BUILDING SERVICES BRANCH

TESTING AND COMMISSIONING

PROCEDURE NO. 10

FOR

SWIMMING POOL FILTRATION PLANT

INSTALLATION

IN

GOVERNMENT BUILDINGS

HONG KONG

HONG KONG SPECIAL ADMINISTRATIVE REGION GOVERNMENT

Building Services Branch
Architectural Services Department
(2000 Edition)

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TABLE OF CONTENT

B.S.B. Testing and Commissioning Procedure No. 10
Swimming Pool Filtration Plant Installation

1. Introduction

1.1 This procedure is intended to lay down the minimum testing and commissioning requirements to be carried out by the Contractor on a new Swimming Pool Filtration Plant Installation upon completion or on an existing Swimming Pool Filtration Plant Installation after a major alteration. Additional testing and commissioning (T & C) requirements may be proposed by the Contractor as appropriate and agreed by the Project Building Services Engineer (PBSE), e.g. for special equipment supplied and/or installed by the Contractor.

1.2 This procedure is also written to facilitate the PBSE and Project Building Services Inspector (PBSI) in carrying out the following aspects of work with respect to T & C.

(i) To vet and approve the T & C procedures proposed and submitted by the Contractor.

(ii) To witness those T & C procedures as specified.

(iii) To receive the T & C certificate and other supporting data.

2. General Requirements

2.1 The Contractor shall submit the T&C procedures together with the Testing and Commissioning progress chart in Appendix B to the PBSE. The submission shall be made at least one month before the commencement of T&C.

2.2 Where tests are required to be witnessed by the PBSE/PBSI, the Contractor shall give due advance notice (usually not less than three days) and provide details of date, time and type of tests to be performed.

2.3 Upon completion of such T & C procedure, the Contractor shall complete and sign a testing and commissioning certificate as Appendix A, to the effect that agreed T & C procedures have been duly carried out.

2.4 The Contractor shall employ trained, experienced engineer to carry out the T & C procedure and for specialized items such as gas chlorination system, ozone dosing, boiler system, etc. they may be carried out by the manufacturer's own testing and commissioning engineers if necessary.

2.5 Before operating the system to carry out T & C, the contractor should follow steps:

(a) Obtain design drawings and specifications and become thoroughly acquainted with the design intent.

(b) Obtain copies of approved shop drawings of all water handling equipment, outlets (supply, return), boiler, gas chlorinator, chemical dosing system and etc.

(c) Compare design to installed equipment and field installation.

(d) Walk the system from the water and other fluid handling equipment to terminal units to determine variations of installation from design.

(e) Obtain schematic diagrams of system as-built piping layouts to facilitate reporting.

2.6 During construction certain tests will have been carried out on the installations to ensure their suitability for operating at the design conditions. The Contractor may verify that such tests have taken place by production of tests certificates.

(a) Works Tests

(i) Works tests shall follow the procedure normally associated with the specified item of equipment and to the standards as laid down in the Specification and the Conditions of Contract.

(ii) Works static pressure tests will be carried out on such items of plant and equipment as pressure vessels, water coils, heat exchangers, filter bed tanks, and all items of plant or equipment if the provision has been made in the specification and the Conditions of Contract.

(iii) Dynamic rotation tests will be carried out on such items as fan impellers and drives, pump impellers and drives. Tests shall be conducted through the entire rotational speed range up to a maximum of 50% design operating speed if the provision has been made in the Conditions of Contract. When items of plant are purchased ex-stock, a manufacturers test certificate will suffice.

(iv) Rotational test on electric motors will not be carried out if the equipment is constructed to the requisite current British Standard or any other approved standards.

(v) Operational test on the chlorine gas leakage detection system.

(vi) Water quality test.

(vii) Operational test on the loose supplied items such as pool cleaners and pool covers.

(b) Pressure Testing and Welding Test on Piped Services

For this part of test, refer to the relevant section in the "Testing and Commissioning Procedure for Air-conditioning, Refrigeration, Ventilation and Control Systems."

