isolator: Type:..... Rated current
.....A Circuit breaker: Type:..... Steps:..... Rated
current:.....A Circuit breaker:
Type:..... Steps:..... Rated current:.....A

Reactors:

Tuning Order:.....

Reference..... Ratings:..... Rated current:.....A Inductance:.....μH /
ph Reference:..... Ratings:..... Rated current:.....A
Inductance:.....μH / ph

Capacitor unit position:	<input type="checkbox"/> Horizontal	<input type="checkbox"/> Vertical
Ventilation:	<input type="checkbox"/> Forced air cooling =>fans ofW each flow rate ofm ³ /h	
	<input type="checkbox"/> Natural air cooling	
Temperature inside the bank:°C	

Checking of power factor relay (Automatic banks only)

Type :	<input type="checkbox"/> NR6	<input type="checkbox"/> NR12	<input type="checkbox"/> NRC12	<input type="checkbox"/> RT6	<input type="checkbox"/> RT12
Display reading:	Cos phi target : <input type="checkbox"/> Inductive <input type="checkbox"/> Capacitive				
	Alarms :				
	Connected steps :				
Record of Settings:	<ul style="list-style-type: none"> • Cos phi target : C/K : CT ratio : • Number of steps : • Regulation program : <input type="checkbox"/>Ca <input type="checkbox"/>Cb <input type="checkbox"/>n <input type="checkbox"/>S <input type="checkbox"/>1-1-1-1-1 <input type="checkbox"/>1-2-2-2-2 <input type="checkbox"/>1-2-4-4-4 • Connection type : <input type="checkbox"/>LL <input type="checkbox"/>LN • Time delay setting : <input type="checkbox"/>1 minute <input type="checkbox"/>50s 				

Visual Inspection

S/N	DESCRIPTION	STATUS	REMARKS
<i>General Checks</i>			
1	Compare name plate data with approved submittals	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
2	Check the incomer load break switch for locking facility	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
3	Check proper fixing of equipment	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
4	Check cleanliness of all components	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
5	Check tightness of all bolts and cable terminations	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
6	Check proper earth of cubicle and door	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
7	Check proper connection of CT terminals	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
8	Check the door mounted accessories for damage	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
9	Check the ventilation fans	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
10	Check the display unit	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>
11	Check the availability of factory test certificate	<i>Ok</i> <input type="checkbox"/>	<i>Not Ok</i> <input type="checkbox"/>

Harmonic Measurements

Harmonic measurement readings to be noted from the power factor controller before and after commissioning.

Before commissioning: THD V:.....%

After commissioning: THD V:.....%

Insulation resistance testing by applying 500V DC as per below table

R-Y	
Y-B	
B-R	
R-E	
Y-E	
B-E	

Capacitor bank efficiency

A) Global measurements: Manually connect all the steps.

Make a current measurement on each phase and compare to theoretical value.

	Phase 1	Phase 2	Phase 3	Theoretical (A)
I measured (A)				

2.1.32 Lighting Control System (LCS) Check list

Appendix 1 - Pre-commissioning Check List

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Installation of LON devices	V	Check correct installation of Metro 12-12 Switching module as per manufacturer recommendations.	
2	Termination of LON, DALI cable	V	Check correct termination of LON and DALI cable for the LON device.	
3	Termination of power supply	V	Check correct termination of power supply to the LON device.	
4	Termination of lighting circuits	V	Check correct termination of lighting circuits to the twelve ports LON device.	
5	Channel Schedule	V	Channel Schedule with Area/Circuit reference / Sensor/Switch reference for twelve outputs to be provided. Refer Annexure 1	

Appendix 2 - Pre-commissioning Check List Configuration Module

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Installation of LON devices	V	Check correct installation of Metro configuration module as per manufacturer recommendations.	
2	Termination of LON, DALI cable	V	Check correct termination of LON and DALI cable from the touch screen for the LON device.	
3	Termination of power supply	V	Check correct termination of power supply to the LON device.	

Appendix 3 - Pre-commissioning Check List LON/DMX Module

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Installation of LON devices	V	Check correct installation of Metro LON/DMX module as per manufacturer recommendations.	
2	Termination of LON, DMX cable	V	Check correct termination of LON and DMX cable from the light fittings for the LON device.	
3	Termination of power supply	V	Check correct termination of power supply to the LON device.	
4	DMX cable routing	V	Check drawing with DMX cable routing provided.	

Appendix 4 - Pre-commissioning Check List Local Devices – Switches & Sensors

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Sensor, Switch Installation	V	Check installation of multi sensor, switches as shown on drawings.	
2	Termination of DALI cable	V	Check correct termination of DALI cable from sensors, switches to LON device.	
3	DALI cable routing	V	Check drawing with DALI cable routing provided.	
4	Addresses	V	Check addresses of sensors, switches done as per manufacturers recommendations.	

Appendix 5 - Pre-commissioning Check List Network cabling – Lon, Dali, Patch cable

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Termination of LON cable	V	Check correct termination of LON cable to all the LON devices and IP Router. All Lon cables should be tagged for reference.	
2	Termination of DALI cable	V	Check correct termination of DALI cable from all the dimmable light fittings, sensors, switches to LON device. All cables to be tagged.	
3	Termination of patch cable	V	Check correct termination of patch cable from the Network switch to the IP Router.	Testing & Commissioning of Patch cable, Network switch is done by IP network supplier
4	LON cable routing	V	Check drawing with LON cable routing provided.	
5	DALI cable routing	V	Check drawing with DALI cable routing provided. This includes for all light fittings, sensors & switches.	

Appendix 6 - Pre-commissioning Check List Bus wire Continuity Test for LON, Dali cable

OUTGOING CABLE TEST				Continuity Test			
Cable Reference	Cable From	Cable to	Continuity Test	Cable Size /Type mm ²	POS to NEG	POS to PE	NEG to PE
LON Cable	Router	LON device		Belden 7701NH 2C x 0.5Sq.mm			
LON Cable	LON device	LON device		Belden 7701NH 2C x 0.5Sq.mm			
DALI Cable	MULTISENSOR / Switches, Touch panel	LON device		Belden 7701NH 2C x 0.5Sq.mm or approved equal 2Cx1.5 Sq.mm			
DALI Cable	Light fittings	LON device		Belden 7701NH 2C x 0.5Sq.mm or approved equal 2Cx1.5 Sq.mm			

Appendix 7 - Pre-commissioning Check List LON/ IP Router

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Installation of LON/IP Router	V	Check correct installation of LON/IP Router as per manufacturer recommendations.	
2	Termination of LON cable	V	Check correct termination of LON cable from the LON devices.	
3	Termination of power supply	V	Check correct termination of power supply to the LON device.	
4	LON cable routing	V	Check drawing with LON cable routing provided.	
5	Termination of Patch cable	V	Check Patch cable terminated in the IP router.	
6	IP Addressed provided	V	Check document with list of IP addresses provided.	

Appendix 8 - Pre-commissioning Check List Interface Test: Fire Alarm

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Check Router installed	V	Check Router is installed.	
2	Check Power supply to Router	V	Check Power supply to Router is provided.	
3	Termination of LON cable	V	Check LON cable terminated to all LON devices and Router	
4	Termination of volt free contact	V	Check Volt free contact is terminated in Router.	

Appendix 9 - Pre-commissioning Check List Earthing & Bonding

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Termination of Earth cable	V	Check all LON devices are terminated with earth cable.	
2				
3				
4				

Appendix 10 - Commissioning Check List Functional Test: Dimming and Switching Test

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Select and determine that Lamp is "Off"	V	Lamp is not lighted and GUI Lamp status is "off"	
2	Switch off the light by single pulse	V	Lamp will be switched on and GUI Lamp status is "on"	
3	Dim the light by press and hold the switch	V	Lamp will be dimmed in stages	
4	Groups Test	V	Lamps in assigned groups switch ON/OFF/DIM together	

Appendix 11 - Commissioning Check List Functional Test: Occupancy and Light Level Test

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Determine lights are off	V	GUI shows presence is "off" and lights are "off"	
2	Simulate presences	V	GUI shows presence is "on"	
3		V	Lamp is lighted and GUI shown Lamp status as "on" and Lux level is at set level ____ lux;	
4	Remove presence and wait for configured duration	V	GUI shows presence is "off" and lights are "off"	
5	After ____ Mins	V	Lamp is dimmed; GUI Shows that Lux level is at set level ____ lux;	
6	After ____ Mins	V	Lamp is not lighted and GUI shows Lamp status as "off" and Lux Level is natural light level ____ lux;	

Appendix 12 - Commissioning Check List Functional Test: Centralized lighting

Item No.	Detail Test Description	Test Type	Expected Results and Observations	Status/Remarks
1	Manual Control	V	Lights are switched ON/OFF/Dimmed from centralized PC	
2	Scene setting	V	Lights are dimmed to pre-assigned scenes in areas equipped with scene switches.	
3	Automatic control	V	Lights are switched ON/OFF/Dimmed automatically from centralized PC	
4	Switches	V	Lights are switched ON/OFF triggered from local switch	

2.1.33 ATS Check Sheet

Appendix 1 - ATS PRE-Commissioning Check Sheet

ATS PRE-COMMISSIONING CHECK SHEET			
S/N	DESCRIPTION	STATUS	REMARKS
VISUAL AND MECHANICAL CHECKS			
	Compare equipment nameplate data with latest diagram.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Property equipment Tag number and nameplate are fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Surrounding and unit surface condition Clean & tidy before testing.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Inspect all doors, panels, and sections for corrosion, dents, scratches, fit, and missing hardware.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Check that all the warning notices are in place.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Verify the cable terminations are tight and secure	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Check that the grounding of the panel is as per specifications.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Verify Test instrument carries valid Calibration certificates	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Check panel rating (name plate) and compare with (IFC) Drawing .	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

Appendix 2 - ATS Functional Test Report

ATS FUNCTIONAL TEST REPORT			
CONTINUITY TEST			
1.	Using the continuity range of the multi-meter check the continuity between two points as per the control drawing.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Repeat the test for all the rest of the circuits. Make sure the ATS system is powered off. If there is already voltage in the circuit you will not get accurate readings.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
INSULATION RESISTANCE TEST			
	The insulation resistance of main bus system, each phase to ground and phase to phase should be measured.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Disconnect all the cables and equipment connected to the main bus in order to achieve complete isolation of the main bus.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Ensure that the main bus insulation, insulation boots, and bushings are clean, free of dust.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Connect the line terminal of the meg-ohmmeter with one phase of the main bus and all other phases together to ground and to earth terminal of the meg-ohmmeter.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Set the test voltage to 500.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Measure the insulation resistance for one minute.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Repeat for all other phases.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	Record Voltage readings below:	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
a.	Between R&YV	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	Between Y& B.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
c.	Between B& R.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
d.	Between R &N.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

e.	Between Y & N.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
f.	Between B & N.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
g.	Between R & E.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
h.	Between Y & E.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
i.	Between B & E.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
j.	Between N & E.....V	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

OPERATION	NORMAL' FUNCTION, LOSS OF SOURCE 1, TRANSFER TO SOURCE 2		
	Panel on Normal Mode: • Q1 on position 'Normal' • Q2 on position '0N' • Q3 on position 'P1' ATS on position I. No Power on source N°1. Power on source N°2.	Type of network put on Nt equal to 4NBL. Nominal Voltage Un equal to 400 V. Nominal Frequency Fn equal to 50Hz. Key on AUTO Mode F1/F2 are close switch Q5 on position 0	
	EXTERIOR EVENT	ACTION OF THE AUTOMATISM	STATUS
	Lost of phase 3 on S1	The LED 'presence of S1' is off on the ATyS D20 & on the synoptique. the Genset is starting(contact 73-74 of the ATyS is closing)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	Inject a network (3 phase + N) on S2	The LED 'of current' S2 is ON on the ATyS D20 and on the synoptique. Visualization of the Timer DTT : (Stabilization of the genset) IFT : 5 SEC	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	/£/No time normally to see it	Transfer of the ATyS on position Zero The LED position 0 of the ATyS is ON on the ATyS D20	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	/£/No time normally to see it	Visualisation of the Timer 'temporisation on zero position (OMF = 5SEC). ODT : 3 SEC	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>

