Design Summary
102LS Tsuen Wan Swimming Pool Complex

Swimming Pool Complex

Two separate buildings of five storeys with a GFA of 12,000 sq.m plus three swimming pools namely

❶ Indoor Heated Pool
- Standard+diving pool to FINA competition standard
- mechanical movable floor + pool divider (Submersible Boom)
- pool depth varies from 2m to 5.6m
- 1000 seat spectator stand + a curved roofing integrated with E&M services design

❷ Outdoor Leisure Pool
- training pool + children paddling pool

❸ Teaching Pool

Contract period : Construction commenced in Nov.,94 and re-entry in April, 97
Completion contract resumed in Sept., 97 and project substantially completed in October,98

Filtration Plants

Filtration plant located at the basement with an area of 2,900 sq.m approximately with an extended pipe tunnel surrounding the main pool. Each of the three pools are served with independent filtration system which includes the following process

Process:
1. Sand Filter
2. Primary Disinfection - Ozonator .
3. Reaction Tanks (2 min.) .
4. Deozonisation (Carbon filter - 1.5 min.)
5. Secondary Disinfection - Sodium Hypochlorite (NaOCl)/Residual free chlorine 0.6ppm(0.55-0.65)→1ppm w/o O_3
6. Acid Dosing - pH control 7.3 (range 7.2-7.4)
7. Heat exchangers (For main pool only)

Main Equipment/key parameters:

	Main Pool	**Leisure Pool**	**Teaching Pool**	**Remarks**
Pool Volume	4750 cu.m	900 cu.m	270 cu.m	
Turnover Rate	4 hours	1.5 hours	2 hours	
Circulation Rate	1188 cu.m/hr.	600 cu.m/hr.	135 cu.m/hr.	
Circulation Pumps **(cu.m/hr. x no.)**	238 cu.m/hr. x 6	150 cu.m/hr. x 5	68 cu.m/hr. x 3	
Sand filter	dia.2.5x8Lx5 19.8 mý	dia.2.5x6Lx4 12.5 mý	dia.2.3x2.3Hx2 5.7 mý	12-16 m/hr/filter area
Ozonator	690 g/hr x2	410 g/hr x2	130 g/hr x2	1 ppm / 1.15 ppm(mainP) (max 1.2ppm)
Reaction Tank	dia.2.8x8Lx1 39.6 cu.m	dia.2.8x4.5Lx1 20 cu.m	dia.2.8x2Hx1 4.5 cu.m	Rx Time = 2 min.
Carbon Filter	dia.2.8x9Lx2 18.8 cu.m	dia.2.8x5Lx2 9.9 cu.m	dia.2.8x2Hx2 4.5 cu.m	Absorption Time 1.5 min.
Air Compressor	1350 cu.m/hr. x 2	750 cu.m/hr. x 2	345 cu.m/hr. x 2	Backwash:50m/hr/filter area sand filter - 7 min. carbon filter - 5 min
NaOCl Generator	Chlorine production Rate 5 kg/hr x 2			

Electrical

Rating of Main & Submain System :

Transformer	:	1500 kVA x 2 nos.
Standby Generator	:	250 kVA
General Lighting & Power	:	400 kVA
HVAC	:	1000 kVA
Filtration Plant & Hot Water Boiler	:	1250 kVA

Other Electrical/Electronic Installation :

Scoreboard
Timing System
Underwater Sound System
Electric window and blind

HVAC

Capacity of Various Plants

Chillers	355 kW x 2	→	❶710 kW	⎫ ❶cooling capacity =1250 kW
	180 kW x 3	→	❶540 kW	⎭
⎧ Heat Pumps ⎨ ⎩	213 kW x 3 = 640 kW	Â→	❷440 kW	-❷Space Heating = 440 kW
		³ À→	❸200 kW	⎫
Solar Panels	2 mý x 168 nos.	→	❸total area :330mý	⎬ ❸Pool Heating = 800 kW + 330mý
Electric Boilers	300 kW x 2	→	❸600 kW	⎭

Brief Description on Heating and A/C systems

- Refrigeration plants with 2 air cooled chillers and 3 heat recovery chillers located at the roof floor of the outdoor pool building.
- All solar panels placed on a special suspended steel frame structure with an area of 14 m x 48 m approximately at the indoor pool building.
- Other equipment associated with the solar system, electric boiler and the heat exchangers located in the basement plant room.
- The indoor swimming pool together with the spectator stand during competition events in summer attributes to the major cooling load demand of the refrigeration plant (chillers + heat pumps) among the other area in the indoor pool & outdoor pool complex. At the same time, reheat at air handling units (provided by heat pumps) are always required for dehumidification of swimming pool hall so as to prevent condensation on glazing/mullions and to maintain a comfort condition for the swimmers.
- In winter time, the indoor pool will still be opened for the public. The pool water temperature would be maintained at a range of 26°C to 28°C via the three heat exchangers at the discretion of the operator.
- There are three sources for pool heating ; namely, ❶ Electric Boilers ; ❷ Solar Panels ; and ❸ The surplus recovered by the heat pumps after the demand on space heating is satisfied.
- The pool temperature is basically maintained by solar panels and heat pumps only in the normal operation whereas the electric boilers act as booster during the initial stage of operation and act as standby provision to the heat pumps and solar panel as well.

Mechanical Movable Floor & Pool Divider

- Operates on Archimedes' principle - A body submerged in fluid, exerts a upward force = weight of fluid being displaced.
- Moved down by means of tensioned stainless steel cables, running thro' pulleys at pool bottom/pool deck to hydraulic actuators at pipe tunnel.
- Submersible boom - two separated sections for recreational/diving activities
- Submersible boom - stainless steel frame + GRP outer skin + buoyancy secured by PU foam block in GRP laminate / access via. removable grill by certified divers.
- lane rope 3kN to 5 kN
- Tandem floor - Bearing capacity 65kg/mý , ~ 540 adults/half pool (25mx25m)

- Tandem floor - roller guide, two boom sections, extremities raised approx. 1m above water for cleaning.