3. Testing and Inspection

3.1 The Contractor shall carry out the tests and inspections as shown in Part 3 and record the test results on Part 4 of Appendix A and as agreed between the PBSE and the Contractor.

3.2 The Contractor shall provide all the necessary staff, labour, materials and equipment for a thorough test and examination of the installation.

3.3 The Contractor is required to carry out a full T & C procedure for the equipment and the complete system to ascertain that the equipment and the system are operating in accordance with the design objectives. It includes

(a) the balance of water distribution,

(b) adjustment of total system to provide design quantities,

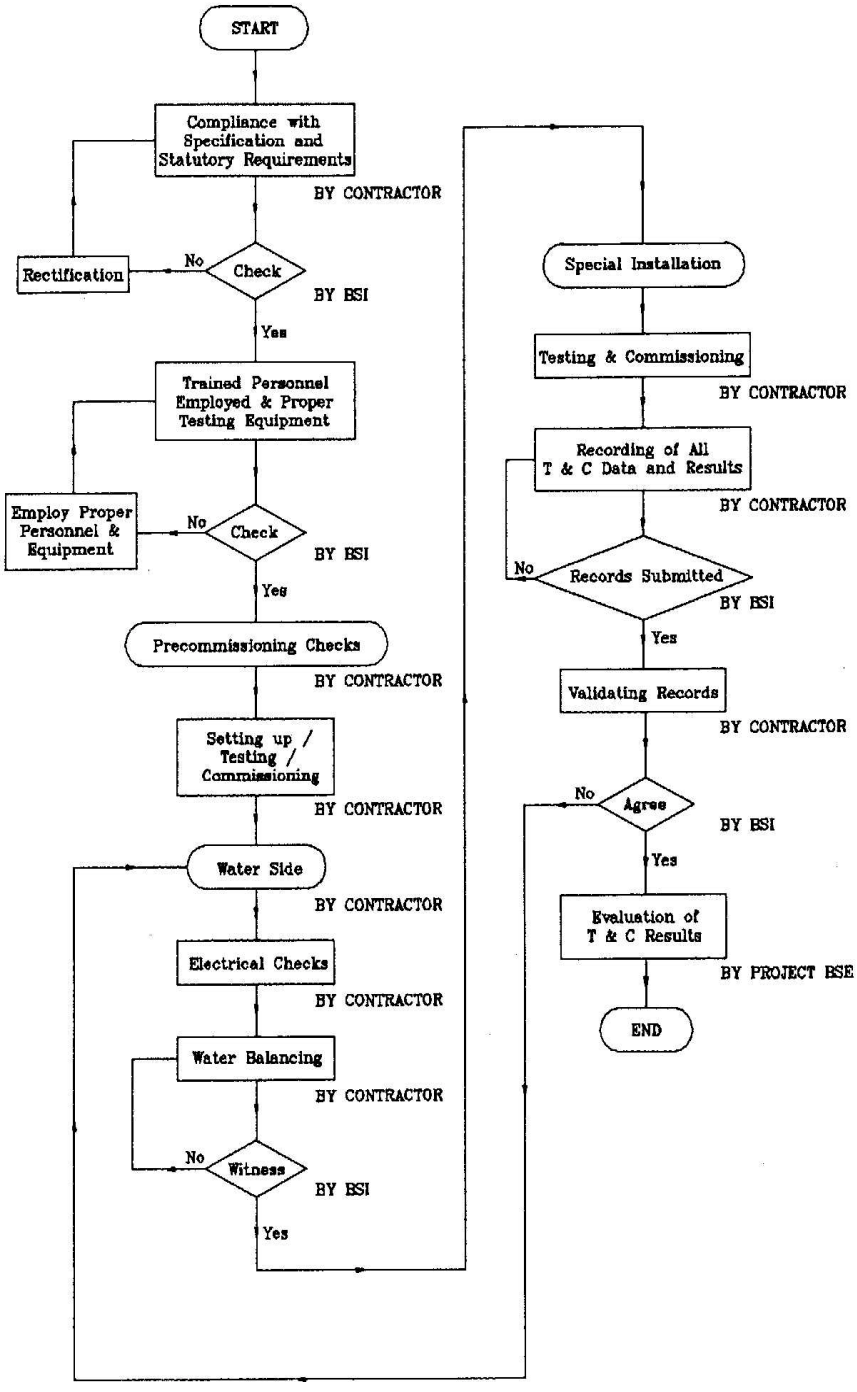
(c) electrical measurement,

(d) verification of performance of all equipment and automatic controls,

(e) sound and vibration measurement.

3.4 Flow Chart

The flow-chart in below provides guidelines for the sequence of T&C of the Swimming Pool Filtration Plant Installation:-



3.5 Pre-commissioning Check

3.5.1 Water Distribution System

Check the following items with reference to the corresponding sections in the "Testing and Commissioning Procedure for Air-conditioning, Refrigeration, Ventilation and Control Systems" :

(a) System Cleanliness

(b) State of System

(c) Check of System before Filling

(d) Mechanical Checks for Pumps, Motorized Valves and Float Switches

(e) System Filling

(f) Electrical Checks With and Without all Electrical Supplies Isolated

3.5.2 Filtration System

Normally for conventional type pool filtration system, filtering of the water is by sand bed filters. For other systems reference should be made to the particular equipment manufacturer's published instructions.

(a) State of System

Check :

(i) that filter beds are set on concrete kerb or slab and are level.

(ii) that the correct grade and depth of sand has been installed against the manufacturer's filter data label.

(iii) that pump strainer basket is in proper position and lid is properly secured after.

(iv) that all inspection doors are properly closed after inspection and that all valves are set in their proper position for initial starting up as detailed in Clause 6.2(a).

3.5.3 Air Distribution System

(a) System Cleanliness