		Transfer of the ATyS on 2nd position	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		The LED position 2 of the ATyS is ON on the ATyS D20.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
	Check all the terminal block connection through voltmeter	Check the customer terminal (outgoing): X1/X2	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		Check the customer terminal (ingoing): X1/X2	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok

OPERATION	NORMAL' FUNCTION, LOST OF SOURCE 2, TRANSFER TO SOURCE 1 :		
	ACTION OF THE AUTOMATISM	STATUS	
	Panel on Normal Mode:	Type of network put on Nt equal to 4NBL.	
	• Q1 on position 'Normal'	Nominal Voltage Un equal to 400 V.	
	• Q2 on position 'ON'	Nominal Frequency Fn equal to 50Hz.	
	• Q3 on position 'P1'	Key on AUTO Mode	
	ATS on position I.	F1/F2 are close switch Q5 on position 0	
	Power on source N°1.		
	No Power on source N°2.		
EXTERIOR EVENT			
	Lost of phase 3 on S1	Visualisation of the Timer MRT :	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		(Loss of S2)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		1RT : 1 MIN	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
	before end of timer 1RT, switch off S2	The LED position 2 of the ATyS is OFF on the ATyS D20 and on the synoptique.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		Transfer of the ATyS on zero position	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		The LED position 0 of the ATyS is ON on the ATyS D20	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
	/£/No time normally to see it	Visualisation of the Timer ODT:	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		ODT : 3 SEC	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		Transfer of the ATyS on position 1	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok
		The LED position 1 is ON on the ATyS D20.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok

OPERATION	NORMAL' FUNCTION, LOST OF SOURCE 2, TRANSFER TO SOURCE 1 :		
	ACTION OF THE AUTOMATISM	STATUS	
	Panel on Normal Mode:	Type of network put on Nt equal to 4NBL.	
	• Q1 on position 'BY PASS'	Nominal Voltage Un equal to 400 V.	
	• Q2 on position 'OFF'	Nominal Frequency Fn equal to 50Hz.	
	• Q3 on position 'P1'	Key on AUTO Mode	

	Power on source N°1.	F1/F2 are close /Switch Q5 on position 'Forced'	
	Power on source N°2.		
	EXTERIOR EVENT	ACTION OF THE AUTOMATISM	STATUS
		the ATyS is supplied	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	Lost of phase 3 on S1	The ATyS D20 gives information on frequency and nominal voltage/frequency	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
		The LEDs presence of S1/S2 are ON on the ATyS D20 and on the synoptique.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>

OPERATION	FUNCTION BY-PASS SOURCE 2:		
	Panel on Normal Mode:	Type of network put on Nt equal to 4NBL.	
	• Q1 on position 'BY PASS'	Nominal Voltage Un equal to 400 V.	
	• Q2 on position 'OFF'	Nominal Frequency Fn equal to 50Hz.	
	• Q3 on position 'P1'	Key on AUTO Mode	
	Power on source N°1.	F1/F2 are close /Switch Q5 on position 'Forced'	
	Power on source N°2.		
	EXTERIOR EVENT	ACTION OF THE AUTOMATISM	STATUS
		the ATyS is supplied	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	Operate Q2 on 'OFF' position , open the right side door and manipulate Q5 on Start GEN	The ATyS D20 gives information on frequency and nominal voltage/frequency	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
		The LEDs presence of S1/S2 are ON on the ATyS D20 and on the synoptique.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
		the ATyS is supplied	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
	Manipulate Q3 on position 'P2'	The ATyS D20 gives information on frequency and nominal voltage/frequency	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>
		The LEDs presence of S1/S2 are ON on the ATyS D20 and on the synoptique.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>

TestInstrument:.....CalibrationCertificate:.....DueDate:....

TestInstrument:.....CalibrationCertificate:.....DueDate:.....

Appendix 3 - AHF PRE-Commissioning Check Sheet

AHF PRE-COMMISSIONING CHECK SHEET			

S/N	DESCRIPTION	STATUS	REMARKS
GENERAL CHECKS			
1.	Property equipment Tag number and nameplate are fixed and readable.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2.	Adequate room space for operation and maintenance purpose	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3.	Surrounding and unit surface condition Clean & tidy before testing.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4.	Inspect for damage that may have occurred during shipping or installation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5.	Check installation conditions acceptable and meet manufacturer requirements	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6.	Verify Test instrument carries valid Calibration certificates	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7.	Check panel rating (name plate) and cross check with approved material submittals and Vendor supplied equipment	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8.	Check power supply cable and earthing installation and ready for use	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
9.	Verify Proper mounting of components.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
10.	Check tightness of all bolts and cable terminations if any.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
11.	Check proper earth of cubicle and door.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
12.	Determine installation location and proper wiring of AccuSine's Current Transformers	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
13.	Check the door mounted accessories.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
14.	Check the ventilation fans (Internal and External).	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
15.	Check the display unit.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
16.	Check the availability of Factory test report	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

2.1.34 HV-Ductor Report

Appendix 1 - HV-Ductor Report

HV-DUCTOR REPORT					
Cubicle / Switchboard Ref :			Sr. No :		
Bus-Bar Tie-In Torque Checks					
SI No	Bus-Bar Jointing	R	Y	B	N
1	Joint-1	Nm	Nm	Nm	Nm
2	Joint-2	Nm	Nm	Nm	Nm
3	Joint-3	Nm	Nm	Nm	Nm
4	Joint-4	Nm	Nm	Nm	Nm
5	Joint-5	Nm	Nm	Nm	Nm
**Torque (Nm) to be apply as per the bolt Size and should be s per instructed in Installation Manual					
Bus-Bar Tie-In Contact Resistance Measurements					
SI No	Test Connection	R	Y	B	N
1	Joint-1	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
2	Joint-2	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
3	Joint-3	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
4	Joint-4	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
5	Joint-5	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$	$\mu\Omega$
Switch Board High Voltage Test Results					
SI No	Test Unit	R	Y	B	N
1	Connection	R to Y+B+N+E	Y to R+B+N+E	B to R+Y+N+E	N to R+Y+B+E
2	IR test before pressure test (1KV for 1 Min)				
3	HV pressure test voltage-kV				
4	Duration of Test	10 sec.	10 sec	10 sec	10 sec
5	Leakage current observed (mA)	mA	mA	mA	mA
6	IR test after pressure test (1KV for 1 Min)				

**HV Test to be carried out @ 80 % of the HV Test Value at FAT (80% of Ud)

HV Test includes panel enclosure, bus-bars, CTs & breaker/contactor. The following precautions need to be taken care, before starting the test.

- a) A visual inspection will be made to ensure the surface dust and moisture

- has been removed from the component under test.
- b) Ensure the component is isolated from other connected system, which may feedback to other components or circuits not under test.
 - c) A check shall be made to verify the ground for the component under test and test equipment being connected to the system ground.
 - d) CT's secondary terminals shall be shorted.
 - e) VT's & surge arresters shall be isolated from the equipment under test.
 - f) Mark out the area and assure nobody enters during test.
 - g) I/C Circuit breakers should be closed.
 - h) Busbar should be fully mounted tightened and shields between phases & between phases and earth should be in place. Moreover bus-bars covers should be in place.
 - i) All earthing switches related to the equipment under test should be open.
 - j) Busbar conductivity test shall be performed
 - k) Insulation resistance test shall be done before and after the test
 - l) After each test the subject under test should be discharged to ground.

The required test voltage shall be raised slowly and maintained for one minute between one phase and other phases connected to ground and then reduced slowly to zero. Testing shall be repeated for the other phases as mentioned above. During each test leakage current should be recorded.

2.1.35 Metering Checks and Micrologic Test Report

Appendix 1 – Metering Checks Test Report

METERING CHECKS TEST REPORT	

Manufactured by : **TYPE :**

AMMETER TYPE : **CT RATIO :**

RATING : **METER SCALE :**

CLASS OF ACCURACY :

FEEDER	AMMETER SERIAL No	INJECTED CURRENT (A)	ACTUAL READING (A)	EXPECTED READING (A)	% Error

SL. No. **TYPE :**

VOLTMETER TYPE : **VT RATIO :**

RATING : **METER SCALE :**

CLASS OF ACCURACY :

FEEDER	VOLTMETER SERIAL No	INJECTED VOLTAGE (V)	ACTUAL READING (V)	EXPECTED READING (V)	% Error

Appendix 2 – Micrologic Test Report

MICROLOGIC TEST REPORT					
BREAKER NAME PLATE DATA					
Mfg :	Family	Breaker Type:			
Standard:	Interrupt Rating:	Serial number:			
TRIP UNIT DATA					
Family:	Type:	Serial:			
TRIP UNIT BASIC PROTECTION SETTINGS					
Parameter	As Found	As Left	As Tested	I ² t	Current Level
Sensor Rating (In)			A		A
LT Switch setting (Io)			xIn		A
Long time Pickup(Ir)			xIn		A
Long time Delay (tr)			Sec.		
Inverse Definite Min. Time Lag(Idmt)					
Short time Pickup(Isd,Im)			xIr		A
Short time Delay (tsd)			Sec.		
Instantaneous Pickup(Ii)			xIn		A
Ground fault pickup (Ig)			xIn		A
Ground fault Delay(tg)			Sec.		
Ground fault Push to Trip Button					
FFTK File Name :			Automatic Test Results		
Parameter	Test Current Level	Trip Time	Status		
Long time Pickup (Ir)					
Short time Pickup (Isd,Im)					
Instantaneous Pickup(Ii)					
Ground fault pickup (Ig)					

2.1.36 CB Pre-commissioning Check Sheet

Appendix 1 – CB Pre-commissioning Check Sheet

CB PRE-COMMISSIONING CHECK SHEET			

S/N	DESCRIPTION	STATUS	REMARKS
General Checks			
1	Property equipment Tag number and nameplate are fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Surrounding and unit surface condition Clean & tidy before testing.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Verify Test instrument carries valid Calibration certificates	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
Installation Checks			
7	Check all the panel are installed properly	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8	Check all the cubicles base are bolted from rear and front on the platform.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9	Check all the cubicles frame are bolted /coupled with each other as per the installation.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
10	Check horizontal bus coupling and its tightness. Tightness torque should be at 50NM for bolt M10 of strength 8.8 with contact washer.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
11	Check earthing correctly installed as per drawings and sized correctly	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
Mechanical Function Check of the Incomers			
12	Check mechanical opening and closing of the breakers.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
13	Check mechanical interlock of the breaker.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

2.1.37 Energisation Checks Form

Appendix 1 – Energisation Checks Form

ENERGISATION CHECKS FORM			
S/N	DESCRIPTION	STATUS	REMARKS
1	Bus duct connection is completed in incomer	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Top covers are properly placed and the explosion covers are properly installed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Incomers relays final settings have been restored as per the protection coordination study	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Panel back covers are properly covered	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	All outgoing breakers are completely racked out and locked in rack-out position	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	All outgoing breakers RACK IN PROHIBITION key is kept in secured safe place / key box.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	All the CT shorting links are verified as per the respective drawing	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8	Keep the space heaters ON at least one hour before energisation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
9	Verify cooling and ventilation system operation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
10	Verify All pre commissioning tests are conducted for all equipment's and components	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
11	Ensure No admission for unauthorised personnel in the concern vicinity.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
12	Review A study of switching programme or the sequence to be executed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
13	Ensure All the panel covers are closed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
14	Ensure All safety action taken, like keeping fire extinguisher and first aid items	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

Appendix 2 – Post Energisation Checks Form

POST ENERGISATION CHECKS FORM			

S/N	DESCRIPTION	STATUS	REMARKS
1	Verify LOTO procedures in place and implemented	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
2	Verify Location lockable and prevents restrict access to unauthorized personnel	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
3	Verify fire system operational	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
4	Verify Cooling and ventilation system operational and status	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
5	Ensure No admission for unauthorised personnel in the concerned vicinity.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
6	Ensure All safety action taken, like keeping fire extinguisher and first aid items	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
7	Verify No abnormality in the system after energization	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
8	Check Phase sequence for correct rotation on incoming feed. <i>Clockwise</i> <input type="checkbox"/> <i>Anti-Clockwise</i> <input type="checkbox"/>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
9	Check and record Phase Voltage on incoming feeder. L1-N V L1-L2 V L2-N V L2- L3 V L3-N V L1- L3 V	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
10	Check for correct readings on indicating meters and instrumentation	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

2.1.38 UPS Module Tests

Appendix 1 – UPS Module Tests

UPS Module Tests					

Load Tests
module of multi-module systems

Test shall be carried out on each

Parameter to be Measured	Balanced Loads					Unbalanced Loads
	No Load	25%	50%	75%	100%	L1-100%,L2-50%,L3-50%
Input voltage (L-L)						
Input current						
Input power						
Input current harmonics						
Input power factor						
Output voltage (L-L)						
Output voltage (L-N)						
Output current						
Output power						
Output voltage harmonics (L-L)						
Output voltage harmonics (L-N)						
Output frequency						
Output modulation						
Phase angle imbalance						

** For 10

minutes

Transient Test

Transient Step	Result	
	Voltage	Current
No load to 25% load		
25% load to no load		
50% load to 100% load		
100% load to 50% load		
No load to 100% load		
100% load to No load		

Output voltage and output current shall be Recorded on an oscilloscope for each of the time above transient conditions. voltage shall

Transfer and Loss of Supply Test

Test	Result	
	Voltage Deviation	Recovery time
Removal of input supply		
Restoration of Input supply		
Load transfer from		
• Module output to bypass		
• Bypass to module output		

Test shall be carried out with full load applied. Transient peak voltage deviation and recovery

to within 1% of the steady-state output be recorded.

Instrument Check
of multi-module systems

Test shall be carried out on each module

Meter	No Load		50% Load		100% Load	
	Indicated	Measured	Indicated	Measured	Indicated	Measured
Input voltage (L-L)						
Input current						
Battery current						
Battery voltage						
Output voltage (L-L)						
Output voltage (L-N)						
Output current						

Test shall be carried out with true r.m.s reading meter for AC Instruments

Battery Discharge Test

Rated Autonomy Time

mins.

Parameter	Percentage of autonomy time										V
	Initial	10%	20%	30%	40%	50%	60%	70%	80%	90%	
DC Bus voltage											
Current											

Test shall be carried out with fully charged battery, 100% load, mains input disconnected.

Results
Time to low battery shutdown mins.
Input power walk-in secs.

Results
Low Battery shutdown voltage V
Input current limit operation A
Percent Overload %

Battery Charge Test

Parameter	Time - every 30 minutes until battery is fully charged												
	Initial	1/2 hr.	1 hr.	1 1/2 hr.	2 hr.	2 1/2 hr.	3 hr.	3 1/2 hr.	4 hr.	4 1/2 hr.	5 hr.	5 1/2 hr.	6 hr.
Module input current													
Module output voltage													
DC bus voltage													
Battery charging current													

Test shall be carried out with load disconnected.

Result Battery current limit setting

A

2.1.39 EL Functional Test Report

Appendix 1 – EL Functional Test Report

EL FUNCTIONAL TEST REPORT			
S/N	DESCRIPTION	STATUS	REMARKS
1	Replace battery fuses and switch on mains supply.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Check correct operation of charger i.e. float voltage and current and adjust if necessary	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Check and record float voltage across each cell / block in battery	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Check correct operation of the display	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	Check the room temperature (should be 20 C) Actual Temp.....C	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	Close all inverter module MCBs (observing correct procedure – see operating and maintenance manual). Place inverter inhibit switch in run position, isolate mains supply and check correct operation of inverter.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	Reconnect main supply	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8	Inhibit inverter again, isolate mains supply and connect load circuit(s).	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
9	Reconnect mains supply and check charger recharges battery correctly.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
10	Check applied load is within design parameters.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
11	Place inverter inhibit switch to 'run' position, isolate mains supply and check correct operation of inverter on load.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
12	Check and record the Output voltage and current	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
13	Check discharge current of battery in to inverter, and check regularly all individual cell / block voltages.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
14	Reconnect mains supply as mentioned in point 9 above.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

2.1.40 DB Pre - Check Sheet

Appendix 1 – DB Pre - Check Sheet

DB PRE - CHECK SHEET			

S/N	DESCRIPTION	STATUS	REMARKS
1	Property equipment Tag number and nameplate are fixed and readable.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Adequate room space for operation and maintenance purpose	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Surrounding and unit surface condition Clean & tidy before testing.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Compare equipment nameplate data with latest diagram.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	Inspect all doors, panels, and sections for corrosion, dents, scratches, fit, and missing hardware.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	Inspect main bus for physical damage, cracks on bushings, damaged insulation or connections.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	Verify that circuit breaker and RCD sizes and types correspond to drawings.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8	Check that identification labels for all circuit breakers, isolators correspond with the DB schedule.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
9	Check that all the warning notices are in place.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
10	Check that the grounding of the panel is as per specifications.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
11	Check that the DB schedule is in place.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

2.1.41 Ion & Silver Copper Water Treatment Pre-Commissioning Report

Appendix 1 – Ion & Silver Copper Water Treatment Pre-Commissioning Report

Ion & Silver Copper Water Treatment Pre-Commissioning Report	

S/N	CHECK LIST	YES	NO	REMARKS
1	The equipment room will have adequate dimensions to accommodate also the possible additional equipment required for water treatment			
2	The equipment room will have easy access to facilitate normal maintenance and service requirements			
3	The equipment room will be suitably illuminated, ventilated and complete with drain line to gutter			
4	Verify surrounding and unit surface condition Clean & tidy before use.			
5	Locate the Copper Silver Ionisation reactor & controller on a vertical surface suitable to support the operating weight (flow to be upwards)			
6	Arrange an open drain able to let the rinse drain flow by gravity according to the flow rates given in the technical submittal.			
7	Provide for an electric plug of 230 V, 50 Hz, single phase current with earthing			
8	Check raw water pressure to be within the permitted values			
9	Connect the Cu-Ag reactor to the piping system as shown in the dimensional drawing, taking care that the piping size of inlet, & outlet corresponds to specifications			
10	Ensure the system is rigidly supported to prevent vertical , horizontal or lateral movement			
11	Check if bypass line has been provided			

12	Install the controller indoor away from direct sources of heat, sunlight and moisture			
13	Mount the controller on a vertical rigid surface capable of supporting its weight			
14	Connect the power supply to the controller			
15	Connect the power lead between the controller and the reactor			
16	Provide electrical supply to the water meter			

2.1.42 Hot Water pumps Pre-Commissioning Report

Appendix 1 – Hot Water pumps Pre-Commissioning Report

Hot Water Circulating Pumps Pre-Commissioning Report			

PUMP NAMEPLATE DETAILS		MOTOR NAMEPLATE DETAILS			
Type		Type			
Model No	DT Code	Model No		DT Code	
Imp Dia		kW	V	FLA	Hz
Q,m3/h	Q,m3/h	RPM	DE brg	NDE	
Made In		Made In			

S/N	DESCRIPTION	STATUS	REMARKS
General			
1	Check the pumps from damage occurred during the installation.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Property equipment Tag number is fixed and readable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Adequate room space for operation and maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Surrounding and unit surface condition Clean & tidy before use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Water is available to operate the pump for at least 30 min.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6	Check arrows on the pump housing if corresponds with system flow direction	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7	Verify no visible leaks on the pipework and system installation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
Electrical			
8	Verify the terminal box orientation for maintenance purpose	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9	Check power cable and termination labelled and correctly installed	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
10	Verify that power is tested and ready for use.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

11	Verify the operating voltage and frequency on the pump nameplate	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
12	Verify Lock Out tag Out procedure in place and permits available	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
13	Check and ensure that the power supplied is suitable to the motors.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
14	Verify that the power wiring is in compliance to Motor wiring diagram	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
Mechanical			
15	Verify hydronic pipework tested, flushed and vented	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
16	Inlet and outlet pipe supports are properly installed.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
17	Suction piping layout avoids air lock and turbulence.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
18	Verify Isolation Valves installed and tagged on both side of the pump	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
19	Check if Temperature gauge is installed on the discharge lines	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
20	Verify Pipework is insulated and labeled	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

2.1.43 Camera Pre-checks

Appendix 1 – Camera Pre-checks

Camera Pre-Checks			
S/L	CHECK LIST	STATUS	REMARKS
Model Verification			
	Confirm Camera type and lens selection as per approved drawing and material submittal	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Verify RAL color as per project selection requirement	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
Hardware Mounting Inspection			
	Check Camera correctly fitted to bracket	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check Camera housing correctly and securely fitted	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check Sun shield securely fitted (external only)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check Integrated media outlet installed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check Power cables installed and tested	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check External power supply securely wall mounted (if applicable)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check External PSU correctly earth grounded (if applicable)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check PSU set to 230v (if applicable)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check Rack mounted PSU securely fixed in cabinet (if applicable)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
Cable connection & labelling			
12	Check Camera connected and labelled appropriately (data cable & power if applicable)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
13	Check Network cables securely plugged into the IMO	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
14	Check Wiring as per drawings	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

2.1.44 WorkStation Pre-checks

Appendix 1 – WorkStation Pre-checks

WorkStation Pre-checks			
S/L	CHECK LIST	STATUS	REMARKS
Workstation with Monitor			
	SM5200 Installed as per the marked location	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	WorkStation Connected With require Number of Display Monitor For CCTV monitoring	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Operating Systems(Windows) Installed and Configured	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	WS 5200 Software Installed and Configured	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	WS5200-MAP license Installed and Configured	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
Software			
	Operating Systems installed with latest Service Pack	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	HDD have sufficient Space For Operating Systems	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	WS5200 Latest Version Installed on All Workstations	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	WS5200-Map license Installed on All Workstations	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Endura Utilities Installed on Workstation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	System Manager (SM5200) Software is up to date	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
Joystick			
	Joystick Installed as per the Mark location		
	Joystick Connected With WorkStation For Pan Tilt & Zoom and other Functionality.		
	Joystick Configured		

2.1.45 System & Storage Manager Pre-checks

Appendix 1 – System & Storage Manager Pre-checks

System & Storage Manager Pre-checks		

S/L	CHECK LIST	STATUS	REMARKS
Systems Manager(SM5200)			
	Verify SM5200 System Manager Installed as per the approved drawings and location	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Ensure Power, cooling system, and network systems verified prior to powering on the system.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Verify the LEDs on the right side in Up indicate Unit status (<i>green= good, red = defective fans, voltage issues</i>)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Verify the LEDs on the right side in Up indicate <i>Prim Network Port status (green=connected at 1Gbps)</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Verify the LEDs on the right side in Down indicate <i>Secondary Network Port status (off = disconnected)</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Verify the LEDs on the right side in Down indicate <i>Software status (green = good, red = dropping packets, database issues)</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
Network Storage Manager(NSM5200)			
	Verify NSM5200Storage System Manager Installed as per the approved drawings, location and material submittal	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Ensure Power, cooling system, and network systems verified prior to powering on the system.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Verify All HDD drives are installed correctly.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	Verify the LEDs status on Above HDD (After Power UP) <i>Green flashing = good, Red = drive failure, Red/Amber flashing =drive rebuilding, Off = drive missing</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

2.1.46 Booster Set Pumps Commissioning Report

Appendix 1 – Booster Set Pumps Commissioning Report

Booster Set Pumps Commissioning Report		

Booster type	Model Nr.	Prod. code / serial		Application	Made
Pump type	Model Nr.	Prod	Q, m ³ /h	Head, Mh	Made
Motor type	Model Nr.	Prod	KW	Volt	FLA

Measured supply voltage & frequency:	V,	Supply: Mains <input type="checkbox"/> Generator <input type="checkbox"/>
Direction of rotation :	Pump 1 CCW <input type="checkbox"/> CW <input type="checkbox"/> Pump 2 CCW <input type="checkbox"/> CW <input type="checkbox"/> Pump 3 CCW <input type="checkbox"/> CW <input type="checkbox"/>	
Change-over time in case of Y/D start (Check for each pump):	S	
Overload setting :	A	Overload device type and rating : _____ A

CU351 /			
Set point, bar:	On/Off Band, %:		Nr. of standby pump(s):
Min. pr. stop, bar:	Off delay, min. pr. stop, S:		Dry run protection:
External VFD			
Motor power, kW:	Motor voltage, V:	Motor freq, Hz:	Motor current, A:
Ramp up time, S:	Ramp down time, S:	Min. freq, Hz:	Max. freq, Hz:

Expansion Vessel

Type:		Model Nr:		Set point, Bar :
Pressure tank:	L	Pre-charge press:	Bar	

PERFORMANCE CHECK (Refer to pump)	Pump 6						
Closed valve pressure at full speed (bar)							
Operating current, full speed at set point (A)							
Outlet pressure, full speed at open valve (bar)							
Operating current, full speed at open valve (A)							

Other controller settings are default values as per I/O manual.