Check the following items with reference to the corresponding sections in the "Testing and Commissioning Procedure for Air-conditioning, Refrigeration, Ventilation and Control Systems" :-

(b) Air Regulating Devices And Other Components Within Airways

(c) Visual Checks for Air Tightness

(d) Mechanical Checks on Fans

(e) Electrical Checks With and Without all Electrical Supplies Isolated

3.6 Setting to Work & Balancing

3.6.1 Water Distribution System

(a) General

It is not possible to embody every type of plant and piping layout, pool water flow patterns usually found in swimming pool installations. The procedure given here may have to be adapted to suit the particular arrangement.

(b) Procedure

The procedures to be carried out in order to achieve a water distribution system working satisfactorily and regulated appropriately should be referred to the relevant and appropriate sections in the "Testing and Commissioning Procedure for Air-conditioning, Refrigeration, Ventilation and Control Systems", such as :

(c) Checks Prior to Pump Start-Up

(d) Initial Starting and Running of Electrically Driven Centrifugal Pump Set

(e) Regulation of Water Flow

(i) Initial Check of System Flow Rates

(ii) Final Regulation

(f) Other Regulating Valves

3.6.2 Filtration System

(a) Initial Starting-up

After the water has been filled to the correct pool level and that all mechanical and electrical checks on the circulating pumps are completed to satisfaction, initial starting up of the filter beds could then commence.

(i) Set the corresponding valves in "filter" positions.

(ii) Switch on the circulation pump and run for approximately five minutes.

N.B. During this filtering cycle some remnant construction debris and pipe dirt will be carried and directed into the top of the filter and are then trapped in the filter. The pressure across the filter bed as reflected in the differential pressure gauge provided will increase.

(iii) After the prescribed time lapse, turn off the pump and set all the necessary values to "backwash" position.

(iv) Run the backwash pump and air compressor and backwash for 6 to 8 minutes or until the water appears clean through the sight glass. The air supply must be kept at the manufacturer's recommended value and should not be exceeded.