NOTES / SNAGS :

2.1.47 Workstation Functional Test

Appendix 1 – Workstation Functional Test

Workstation Functional Test			
S/L	CHECK LIST	STATUS	REMARKS
Test Purpose: Verify that the WS5200 workstation is communicating over the LAN and contains all software required for commissioning.			
1.	Click “Start”, select “Run”, Type “cmd”, in command prompt windows type “ipconfig” and verify that the configuration information attached to the IRF match the below configuration parameters	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
a.	IP Address	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
b.	Subnet Mask	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
c.	Default gateway	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
2.	Click “Start”, type “services.msc” and Verify that the VSC Ressource Kit services is running	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
3.	Double Click on VSC security Center icon and Confirm that VSC security Center is installed and working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
4.	Confirm Test satisfactory	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	

2.1.48 System Manager Functional Test

Appendix 1 – System Manager Functional Test

System Manager Functional Test			

S/L	CHECK LIST	STATUS	REMARKS
Test Purpose: Verify that the SM5200 boots up and all Parameter are configured.			
	Go to WS5200 Workstation Click “Start-Program-Endura Utilities-Search” and verify the below configuration parameters.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
A.	In Right Pane receive All Connected Device,Check the SM5200	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
B.	Verify the Configured IP Address	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
C.	Verify the Configured Subnet Mask	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
D.	Verify the Configured Default gateway	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Go to WS5200 Workstation Click “Start-Program-Endura Utilities-Search and verify the below are configured	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
A.	DHCP Server	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
B.	Time Server	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
C.	Administrative Privileges	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Double Click on VSC security Center icon and confirm that VSC security Center is installed and working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Double Click on VSC Config Panel icon and Confirm that VSC Config Panel is installed and working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Confirm Test satisfactory	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	

2.1.49 Booster Pumps Pre-Commissioning Report

Appendix 1 – Booster Pumps Pre-Commissioning Report

Booster Pumps Pre-Commissioning Report	

PUMP NAMEPLATE DETAILS				
Booster /Transfer set type	Model Nr	Serial Nr/Prod Date	Application	Made In

General		
Check the booster set from damage occurred during the installation.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Property equipment Tag number is fixed and readable.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Adequate room space for operation and maintenance purpose	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Surrounding and unit surface condition Clean & tidy before use.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Water is available to operate the pump for at least 30 min.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Check arrows on the pump housing if corresponds with system flow direction	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Verify no visible leaks on the pipework and system installed	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Wiring diagram available at site.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
IOM available at site.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok

Electrical		
Power supply available .measured voltage :_____).		<input checked="" type="checkbox"/> Mains
Verify the terminal box orientation for maintenance purpose		<input checked="" type="checkbox"/> Ok
Power, motor and control cables connected to control panel.		<input checked="" type="checkbox"/> Ok
Check inverter and isolator installed correctly and ready for use		<input checked="" type="checkbox"/> Ok
Check power cable and termination labelled and correctly installed		<input checked="" type="checkbox"/> Ok
Verify Log Out tag Out procedure in place and permits available		<input checked="" type="checkbox"/> Ok
Verify thermal load protection installed and correct size		<input checked="" type="checkbox"/> Ok
Record Motor/Pump electrical Nameplate data		<input checked="" type="checkbox"/> Ok

Voltage:.....V Power:.....kW

Mechanical		
Verify hydraulic pipework tested and suction line of pipework cleaned.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Check for any visible leak around the pipework.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Verify unfinished distribution pipework isolated	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Verify strainers directions and cleaned	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Check Pump base frame is rigidly secured to inertia base with aligned anti-vibes	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Check alignment of flexible connections to pipework system, verify if WRAS approved	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Suction piping layout avoids air lock and turbulence.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Inlet and outlet pipe supports are properly installed independently.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Verify lubrication is applied	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Pipe flanges are aligned without strain against the pump flanges.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Valve arrangements installed on both side of the pump as per approved schematics	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Verify Pressure gauges and pressure switch installed correctly and functioning	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok
Pressurization tank size: _____ lt, refer to list.	<input checked="" type="checkbox"/> Ok	<input type="checkbox"/> Not Ok

Pr. tank pre-charge pr: _____ bar (90% of highest cut-in pr. for on/off cntrl, 70% of set pt. for VFD sets).	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>
Low level F/Sw. is set to cut-out at a water level of _____ cm above the suc. pipe outlet to the pumps	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>

REMARKS

.....
.....
.....

2.1.50 Fixed Box / Dome / PTZ Camera Functional Test

Appendix 1 - Fixed Box / Dome / PTZ Camera Functional Test

Fixed Box / Dome / PTZ Camera Functional Test			
S/L	CHECK LIST	STATUS	REMARKS
Test Purpose: Verify the Camera – LAN connectivity			
5.	Go to WS5200 Workstation Click “Start-Program-EnduraUtilities-Search . In Right Pane receive All Connected Device,Select the Camera and Right Click and PING. You will receive “Reply....”.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
6.	Double Click on selected Camera and will open on internet explorer, Enter the username and the password ,Click Live Monitoring	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
a.	login windows popup appears	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
b.	Security window desappear and camera window shows up	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
c.	A live image from the camera appear in the web browser	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
7.	Double Click on VSC security Center icon and Confirm that VSC security Center is installed and working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
8.	Confirm Test satisfactory	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	

2.1.51 MSFD & MD Functional Test

Appendix 1 - MSFD & MD Functional Test

MSFD & MD FUNCTIONAL TEST			
S/N	DESCRIPTION	STATUS	REMARKS
1.	Visually inspect the positioning of the actuator and record status Actuator should be either N/O or N/C.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
2.	Check damper blades current position (opened or closed), verify with sequence of works under normal operation against Schematics or Drawings	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
NORMALLY OPEN DAMPER (<i>tick where applicable</i>) <input type="checkbox"/> BMS <input type="checkbox"/> Fire Alarm			
1.	Damper Should be in Open Position either by :(<i>tick where applicable</i>) <ul style="list-style-type: none"> • Fail Safe Position (Spring Open) <input type="checkbox"/> • Energized to Open <input type="checkbox"/> 	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
2.	Based on the Open position sequences verify the below whenever applicable		
a.	Fail Safe Position (Spring Open) Damper Type - Energize Power to initiate actuator to Close	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
b.	Energized to Open Damper Type - disable power to close MSFD damper by Spring Shut	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
c.	Energized to Open Damper Type - Invert power to close MD damper.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
3.	Visually verify damper is closing	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
4.	Verify and record any abnormalities ie. Noise, self-rotating...	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
5.	Time and record duration for full closure.sec	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
6.	Based on the Closed position sequences verify the below whenever applicable		

a.	Fail Safe Position (Spring Open) Damper Type - Disable Power to initiate actuator to Open	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
b.	Energized to Open Damper Type - Energize power to Open damper	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
c.	Energized to Open Damper Type - Invert power to Open MD damper.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
7.	Record duration for damper to fully open.sec	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
NORMALLY CLOSED DAMPER (tick where applicable)			
	<input type="checkbox"/> BMS <input type="checkbox"/> Fire Alarm		
1.	Damper Should be in Close Position either by :(tick where applicable) <ul style="list-style-type: none"> • Fail Safe Position (Spring Shut) <input type="checkbox"/> • Energized to Close <input type="checkbox"/> 	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2.	Based on the Close position sequences verify the below whenever applicable	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
a.	Fail Safe Position (Spring Shut) Damper Type - Energize Power to initiate actuator to Open	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
b.	Energized to Close Damper Type - Disable power to Open damper by Spring Open	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
c.	Energized to Close Damper Type - Invert power to Open MD damper.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
3.	Visually verify damper is Opening		
4.	Verify and record any abnormalities ie. Noise, self-rotating...	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5.	Time and record duration to fully Close.sec	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6.	Based on the Open position sequences, verify the below whenever applicable		
a.	Fail Safe Position (Spring Shut) Damper Type - Disable Power to initiate actuator to Close MSFD	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
b.	Energized to Close Damper Type - Disable power to Close damper	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
c.	Energized to Close Damper Type - Invert power to close MD damper.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
7.	Record duration for damper to fully close.sec	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

2.1.52 CCTV System Cause and Effect Test

Appendix 1 - CCTV System Cause and Effect Test

CCTV System Cause and Effect Test					
S/N	DESCRIPTION	CAUSE	EFFECT	STATUS	REMARKS
1.	Camera covering fire access panel (Glass window)	Motion detection or door open	<ul style="list-style-type: none"> • Alarm on AECS • Dedicated camera for that area coverage will pop-up 	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2.	Door force open	Door forced Open	<ul style="list-style-type: none"> • Alarm on AECS • Dedicated camera for that area coverage will pop up 	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3.	Door held open	Door held for more than define 10s (default)	<ul style="list-style-type: none"> • Alarm on AECS • Dedicated camera for that area coverage will pop up 	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4.	Unauthorised access	Detects unauthorised person trying to access restricted door	<ul style="list-style-type: none"> • Alarm on AECS • Dedicated camera for that area coverage will pop up 	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5.	AutoTracker (Only for PTZ Cameras)	Detects and tracks movement in the field of view.	Alarm & image pop-up at CCTV station	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6.	Camera Sabotage:	Detects contrast changes in the field of view If the lens is obstructed by spray paint, a cloth, or a lens cap.	Alarm raised on CCTV Monitor	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

7.	Camera Sabotage:	Any unauthorized repositioning of the camera	Alarm raised on CCTV Monitor	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8.	Directional Motion:	A person or object moves in a specified wrong direction	Alarm & image pop-up at CCTV station	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9.	Loitering Detection:	Identifies when people or vehicles remain in a defined zone longer than 5min (default)	Alarm & image pop-up at CCTV station	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
10.	Object Counting (if required Client to advise defined zone number of persons limits)	Counts the number of objects that enter a defined zone.	Alarm & image pop-up at CCTV station	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
11.	Object Removal	An object is removed from a user-defined zone.	Alarm & image pop-up at CCTV station	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
12.	Stopped Vehicle	Detects vehicles stopped near a sensitive area longer than 5 min (default).	Alarm & image pop-up at CCTV station	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