(v) After "backwash" process is completed, turn off the pump and reset all necessary valves to their "filter" position for normal operation.

3.6.3 Gas Chlorination System

(a) There are several different systems for water treatment, e.g. ozone, ultra violet radiation, sodium hypochlorite and gas chlorination. By far the gas chlorination system is comparatively the cheapest and is commonly found in swimming pool projects.

This procedure will then concentrate on the gas chlorination system.

(b) Checks Prior to Start-up

(i) Check visually that all pipeworks are intact and that all other relevant fire services requirements of the chlorine gas store room and chlorinator room are complied with.

(ii) Check that measuring weights are provided for each chlorine gas bottle and that the bottles are properly connected to the gas manifold.

(iii) Check that the chlorine solution feed pump was commissioned previously and working satisfactorily according to manufacturer's recommended procedure.

(iv) Visually check that all sensing cables and solution feedlines are properly connected and in their correct place according to the approved shop drawings.

(v) Ensure that the electrical supply to the electronic chlorine & pH level control unit is connected properly and that the control unit had been factory calibrated.

(vi) Repeat procedures (iii) to (v) for the soda solution feedline.

(vii) Set the controller free chlorine level dial reading to between 1.0 and 4.0 p.p.m. for breakpoint chlorination condition and from 0.3 to 0.6 p.p.m. for minimum combined residual level.

(viii) Turn on the gas manifold, switch on supply to level controller and injection pump.

(ix) Switch on the soda solution injection pump and set the control knob of the pH controller to the proper level.

(x) After some time, periodically take water samples at water outlet positions and test with the specified water quality testing kit to ensure that the proper residual chlorine and pH levels are maintained.

3.6.4 Hot Water Boiler & Calorifier System

Testing and commissioning of hot water boilers and calorifiers shall follow the established procedures of recognized authorities which shall be submitted by the installing Contractor for the approval and agreement of the PBSE.

3.6.5 Portable Pool Cleaning Equipment

These equipment are loose items usually to be ordered and specified in the Contract Specification. Visual check on the correctness of the equipment offered and simple performance check against the equipment descriptive brochure will suffice.

3.6.6 Performance Tests

After the system has been commissioned, its performance shall be observed and checked under normal conditions, both winter and summer while making all required adjustments to automatic controls, until all performance requirements are met.

3.6.7 Noise & Sound Tests

For these tests, refer to the "Testing and Commissioning Procedure for Air-conditioning, Refrigeration, Ventilation and Control Systems".

3.6.8 Vibration Tests

For these tests, refer to the "Testing and Commissioning Procedure for Air-conditioning, Refrigeration, Ventilation and Control Systems".

4. Statutory Inspection/Commissioning

4.1 After the proper testing and commissioning of the Swimming Pool Filtration Plant installation, the Contractor shall notify the appropriate Authority, through the PBSE, on the completion of the installation and its readiness for inspection and testing.

5. Calibrated Equipment

5.1 The contractor shall supply calibrated equipment as stipulated in the Specification of the Contract for the inspection, measuring and testing of the installation. The equipment shall be calibrated by laboratories accredited by the Hong Kong Laboratory Accreditation Scheme (HKLAS) or other recognised accredited laboratories.

5.2 A list of equipment proposed to be used for T & C must be provided prior to commissioning the work. All equipment that require periodic calibration shall have this carried out before the work is commenced and data sheets on such test instrument indicating the manufacturer's name, model number, latest date of calibration and correction factors shall be submitted to the PBSE for approval. If any item requires re-checking its accuracy because of the time that has elapsed since the previous calibration, this shall be carried out prior to commencing the work.

5.3 The suggested minimum instruments & accessories necessary to carry out the objectives are:

(a) Combination inclined and vertical manometer 0-2000 Pa (0/10 in. of water) is generally the most useful.

(b) Pitot tubes (usually 450-mm (18-in.) and 1200-mm (48-in.) long tube cover most balancing requirements).

(c) A tachometer, which should be the high quality, direct contact, self-timing type.

(d) Clamp-on ampere meter with voltage scales.

(e) Dial and glass stem thermometers.

(f) Pressure gauges (Manifold & Single).

(g) Water pH value colour testing kits.

(h) Chlorine gas leakage detector.

Testing and Commissioning Certificate on Swimming Pool Filtration Plant Installation

Part 1 : Details of Project

1.1 Project title (with location) :

1.2 * P.W.P. / Project No. :

1.3 *Contract/sub-contract/Quotation No. :

1.4 * Contractor/Sub-contractor :

1.5 PBSE :

1.6 PBSI :

Part 2 : Declaration

2.1 I certify that the Swimming Pool Filtration Plant Installation as specified in the Contract/Sub-contract/Quotation at the above location has been inspected, tested and commissioned in accordance with this procedure and/or any other procedures agreed between the PBSE and the Contractor. The results are satisfactory in the aspects as mentioned in Part 3 and/or as recorded in Part 4 of this Certificate, except as indicated in the COMMENTS items.

2.2 I also certify that site tests have been performed in accordance with the requirements set out in Appendix A of this procedure and that the results are satisfactory. A record of the tests has been prepared and submitted to the PBSE.

Signature of Contractor‘s Representative _____

Full Name of Contractor‘s Representative _____

Designation of Contractor‘s Representative _____

Name and Stamp of Contractor _____

Date _____

Note : This certificate must be signed by a person authorized by the Firm/Company.
* Delete if not applicable

		Items tested checked by Contractor	Items witnessed by PBSE/PBSI
Part 3.	**Items Inspected and Tested**		
3.1	General Requirement as indicated in the T&C procedure have been complied	*Yes/No	*Yes/No
3.2	Pre-commissioning Checks		
3.2.1	Water Distribution System		
3.2.1.1	The system has been properly cleaned, flushed and filled with water.	*Yes/No	*Yes/No
3.2.1.2	The equipment associated with the system has undergone the mechanical and electrical checks and the results are satisfactory.	*Yes/No	*Yes/No
3.2.2	Filtration System		
3.2.2.1	The filter beds have been properly installed and are level.	*Yes/No	*Yes/No
3.2.2.2	Correct grade and depth of sand has been installed with the manufacturer's recommendation.	*Yes/No	*Yes/No
3.2.2.3	The pump strainer basket has been properly closed and the lid secured.	*Yes/No	*Yes/No
3.2.2.4	All inspection doors have been properly closed and all valves have been set in their proper positions.	*Yes/No	*Yes/No
3.3	Setting to Work & Balancing		
3.3.1	Water Distribution System		
3.3.1.1	The water pumps have been commissioned in accordance with this procedure and the pumps are operating satisfactorily.	*Yes/No	*Yes/No
3.3.1.2	The water flow rates of the system have been regulated and balanced in accordance with this procedure. The results satisfy the specified the requirements.	*Yes/No	*Yes/No
3.3.2	Filtration		
3.3.2.1	The water pumps have been commissioned in accordance with this procedure and the pumps are operating satisfactorily.	*Yes/No	*Yes/No