2.1.53 Pump Pre-Commissioning Check Report

Appendix 1 - Pump Pre-Commissioning Check Report

Pump Pre-Commissioning Check Report			

S/N	DESCRIPTION	STATUS	REMARKS
General			
1	Check the pumps from damage occurred during the installation.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
2	Property equipment Tag number is fixed and readable.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
3	Adequate room space for operation and maintenance purpose	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
5	Surrounding and unit surface condition Clean & tidy before use.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
6	AHU Condensate Tray should be free from solid materials, stones, sludge, pebbles etc.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
7	Check that the pump-set installation and connection to the controller/isolator is as per the Installation & Operating Instructions	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
8	Verify the piping and collection tank are completed and installed as per the Install Manual	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
9	Verify the cooling slots of the motor are not covered.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
10	Verify that the pump is protected against splashing water	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
11	Installation and operation manual available at site.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
12	The pump must not be installed in vertical pipe work pumping downwards. (UPA Type only)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
13	Check arrows on the pump housing if corresponds with system flow direction	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

Electrical			
14	Verify and record nameplate of pump/motor <i>Type:</i> <i>Product no:</i> <i>frequency:</i> <i>Serial Number:</i>	<i>Manufacturer:</i> <i>Rated Voltage &</i>	
15	Verify and record power supply on the incoming feed to the isolator or DB breaker! Voltage:.....V Current:.....A	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
16	Verify Alarm cable/control cable connected to BMS Panel.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
17	To ensure the cables are tested and labelled as per standards	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
18	To ensure LOTO procedures in place and implemented.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
19	Control panel is installed & Power, motor and control cables connected to the isolator/circuit breaker.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
20	Check power cable and termination labelled and correctly installed	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
21	Check wiring diagram available inside control panel.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
22	Verify that the power wiring is in compliance to Motor wiring diagram.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

2.1.54 Storage Manager Functional Test

Appendix 1 - Storage Manager Functional Test

Storage Manager Functional Test			

S/L	CHECK LIST	STATUS	REMARKS
Test Purpose: Verify that the WS5200 Workstations Boots up and all applicable softwares are installed and configured with the appropriate system parameters			
9.	Go to WS5200 Workstation Click "Start-Program-EnduraUtilities-Search and verify tht the configuration information attached to the IRF match the below configuration parameters	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
a.	On Right Pane receive All Connected Device,Check the NSM5200	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
b.	Verify the Configured IP Address	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
c.	Verify the Configured Subnet Mask	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
d.	Verify the Configured Default gateway	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
e.	Verify that adequate data storage capacity has been installed on the NSM 5200	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
f.	Verify the system hardware supplied meets the minimum specifications.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
g.	Verify the system hardware(HDD,LAN) Front Panel light showing healthy(Flashing Green / Orange.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
10.	Double Click on VSC security Center icon and Confirm that VSC security Center is installed and working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
11.	Confirm Test satisfactory	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	

Pass: Fail:

Comments:

2.1.55 ANPR Camera Functional Test

Appendix 1 - ANPR Camera Functional Test

ANPR Camera Functional Test			
S/L	CHECK LIST	STATUS	REMARKS
	Test Purpose: Verify the Camera – LAN connectivity		
	Check that image Capturing,Recognition and alarming Features of ANPR Systems are in compliance with the Specification Defined to below aspect	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Several Old,New(Both Short And Long)Plates.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Tilted Plates	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Dirty Number Plates	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Hot Listed Number Plate	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check ANPR Systems generates the Alarm For the Flagged Vehicle.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Check ANPR systems generates the Alarm for the unrecognized Vehicle.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	Confirm Test satisfactory	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	

2.1.56 PAVA System Check List

Appendix 1 - PAVA System Check List

PAVA SYSTEM CHECK LIST			

S/N	DESCRIPTION	STATUS	REMARKS
	STATIC ELECTRICAL CHECKS		
	Before the electrical supply is connected, to ensure		
a.	All the sites installed items are correctly positioned and connected	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	All electrical connections and terminations are correct and tied.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
c.	Rack earth is properly connected with mains supply.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	CONTROLLER UNIT CHECK		
a.	Ensure that good condition of Display board	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	Ensure the audio signal processing	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
c.	Ensure the Input & Output points	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
d.	Color touch-screen paging console (PSS) Test	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
e.	Ensure the touch-screen is good condition	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
f.	Ensure that each key contains a color changing field indicating.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	AMPLIFIERS & SPEAKER LINES.		
	IDA has a capability to monitor both the power Amplifiers and Speaker Lines to detect Amplifier availability & Gain, as well as, Speaker Line open/short circuit and impedance changes		
a.	Engineer to ensure all monitoring are configures.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	Check Amplifier disconnection reporting.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
c.	Check Amplifier Gain reporting.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

d.	Check Line Open circuit reporting.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
e.	Check Line Short circuit reporting.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	BACKUP AMPLIFIER TEST.		
	IDA is capable to accommodate backup amplifiers incase the main amplifier fails. It will automatically switch to the backup amplifier in case of failure and the backup amplifier is monitored		
a.	Engineer to ensure all monitoring are configured.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	Check backup amplifier disconnection reporting.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
c.	Check automatic switching of the amplifiers	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	POWER SUPPLY & BATTERY TEST		
a.	Engineer to ensure 220VAC is available and Mains & Output LED are ON	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	Engineer to ensure Battery is terminated properly and charged (Battery Fault LED is OFF)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
c.	Battery should supply the load when 220VAC is cut.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	PAGING AND MANUAL EVAC TEST		
a.	Engineer to ensure Security Microphones are configured correctly as per zone map and EVAC messages are downloaded	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	Check paging of each Zones from MIC	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
c.	Select each zone and activate EVAC message	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	FIRE ALARM INTERFACE TEST		
a.	Engineer to ensure EVAC contacts are configured correctly as per Cause & effect plan	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	By using a short piece of wire, make a Short Circuit on the Fire Alarm Interface T.B to activate the evacuation contact	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
c.	EVAC LED & IDA LCD should indicate EVAC activation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
d.	Message should be heard from corresponding speaker lines	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	FIRE MANUAL OVERRIDE.		

	Recorded message	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
a.	Alert message	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
b.	Evacuation message	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

Test Equipment

1. Manufacturer:..... Model/Serial No:.....
Calibration Due Date:.....
2. Manufacturer:..... Model/Serial No:.....
Calibration Due Date:.....

2.1.57 Integration Test CCTV & EACS

Appendix 1 - Integration Test CCTV & EACS

INTEGRATION TEST CCTV & EACS			
S/L	CHECK LIST	STATUS	REMARKS
<i>Test Purpose:</i> Verification for CCTV Integration with EACS			
EACS Integration			
16.	Verify that the configuration information attached to the IRF match the below configuration parameters		
a.	Show the Valid Card on Reader and Alarm "Granted Access" Will shown on Alarm Monitoring and Camera will be POP up.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
b.	Show the Invalid/unauthorize Card on Reader and Alarm "Invalid Access" Will shown on Alarm Monitoring and Camera will be POP up	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
c.	Open the Door until define time and Alarm "Door Held Open" Will shown on Alarm Monitoring and Camera will be POP up	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
Time Stamping			
17.	Verify that the Onguard Video Viewer are Configured Correctly :		
a	Open the Video Viewer	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
b.	Go To Camera Tab and Launch Any Camera You will get Cameras Live & Recorded video with time Stamp	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

2.1.58 Fix Camera Functional Test

Appendix 1 - Fix Camera Functional Test

FIX CAMERA FUNCTIONAL TEST			
S/L	CHECK LIST	STATUS	REMARKS
Test Purpose: Verify that the Camera setup has been completed successfully			
18.	Launch WS Work station application and Confirm WS Work station is installed and working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
19.	Open equipment window , select camera then network configuration and Verify that the information attached to the IRF match the below confiurement parameters	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
c.	IP Address	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
d.	Camera name	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
20.	Open camera window,select the camera and double click to open live viewing and verify the below	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
e.	verify that the picture is acceptable using the following parameters: there is no jitter, no visible curve to object shape within the specified field of view (they may be curvature beyond focus area), no section of the housing in view, no visible discoloration.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
f.	Verify the image correspond with snapshot taken during pre-checks	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
21.	Select Camera, right click and select “View Recorded Footage” and Verify that the video was recorded properly and recording can be played back	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	
22.	Disconnect the camera (sampling) and Confirm that there is a cross on the camera icon	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
23.	Reconnect the camera and Confirm that icon is back to normal mode	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

2.1.59 PTZ Camera Functional Test

Appendix 1 - PTZ Camera Functional Test

PTZ CAMERA FUNCTIONAL TEST			
S/L	CHECK LIST	STATUS	REMARKS
<i>Test Purpose:</i> Verify that the PTZ Camera setup has been completed successfully			
24.	Launch WS Work station application and Confirm WS Work station is installed and working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
25.	Open equipment window , select camera then network configuration and Verify that the information attached to the IRF match the below confiuration parameters	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
g.	IP Address	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
h.	Camera name	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
26.	Open camera window,select the camera and double click to open live viewing and verify the below	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
i.	verify that the picture is acceptable using the following parameters: there is no jitter, no visible curve to object shape within the specified field of view (they may be curvature beyond focus area), no section of the housing in view, no visible discoloration.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
27.	Using the mouse on the camera view, move the camera, zoom and flip.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
j.	Confirm Zoom is working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
k.	Confirm Pan is working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
l.	Confirm Tilt is working	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
28.	Using the Keypad KBD move and zoom the camera Verify that the keypad is working properly and the camera is responding.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
29.	Select Camera, roght click and select "View Recorded Footage" and Verify that the video was recorded properly and recording can be played back	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	
30.	Disconnect the camera (sampling) and Confirm that there is a cross on the camera icon	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
31.	Reconnect the camera and Confirm that icon is back to normal mode	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

2.1.60 EHW Pre-Commissioning Report

Appendix 1 - EHW Pre-Commissioning Report

EHW Pre-Commissioning Report			

S/N	DESCRIPTION	STATUS	REMARKS
1	Verify and record name plate data <i>76. Manufacturer:</i> <i>77. Model:</i> <i>78. Serial No:</i> <i>79. Power :.....kW</i> <i>80. Voltage:.....V</i> <i>81. Current:.....A</i> <i>82. No of Elements:</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
2	Verify property equipment tag number and nameplate is fixed and readable	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
3	Verify surrounding and unit surface condition clean & tidy before testing	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
4	Verify adequate room space for operation and maintenance purpose	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
5	Verify correct and approved water heaters are installed and located as per drawings	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
6	Verify water heaters are installed in accordance with manufacturer's instructions	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
7	Check if water heater safety valve installed	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
8	Verify safety valve installed at the cold isolation valve side.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
9	Verify and record expansion vessel pre-charge pressure. <i>Pre-charge:.....Bar</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
11	Ensure the drain cock is closed	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
12	Verify all related pipework are completed and free of any leak	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
13	Verify Tundish correctly installed and connected to a discharge pipe or trapped gulley	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
14	Verify pressure test completed and signed off	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

15	Verify pipework flushed , tap restrictors & strainers cleaned, and signed off	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
16	Check and Record availability of Power supply during testing of the EHW system <i>Isolator/Spur Ref no:</i> <i>Voltage:.....V</i> <i>Current:.....A</i>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
17	Verify water pipes and equipment's earthed accordingly	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
18	Verify Booster pumps operation and ready for use	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
19	Verify that the drainage system ready for operation	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

REMARKS

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2.1.61 Wireless LAN Controllers Test Sheet

Appendix 1 - Wireless LAN Controllers Test Sheet

Wireless LAN Controllers Test Sheet					
Test Procedure Document No			Test Result Document No		
Test Procedure No					
CP No.		Sub-Facility		Room No.	
Device Type		WLC1: <input type="checkbox"/> WLC2: <input type="checkbox"/>			
Model No					
Device IP Address					
Asset Label					
Component ID					
Device Name					
Device Location					
Firmware Version					
<i>Physical inspection of the WLCs</i>					
Test No.		1.	Test Date		
Test Purpose		Physical inspection of WLC			
Checks:		Verify that Devices are installed properly and working conditions are acceptable			
Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>		Comments:			
<i>WLC operational status verification</i>					
Test No.		2.	Test Date		
Test Purpose		WLC operational status verification			
Checks:		Verify that WLCs initial configurations and Running Status are acceptable			

Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	<i>Comments:</i>
---	------------------

WLC Links Status Verification

Test No. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	3.	Test Date	
Test Purpose	WLC Links Status Verification		
Checks:	Data ports will be up on all the WLCs and the interfaces will be working in full duplex mode without any errors.		
Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	<i>Comments:</i>		

WLC network redundancy status verification

Test No. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	4.	Test Date	
Test Purpose	WLC network redundancy status verification		
Checks:	Verify that the WLC is reachable even if one or more ports are down (at least one port is UP)		
Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	<i>Comments:</i>		

WLC Network Reachability Test

Test No. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	5.	Test Date	
Test Purpose	WLC Network Reachability Test		
Checks:	Verify that WLC network reachability to the rest of the network devices.		
Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	<i>Comments:</i>		

WLC Management Access Verification Test

Test No. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	6.	Test Date	
Test Purpose	WLC Management Access Verification Test		
Checks:	Verify only allowed protocols (HTTPS/SSH) and correct SNMP version enabled in each WLC		
Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>	<i>Comments:</i>		

2.1.62 Energisation Checks Form

Appendix 1 - Energisation Checks Form

ENERGISATION CHECKS FORM			

S/N	DESCRIPTION	STATUS	REMARKS
1	Bus duct connection is completed in both the incomers	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	N/A
2	Top covers are properly placed and the explosion covers are properly installed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Incomers (both) relays have been tested as per the protection coordination study	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Incomers (both) relays final settings have been restored as per the protection coordination study	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	Restricted Earth Fault Protection has been checked for Sensitivity and Stability.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	Earthing Interlock (Mech./Electrical) between the upstream and downstream is satisfactory	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	Panel back covers are properly covered	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8	Power Transformers HV & LV Junction boxes are completely secured bolted/locked.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
9	All outgoing breakers are completely racked out and locked in rack-out position	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
10	All outgoing breakers RACK IN PROHIBITION key is kept in secured safe place / key box.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
11	All VTs are in service and the VT circuit is kept ON by putting the MCBs ON	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
12	All the CT shorting links are verified as per the respective drawing	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
13	Earthing switch of both the incomers are OPEN and LOTO should be applied	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
14	Keep the space heaters ON at least one hour before energisation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
15	Verify FM200 operation and ready for use	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
16	Verify cooling and ventilation system operation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

17	Verify All pre commissioning tests are conducted for all equipment's and components	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
18	Visual check at power transformer for power cable termination, cable box cover, oil level and cooler fan setting.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
19	Ensure No admission for unauthorised personnel in the concern vicinity.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
20	Review A study of switching programme or the sequence to be executed	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
21	Ensure All the panel covers are closed	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
22	Ensure All safety action taken, like keeping fire extinguisher and first aid items	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

2.1.63 External Sump Pumps Pre-Commissioning Report

Appendix 1 - External Sump Pumps Pre-Commissioning Report

External Sump Pumps Pre-Commissioning Report		

S/N	DESCRIPTION	STATUS	REMARKS
Model Verification			
1	Verify and record nameplate of each Sump Pump as per below:	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
Pump 1 (Duty) <i>Type:</i> <i>Manufacturer:</i> <i>Model:</i> <i>Serial Number:</i> <i>Motor Type:</i> <i>Max Starts per Hour:</i> <i>Max head [m]:</i> <i>Enclosure class:</i> <i>Maximum installation depth [m]:</i> <i>Number of phases:</i> <i>Frequency [Hz]:</i> <i>Speed [rpm]:</i> <i>Production code (year/week):</i> <i>Maximum flow rate [m³/h]:</i> <i>Maximum liquid temperature [°C]:</i> <i>Insulation class(IP Rating):</i> <i>Power factor:</i>		Pump 1 (Standby) <i>Type:</i> <i>Manufacturer:</i> <i>Model:</i> <i>Serial Number:</i> <i>Motor Type:</i> <i>Max Starts per Hour:</i> <i>Max head [m]:</i> <i>Enclosure class:</i> <i>Maximum installation depth [m]:</i> <i>Number of phases:</i> <i>Frequency [Hz]:</i> <i>Speed [rpm]:</i> <i>Production code (year/week):</i> <i>Maximum flow rate [m³/h]:</i> <i>Maximum liquid temperature [°C]:</i> <i>Insulation class(IP Rating):</i> <i>Power factor:</i>	
Installation Checks			
1	Visually check for any potential damages during transportation, storage or installation	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Verify Property equipment Tag number is fixed and readable.	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Verify Adequate room space for operation and maintenance purpose	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Verify Surrounding and unit surface condition Clean & tidy before use.	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	Confirm that all preservation/packaging measures have been removed	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	Confirm all systems are correctly earthed to specification prior to startup	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	Pit should be free from solid materials, stones, sludge, pebbles etc.	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

8	Check arrows on the pump housing if corresponds with system flow direction	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9	The lifting chain should be fastened to the lifting bracket & the other end hooked to the top of pit.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
10	Float switches installed as per the recommendations in IO manual and approved drawings.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
11	Installation and operation manual available at site.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

Mechanical Checks

1	Check the installation is coordinated with other services.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
2	Check all nuts, bolts, screws, fasteners etc are fixed and tightened as required.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
3	Check the alignment is completed as per approved installation drawings.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
4	Check all piping connections are complete including flexible connections where applicable.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
5	Rotate the pump impeller manually and ensure free and smooth rotation	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
6	Ensure the pumps are cleaned prior to start-up and identification labels and tags are in place.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
7	Verify that each pump is free to rotate.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
8	Verify valves installed correctly and tagged	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
9	Verify pumps lubrication acceptable	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	

8

Electrical

1	Verify and record nameplate of the control panel <i>Manufacturer:</i>	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/>	
	<i>Type:</i> <i>Manufacturer:</i> <i>Product no:</i> <i>Serial Number:</i> <i>Rated Voltage & frequency (Un):</i> <i>Serial number:</i> <i>Max Back up Fuse(I_{pump max}) :</i> <i>Weight:</i> <i>Max Pump Input Current(I_{pump max}) :</i> <i>Prod Year and week (P.c):</i> <i>Serial Number:</i> <i>IP Rating:</i> <i>Asset Tag number:</i> <i>Room location:</i>		

	Verify and record phase voltage on the incoming feed to the control panel. <i>Kahramaa</i> <input type="checkbox"/> <i>Generator</i> <input type="checkbox"/> L1-NV L1-L2V L2-NV L2- L3.....V L3-N.....V L1- L3.....V	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
2	Verify and record incoming current on the incoming feed of the control panel Current.....A	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
3	Check and record Phase rotation of the incoming feeder to the control panel. <i>CW</i> <input type="checkbox"/> <i>CCW</i> <input type="checkbox"/>	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
5	Check the cables are not sharply bent or pinched	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
6	Motor cable adjusted by coiling it up on a relief fitting to ensure it will not damage during operation *	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
7	Control panel is installed & Power, motor and control cables connected to the control panel.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
8	Check Controller Panel and isolator installed correctly and ready for use	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
9	Check & Inspect the Power supply Disconnection means to the sump pump is installed and labeled	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
10	Check power cable and termination labelled and correctly installed	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
11	Verify all motor safety switches are operable and ready for use	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
12	Verify Lock Out tag Out procedure in place and ready for implementation with permit available	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
13	Check wiring diagram available inside control panel.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
14	Verify that the power wiring is in compliance to Motor wiring diagram.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

2.1.64 RAID ,NTP Server And Cameras Configuration

Appendix 1 - RAID ,NTP Server And Cameras Configuration

RAID ,NTP SERVER AND CAMERAS CONFIGURATION			
S/L	CHECK LIST	STATUS	REMARKS

Test Purpose: Verify that all CCTV Equipments And EACS Equipments Power ON and installed all Application & Cervices.

1.	Verify that the configuration information attached to the IRF match the below configuration parameters		
m.	Log on to Endura Utilities as an admin user.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
n.	Click the Reporting tab.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
o.	Select the report type to run (Camera Report or System Report) from the lower-left section of the window.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
p.	Click Generate. There is a message: Generating Report, and then the report is displayed.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
q.	Click Export to export the report.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
r.	Save the report to a location of your choice. You Will receive All Cameras Configuration (Name ,Model No,Frame Rate,Bit Rate etc..)	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
2.	To obtain time server information, SSH must be enabled on cameras and encoders.		
s	Log on to Endura Utilities as an admin user.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
t.	Click Search to discover all devices within reach of Endura Utilities on the Endura network.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
u.	Click the System Attributes tab.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
v.	Click a model in the left section of the window to select it.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
w.	Click a device in the right section of the window to select it.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
x.	Right-click and select Scripts from the drop-down menu.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
y.	Select the Time Sync Status script from the submenu.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
z.	Click Yes at the prompt. A progress bar shows the progress of the script.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	
aa.	Click Export Log to export the results of the script to a file.	Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A <input type="checkbox"/>	

bb.	<p>1. Save the file to a location of your choice.</p> <p>You Will Receive Below information:</p> <ol style="list-style-type: none"> 1. IP Address: {Device IP Address} 2. Friendly Name: {Device Friendly Name} 3. Description: {Current Date/Time of device}, {IP Address of time server}, {Time Offset} 	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
4.	2. CHECKING HDD/RAID ARRAY STATUS		
c	Log on to Endura Utilities as an admin user.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
dd.	Click Search to discover all devices within reach of Endura Utilities on the Endura network.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
ee.	Click the System Attributes tab.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
ff.	Click an NSM model in the left section of the window to select it.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
gg.	Click an NSM device in the right section of the window to select it.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
hh.	Right-click and select Scripts from the drop-down menu.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
ii.	Select the NSM HDD-RAID Array Status script from the submenu.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
jj.	Click Yes at the prompt. A progress bar shows the progress of the script.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
kk.	Click Export Log to export the results of the script to a file.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
ll.	Save the file to a location of your choice.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
5.	EXAMINING HDD/RAID ARRAY INFORMATION	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
nn.	3. OK: Indicates the RAID array is operating normally.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
oo.	4. VERIFYING: Indicates the integrity of the RAID array is being checked. This occurs at least once a week.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
pp.	5. REBUILDING: Indicates that the RAID array is currently rebuilding one or two drives.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
qq.	6. DEGRADED: Indicates that one or two drives are in a degraded state.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	
	7. INITIALIZING: Indicates that the RAID array is booting.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok <input type="checkbox"/> N/A	

<i>rr.</i>	8. INOPERABLE: Indicates that more than two drives are in a DEGRADED state or are missing.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>ss.</i>	9. Check the number of drives that have an OK status.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>tt.</i>	10. Check the number of drives that have a DEGRADED status.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>uu.</i>	Check the number of drives that are missing	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
6.	Storage Status		
<i>v</i>	11. Log on to Endura Utilities as an admin user.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>ww.</i>	12. Click Search to discover all devices within reach of Endura Utilities on the Endura network.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>xx.</i>	13. Click the System Attributes tab.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>yy.</i>	14. Click an NSM model in the left section of the window to select it.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>zz.</i>	15. Click an NSM device in the right section of the window to select it.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>aaa.</i>	16. Login on Web Browser and Select Attached Storage	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
<i>bbb.</i>	And you Will get Use and Unused Space.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
7.	Operating Systems		
<i>c</i>	For Verification of Each System Manager(SM) & Network Storage Manager(NSM) need to Connect Monitor Directly, and Reboot the Systems , You Will get the installed Operating System logo. Note: SM and NSM has preinstalled Linux Based Operating Systems.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	
8.	Power Supply		
<i>d</i>	For Verification of Each SM & NSM need to check physically for power Status via front Panel LED status.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/> <i>N/A</i> <input type="checkbox"/>	