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

		Items tested checked by Contractor	Items witnessed by PBSE/PBSI
3.3.2.2	The water pumps have been commissioned in accordance with this procedure and the pumps are operating satisfactorily.	*Yes/No	*Yes/No
3.3.3	Gas Chlorination System		
3.3.3.1	All pipe work have been checked and are found intact.	*Yes/No	*Yes/No
3.3.3.2	The relevant fire services requirements for the chlorine gas store room and chlorinator room have been complied with.	*Yes/No	*Yes/No
3.3.3.3	Measuring weights have been provided for chlorine gas bottles/drums and the bottle/drums have been properly connected to the manifold.	*Yes/No	*Yes/No
3.3.3.4	The chlorine solution feed pump has been commissioned according to manufacturer's recommendation and are working satisfactorily.	*Yes/No	*Yes/No
3.3.3.5	The water pumps have been commissioned in accordance with this procedure and the pumps are operating satisfactorily.	*Yes/No	*Yes/No
3.3.3.6	The electronic chlorine and pH level control unit have been properly installed and calibrated.	*Yes/No	*Yes/No
3.3.3.7	The soda solution feedlines have been properly commissioned as for the chlorine solution feedlines.	*Yes/No	*Yes/No
3.3.3.8	The controller has been set for proper levels for breakpoint chlorination condition and for minimum combined residual level.	*Yes/No	*Yes/No
3.3.3.9	The pH level controller has been set for appropriate level.	*Yes/No	*Yes/No
3.3.3.10	The chemical dosing plants have been switched on and are operating satisfactorily.	*Yes/No	*Yes/No
3.3.3.11	The pool water has been tested for proper residual chlorine level and pH level.	*Yes/No	*Yes/No
3.3.4	Ozonation System		
3.3.4.1	Fuses are correct value.	*Yes/No	*Yes/No
3.3.4.2	Locking mechanism for circulation pump and the booster have been carried out.	*Yes/No	*Yes/No

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

		Items tested checked by Contractor	Items witnessed by PBSE/PBSI
3.3.4.3	Functional check of the thermal switch for the air control has been tested.	*Yes/No	*Yes/No
3.3.4.4	Functional check of the working hour meter and vacuum control have been carried out.	*Yes/No	*Yes/No
3.3.4.5	Functional check of cooling water lack has been carried out.	*Yes/No	*Yes/No
3.3.4.6	Functional check on Ozone generation fault has been carried out.	*Yes/No	*Yes/No
3.3.4.7	Setting and functional check of the hour timer for the adsorption period carried out.	*Yes/No	*Yes/No
3.3.4.8	Functional check of the cooling air ventilators for the absorber has been carried out.	*Yes/No	*Yes/No
3.3.4.9	Setting and functional check of the heating thermostat has been carried out.	*Yes/No	*Yes/No
3.3.4.10	Setting and functional check of the regeneration period control has been carried out.	*Yes/No	*Yes/No
3.3.4.11	The setting of the regeneration limitation thermostats has been properly set.	*Yes/No	*Yes/No
3.3.4.12	The door contacts has been functioning properly.	*Yes/No	*Yes/No
3.3.4.13	The overload protection of the regeneration fan performed satisfactorily.	*Yes/No	*Yes/No
3.3.4.14	The overload protection of the high tension transformer performed satisfactorily.	*Yes/No	*Yes/No
3.3.4.15	The overheat protection of the ozone generator is operating satisfactorily.	*Yes/No	*Yes/No
3.3.5	Hot Water Boiler & Calorifier System		
3.3.5.1	The hot water boiler and calorifier system have been commissioned and tested.	*Yes/No	*Yes/No

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

		Items tested checked by Contractor	Items witnessed by PBSE/PBSI
3.3.6	Pool Cleaning Equipment		
3.3.6.1	The pool cleaning equipment as specified has been provided and the performance of these equipment have been checked.	*Yes/No	*Yes/No
3.3.6.2	Other associated facilities required for the operation of these equipment have been provided.	*Yes/No	*Yes/No
3.4	Performance Tests		
3.4.1	A full-load performance test has been carried out. The results are satisfactory.	*Yes/No/N.A.	*Yes/No/N.A.
3.4.2	A full-load performance test has NOT been carried out but it will be carried out during the maintenance period.	*Yes/No/N.A.	*Yes/No/N.A.
3.5	Record of Tests		
	A record of tests as indicated in Appendix A Part 4 of this procedure has been completed and submitted to the PBSE.	*Yes/No	*Yes/No

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

		Items tested checked by Contractor	Items witnessed by PBSE/PBSI
3.6	Comments	*Yes/No/N.A.	*Yes/No/N.A.

Note: * Delete if not applicable

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

Part 4 : Test Record attached to the Test Certificate

4.1 Test Data

4.1.1 Plant performance can be substantiated only when the test data has been recorded and validated against the design data. Proforma for recording such data can be found in the succeeding pages and these should be properly filled in before submission to the Designers with any relevant comments related to site conditions.

4.1.2 Water Distribution System

4.1.2.1 Pumps

Location	No.	Design	Test
Volume	(1/s)		
No Flow Head	(kPa)		
Full Flow Discharge Head	(kPa)		
Full Flow Suction Pressure	(kPa)		
Full Flow Differential	(kPa)		
Motor Type			
Motor Speed	(rev/s)		
Motor Full-load Current	(amperes & volt)		

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

4.1.2.2 Filter Beds (Sand)

Location	No.	Design	Test
Filter Area	(m^2)		
Entering Water Pressure	(kPa)		
Leaving Water Pressure	(kPa)		
Differential Pressure	(kPa)		
Water Quantity	($1/m^2$)		

4.1.2.3 Water Distribution in Pipeworks

Use the water schematics diagram indicating the design figures for flow rate, measure and temperature and insert the test figures in brackets.

4.1.3 Gas Chlorinators

Location	No.	Design	Test
Manufacturer			
Model			
Type			
Gas Feed Rate	(1/s)		

4.1.4 Chemical Metering Pumps

Location	No.	Design	Test
Fluid Handling			
Manufacturer			
Model/Type			
Feed Rate	(1/s)		
Automatic Timer Setting			

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

4.1.5 Water Quality

Location of water samples taken :

Manufacturer/model no. of temperature sensor :

Manufacturer name & model no. of testing kit used :

Time and the date of		pH value		Residual Chlorine Leave (ppm)	
Measurement Taken	water temperature	design	test	design	test

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

4.2 Testing Equipment

Type	Model	Serial No. of Instrument	Date of Calibration

Tested / Checked by _____ Signature _____
(Name of Contractor's Representative)

Witnessed by _____ Signature(s) _____
(Name(s) of *PBSE/*PBSI)

Testing and commissioning progress chart
"Swimming Pool Filtration Plant Installation"

Contract No. : _____

Contract Title : _____

Name of Contractor/sub-contractor : _____

Contract Period : / /20 to / /20 * Revised/Actual Completion Date : / /20

	Testing and Commissioning Progress Chart for Swimming Pool Filtration Plant Installation (Rev.)(1)																		
	Dates (2)																		Remark
	Activities	Refer to T&C Procedure	S	A	S	A	S	A	S	A	S	A	S	A	S	A	S	A	
1.	Filtration System Activities																		
1.1	Cleanliness & State Check	P.S.(3)																	
1.2	Mechanical Check	Section 3.6.2 – (a)																	
1.3	Electrical Check	Ditto																	
1.4	Check of Filter bed																		
1.4.1	Check of filter bed properly installed	Section 3.5.2 – (a) (i)																	
1.4.2	Check of Correct Grade and depth of sand properly installed	Section 3.5.2 – (a) (ii)																	
1.4.3	Check pump strainer basket properly installed and lid secured	Section 3.5.2 – (a) (iii)																	
1.4.4	Filtration media included	P.S.																	
1.4.5	Backwashing of filter bed	Section 3.6.2 – (i) to (v)																	
1.4.6	Pressure test of welding of pipe	Section 2.6 - (b)																	
1.4.7	Pressure test of filter	P.S.																	
	Submission of Record of Test																		

Testing and Commissioning Progress Chart
"Swimming Pool Filtration Plant Installation"