2.1.65 Check list for Testing and commissioning of Motor control centres

Appendix 1 - Check list for Testing and commissioning of Motor control centres

Checklist for Testing and Commissioning of Motor Control Centres.									
Descriptions			Check List		QC Initials	Remarks			
			Yes	No	N/A				
1	GENERAL								
1.1	Check material submittal approved								
1.2	Check Shop drawings are approved								
1.3	Check Materails are approved								
2	CIVIL CLEARENCE								
2.1	Check Civil works are completed								
2.2	Check other MEP services are completed in the room								
2.3	Check Plinth and painting works are completed								
3	TESTING AND COMMISSIONING OF Motor Control Centres								
3.1	Check the visual conditions of Motor Control Center Panels								
3.2	Check the Motor Control Centres Panels installed as per approved drawing								
3.3	Check Motor Control Centres Panels protected from other construction activities								
3.4	Panel base floor level survey setting out checked.								
3.5	Check Bus Bar tightened and Cable termination as per manufacturer recommendation.								
3.6	Check Power and control cable termination completed.								
3.7	Check Insulation Resistance test completed								
3.8	Check Final Cable termination with correct Torque Settings.								
3.9	Check Earthing installed as per drawing & details								
Others:									

2.1.66 Access Points Functional Test Report

Appendix 1 - Access Points Functional Test Report

ACCESS POINTS FUNCTIONAL TEST REPORT			

Test Procedure Document No		Test Result Document No	
Test Procedure No			
CP No.	Sub-Facility	Room No.	
Device Type			
Model No			
Device IP Address			
Asset Label			
Component ID			
Device Name			
Device Location			
Firmware Version			

Access point IP assignment Verification

Test No.		Test Date	
Test Purpose	All the WLCs configured, up and running normally. AP connected to the access switches in the network with the DHCP service available in the network.		
Checks:	1. Verify that the AP receives an IP address from the AP management pool on the DHCP server. 2. AP static IP option is disabled		
1. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/> 2. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

Adding new Access Point Verification

Test No.		Test Date	
Test Purpose	New Access Point to WLC registration verification		
Checks:	3. AP uses option 43 in DHCP scope to discover the WLC 4. Newly connected APs to the network will successfully associate with the WLCs.		
3. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
4. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

SSID broadcast Test

Test No.		Test Date	
Test Purpose	Verify all the configured SSIDs are broadcast with required security mechanisms.		
Checks:	5. Verify that all the SSIDs configured as broadcast, are listed on the wireless network list with correct security mechanisms 6. The non-broadcast SSIDs are not listed on the Wireless network list		
5. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
6. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

WLAN client Connectivity test

Test No.		Test Date	
Test Purpose	To confirm the IP address and network connectivity for the wireless users		
Checks:	7. Verify that clients are getting correct IP address according to the SSID associated 8. Verify that clients are assigned to the correct VLAN according SSID associated 9. Verify the network connectivity of the client once successfully associated to the WLAN		
7. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
8. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
9. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

Corporate User authentication verification with WLAN

Test No.		Test Date	
Test Purpose	Corporate User authentication verification with WLAN		
Checks:	10. Verify that only correct WPA2/PSK allow access to the WLAN		
10. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

Guest User authentication verification with WLAN

Test No.		Test Date	
Test Purpose	Guest User authentication verification with WLAN		
Checks:	11. The guest client associates to the guest WLAN successfully and is tunneled to anchor WLCs.		
11. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

User Roaming test

Test No.		Test Date	
Test Purpose	To confirm that the User Layer 2 roaming on the below mentioned scenarios are working properly.		
	1. Both AP associated to same WLC 2. Both AP associated to different WLCs		
Checks:	12. Verify that the user network connectivity while roaming for all the above-mentioned scenarios is acceptable.		
12. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

Rogue AP identification test

Test No.		Test Date	
Test Purpose	Verify that Rogue APs identified by the WLAN		
Checks:	13. Verify that an AP that is not part of the designed wireless network is identified and marked as a rogue AP.		
13. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

WLC high availability test

Test No.		Test Date	
Test Purpose	WLC high availability configuration verification		
Checks:	14. Verify that the APs and clients will move from the primary to the secondary WLC in event of failure.		
14. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

WiFi Signal Strength and Data Throughput test

Test No.		Test Date	
Test Purpose	WiFi Signal Strength and Data Throughput test		
Checks:	15. Verify iperf result are similar like one attached.		
15. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

PRIME and MSE availability testing

Test No.		Test Date	
Test Purpose	PRIME and MSE availability testing		
Checks:	16. Prime and MSE should be reachable		
16. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

CMX Analytic – Status

Test No.		Test Date	
Test Purpose	CMX Analytic – status		
Checks:	17. Verify that CMX analytics services is up and running		
17. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

Voice WLAN connectivity

Test No.		Test Date	
Test Purpose	Voice WLAN connectivity		
Checks:	18. Wireless phones associate to the voice SSID configured with no authentication and basic network connectivity is available 19. Wireless phones associate to the voice SSID configured for production, it is authenticated, traffic is encrypted and the phone has basic network connectivity		
18. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/> 19. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

wIPS

Test No.		Test Date	
Test Purpose	To verify Context-Aware Service and wIPS		
Checks:	20. After adding the license file, the Select Mobility Service page appears		
20. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

MSE Testing Context-Aware

Test No.		Test Date	
Test Purpose	Location based features of MSE		
Checks:	21. The MSE services for Context-Aware status is up and running		
21. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

Standard Installation & Commissioning Testing (Licensing)

Test No.		Test Date	
Test Purpose	AP License check on WLC		
Checks:	22. WLC is loaded with correct AP license, The WLC Controller should reflect the correct AP count		
22. Pass: <input type="checkbox"/> Fail: <input type="checkbox"/>			
Comments			

2.1.67 Pre-commissioning check list – Stand pipe system – Fire Fighting

Appendix 1 - Pre-commissioning check list – Stand pipe system – Fire Fighting

2.1.68 Panic Alarm System Check List

General Notes:

The Following procedure is to confirm the installation and operation of the intrusion system for compliance with the contract documents and its intended operation

Appendix 1 - Checklist:

1. Put system in test!	No <input type="checkbox"/>	Yes <input type="checkbox"/>
2. Workmanship clean and neat.	No <input type="checkbox"/>	Yes <input type="checkbox"/>
3. Wire tagging as per specifications.	No <input type="checkbox"/>	Yes <input type="checkbox"/>
4. Alarm received in the monitoring work station when button is activated.	No <input type="checkbox"/>	Yes <input type="checkbox"/>
5. Event received in the monitoring work station when the button is reset.	No <input type="checkbox"/>	Yes <input type="checkbox"/>
6. User group trained to verify and respond to alarm condition?	No <input type="checkbox"/>	Yes <input type="checkbox"/>

COMMENTS:-

2.1.69 EACS/CCTV Integration Inspection Check List

Associated CCTV Cameras:

General Notes:

The following procedure is to confirm the termination of the installation for compliance with the Contract Documents and its intended operation.

Appendix 1 - Checklist:

Event(EACS)	Action (CCTV)	1	2	3	4
		PTZ camera moves to Preset	Video from one or more cameras displayed on operator's PC	Recording of any camera started	CCTV site map pops up with evt source highlighted
1	Access Granted				
2	Invalid Access Level				
3	Door Forced				
4	Cabinet Tamper				
5	Access Zone State Change				
6	Intercom System Event				
7	Door kept Open				
8	Operator Event				
9	Card error				
10	Security breach				
11	Tamper				
12	Fire Alarm				

COMMENTS

2.1.70 Intruder Detection System Check List

General Notes:

The following procedure is to confirm the installation and operation of the Intrusion System for compliance with the Contract Documents and its intended operation.

Appendix 1 - Checklist:

1. Put system in test!	No <input type="checkbox"/> Yes <input type="checkbox"/>
2. Workmanship clean and neat.	No <input type="checkbox"/> Yes <input type="checkbox"/>
3. Wire tagging and panel label(s) per specifications.	No <input type="checkbox"/> Yes <input type="checkbox"/>
4. LED in PIR Sensor is flashing when someone in the field of detection	No <input type="checkbox"/> Yes <input type="checkbox"/>
5. Alarm received in the monitoring work station when someone in the field of detection	No <input type="checkbox"/> Yes <input type="checkbox"/>
6. Alarm received in the monitoring workstation when the door is open	No <input type="checkbox"/> Yes <input type="checkbox"/>
7. Alarm is displayed in the monitoring workstation as per the agreed Schedule.	No <input type="checkbox"/> Yes <input type="checkbox"/>
8. User group trained to verify and respond to alarm condition.	No <input type="checkbox"/> Yes <input type="checkbox"/>

COMMENTS :

2.1.71 External Sump Pump Commissioning Report

Appendix 1 - External Sump Pump Commissioning Report

External Sump Pump Commissioning Report			
S/N	DESCRIPTION	STATUS	REMARKS
General Checks			
1	Check and record Outgoing cables power supply to Pumps motor energized (only for 3 Phase pumps) L1-N V L1-L2 V L2-N..... V L2- L3..... V L3-N..... V L1- L3..... V	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Verify Isolator of pump is functional when activated.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Verify and record Rotation of pump Clockwise <input type="checkbox"/> Anti-Clockwise <input type="checkbox"/>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Adjust and record of the float sensors. <i>Height:.....m</i>	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	Verify piping system free of any leaks	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	Record and Measure any imbalance (If any).	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	Check for any unusual noise and vibration during operation.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8	Verify and test HOA controls of the pumps at the control panel.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

2.1.72 Client Workstation checklist.

Appendix 1 - Client Workstation checklist

1. Proper device per specifications and drawings?	No <input type="checkbox"/> Yes <input type="checkbox"/>
2. Client software restarts when system rebooted?	No <input type="checkbox"/> Yes <input type="checkbox"/>
3. Monitors positioned for ease of viewing?	No <input type="checkbox"/> Yes <input type="checkbox"/>
4. Cables coiled and tied neatly?	No <input type="checkbox"/> Yes <input type="checkbox"/>
5. Recognizes and communicates with network and cameras?	No <input type="checkbox"/> Yes <input type="checkbox"/>
6. Alarm list view set to client requirements?	No <input type="checkbox"/> Yes <input type="checkbox"/>
7. Alarm notification at sufficient volume to notify system users?	No <input type="checkbox"/> Yes <input type="checkbox"/>
8. Integration with access control server programmed?	No <input type="checkbox"/> Yes <input type="checkbox"/>
9. Spot monitor or camera pop up upon alarm?	No <input type="checkbox"/> Yes <input type="checkbox"/>
10. Client trained on system monitoring?	No <input type="checkbox"/> Yes <input type="checkbox"/>
11. Client can connect to all Panels?	No <input type="checkbox"/> Yes <input type="checkbox"/>
12. Secured logon hierarchy in place?	No <input type="checkbox"/> Yes <input type="checkbox"/>
13. Third party software enabled?	No <input type="checkbox"/> Yes <input type="checkbox"/>

Comment:

2.1.73 Hot Water Circulating Pumps Commissioning Report

Appendix 1 - Hot Water Circulating Pumps Commissioning Report

Hot Water Circulating Pumps Commissioning Report			
S/N	DESCRIPTION	STATUS	REMARKS
1	Check and record incoming cables power supply to Pump motor energized Voltage: V Current: A	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
2	Verify Isolator of pump is functional when activated.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Record and Measure any imbalance (If any)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Check for any unusual noise during operation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
5	Verify Electric Water Heater operation and record Asset Tag No:.....	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
6	Verify and record Set point of Electric Water Heater (<i>Recommended 60°C - 65°C</i>): °C	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
7	Identify furthest Tap and record Asset Tag No (if Any).....	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
8	Verify and record by use of thermometer the temperature of the water on the outlet. (38°C) Temp:..... °C	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
9	Confirm if Thermostatic Valve adjusted	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
10	Verify and record return temperature (<i>Recommended >50°C</i>):..... °C	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
11	Confirm if Multi Therm Balancing Valve adjusted	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok	

2.1.74 Sprinkler system Commissioning checklist

Appendix 1 - Mechanical System

Sl. No.	Test Description	Visual Inspection requirement	Report	Remarks
01	The installation of Pipes and Equipments installed as per approved shop drawing and approved method of statement.	The installation of Pipes and Equipments shall be installed as per approved shop drawing and approved method of statement.		
02	Check pressure testing & flushing for all the equipment and pipes were completed.	pressure testing & flushing for all the equipment and pipes were completed shall be as per approved method of statement		
03	Check all drain pipes connected to the nearest drain points.	Shall be as per the approved drawing		
04	Check all valves are in closed condition.	Shall be as per the approved drawing		
05	Commission the fire pump set as per pump commissioning method statement.	Shall be as per the approved method of statement		
06	Check Butterfly Valve, OS & Y Gate valve, Alarm check valve and Flow switch are interfaced with main Fire Alarm Control panel	Shall be as per the approved drawing		

Appendix 2 - Testing & Commissioning Test Sheet

Sl. No.	Test Description	Performance required	Report	Remarks
01	Check all Alarm Check Valves and ZCV are set in required working pressure	Working pressure shall be indicated in Pressure gauges of ZCV, inlet and outlet of Alarm Check Valve		
02	Open the Inspector Test and Drain Valve of ZCV assembly and	check pressure of the systems gets reduced		
		The Alarm check Valve Bell starts sounds		
		The Jockey pump shall starts to maintain the working pressure to maintain the required working pressure.		
		If pressure drops continuously to the cut in pressure of Electrical pump then it gets started to maintain the required pressure and continuously work for 10 minutes and automatically it will turn OFF.		
		Still the pressure drops below the cut in pressure of Diesel pump then it gets started to maintain the required working pressure and SHUT OFF Diesel pump by Manual Only.		
03	Close the Test and Drain Valve	Check the systems reaches the required working pressure		

Appendix 3 - PRE- Commissioning Chck List

Sl. No.	Test Description	Visual Inspection requirement	Report	Remarks
01	The installation of Pipes and Equipments installed as per approved shop drawing and approved method of statement.	The installation of Pipes and Equipments shall be installed as per approved shop drawing and approved method of statement.		
02	Check pressure testing & flushing for all the equipment and pipes were completed.	pressure testing & flushing for all the equipment and pipes were completed shall be as per approved method of statement		
03	Check all drain pipes connected to the nearest drain points.	Shall be as per the approved drawing		
04	Check all Landing valves are set to required working pressure.	Shall be as per the approved method of statement		
05	Commission the fire pump set as per pump commissioning method statement.	Shall be as per the approved method of statement		
06	Check Butterfly Valve ,OS & Y Gate valve and Flow switch are interfaced with main Fire Alarm Control panel	Shall be as per the approved drawing		

Appendix 4 - Testing And Commisioning Check List

Sl. No.	Test Description	Performance required	Report	Remarks
01	Open remote Fire Hose Reel	check pressure of the systems gets reduced		
		The Jockey pump shall starts to maintain the working pressure to maintain the required working pressure.		
		If pressure drops continuously to the cut in pressure of Electrical pump then it gets started to maintain the required pressure and continuously work for 10 minutes and automatically it will turn OFF.		
		Still the pressure drops below the cut in pressure of Diesel pump then it gets started to maintain the required working pressure and SHUT OFF Diesel pump by Manual Only.		
02	Close Fire Hose Reel	Check the systems reaches the required working pressure		

Appendix 5 - Testing And Commisioning Check List

03	Open the remote Landing Valve	check pressure of the systems gets reduced		
		The Alarm check Valve Bell starts sounds		
		The Jockey pump shall starts to maintain the working pressure to maintain the required working pressure.		
		If pressure drops continuously to the cut in pressure of Electrical pump then it gets started to maintain the required pressure and continuously work for 10 minutes and automatically it will turn OFF.		
		Still the pressure drops below the cut in pressure of Diesel pump then it gets started to maintain the required working pressure and SHUT OFF Diesel pump by Manual Only.		
04	Close the Landing Valve	Check the systems reaches the required working pressure		

Appendix 6 - Wet Riser – Fire Hydrant Pre- Commisioning Check List

Sl. No.	Test Description	Visual Inspection requirement	Report	Remarks
01	The installation of Pipes and Equipments installed as per approved shop drawing and approved method of statement.	The installation of Pipes and Equipments shall be installed as per approved shop drawing and approved method of statement.		
02	Check pressure testing & flushing for all the equipment and pipes were completed.	pressure testing & flushing for all the equipment and pipes were completed shall be as per approved method of statement		
03	Check all drain provisions are provided	Shall be as per the approved drawing		
04	Check all Landing valves are set to required working pressure.	Shall be as per the approved method of statement		
05	Check OS & Y Gate valve and tamper switch are interfaced with main Fire Alarm Control panel	Shall be as per the approved drawing		

Appendix 7 - Testing and Commisioning Check List

Sl. No.	Test Description	Performance required	Report	Remarks
01	Open remote Fire Hydrant	check pressure of the systems gets reduced		
		The Jockey pump shall starts to maintain the working pressure to maintain the required working pressure.		
		If pressure drops continuously to the cut in pressure of Electrical pump then it gets started to maintain the required pressure and continuously work for 10 minutes and automatically it will turn OFF.		
	Close Fire Hydrant	Still the pressure drops below the cut in pressure of Diesel pump then it gets started to maintain the required working pressure and SHUT OFF Diesel pump by Manual Only.		
		Check the systems reaches the required working pressure		

2.1.75 Access Controlled Door checklist.

General Notes:

The Following Procedure Is To Confirm The Installation And Operation Of The Security Access System For Compliance With The Contract Documents And Its Intended Operation.

Appendix 1 - Checklist:

1. Door unlock time, entry reader (present card and doesn't open door)	No <input type="checkbox"/> Yes <input type="checkbox"/>
2. Valid entry – No alarms?	No <input type="checkbox"/> Yes <input type="checkbox"/>
3. Forced door alarms?	No <input type="checkbox"/> Yes <input type="checkbox"/>
4. Held door alarm after valid card read? (<i>present card and hold door open</i>)	No <input type="checkbox"/> Yes <input type="checkbox"/>
5. Local noise operates when door held too long?	No <input type="checkbox"/> Yes <input type="checkbox"/>
6. Door relocks upon? (<i>opening, closing or other – specify</i>)	No <input type="checkbox"/> Yes <input type="checkbox"/>
7. “No Special Knowledge” required to exit? If not write explanation comment	No <input type="checkbox"/> Yes <input type="checkbox"/>
8. Door unlocks time, exit reader? (<i>present card and doesn't open door</i>)	No <input type="checkbox"/> Yes <input type="checkbox"/>
9. Local noise operates when card not used?	No <input type="checkbox"/> Yes <input type="checkbox"/>
10. Does door close and lock securely?	No <input type="checkbox"/> Yes <input type="checkbox"/>
11. Theft-resistant screws installed?	No <input type="checkbox"/> Yes <input type="checkbox"/>
12. Invalid card detected?	No <input type="checkbox"/> Yes <input type="checkbox"/>
13. Workmanship clean and neat?	No <input type="checkbox"/> Yes <input type="checkbox"/>
14. Tagging and panel label as per specifications?	No <input type="checkbox"/> Yes <input type="checkbox"/>

Comments:-

2.1.76 VFD Commissioning Report

Appendix 1 - VFD Commissioning Report

VFD Commissioning Report			
S/N	DESCRIPTION	STATUS	REMARKS
1	Record Motor nameplate as per below	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	XIII. Manufacturer:		
	XIV. Serial No:		
	XV. Asset Tag No:		
	XVI. Power rating: kW		
	XVII. Voltage Rating: V		
	XVIII. Current Rating: A		
2	Switch on VDF and record any abnormalities	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
3	Verify indication lamps and LCD panel functional	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
4	Program and record VFD as per below parameters	<input checked="" type="checkbox"/> Ok <input type="checkbox"/> Not Ok	
	I. Select language: English II. Motor Frequency: Hz III. Motor Power: kW IV. Motor Voltage: V V. Motor Current: A VI. Nominal Motor Speed: RPM VII. Maximum Frequency: Hz VIII. Motor thermal Current: A IX. Acceleration Time: sec X. Deceleration Time: sec XI. Low speed:		

	RPM XII. High-speed: RPM		
6	Verify Isolator is functional when activated.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
7	Record and Measure any imbalance (If any)	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
8	Check for any unusual noise during operation	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	

ARAB ENGINEERING BUREAU

2.1.77 Transfer Pump (TF) Commissioning Report

Appendix 1 - Transfer Pump (TF) Commissioning Report

Transfer Pump (TF) Commissioning Report			
S/N	DESCRIPTION	STATUS	REMARKS
NAMEPLATE DATA			
<i>Booster Type / Model Nr. :</i>		<i>Serial Nr. / Prod. Date :</i>	<i>Made in</i>
<i>Pump type</i>	<i>Pump part no. & prod. date (yy/ww)</i>	<i>Motor part no. / kW</i>	<i>Application</i>
	Verify the terminal box orientation for maintenance purpose	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Power, motor and control cables connected to control panel.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Check inverter and isolator installed correctly and ready for use	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Check power cable and termination labelled and correctly installed	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Check for any visible leak around the pipework.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Measured supply voltage & frequency : _____ V , _____ Hz.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Mains/Generator: _____	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Direction of rotation (Check for each pump) : _____ CCW _____ CW, from motor fan side.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Change-over time in case of Y/D start (Check for each pump) : _____ secs.	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	O. L. R. rating : _____ A Motor FLA _____ A	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
	Overload relay settings : _____ A	<i>Ok</i> <input type="checkbox"/> <i>Not Ok</i> <input type="checkbox"/>	
PERF. TEST (refer to pump data)		Pump 1	Pump 2
Closed valve pressure, bar			
Pressure at nominal flow, bar			

Operating current at nominal flow, (A)							
Pump alternation: _____ O.K.							
TIME LOG, FIELD AND TRAVEL TIMES							
S/n	Date	Name	Start Time	Stop Time	Total Hrs.	F/T	Supervisor, Customer name & signature

2.1.78 Secondary Condensate Pump (UPA) Commissioning Report

Appendix 1 - Secondary Condensate Pump (UPA) Commissioning Report

Secondary Condensate Pump (UPA) Commissioning Report				
S/N	DESCRIPTION	STATUS	REMARKS	
START-UP				
1.	Check and record incoming cables power supply to Pump motor energized Voltage: V Current: A	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
2.	Verify Isolator of pump is functional when activated.	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
3.	Ensure collection tank fill with clean water	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
4.	Verify Collection Tank Float Valves installed	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
5.	Verify pump vented via the vent screw	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
6.	Verify pump MANUAL mode operation Pumps runs continuously	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
7.	Verify pump AUTO mode operation Pumps stops and runs based on integral float switch	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
8.	Record and Measure any imbalance (If any)	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
9.	Check for any unusual noise during operation	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
10.	Pump operation satisfactory and discharge to cooling tower make up tank	<input type="checkbox"/> Ok <input type="checkbox"/> Not Ok		
FLOW PERFORMANCE TEST				
	energize the Condensate Secondary Pump isolator			
2.	Operate the Condensate Secondary Pump in Manual Mode			
3.	Verify the Condensate Secondary Pump flow rate capacity using the following procedure			
32.	Fill up the Condensate Recovery Tank to a known volume			
33.	Measure the initial water level from the bottom of the Condensate Recovery Tank using a meter tape. initial reading:.....mm			

34.	Record the pump operating time Time:sec		
35.	Check and record motor voltage and current using a clamp meter while the pump is in operation. Voltage:V Current:A		
36.	Stop the Pump and Compute the water displacement. (Displacement = Initial reading – Final reading): Final reading:mm Water Displaced:L		
37.	Computed Actual volume flow rate. Actual Flow Rate:L/S Rated Flow Rate: L/S		

END OF PART