	Testing and Commissioning Progress Chart for Swimming Pool Filtration Plant Installation (Rev.)(1)																		
		Dates (2)																	Remark
	Activities	Refer to T&C Procedure	S	A	S	A	S	A	S	A	S	A	S	A	S	A	S	A	
2.	Chemical Treatment Activities																		
2.1	General Check																		
2.1.1	Cleanliness & State Check	P.S.																	
2.1.2	Mechanical Check	Ditto																	
2.1.3	Electrical Check	Section 3.6.3 – (b) (iv) & (v)																	
2.1.4	Check of compliance of fire services requirements	P.S.																	
2.1.5.	Check of Pipe work are properly connected and intact	Ditto																	
2.2	Chlorination																		
2.2.1	Measuring weight provided for chlorine gas bottles/drums which are properly connected	Section 3.6.3 – (b) (ii)																	
2.2.2	Commissioning of feed pump	Section 3.6.3 – (b) (iii)																	
2.3	Ozonation																		
2.3.1	Measuring weight provided for chlorine gas bottles/drums which are properly connected	P.S.																	
2.3.2	Commissioning of feed pump	Ditto																	
2.4	Water Sampling																		
2.4.1	Taking water sampling periodically	Section 3.6.3 – (b) (x)																	
2.4.2	Testing on water sample for proper residual chlorine / ozone are maintained	Ditto																	

Testing and Commissioning Progress Chart
“Swimming Pool Filtration Plant Installation”

	Testing and Commissioning Progress Chart for Swimming Pool Filtration Plant Installation (Rev.)(1)																				
	Dates (2)																				Remark
	Activities	Refer to T&C Procedure	S	A	S	A	S	A	S	A	S	A	S	A	S	A	S	A	S	A	
2.5	Noise & Sound Check	Section 3.6.7																			
2.6	Vibration Check	Section 3.6.8																			
	Submission of Record of Test																				

Testing and Commissioning Progress Chart
"Swimming Pool Filtration Plant Installation"

	Testing and Commissioning Progress Chart for Swimming Pool Filtration Plant Installation (Rev.)(1)																		
		Dates (2)																	Remark
	Activities	Refer to T&C Procedure	S	A	S	A	S	A	S	A	S	A	S	A	S	A	S	A	
3.	Water Distribution System Activities																		
3.1	Cleanliness & State Check	Section 3.5.1 – (a)																	
3.2	Mechanical Check	Section 3.5.1 – (d)																	
3.3	Check of System before Filing	Section 3.5.1 – (c)																	
3.4	Electrical check	Section 3.5.1 – (f)																	
3.4.1	Electrical Supplies Isolated	Ditto																	
3.4.2	Electrical Supplies Available	Ditto																	
3.5	Initial Running of Pump Set	Section 3.6.1 – (d)																	
3.5.1	Pump Discharge Rate	P.S.(3)																	
3.5.2	Pump Suction Pressure	Ditto																	
3.5.3	Pump Discharge Pressure	Ditto																	
3.5.4	Pump Motor Speed	Ditto																	
3.5.5	Pump Motor Current	Ditto																	
3.5.6	Supply Voltage	Ditto																	
3.5.7	Non-return Valve Operation	Ditto																	
3.5.8	Isolation Valve Operation	Ditto																	
3.5.9	Flexible Joint	Ditto																	
	Submission of Record of Test																		

Testing and Commissioning Progress Chart
"Swimming Pool Filtration Plant Installation"

	Testing and Commissioning Progress Chart for Swimming Pool Filtration Plant Installation (Rev.)(1)																		
	Dates (2)																		Remark
	Activities	Refer to T&C Procedure	S	A	S	A	S	A	S	A	S	A	S	A	S	A	S	A	
4.	Air Distribution System Activities																		
4.1	Cleanliness & State Check	Section 3.5.3 – (a)																	
4.2	System Components Check	Section 3.5.3 – (b)																	
4.3	Visual Check	Section 3.5.3 – (c)																	
4.4	Mechanical Check	Section 3.5.3 – (d)																	
4.5	Electrical Check	Section 3.5.3 - (e)																	
4.6	Submission of Record of Test																		
5.	Submission of T&C Certificate																		

Notes

* Delete if not applicable

(1) Insert revision no.

(2) Insert additional columns as necessary
S - schedule % completion
A - actual % completion

(3) Particular Specification